



Environmental Education and Conservation of Biodiversity: A research review

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Abstract:

Environmental education plays a crucial role in promoting the conservation of biodiversity. As human activities continue to exert significant pressure on natural ecosystems, understanding the importance of biodiversity and its conservation becomes increasingly vital. This paper explores the connection between environmental education and the conservation of biodiversity, highlighting the key principles and approaches that contribute to effective conservation efforts. Environmental education serves as a powerful tool for raising awareness and fostering a sense of responsibility towards the environment. By providing individuals with knowledge about the intricate relationships within ecosystems and the value of biodiversity, environmental education helps cultivate a deep appreciation for the natural world. It instills a sense of stewardship, encouraging individuals to actively participate in biodiversity conservation. Effective environmental education programs adopt a multidisciplinary approach, integrating scientific knowledge, experiential learning, and community engagement. By employing interactive methods such as field trips, citizen science projects, and hands-on activities, educators can enhance learners' understanding of biodiversity and its conservation. Encouraging active participation and providing opportunities for direct interaction with nature empowers individuals to develop a personal connection with their environment. Furthermore, environmental education promotes the development of critical thinking and problem-solving skills. By engaging learners in real-world conservation challenges, such as habitat loss, climate change, and species extinction, education equips them with the tools to address these issues effectively. It fosters a mindset of sustainable decision-making and empowers individuals to become agents of change in their communities. Conservation of biodiversity requires collaboration among various stakeholders, including government agencies, NGOs, local communities, and individuals. Environmental education serves as a catalyst for building partnerships and fostering collective action. It encourages the involvement of diverse groups, facilitates dialogue, and promotes the sharing of knowledge and resources. By engaging people from different backgrounds and

perspectives, environmental education can inspire innovative solutions and promote inclusive conservation efforts.

Keywords: Environment, Conservation, Biodiversity, Environmental Education.

1. Introduction:

Education is the medium that gives us the skills techniques, information, and knowledge necessary to recognize, comprehend, and respect the responsibilities we have to our communities, families, and country. Everyone benefits from education since it gives them a positive view on the world and our society. This is why education is so important in life. We can acquire and explore new concepts with the aid of education. **Shuaibi (2014)**, education is the key to future success and a wide range of chances. Education fosters the growth of a person's personality, ideas, and social abilities. The process of obtaining knowledge and facts that pave the way for a prosperous future is known as education. Environmental education plays a vital role in promoting awareness and understanding of the environment, fostering sustainable behaviors, and contributing to the conservation of biodiversity. It is a multidisciplinary field that combines principles of ecology, conservation, sociology, and education to empower individuals and communities to become responsible stewards of the planet. **Busi (2021)** said that Environmental education aids in increasing people's environmental awareness, concern, and knowledge as well as their ability to apply this knowledge to sustainably protect, conserve, and utilize the environment for the benefit of both current and future generations. It is a process that helps people become more conscious of their surroundings and learn the knowledge, skills, attitudes, experiences, and motivation necessary to take action, both individually and as a group, to address current and future environmental issues. Environmental Education is a multifaceted process that encompasses not only events but also a fundamentally sound strategy for constructing society as a whole. Conservation of biodiversity is of utmost importance in today's world, as it encompasses the variety of life on Earth and the ecological processes that sustain it. Biodiversity provides numerous benefits to humanity, including ecosystem services like clean air and water, pollination, climate regulation, and food security. However, human activities such as habitat destruction, pollution, overexploitation, and climate change are causing a rapid loss of biodiversity, threatening the stability and functioning of ecosystems. Environmental education plays a critical role in addressing these challenges by fostering knowledge, attitudes, values, and skills necessary to conserve biodiversity. It provides individuals with the tools to understand complex environmental issues, make informed decisions, and take responsible actions towards sustainable living. Through environmental education, people learn about the importance of biodiversity, the causes and consequences of its loss, and the strategies to mitigate these impacts. Environmental education aims to empower individuals with the knowledge, skills, attitudes, and values necessary to understand and address environmental challenges. It encompasses a wide range of objectives that contribute to the overall goal of promoting environmental awareness, fostering sustainability, and encouraging responsible actions towards the environment. Here are some common aims and objectives of environmental education:

1. **Raise Awareness:** Environmental education seeks to raise awareness about environmental issues, such as climate change, deforestation, pollution, and loss of biodiversity. It aims to ensure that individuals understand the interconnectedness between human activities and the environment and recognize the impacts of their actions.
2. **Promote Knowledge and Understanding:** Environmental education aims to provide individuals with a sound understanding of ecological principles, environmental systems, and the importance of biodiversity. It encourages the acquisition of scientific knowledge related to environmental issues and fosters critical thinking and problem-solving skills.
3. **Encourage Pro-environmental Attitudes and Values:** Environmental education aims to develop positive attitudes and values towards the environment, such as appreciation, respect, empathy, and stewardship. It seeks to cultivate a sense of responsibility and commitment to sustainable practices and ethical decision-making.
4. **Foster Environmental Skills and Action:** Environmental education aims to equip individuals with the necessary skills to address environmental challenges effectively. This includes skills related to sustainable resource management, conservation practices, waste reduction, renewable energy, and environmental advocacy. It encourages individuals to take action at personal, community, and societal levels to contribute to environmental sustainability.
5. **Promote Sustainable Lifestyles:** Environmental education aims to promote sustainable lifestyles by encouraging individuals to make environmentally conscious choices in their daily lives. It focuses on areas such as energy conservation, waste reduction, sustainable transportation, responsible consumption, and the adoption of eco-friendly practices.

Environmental education plays an important role in raising awareness, fostering a sense of responsibility, and promoting actions to conserve biodiversity. By utilizing various strategies and initiatives, such as experiential learning, community engagement, and technology, we can empower individuals to become active participants in biodiversity conservation. Policy support and collaboration among stakeholders are essential for the success of environmental education efforts. It is through these collective actions that we can work towards a sustainable future where biodiversity thrives.

2. Objectives of the study:

1. To study the importance of environmental education.
2. To find out the role of environmental education towards conservation of biodiversity in India.
3. To study the initiatives taken by government of India towards conservation of biodiversity.

4. Methodology:

This study uses a qualitative research approach and focuses on the evaluation of secondary data. This study use secondary data sources to examine how environmental education contributes to

biodiversity conservation and government efforts to protect it, such as academic journals, news articles, reports, and pertinent publications.

5. Findings:

5.1. Environmental Education and it's important:

Environmental education is a multidisciplinary approach to learning that aims to raise awareness, foster understanding, and promote responsible actions towards the environment. It encompasses formal and informal learning experiences that empower individuals to become environmentally literate, engaged citizens capable of addressing environmental challenges. Environmental education emphasizes the interconnectedness of ecological, social, economic, and cultural systems, encouraging sustainable practices and advocating for the conservation of natural resources and biodiversity. **Stapp (2005)** claims that environmental education aims to create a population that is knowledgeable about the biophysical environment and the issues it raises, is aware of how to address these issues, and is motivated to strive to find a solution (NAAEE, 2005a). The process of supporting learning or the acquisition of environmental information, skills, values, morals, attitudes, and habits is known as environmental education. Typically, it uses teaching, training, storytelling, discussion, and focused research as its educational approaches. Environmental is very important subject in the present era.

Environmental education is a field of study that aims to promote awareness, knowledge, and understanding of environmental issues and encourage individuals to take action to protect and sustain the natural world. It encompasses a wide range of topics, including conservation, sustainability, biodiversity, climate change, and ecological systems. In recent years, there has been a growing body of literature on environmental education, exploring its effectiveness, strategies, and impact on individuals and society. Here is a brief literature review on environmental education:

According to the report of **UNESCO (2014)** "Environmental Education: A Pathway to Sustainability"; this report highlights the importance of environmental education in achieving sustainable development. It provides a comprehensive overview of the key principles, approaches, and challenges in environmental education and emphasizes its role in fostering responsible citizenship and sustainable lifestyles.

