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Traditional Wisdom And Environmental Sustainability in the Context of Viksit Bharat @2047: Indigenous Ecological Practices And Climate Resilience

Laylee Chakraborty

Assistant Professor of Swami Vivekananda College of Education For Women

Priyabrata Sau

Assistant Professor of Indian Institute of Education, Email: saupriyabrata9@gmail.com

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Abstract: *Environmental sustainability has become a very important issue in the national vision Viksit Bharat @2047, balanced development needs to combine economic development with environmental safety. In this regard, the indigenous knowledge systems, and traditional ecological practices provide climate resilience-based and community-based solutions to biodiversity conservation. The current research paper explores the importance of traditional wisdom in ensuring environmental sustainability, and discusses its applicability within the modern development models. A descriptive survey method with correlational research design was adopted for the study. A total of 100 respondents including farmers, members of the local community, indigenous knowledge holders and rural residents were sampled using purposive sampling in chosen regions of West Bengal. The self-administered questionnaire and rating scale were employed to measure indigenous ecological practices, conservation of biodiversity and association of traditional knowledge with modern scientific practices. The results show that indigenous knowledge systems and environmental sustainability (r = 0.74), biodiversity conservation (r = 0.85) and traditional wisdom combined with modern science (r = 0.89) have a significant positive correlation. Findings suggest that indigenous ecological knowledge has a significant contribution to long-term ecological resilience, climate adaptation and sustainable resource management. This research finds that the incorporation of conventional wisdom and scientific innovation can offer a holistic and culturally-based route to fulfill the sustainability targets envisioned of Viksit Bharat, 2047.*

Keywords: *Indigenous Knowledge System, Traditional Ecological Practices, Environmental Sustainability, Viksit Bharat @2047, Biodiversity Conservation and Climate Resilience.*

Introduction: The developmental goals of India as envisioned by Viksit Bharat @2047 will need an equalized outlook between economic development and preservation of the environment. Although modern science and technology have played a major developmental role, it has also contributed to ecological impacts that are not desired like resource waste, pollution, and climatic vulnerability. On the contrary, the ancient Indian communities have always been practicing sustainable lifestyle that has been in line with nature. They have knowledge systems that are developed over generations based on conservation,

moderation, and keeping ecological limits and respect. Yet, these systems are slowly being left out in the modern developments. This paper aims to re-visit the usefulness of indigenous knowledge within the current environmental setting and how it can be used to achieve sustainable development objectives in terms of long-term vision of sustainable development in India.

Conceptual Clarification: Indigenous knowledge entails local knowledge attained by communities in the constant interaction with the environment around the community. It is situational, practical and passed on intergeneration ally by oral traditions and practices. It covers an extensive area comprising of agriculture, water management, conservation of forests and adaptation to climate.

Environmental sustainability refers to the sustainable utilization of the natural resources in a manner that does not destroy ecological balance and makes it available to the following generations. It aims at reducing environmental degradation at the same time enhancing long-term ecological health. The connection between the two concepts is that the indigenous knowledge systems are already geared towards sustainable practices. It makes them very topical in dealing with the existing environmental issues since they focus on nature, preserving the resources, and engaging the community.

Significance of the study: The current research is very important in the environment of the long-term vision of Viksit Bharat @2047 of India that has prioritized sustainability and inclusive development. Now, when environmental threats, like the phenomenon of climate change, the loss of biodiversity, and exhausting resources, are growing, it is highly significant to seek alternative and locally-based solutions. Indigenous knowledge systems, whose evolution attained through generations of close contact with nature, can provide viable and cost efficient, as well as ecologically sustainable methods of resource management. This study can be used in a better understanding of the role of the culturally embedded knowledge in ensuring environmental sustainability since it highlights the relevance of the traditional ecological practices. It also aims at advancing the introduction of indigenous wisdom into the current policy frameworks which will uplift the strategies of sustainable development and make sure that the development is not only environmental but also socially responsible.

Statement of the problem: The current ways of development are inclined to focus on science and technology solutions without considering the situation-specific and sustainable practices of local communities. This has caused disconnection of traditional wisdom to formal environmental management systems leading to unsustainable use of resource and degradation of the ecology. Moreover, fast urbanization, globalization, and cultural change are also being a contributory factor to erosion and loss of indigenous knowledge most of which is not documented, but is passed along through oral tradition. This is because efforts to conserve and assimilate this knowledge are not systematic thus creating a significant problem to sustainable development. So the title of the present study is that- “Traditional wisdom and environmental sustainability in the context of viksit bharat @2047: indigenous ecological practices and climate resilience”.

