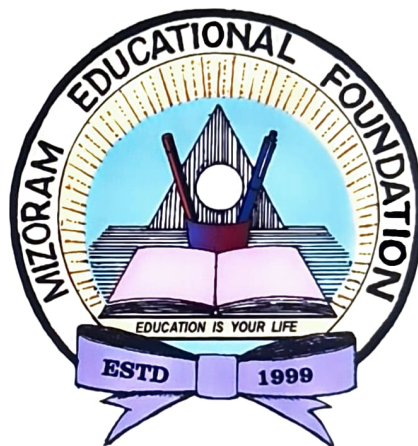


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Environmental Education on Deforestation

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Abstract

The escalating interest in environmental preservation among humanity has underscored the realization that indiscriminate and imprudent deforestation may precipitate a catastrophe with not only ecological ramifications, but also economic and social consequences. Deforestation has been molding global climatic conditions detrimentally and has emerged as a significant environmental threat at both global and regional levels. Despite advancements in education, information dissemination, and overall awareness regarding the significance of forests, deforestation rates have not diminished substantially. This is because communities and individuals continue to devastate forest lands for personal profit and subsistence agriculture, leading to profound alterations in the atmosphere and environment. This paper presents a summary of the causes of deforestation and an analysis of the frequency of fire occurrences and the areas affected by fire in Mizoram over a period of 20 years. The study employs descriptive statistics to elucidate these trends. In response to the pervasive global deforestation patterns, initiatives such as Environmental Education (EE) have been introduced to help alleviate these pressing issues.

Keywords: *Frequency of Forest fire, Area affected by fire, Descriptive statistics.*

Introduction

Forests serve a multitude of functions that can be broadly categorized into three primary groups: protective functions, productive functions, and accessory functions (Trivedi, 2004). Forests cater to the needs of local and indigenous populations, while also preventing rapid evaporation of water from the land and helping to maintain stable temperature levels. Most importantly, forests constitute a critical component of the natural environment. They provide habitats for the Earth's wildlife and contain a plethora of natural resources, including medicinal herbs and plants. Additionally, forests play a vital role in regulating life cycles on the planet

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(Poddar, Mukherjee, & Nandy, 2011). As population growth continues and demands for land increase, along with the expansion of development and the adoption of new technologies, deforestation has emerged as a global concern. Regardless of the underlying causes, deforestation has severe consequences upon the quality of life.

Trees contribute greatly to human existence by converting hazardous carbon dioxide into breathable oxygen. Not only does deforestation impact this natural process, but the burning of trees common in deforestation releases large amounts of carbon dioxide into the atmosphere, adding to the greenhouse gas effect and possibly impacting global warming.

Deforestation is considered to be one of the contributing factors to global climate change. The problem caused by deforestation is the impact on the global carbon cycle. Gas molecules that absorb thermal infrared radiation are called greenhouse gases. If greenhouse gases are in large enough quantity, they can force climate change. Amongst the GHGs, CO₂ emissions from shifting cultivation contribute the maximum with 2620.27 Mg. The level of emission of other GHGs are comparatively low to that of CO₂; however, they contribute to a major share in warming the atmosphere owing to their higher values of global warming potential (Sahoo, Singh and Prasad, 2018).

Objectives: The current study aims to examine the environmental degradation caused by deforestation in Mizoram through a review of various reports, while also proposing mitigation measures.

1. To assess the extent of forest fires and the area affected by fire in Mizoram.
2. To disseminate pertinent information regarding Environmental Education knowledge to young individuals and children.
3. To offer valuable insights to state governments, Environmental Education policymakers, non-governmental organizations (NGOs), and various stakeholders in addressing deforestation through the implementation of Environmental Education strategies.

Methodology

The current study relies entirely on secondary data obtained from various formats provided by the Government of Mizoram. Information on the number of fire occurrences and the total area affected by fire in square kilometers was gathered from the Principal Chief Conservator of Forests (PCCF), Government of Mizoram. Descriptive statistics were utilized for calculations.

