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BUILDING A LEGACY OF ENVIRONMENTAL SUSTAINABILITY FOR FUTURE GENERATIONS

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Original Article

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Abstract

The article primarily focuses on how environmental sustainability will benefit future generations. As the saying goes, "The earth does not belong to anyone; rather, humanity belongs to the earth." In daily life, we frequently read news articles highlighting the negative impact of human actions on nature, such as deforestation and inadequate water storage for future needs. In the 21st century, humanity faces numerous challenges in safeguarding ecological balance for future generations. Sustainability involves coexisting with the earth for the long term, making it crucial to preserve our planet for future generations. One effective way to support sustainability is through the reduction, reuse, and recycling of waste materials, rather than discarding them. While taking care of the planet may seem like a daunting task, small changes can lead to significant differences. Each generation inherits both a natural and cultural legacy, which the present generation must uphold. However, the extent to which the present generation follows this responsibility varies. Our actions directly influence the environment's response. It is essential to protect the environment by using eco-friendly products, which will, in turn, help preserve the earth. This study primarily focuses on educating people about environmental protection and methods to safeguard the environment. We can preserve our planet by consuming resources responsibly and reducing unnecessary waste. Air, soil, and water should be used and maintained based on necessity. The purpose of this research is to introduce the impact and causes of environmental degradation. It also emphasises the importance of environmental sustainability and the challenges associated with it. Key issues such as deforestation and global warming are explored. The United Nations aims to raise awareness about environmental sustainability, especially as the real estate sector continues to expand. Builders and governments often prioritise short-term gains over long-term preservation for future generations.

Keywords: Deforestation; Environmental Sustainability; Organic Farming; Protecting Environment; Safeguarding Future Generation; Water Conservation

Introduction

Environmental sustainability is one of the most pressing challenges faced by the current generation. With the rising global population, the widespread use of hazardous substances has become a common practice, raising several concerns about the sustainability of the natural resources on our planet. Furthermore, the rapid growth of urbanisation, industrialization, and modern agricultural practices are all contributing significantly to environmental degradation. According to reports from the United Nations, the rate of destruction of both plant and animal species has exceeded 100% compared to earlier periods, with projections suggesting that this rate could increase exponentially in the coming years due to inadequate environmental management. This alarming trend is largely attributed to human practices that prioritise short-term gains while neglecting the long-term well-being of future generations, thus severely undermining the prospects for a sustainable future [1].

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The issue of global warming is particularly concerning, with glaciers melting at rates two to three times faster than in previous years. Despite widespread awareness of how pollution is impacting the earth and its ecosystems, tangible steps to mitigate environmental harm are still insufficient. The overuse of plastic, rubber, and petroleum products is one of the main causes of environmental damage. To protect the environment, these products need to be used less or not at all. Over the past decade or so, as the global population has continued to grow, there has been increased governmental focus on environmental issues, leading to heightened pressure on industries to reduce their use of hazardous materials. However, despite these efforts, the situation remains dire [2].

A particularly concerning issue is the practice of governments and industries claiming forest lands under the guise of development. In their pursuit of progress, little thought is given to the long-term consequences for the environment and the livelihoods of future generations. While development is essential for survival, it is equally crucial to recognise the importance of maintaining the natural balance of our ecosystems. For instance, industries often release harmful emissions into the atmosphere, which contribute to air pollution. To counteract these effects, reforestation and the planting of trees become vital strategies for maintaining air quality, regulating pollution levels, and promoting environmental sustainability. Trees play a crucial role in absorbing carbon dioxide, replenishing oxygen levels, and mitigating the adverse effects of industrialization on the environment.

Recent studies point out the need for urgent action, emphasizing that the choices and actions of the current generation will directly influence the future of upcoming generations. The present generation can greatly enhance the prospects for a more sustainable and livable world for future generations by taking steps to protect and nurture the environment. If humanity takes care of the environment now, it will not only safeguard natural resources but also ensure a better, more sustainable life for generations to come. The responsibility lies with us to make informed decisions today that will create a lasting positive impact on the world. The actions we take, or fail to take, will determine the future state of the planet. Therefore, it is crucial to prioritise sustainability in all aspects of life and work towards a cleaner, greener, and more sustainable world for future generations.