Research Question: What is the role and relevance of indigenous knowledge system and traditional ecological practices in promoting environmental sustainability, biodiversity conservation and climate resilience in the context of viksit Bharat @2047?

Objectives:

1. To find out the role of Indigenous knowledge systems in promoting environmental Sustainability.
2. To find out how traditional ecological practices contribute to biodiversity conservation.
3. To find out the integration of indigenous knowledge with modern scientific approaches for sustainable development.

4. To identify Challenges and limitation in applying indigenous knowledge system in environmental sustainability.

Hypotheses:

1. **H01-** There is no Significant relationship between Indigenous Knowledge System and Environmental Sustainability.
2. **H02-**There is no significant relationship between Traditional ecological practice and Biodiversity Conservation.
3. **H03-** There is no significant relationship between the integration of indigenous knowledge and modern scientific approaches for sustainable development.

Methodology: The present study adopted a descriptive survey method with a correlational research design**.** The respondents were selected from rural and indigenous communities of West Bengal (e.g. Sundarban Region, Bankura, and Jangalmahal) who possess practical knowledge of traditional environmental practices.

Population: The population of the study comprised: local community members, Farmers, Tribal/indigenous people, village elders, environmental activists, forest resource users, local governance representatives (Panchayat members) .These groups are the most suitable because they directly possess and practice indigenous ecological knowledge.

Sample: A sample of 100 respondents were selected using purposive sampling technique**.** Purposive sampling was used because the respondents were selected on the basis of their direct knowledge and involvement in traditional environmental practices.

Tools Used: The researchers were prepared a Likert scale consisting of items related to: Indigenous ecological practices, Biodiversity conservation, climate resilience, sustainable resource management, integration with modern science.

Statistical Techniques: For analysis, the following statistical techniques were used: Mean, Standard Deviation, Percentage, t-test, Pearson's Product Moment Correlation.

Objective wise analysis:

Objective-1: To find out the role of Indigenous knowledge systems in promoting environmental Sustainability

Key techniques:

1. Sustainable Resource Management:

> Practice of Harvesting only with mature Plants.

> Need based use of Forest, Water and Grazing lands

> Community based sharing of Resource

2. Agro-ecological Practices:

>Crop Rotation and mixed cropping methods

> Use Compost and organic fertilizer

> Seeds preservation

3. Water Conservation Techniques:

>Rainwater harvesting Methods (tanks, Ponds, Stepwells)

> Use Bamboo drip irrigation

> Community maintenance of water bodies.

4. Climate Adaptation and Disaster Management:

> Weather prediction through animal behaviour

> Construction of Climate-resilient houses (Bamboo, Mud etc.)

>Flood and Drought Mitigation strategies

5**. Forest management Practice:**

>Community Forest Protection policy

>Technique use to control fire.

6. Cultural Practices:

>Rituals restriction on resource use

>Collective responsibility towards environment

Correlation:

Category	No. of Sample	Df (N-2)	r Value	Correlation
Indigenous knowledge systems	100	98	0.74	Moderate to high positive correlation
Environmental sustainability	100	98		