Present situation in Mizoram

Among the States and Union Territories of India, Mizoram is highly incomparable with other States in the richness of its forest resources. It is endowed with a moderate climate and a good amount of rainfall has led to the speedy growth of vegetation which reduces the recycling period of the Jhum land. Moreover, it has a large coverage of forest from the total

geographical area (TGA) and often stands among the highest rank at the national level as assessed by the Forest Survey of India. But in the recent decade, Mizoram has lost its forest quality as well as quantity. Negative changes have been experienced up to the last assessment of 2021 since 2009. This can be due to different factors of anthropogenic activities and natural calamities (Vanlaltanpuia, Rao, & Lalrindika, (2022). Therefore, study on forest degradation, its causes and awareness among the mass of the people is a pre-requisite for combating forest degradation. According to the State of Forest Report 2009- 2021, the total loss of forest cover in Mizoram is 1420.49 sq. km. The largest forest cover loss was detected between the years 2015 and 2017 as 562 km². The latest State of Forest Report (2021) reveals that 186 sq. km of forest cover was decreased from the previous assessment in the year 2019.

Forest fires are a prevalent phenomenon in Mizoram, typically occurring during the dry season between February and April. The majority of these fires result from traditional cultivation methods for agricultural purposes. On average, 164 instances of fire occurred in the state, and 44 square kilometers were affected by forest fires between 2000 and 2021. The regression trend line indicates that the Area Affected by Fire (ARF) is declining, while the Frequency of Fire Occurrences (FFO) is increasing. The low R-squared values for both ARF and FFO suggest that human behavior is more difficult to predict than physical processes.

In 2010, the largest area affected by fire was recorded, covering 301.84 square kilometers. In contrast, 2003 witnessed the lowest number of fire occurrences (13) and the smallest area affected by fire (1.68 square kilometers). Both skewness and kurtosis are positive, displaying a leptokurtic distribution with a broader, flatter shape and fatter tails, indicating a tendency for the frequency of fire occurrences and area affected by fire to be above the mean.

The standard error of frequency of fire occurrences demonstrates that the values within the dataset are generally close to the mean. However, the higher standard deviation indicates a substantial variation in the data, ranging from 7 to 1277. Similarly, the standard error, standard deviation, kurtosis, and skewness for the area affected by fire display positive values, signifying that the values tend to cluster near the mean.

Table-1

	Frequency of Fire Occurrences	Area effected by Fire (Sq/km)
Mean	164.65	44.356
Standard Error	61.04878442	17.40553081
Median	93	12.095
Mode	13	#N/A
Standard Deviation	273.0184638	77.83990016
Sample Variance	74539.08158	6059.050057
Kurtosis	16.40166939	6.120986844
Skewness	3.904082647	2.512271486
Range	1270	300.16

Minimum	7	1.68
Maximum	1277	301.84
Sum	3293	887.12
Count	20	20
Confidence Level(95.0%)	127.776574	36.43019459

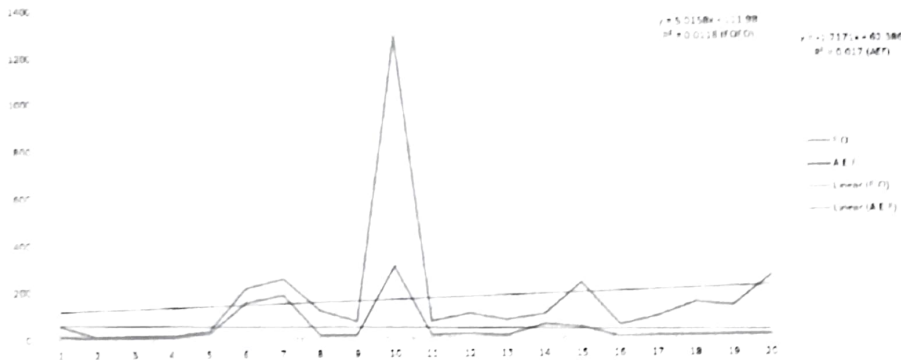


Figure-

Discussion:

Implementing educational campaigns is of paramount importance in combating deforestation through raising awareness. Such campaigns serve as an exemplary means of promoting knowledge about deforestation by educating individuals about the significance of trees and forests. The development of environmental stewardship does not occur overnight; rather, it necessitates awareness from an early age. The concepts of understanding and maintaining the environment and ecological balance should be integrated and promoted through school curricula and activities. In numerous countries, environmental education has emerged as a novel aspect of the educational curriculum, aiming to foster and encourage positive attitudes towards the environment, particularly among young people.

In developing countries, hill areas continue the practice of shifting cultivation, as it is the primary option provided by their environment. Due to the undulating and hilly terrain of these regions, alternative cultivation methods are not as feasible as they are in plain farming areas found in other parts of the region. This situation is evident in the state of Mizoram, which boasts rich flora and fauna, including numerous rare and endemic species of plants and animals. The forests in the state are managed through a three-tier system, comprising state ownership and control, district councils, and village councils.

Forest fires are a common occurrence in Mizoram, typically happening during the dry season from February to April. The majority of these fires result from traditional agricultural practices. On average, 44.35 square kilometers of land are affected by forest fires, with 164.45 incidents occurring annually between 2001 and 2020. According to the latest State of Forest Report (2021), very dense forest class covers less than 1% (157 km²) of the total geographical area, while moderately dense forest constitutes approximately 27.11% (5715 km²).

Mizoram has been classified into five forest fire-prone zones: Extremely Fire Prone Zone (covering 26.28% of the total geographical area), Very Highly Fire Prone Zone (49.73%), Highly Fire Prone Zone (18.91%), Moderate Fire Prone Zone (3.05%), and Less Fire Prone Zone (2.03%). From 2001 to 2021, Mizoram lost 274k hectares of tree cover, equivalent to a 14% decrease since 2000, and 136 Mt of CO₂ emissions (Global Forest Watch, 2021). Carbon is not the only greenhouse gas affected by deforestation; water vapor is also considered a greenhouse gas. Deforestation has led to reduced vapor flows from the land, and even this minor change can disrupt natural weather patterns and alter current climate models.

Conclusion

The urgent need to preserve our environment, conserve natural resources, and utilize them responsibly cannot be overstated. For sustainable development and to prevent the exploitation of natural resources, individuals must be educated about environmental protection and preservation. It is crucial to view the Earth as a habitat not only for the present but also for the distant future, ensuring space and resources for every living being. Our fundamental responsibility lies in the protection and safeguarding of our environmental heritage, making environmental literacy essential.

Teachers play a vital role in educating and training students on the importance of environmental protection and conservation, instilling environmental awareness and a sense of responsibility. To enable teachers to successfully promote environmental awareness, educational institutions must provide conducive conditions. This support allows teachers to contribute to the development of educational plans focused on environmental awareness and integrate indigenous knowledge into the formal education system.

Additionally, a significant portion of the population is illiterate, having been denied access to formal education. Such individuals are often unable to recognize environmental imbalances, but they continue to use natural resources without consideration for preservation. This diverse and dispersed group, including forest inhabitants, the poor, and villagers, possess strong sense of community. Their environmental education must be locally specific, enabling them to become environmentally friendly and coexist harmoniously with their surroundings.

By educating people on the importance of the environment and sustainable logging practices, deforestation rates may begin to decline. Understanding the positive and negative ways humans interact with ecosystems and the advantages of utilizing renewable energy sources can significantly impact future generations. These generations believe that citizens have a collective responsibility to collaborate, use their voices, and protect the planet. They are motivated to acquire new knowledge and stay informed. As such, educational programs and campaigns are critical – they raise public awareness, promote critical thinking, and enhance individuals' problem-solving skills.

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