Literature Review

Goodland [3] provided a comprehensive understanding of the concept of environmental sustainability, exploring its core principles and examining the major factors that influence growth within this framework. The paper delves into the various limits and boundaries that exist in the pursuit of environmental sustainability, emphasizing the importance of recognising these constraints in development and conservation efforts. Goodland contends that although the specific approaches to attaining environmental sustainability may differ by country and sector, the overarching objective remains unchanged: to establish a harmonious relationship between human development and the conservation of natural resources. This highlights the universal nature of environmental sustainability, where despite regional differences, the shared objective is the sustainable management of resources for future generations. Goodland's analysis points out the value of understanding these challenges and the need for global cooperation to ensure that sustainability goals are met effectively across diverse contexts.

Morelli [4] presented a detailed analysis of the common perceptions surrounding human activity and its relationship with the environment. The paper aims to clarify how human actions are intrinsically linked to ecological concepts, particularly the idea of interdependence between humans and the natural world. Morelli emphasises that understanding this interconnectedness is crucial for fostering environmental sustainability, as it highlights the need for humans to recognise their roles within the broader ecological system. The paper further explores how this understanding can serve as a guiding principle for achieving sustainable practices. By emphasizing the importance of viewing human activity through the lens of ecological interdependence, Morelli's work seeks to provide a framework for addressing environmental challenges and promoting a more sustainable future. Ultimately, the paper argues that aligning human actions with ecological principles is not only beneficial but also necessary for ensuring long-term environmental sustainability.

Dong and Hauschild [5] discussed how various environmental sustainability targets present unique decision-making challenges. The author argues that different sustainability goals require distinct approaches to address the specific problems associated with them. In the context of sustainability consumption, decision-making must be based on scientifically accurate and reliable information to make well-informed, effective choices. Dong emphasises the importance of utilising evidence-based data to guide decision-making, particularly when dealing with complex environmental issues. The central aim of the author's work is to identify the specific problems associated with different sustainability targets and to provide practical solutions for each one. By focusing on problem identification and solution formulation, Dong's research highlights the critical role that informed decision-making plays in advancing environmental sustainability. The paper calls for more comprehensive approaches to decision-making that incorporate scientific knowledge and a clear understanding of the unique challenges faced by different sustainability targets, ultimately contributing to more sustainable practices and outcomes.

Little et al. [6] aimed to provide a comprehensive explanation of the concept of sustainability, emphasizing its critical importance for ensuring the long-term survival of both humanity and the ecosystems on which humans depend. The author highlights the necessity of adopting sustainable practices to protect the planet's natural resources and ensure that future generations inherit a liveable world. Little's work also delves into the various approaches and methodologies used to assess economic and social sustainability. These assessments are essential for understanding the impact of human activities on the environment and society, and they provide a framework for evaluating the effectiveness of sustainability efforts. By examining both economic and social dimensions, little offers a holistic view of sustainability, suggesting that addressing environmental challenges requires a balanced approach that considers both ecological and human factors. The paper serves as an essential resource for understanding the multidimensional nature of sustainability and the strategies needed to foster long-term well-being for both people and the planet.

Ahmad et al. [7] explored the critical issue of environmental pollution and its direct impact on human survival. The author asserts that environmental pollution has become one of the most significant challenges facing the future, with its harmful effects spreading across ecosystems, impacting humans, animals, and various species. Ahmad emphasises that pollution, in its many forms, has far-reaching consequences for biodiversity and the health of the planet. The article also addresses the alarming consequences of global warming, which is causing glaciers to melt at an accelerated rate. This phenomenon has led to a noticeable annual rise in sea levels, which is currently averaging 3.3 mm per year. The author stresses that this rising sea level is not only a threat to coastal communities but also to global ecosystems. Ahmad's work highlights the urgency of addressing pollution and global warming to ensure the survival of future generations. The article calls for immediate and collective action to combat environmental degradation and to implement sustainable practices that can mitigate the adverse effects of pollution and climate change.

Methodology

To proceed with this article, data has been collected from various sources, including multiple scholarly articles, reports, and existing literature. The information gathered is derived from an extensive review of previous works, which provide valuable insights and findings on the topic. These sources help to create a full picture of the topic, which is a good base for the analysis in this study. The data obtained is not only sourced from academic literature but also includes relevant reports and studies that offer practical perspectives on the issue at hand. This multi-source approach ensures that the findings are well-rounded and based on a diverse range of authoritative materials, allowing for a thorough exploration of the topic.

Data Collection

- **Primary Data:**
  Primary data refers to information that is collected directly from the original source, where the data is first generated. Such data is gathered for the first time, specifically for the purpose of analysis by agencies or investigators. It is the most direct and firsthand form of data, typically collected through methods such as surveys, interviews, observations, or experiments, allowing researchers to obtain information that is tailored to their specific study objectives.