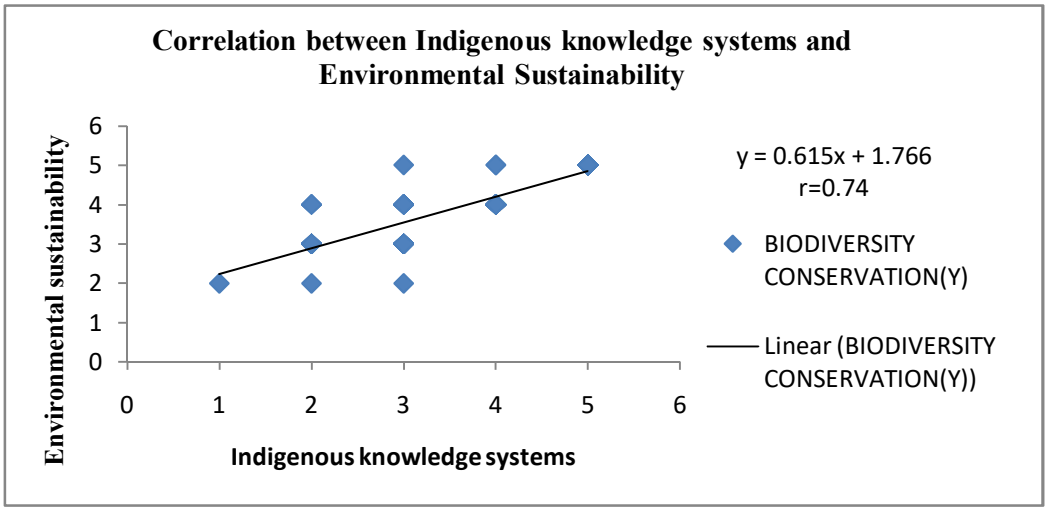


Fig. No.-1 Correlation between Indigenous knowledge systems and Environmental Sustainability

Analysis: The Indigenous Knowledge Systems and environmental sustainability have a strong and positive correlation. The correlation coefficient (r = 0.74) obtained is positive and high. This implies that the more the indigenous knowledge is utilised and practised, the more the environmental sustainability they show among the communities. It has been observed that traditional practices like sustainable management resources, agro-ecological practices, water conservation, climate adjustment and community-based fore management have played a great part in the ecological balance, and sustainability over the long term. As such, the results clearly show that Indigenous Knowledge Systems are crucial in facilitating environmentally-friendly practices.

Objective-2: To find out how traditional ecological practices contribute to biodiversity conservation.

Techniques:

1. Sacred Groves Conservation

> No Cutting of Trees or hunting allowed

> Acts as Natural gene bank for Endemic and endangered flora and fauna.

2. Protection of Keystone and Totemic Species

> Hunting and Cutting is strictly Prohibited

3. Water Ecosystem Management by Traditional Methods

> Conservation of Ponds, Wetlands and rivers

> During breeding season fishing may ban

4. Social and Agro-forestry Practices

> Maintains habitat for animals

> Maintain overall ecosystem biodiversity of the area

5. Law

> Penalties for overuse of resources

> Community monitoring system

> Biodiversity law, 2002

> Convention on biological Diversity.

Correlation:

Category	No. of Sample	Df (N-2)	r Value	Correlation
Traditional ecological practices	100	98	0.85	Moderate to high positive correlation
Biological Conservation	100	98		