Another study "The Effectiveness of Environmental Education for Sustainable Development based on Active Teaching and Learning at High School Level-A Case Study from Puducherry and Cuddalore Regions" conducted by **Prasada Rao et al. (2018)**: This study examines the effectiveness of environmental education programs in promoting sustainable development. It assesses the impact of active teaching and learning methods on students' knowledge, attitudes, and behavioral changes towards environmental issues.

Gupta and Jain (2017) conducted a study regarding environmental education and the research explores the level of environmental education and awareness among secondary school students in India. It investigates the factors influencing students' environmental knowledge and attitudes and provides insights into the design and implementation of effective environmental education programs.

"Environmental Education and Education for Sustainable Development: An International Discourse" by **Tilbury et al. (2017)**. This article presents a global perspective on environmental education and its intersection with education for sustainable development. It examines the key concepts, principles, and challenges in integrating sustainability into education systems and emphasizes the need for transformative learning experiences.

Bowers (2016) explores the role of environmental education in developing environmental literacy and promoting sustainability. It discusses the theoretical foundations of environmental education, its implications for curriculum development, and the potential of transformative learning in fostering sustainable behaviors.

Şenyurt and Aydın (2015) had done a review and this systematic review synthesizes the existing literature on environmental education and its contributions to sustainable development. It identifies key themes, methodologies, and outcomes of environmental education programs and provides recommendations for future research and practice.

Rickinson et al. (2004) study examines the literature on education for sustainable development, encompassing environmental education, global citizenship, and social justice. It explores different pedagogical approaches, policy frameworks, and evaluation methods in promoting sustainability education.

5.2. Role of environmental education towards conservation of biodiversity in India:

Biodiversity, also known as biological diversity, refers to the variety of life forms, ecosystems, and genetic diversity on Earth. It encompasses the richness and abundance of different species, their interactions, and the ecological processes that sustain life. Biodiversity is essential for the functioning of ecosystems, providing numerous ecosystem services that support human well-being. It can be applied more precisely to all the species found in a certain area or environment. Every living creature, including plants, microorganisms, animals, and people, is referred to as biodiversity. Around 8.7 million species of plants and animals are thought to exist, according to scientists. However, too far, only about 1.2 million species, the most of which are insects, have been recognized and described. This implies that the identities of millions of other creatures are yet unknown. The term biodiversity (from "biological diversity") refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life. Biodiversity plays a fundamental role in maintaining ecological stability and resilience. Research has shown that ecosystems with high biodiversity are more resistant to disturbances such as climate change, disease outbreaks, and invasive species (**Díaz et al., 2019**). The presence of diverse species within an ecosystem allows for greater functional redundancy, ensuring that ecological processes continue even in the face of environmental changes. Biodiversity is closely linked to the provision of ecosystem services, which are the benefits humans derive from ecosystems. These services include provisioning services (e.g., food, water, timber), regulating services (e.g., climate regulation, water purification), cultural services (e.g., recreation, aesthetic value), and supporting services (e.g., nutrient cycling, soil formation). Maintaining biodiversity is crucial for the continued provision of these services, which are essential for human well-being. It plays a critical role in enhancing the resilience of

ecosystems to climate change impacts. Studies have shown that diverse ecosystems are more capable of adapting to changing climatic conditions, as different species may respond differently to environmental shifts (**IPBES, 2019**). Preserving biodiversity is essential for maintaining ecosystem functionality and enabling adaptation to future climate scenarios.