- **Secondary Data:**
  Secondary data, on the other hand, refers to data that already exists in some form and was previously collected and published by other researchers or organisations. This data can be found in various formats, including journals, magazines, articles, reports, and websites. Secondary data is often used to supplement primary data, providing additional context or a broader perspective on the research topic. It offers valuable insights and is often more accessible, as it is already available in the public domain or through institutional resources. For the purpose of this study, the data has been primarily gathered from secondary sources. These include reputable journals, articles, and websites, with particular emphasis on sources such as the Ministry of Statistics and Programme Implementation. These secondary data sources provide a wealth of relevant information, which is crucial for the comprehensive analysis and evaluation of the study topic. By utilising existing data, the study can build on established knowledge and contribute to a deeper understanding of the issue under investigation.

Result

Variable descriptions

Table 1: Explanation of Variables with Measurements

Variables	Descriptions	Measurements
CO_2	Carbon dioxide	The total amount of carbon dioxide present in environment.
EP	Ecological Parameter	It includes Rain intensity, Nitrogen pollutants', Temperature & Soil acidity.
TS	Transport	The Pollution which generates from the air which releases from the transports.
EU	Electricity	The Consumption of Electricity should be minimal.
TA	International Trade	The total number of imports and exports taken place.

Source: Collected by Author

Sector-Wise Examination of Fossil Fuel, Nuclear, and Hydroelectric Energy Consumption in India (2012-2023)
In India, the consumption of energy sources such as fossil fuels, nuclear power, and hydroelectric energy is influenced by the specific demands of various sectors, including industrial, commercial, and agricultural. Each sector has distinct energy requirements based on its activities, leading to different patterns of energy consumption [8]. The industrial sector, for instance, is heavily dependent on fossil fuels due to the energy-intensive nature of manufacturing processes, while the agricultural sector may rely more on renewable sources like hydroelectric energy for irrigation and other farming activities. Similarly, the commercial sector's energy needs are often met through a combination of fossil fuels and, increasingly, renewable energy sources (refer to Table 1).

This section aims to provide an in-depth examination of the consumption trends of nuclear and fossil fuel energy from 2012 to 2023 across these key sectors. Over the past decade, India has seen significant economic growth, which has resulted in a sharp rise in energy demand. Fossil fuels, particularly coal, oil, and natural gas, have remained the dominant sources of energy in India, especially within the industrial and commercial sectors [9]. However, nuclear power has been growing steadily as part of India's broader strategy to diversify its energy mix, reduce greenhouse gas emissions, and improve energy security.

The analysis will explore how energy consumption has evolved across the industrial, commercial, and agricultural sectors, the specific factors influencing the shift towards certain energy sources, and the challenges faced by each sector in balancing energy needs with environmental sustainability. Additionally, it will examine the role of government policies, technological advancements, and investment in infrastructure in shaping these consumption trends [10].

By understanding how different sectors utilise these energy sources, this section aims to provide valuable insights into the broader implications for India's energy future. It will also highlight potential areas for improvement in energy efficiency and sustainability, contributing to the formulation of policies that support long-term energy security and environmental goals.

Domestic Consumption:

Compared to the past, there has been a noticeable increase in domestic energy consumption recently. This upward trend highlights the growing energy demands for household activities, driven by factors such as improved living standards and population growth. As the standard of living continues to rise, households are consuming more energy to support daily activities such as cooking, heating, cooling, and operating electronic devices. Additionally, fluctuations in domestic energy consumption have been observed over the years; however, the overall trend has been one of gradual and consistent growth [11].

This increase in energy use can be attributed to several factors, including technological advancements, urbanisation, and lifestyle changes. Households need more power than they did in the past because they have more modern appliances and easier access to energy-hungry technologies [12]. Furthermore, as India's population continues to grow, the demand for energy at the domestic level has naturally increased to accommodate the expanding number of homes and households.

It is important to recognise that rising energy consumption at the domestic level is both a reflection of economic progress and a challenge to energy sustainability. As more people get electricity and other modern energy services, there is a growing need for smart ways to manage energy so that the demand doesn't outstrip the supply. Ensuring that domestic energy consumption remains sustainable while supporting higher living standards will require a combination of policy interventions, technological innovations, and greater awareness of energy conservation [13].