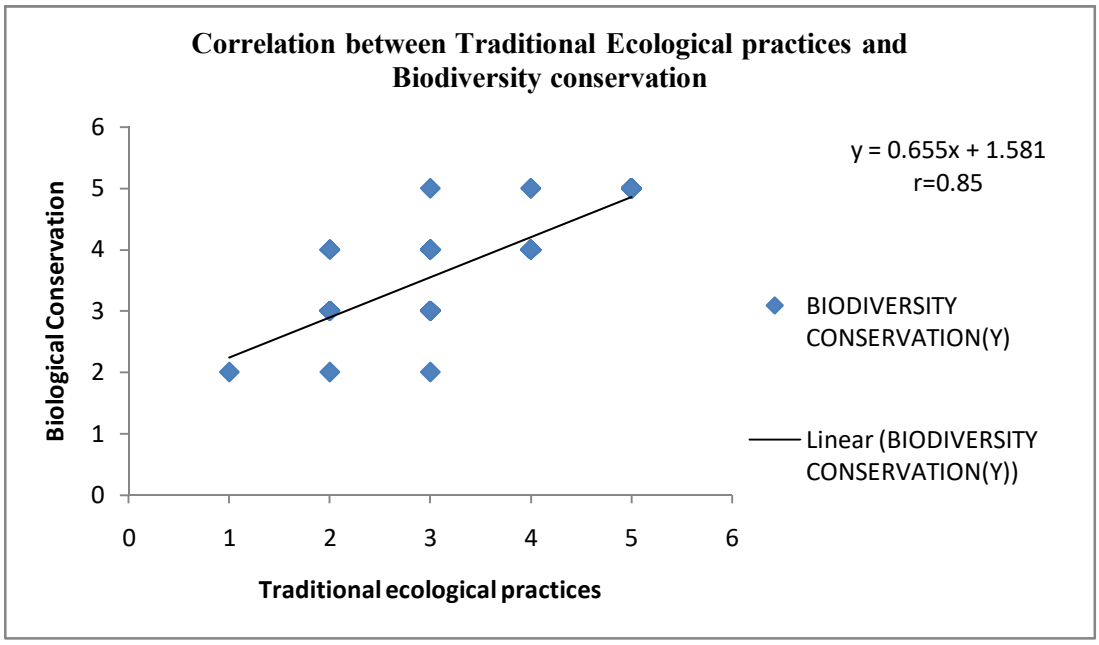


Fig. No.2: Correlation between Traditional Ecological practices and Biodiversity conservation

Analysis- The results indicate that the two variables of traditional ecological practice and biodiversity conservation are connected with a very high level of positive correlation (r = 0.85). This suggests that regions where indigenous population still adheres to the traditional method of conserving their resources have better rates of conservation of the biodiversity. Sacred grove conservation, conservation of key species, management of wetlands and rivers in traditional ways and agro forestry systems are some of the practices adopted towards ensuring the protection of flora and fauna. The value of high correlation indicates that biodiversity conservation and ecological stability are greatly endorsed by traditional ecological knowledge.

Objective-3: To find out the integration of indigenous knowledge with modern scientific approaches for sustainable development.

Techniques

1. Participatory research and Co-Production of Knowledge: Scientists Collaborate directly with indigenous communities and use of Participatory rural Appraisal and local Consultation.

2. Documentation and digital Preservation: Recording oral tradition, ecological knowledge and practices and Modern technology e.g. Use of GIS Mapping, Digital archives and database to protect indigenous knowledge from loss of documents and makes it usable for scientific research.

3. Blending Traditional and scientific Agriculture Practices: Combining indigenous seeds varieties with modern crop scientific methods, Integrating organic farming with scientific soil testing.

4. Climate Change Adaptation Strategies: Integrating indigenous weather forecasting with meteorological data, using traditional drought resistant crops with modern irrigation techniques.

5. Sustainable Resource Management models: Joint forest management promotes efficient and inclusive environmental governance, Upgrading traditional irrigation systems with modern efficient techniques.

6. Biodiversity Conservation: Combining Traditional Methods(Sacred Groves) with Scientific Biodiversity Monitoring (Use of Modern tools like GIS and Remote sensing)

Group	N	Total Score	Mean	SD	df	MD	SEM	SED	t-ratio	P Value	Table Value	Remarks
Indigenous knowledge System	100	339	3.39	1.15	198	0.36	0.11	0.15	2.31	0.02	1.97(at 0.05 level)	Null hypothesis rejected and Research hypothesis accepted.
Modern Scientific Approaches	100	375	3.75	1.05			0.10				2.60(at 0.01 level)	

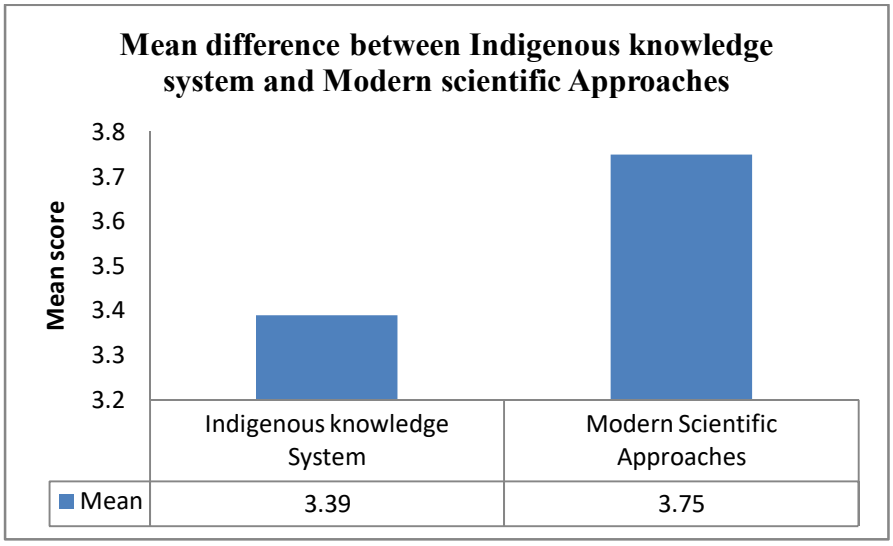


Fig. No.3- Mean difference between Indigenous knowledge system and Modern scientific Approaches