Biodiversity and its preserving are very important for sustaining life on earth. Each species plays a particular function in an ecosystem. They create and break down organic matter in addition to capturing and storing energy. Resources for the production of food, cosmetics, and medicines can be found in biodiversity. There is a right for every species to exist. They should not be intentionally exterminated by humans. Diverse cultures and spiritual heritage are preserved by biodiversity. Therefore, biodiversity preservation is important. **Ramadoss (2011)** said that the primary goal of biodiversity was to foster knowledge, interest and skill needed to address a variety of biodiversity in light of the local context. A biodiversity education programme broadens student's knowledge, interest and competencies in order to safeguard and conserve the biodiversity and locale natural resources.

Biodiversity is very important because every species contributes in some way to the ecosystem. They can generate and store organic material, store energy, manage erosion and pests, repair atmospheric gases, help regulate climate, and recycle water and nutrients throughout the ecosystem. These physiological mechanisms are crucial for the health of ecosystems and human survival. The use of biodiversity in breeding enhanced varieties, as biopesticides, and as fertilizers and fertilizer substitutes. Various types of wild plants have been employed as medicines. Oils, scents, colors, paper, waxes, rubber, latexes, resins, poisons, and cork are further commercial goods that can be made from a variety of plant species, silk, fur, leather, lubricants, and waxes (**Chandrakar. 2012**)

The basis for human existence and welfare is the biological diversity of life on earth. We are protected against natural disasters by biodiversity and healthy ecosystems, which also control the climate and give us access to food, fertile soil, and health care. **Sousa (2016)** have found that public attitude towards biodiversity can be changed by environmental education based on direct contact. The "Ponds with Life" environmental education initiative was created to increase public knowledge and participation in the study of ponds by encouraging face-to-face interactions between the general public and researchers through pedagogical hands-on exploration activities. **Eshun (2022)** have found that all facets of biological variety are in danger. The rate of biodiversity loss has garnered attention on a worldwide scale, and most governments are working to implement measures that would slow the loss. Growing awareness of biodiversity protection in people from an early age will help them become more concerned as they age and incorporate it into their daily lives, which will help stop the loss of species. Through the process of environmental education, people can learn about environmental problems, solve them, and take steps to protect the environment. In order to raise public awareness and consciousness and encourage participation in local biodiversity conservation issues, it is vital to have a better grasp of the significance of biodiversity and what affects the diversity of biological resources. **El Alami & Abderrahman (2020)** said that for ecological preservation and environmental

protection, human environmental behaviors are crucial. Pollution reduction is greatly helped by waste minimization. According to the current Moroccan national plan for sanitation and wastewater treatment, wastewater reuse is anticipated to reach the target of 100% in 2030. This study provided evidence that it will be critical to involve citizens in environmental protection, waste management, and biodiversity preservation. **Solveig et al (2023)** said that education programming dealing with threats to ecosystem services and biodiversity should be included in school curricula, especially for students close to protected areas.

5.3. Government initiatives towards conservation of biodiversity:

India has ratified a number of significant international agreements pertaining to the management and conservation of wildlife. Some of these are the Convention on Biological Diversity, CITES, the Convention on the Conservation of Migratory Species of Wild Animals, and others. Under different Centrally Sponsored Schemes, State/Union Territory Governments receive financial and technical support for the management and conservation of Protected Areas and other forests. Some Government Initiatives towards Conservation of Biodiversity in India:

a) National Biodiversity Action Plan (NBAP): The National Biodiversity Action Plan was launched by the Government of India in 2008. It aims to provide a framework for conservation and sustainable use of biodiversity at the national, state, and local levels. The plan includes strategies and action points for biodiversity conservation, capacity building, research and monitoring, and mainstreaming biodiversity across sectors. The NBAP provides a framework for the conservation and sustainable use of a country's biodiversity. It helps identify priority areas, species, and ecosystems that require protection and outlines strategies to mitigate threats such as habitat loss, pollution, overexploitation, and climate change. NBAP guides policymakers in formulating laws, regulations, and policies related to biodiversity conservation. It helps integrate biodiversity considerations into various sectors, such as agriculture, forestry, fisheries, and urban planning, ensuring that biodiversity conservation is mainstreamed across different areas of governance. The NBAP encourages the active participation of various stakeholders, including government agencies, civil society organizations, indigenous communities, and the private sector. It promotes collaboration and cooperation among these stakeholders, fostering a shared responsibility for biodiversity conservation.