Commercial consumption:

Between 2012 and 2023, the amount of energy consumed in commercial establishments has shown a noticeable shift, with a general decline in energy usage. The primary goal of modern business practices has been to reduce energy consumption in commercial settings, focusing on improving energy efficiency and adopting sustainable practices [14]. This decline in energy consumption can be attributed to a variety of factors, with key contributors being efficiency improvements and advancements in technology.

Over the past decade, businesses have increasingly prioritised energy conservation by adopting more efficient appliances, lighting systems, and heating and cooling technologies. These improvements have significantly reduced the overall energy demand in commercial buildings. Additionally, technological advancements in building management systems, such as smart energy meters and automated lighting controls, have allowed for more precise monitoring and regulation of energy use. These innovations reduce energy waste and help commercial establishments optimise their energy consumption according to real-time needs [15].

Moreover, businesses are now more focused on sustainability, with many companies implementing green building standards and environmentally friendly practices. The rise of renewable energy sources, such as solar and wind power, has also played a role in decreasing the reliance on conventional fossil fuels in the commercial sector [16]. By integrating these renewable technologies into their energy mix, many commercial establishments have further reduced their environmental impact and energy costs.

The combination of these efforts has led to a gradual yet significant decrease in energy consumption in the commercial sector. This trend reflects the growing recognition among businesses of the importance of energy conservation, not only for environmental reasons but also for financial benefits. As energy prices rise and sustainability becomes an increasing priority, businesses are expected to continue investing in energy-saving technologies and practices that further reduce their energy usage and contribute to a more sustainable future [17].

Industrial consumption:

While there have been fluctuations in industrial energy consumption over time, a discernible trend has emerged, indicating a gradual shift in energy use within the industrial sector. Despite short-term variations, the overall pattern of energy consumption in industries is influenced by multiple factors, with significant changes being driven by both external and internal forces [18]. One of the most prominent factors affecting this trend is the implementation of energy

efficiency initiatives by various industries, which have had a considerable impact on reducing overall energy consumption.

The push for greater energy efficiency in industries has become a key priority, as businesses strive to optimise their operations and reduce operational costs. These efficiency measures include upgrading machines, adopting advanced production technologies, and improving manufacturing processes to minimise energy waste. Additionally, many industries have invested in energy management systems and processes designed to monitor and control energy consumption in real time, enabling them to identify areas where improvements can be made. Industrial energy consumption is also shaped by a wide range of variables, including the level of economic activity, industrial output, and the type of industry in question [19]. For example, energy consumption tends to rise during periods of economic growth, as production levels increase to meet the growing demand for goods and services. Conversely, during economic downturns, industrial energy consumption may decrease as production slows. Similarly, industries that are more energy-intensive, such as steel manufacturing or cement production, generally exhibit higher energy consumption than less energy-demanding sectors.

Moreover, the industrial sector's ongoing efforts to reduce carbon emissions and transition to more sustainable practices have played a critical role in reshaping energy consumption patterns. The adoption of renewable energy sources, such as solar or wind power, alongside energy-efficient technologies, has contributed to a reduction in dependence on fossil fuels, ultimately reducing the sector's overall carbon footprint [20].

While industrial energy consumption has experienced fluctuations over time, the clear trend is toward improved energy efficiency, driven by technological advancements and sustainability initiatives. As industries continue to face pressures to reduce costs and mitigate environmental impacts, it is likely that this trend will intensify, leading to further reductions in energy consumption and a more sustainable industrial landscape.

Discussion

The COVID-19 pandemic, which began in 2019, has brought home the vital role of environmental conservation and has prompted a re-evaluation of human impact on the planet. Studies have shown that the pandemic led to a temporary reduction in air and water pollution due to decreased industrial activity and transportation. This period of reduced human activity highlighted the potential for environmental recovery and emphasised the need for sustainable practices [21].

Key Observations and Recommendations:

1. **Minimizing the Use of Non-Renewable Resources:**
   The pandemic has accentuated the necessity to reduce reliance on non-renewable resources. Transitioning to renewable energy sources is imperative to mitigate environmental degradation and ensure sustainable energy for future generations [22].
2. **Promoting Environmental Education and Ethics:**
   There is growing recognition of the need to educate individuals about environmental issues and instil ethical practices that prioritise ecological well-being. Such education can lead to more informed decision-making and a collective effort toward sustainability [23].
3. **Reducing Air Pollution through Cleaner Technologies:**
   The pandemic has demonstrated the positive effects of reduced vehicular and industrial emissions on air quality. Encouraging the use of electric vehicles and implementing stricter regulations on industrial emissions can further decrease air pollution levels [24].
4. **Shifting from Non-Renewable to Renewable Energy Sources:**
   The crisis has highlighted the vulnerabilities associated with dependence on non-renewable energy sources. Investing in renewable energy infrastructure not only supports environmental sustainability but also enhances energy security [25].