Correlation

Category	No. Of Sample	Df(N-2)	r Value	Correlation
IK and MSA Integration	100	98	0.89	Moderate to high positive correlation
Environmental Sustainability	100	98		

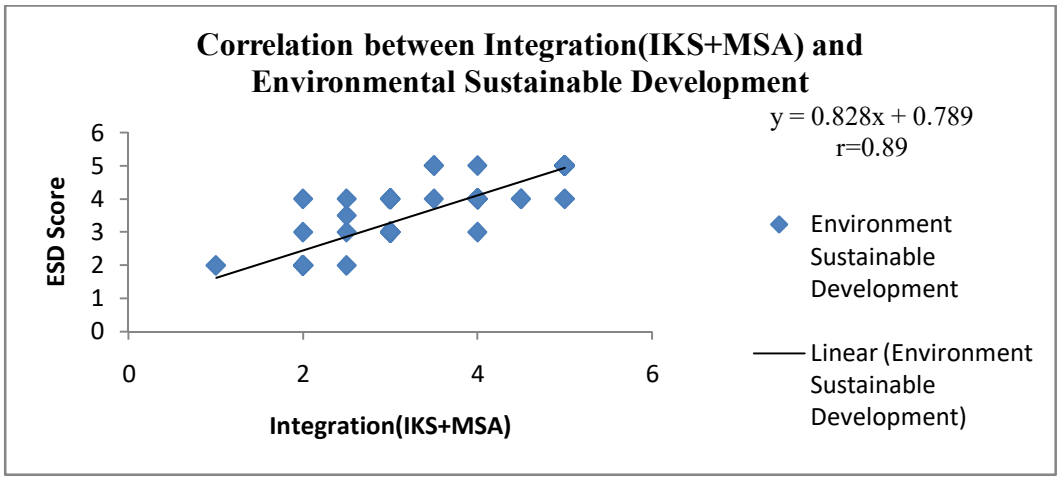


Fig. No.4 Correlation between Integration (IKS+MSA) and Environmental Sustainable Development

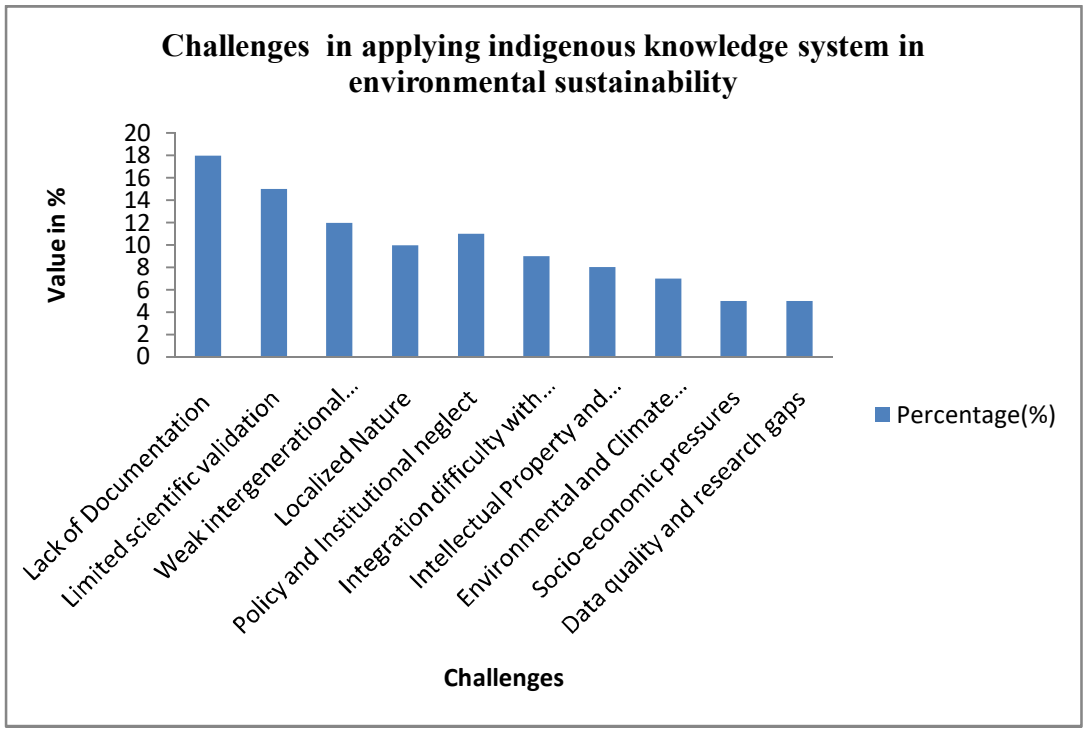
Analysis: The result shows that there is a very high positive correlation (r = 0.89) between the integration of Indigenous Knowledge Systems and modern scientific approaches with environmental sustainability. The obtained (calculated) t-ratio (2.31) is determined to be higher than the table value in the level of significance of 0.05, and therefore the null hypothesis is rejected, and the research hypothesis is accepted. This shows that combination of the traditional ecological knowledge with the modern scientific approach plays a huge role in the achievement of sustainable development. The results indicate that integrating indigenous with the use of scientific instruments like the GIS maps, climate forecast, soil analysis and biodiversity surveillance offers a better and holistic solution to climate resilience and environmental management.