b) Biological Diversity Act, 2002: The Biological Diversity Act was enacted in 2002 to provide a legal framework for the conservation, sustainable use, and equitable sharing of benefits arising from the use of biodiversity. The act establishes biodiversity management committees at the local level and mandates the preparation of People's Biodiversity Registers to document and protect traditional knowledge associated with biodiversity. It is an important legislation enacted by the Government of India to regulate and promote the conservation, sustainable use, and equitable sharing of benefits arising from the utilization of biological resources. The act recognizes the significance of biodiversity for the well-being of present and future generations and aims to protect and manage India's rich biological diversity. The act emphasizes the conservation of biological diversity and the sustainable use of its components. It provides a framework for the protection, management, and restoration of ecosystems, species, and genetic

resources. The act recognizes the importance of maintaining ecological balance and preserving critical habitats for the survival of species. The act provides for the identification, conservation, and management of Biodiversity Heritage Sites. These sites are areas of high biodiversity value, such as national parks, wildlife sanctuaries, and important ecosystems. The act aims to protect and restore these sites and promote their sustainable use for the benefit of present and future generations. This act mandates the preparation of People's Biodiversity Registers at the local level. These registers document traditional knowledge associated with biodiversity and the use of biological resources by local communities. PBRs help in recognizing and protecting the rights of local communities and promoting their participation in biodiversity conservation and sustainable development.

c) National Biodiversity Authority (NBA): The National Biodiversity Authority was established under the Biological Diversity Act, 2002. It serves as the principal regulatory body responsible for granting approvals and ensuring compliance with the provisions of the act. NBA facilitates the implementation of biodiversity conservation measures, access and benefit-sharing arrangements, and conservation of sacred groves and heritage sites. The primary role of the National Biodiversity Authority is to regulate access to biological resources and associated traditional knowledge for research, commercial utilization, and any other purposes. It acts as a regulatory body to ensure that such access is done in a fair and equitable manner, with the goal of conserving biodiversity and protecting the rights of local communities and indigenous people. Key functions of the National Biodiversity Authority include:

- The NBA grants permissions, known as 'Biodiversity Heritage Certificates,' for access to biological resources and traditional knowledge. This ensures that the utilization of such resources is carried out with the prior approval of the authority, taking into account the conservation and benefit-sharing principles.
- The NBA plays a crucial role in ensuring that benefits arising from the use of biodiversity and traditional knowledge are shared fairly and equitably with local communities and indigenous people who have conserved and nurtured these resources for generations. The authority helps in the formulation of benefit-sharing agreements to promote the conservation of biodiversity and the sustainable development of communities.
- The NBA supports the establishment and functioning of Biodiversity Management Committees at the local level. These committees play a crucial role in biodiversity conservation, documentation, and sustainable use of biological resources. The NBA provides guidance and support to BMCs in implementing biodiversity-related activities and projects.
- The National Biodiversity Authority promotes research, documentation, and conservation of biodiversity. It collaborates with various research institutions, universities, and organizations to facilitate studies on biodiversity, its value, and conservation strategies. The authority also maintains a national repository of biological resources and traditional knowledge.

- The NBA conducts awareness programs and capacity-building initiatives to promote understanding and appreciation of biodiversity conservation among various stakeholders, including government agencies, local communities, researchers, and the general public. These programs help in creating a sense of responsibility towards conserving India's diverse biological resources.