Recent Developments in Renewable Energy in India:

India has made significant strides in expanding its renewable energy capacity. As of October 2024, renewable energy accounted for over 46% of the country's total installed electricity generation capacity, with solar and wind energy playing

pivotal roles Press Information Bureau. The government's commitment to achieving 500 GW of renewable energy capacity by 2030 underscores its dedication to a sustainable energy future India Brand Equity Foundation. Furthermore, the National Green Hydrogen Mission, launched in January 2023, aims to bolster the production of green hydrogen, decarbonize heavy industries, and enhance energy security, positioning India as a global leader in clean energy transition RMI. The COVID-19 pandemic has served as a catalyst for rethinking environmental practices and has highlighted the urgent need for sustainable development. By minimizing the use of non-renewable resources, promoting environmental education, reducing pollution, and transitioning to renewable energy sources, significant strides can be made toward a more sustainable and resilient future [26].

Suggestion

As per the findings of this study, it is strongly recommended that the government take stringent measures to enforce existing laws and regulations, particularly in areas where illegal activities, such as improper waste disposal, are occurring. One of the major concerns is the illegal dumping of garbage in restricted areas, such as public spaces, ponds, and rivers. Despite the government's efforts to implement and enforce environmental protection laws, there continues to be widespread violation, particularly among some industrial sectors. Many industries still engage in the unlawful practice of discharging industrial waste directly into rivers and seas, resulting in significant environmental pollution.

This irresponsible behaviour harms the ecosystems and poses serious health risks to local communities that depend on these water sources for drinking, agriculture, and sanitation. The persistent pollution of rivers and seas due to industrial waste disposal continues to contribute to the degradation of natural resources and biodiversity, leading to long-term negative impacts on both the environment and public health.

While the government has been making efforts to curb these practices through regulations and penalties, the implementation and enforcement of these laws need to be more rigorous and consistent. It is essential for authorities to increase surveillance and monitoring of industries, ensuring that any violations are swiftly identified and addressed. Additionally, stricter penalties should be imposed on industries found violating environmental protection laws to create a stronger deterrent against such practices. It is crucial for the government to take stronger, more decisive actions to prevent illegal dumping and industrial waste discharge into water bodies. By doing so, they can significantly reduce pollution, protect public health, and contribute to the preservation of the environment for future generations.

Conclusion

As environmental problems continue to escalate with each passing day, it has become increasingly important for both the government and the public to take proactive measures to address these challenges. A critical aspect of tackling environmental issues involves carefully analysing the various problems that contribute to degradation and taking targeted actions to mitigate their impact. For instance, simple yet impactful activities like planting trees in our surroundings and ensuring the responsible use of water resources can go a long way in promoting sustainability. These practices not only help preserve the environment but also contribute to improving air quality, maintaining biodiversity, and conserving water for future generations.

Environmental sustainability is undeniably one of the most significant factors that requires attention and action from all sectors of society. For long-term development, it is essential that sustainability efforts are prioritised, ensuring that natural resources are used efficiently and responsibly without compromising the ability of future generations to meet their needs. While the government has already introduced several initiatives aimed at safeguarding the environment, one of the most notable being the Swachh Bharat Abhiyan (Clean India Campaign), these efforts alone may not be sufficient to tackle the vast scale of environmental challenges. The Swachh Bharat initiative, which focuses on cleanliness, waste management, and sanitation, is an important step in fostering a cleaner and more sustainable environment.

In addition to government efforts, various other agencies, including the Pollution Control Board, nongovernmental organisations (NGOs), and research institutions, are playing an instrumental role in raising awareness about environmental issues. These organisations work tirelessly to educate the public, conduct research, and promote sustainable practices through various campaigns, workshops, and advocacy programmes. Their collective efforts are

crucial in fostering a culture of environmental responsibility, ensuring that individuals and industries alike are aware of the environmental impact of their actions.

In conclusion, addressing the growing environmental problems requires a collaborative approach involving both governmental and public efforts. By continuing to raise awareness and encouraging sustainable practices, society can work together to create a cleaner, healthier, and more sustainable environment for the present and future generations. It is only through combined efforts, such as the promotion of tree planting, responsible water usage, and waste management, that meaningful progress can be made in safeguarding the environment.

Conflict of Interest

The authors declare that they have no conflict of interest.

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