The National Biodiversity Authority plays a critical role in ensuring the sustainable use, conservation, and equitable sharing of benefits derived from India's rich biodiversity. Through its regulatory functions, it contributes to the conservation of natural resources, protection of traditional knowledge, and the promotion of sustainable development practices.

d) Project Tiger: Launched in 1973, Project Tiger is a flagship initiative of the Government of India for the conservation of tigers and their habitats. It aims to protect and increase the tiger population by establishing tiger reserves, conducting anti-poaching operations, habitat management, community participation, and wildlife research and monitoring. The primary objectives of Project Tiger are to ensure the conservation of the Bengal tiger and its habitats, address the factors leading to tiger population decline, and promote ecological balance in the tiger reserves (**NTCA, n.d.**). The project aims to protect critical tiger habitats, reduce poaching and illegal trade, and engage local communities in conservation efforts. Under Project Tiger, designated areas known as tiger reserves are established to provide protected spaces for tigers and their prey species. These reserves are carefully selected based on their ecological significance and the presence of viable tiger populations (**NTCA, n.d.**). As of 2021, there are 51 tiger reserves in India, covering a total area of approximately 72,749 square kilometers (**NTCA, 2021**). The Project Tiger employs various conservation strategies to ensure the well-being of tigers and their habitats. These include habitat management, anti-poaching efforts, wildlife monitoring, community involvement, and awareness and education programs. The project focuses on habitat restoration, protection against encroachment, and effective patrolling to curb poaching and illegal activities.

e) National Mission for Green India (GIM): The National Mission for Green India was launched in 2014 as a part of the National Action Plan on climate change. GIM aims to increase forest cover and improve the quality of existing forests while enhancing ecosystem services and biodiversity conservation. It focuses on afforestation, reforestation, agroforestry, and ecological restoration. The primary objective of the National Mission for Green India is to increase India's forest and tree cover to cover one-third of the country's geographical area. The mission aims to restore and manage 10 million hectares of degraded forest lands, enhance carbon sinks through afforestation and reforestation, and improve the ecosystem services provided by forests (**Ministry of Environment, Forest and Climate Change**). GIM also seeks to promote sustainable livelihood options for local communities through participatory forest management and capacity building initiatives. The National Mission for Green India recognizes the importance of biodiversity conservation and aims to enhance the biodiversity values of forests. It focuses on the restoration of degraded ecosystems, including wildlife habitats and corridors, to support the conservation of native flora and fauna. By conserving and restoring forest

ecosystems, GIM contributes to the protection of India's rich biodiversity and the ecological balance of the country. The initiative plays a crucial role in climate change mitigation by increasing India's forest carbon stock. GIM aims to sequester carbon dioxide through afforestation, reforestation, and the restoration of degraded forests. The mission's activities contribute to India's commitment to the Paris Agreement by enhancing carbon sinks and reducing greenhouse gas emissions. The afforestation and reforestation efforts under GIM also contribute to enhancing ecosystem resilience and adapting to climate change impacts.

6. Conclusion:

In conclusion, environmental education plays a crucial role in fostering awareness, knowledge, and skills needed for the conservation of biodiversity. By providing individuals with a comprehensive understanding of the interconnections between human activities and the environment, environmental education empowers them to make informed decisions and take responsible actions to protect and preserve biodiversity. Through environmental education, individuals become aware of the importance of biodiversity and the ecological services it provides. They gain knowledge about the threats to biodiversity, such as habitat loss, pollution, overexploitation, and climate change. With this knowledge, they are better equipped to engage in conservation efforts and advocate for sustainable practices. Environmental education also highlights the value of biodiversity in supporting ecosystem stability, providing essential ecosystem services, and contributing to human well-being. By reviewing the scientific evidence on the importance of biodiversity, individuals understand the need to protect and restore ecosystems to maintain a healthy planet for current and future generations. Moreover, environmental education fosters a sense of environmental stewardship and encourages individuals to actively participate in conservation initiatives. It equips them with the skills to identify and address environmental challenges, engage in sustainable behaviors, and promote biodiversity conservation in their communities. It serves as a catalyst for the conservation of biodiversity by raising awareness, fostering understanding, and empowering individuals to take action. By incorporating environmental education into formal and informal learning settings, we can create a more environmentally conscious society that values and protects the remarkable diversity of life on Earth.

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