Relevance of indigenous knowledge with modern scientific approaches for sustainable development

1. **Environmental Conservation:** Indigenous Knowledge provides local adaptability and Science provides scale and precision
2. **Agriculture and Food security**: Integration of indigenous knowledge with modern scientific approaches leads to climate-resilient agriculture.
3. **Climate Change adaptation**: Integration leads to enhance local level adaptation strategies.
4. **Water Resource Management**: Integration of indigenous knowledge with modern scientific approaches leads to Sustainable water resource management.
5. **Healthcare**: Leads to discovery of new medicine and holistic healthcare

Objective-4: To identify Challenges in applying indigenous knowledge system in environmental sustainability

Challenges	Percentage (%)
Lack of Documentation	18
Limited scientific validation	15
Weak intergenerational transfer	12
Localized Nature	10
Policy and Institutional neglect	11
Integration difficulty with modern science	9
Intellectual Property and Exploitation issue	8
Environmental and Climate change impact	7
Socio-economic pressures	5
Data quality and research gaps	5



Major Findings:

1. The study reveals that Indigenous Knowledge Systems (IKS) play a crucial role in promoting environmental sustainability. Local communities have traditionally followed sustainable practices such as controlled harvesting, conservation of sacred groves, and community-based management of natural resources. These practices ensure ecological balance and long-term sustainability. The findings indicate that regions relying on indigenous knowledge demonstrate a higher level of environmental awareness and responsible resource use.

2. Traditional ecological practices significantly contribute to biodiversity conservation. Methods such as crop rotation, mixed cropping, organic farming, and traditional seed preservation help maintain soil fertility and protect diverse plant and animal species. The study finds that areas where such practices are prevalent tend to have richer biodiversity and more stable ecosystems compared to areas dominated by modern intensive agricultural methods.

3. The integration of indigenous knowledge with modern scientific approaches is found to be highly beneficial for sustainable development. While modern science provides advanced technology, data analysis, and scalability, indigenous knowledge offers locally adapted, cost-effective, and environmentally friendly solutions. The combination of these two systems enhances climate resilience and improves the effectiveness of environmental management strategies. The relevance of indigenous knowledge in the modern world remains strong, particularly in addressing contemporary environmental challenges such as climate change, land degradation, and water scarcity. The findings suggest a positive relationship between indigenous practices and modern sustainability frameworks. Rather than being outdated, indigenous knowledge complements scientific methods and provides valuable insights for sustainable development.

5. Despite its importance, the application of indigenous knowledge systems faces several challenges and limitations. These include lack of proper documentation, declining transmission of knowledge to younger generations, insufficient scientific validation, and limited policy support. Additionally, modernization and technological advancement have reduced dependence on traditional practices, posing a threat to their continuity.

Conclusion: The study concludes that Indigenous Knowledge Systems are an essential component of environmental sustainability and biodiversity conservation. Traditional ecological practices not only help in maintaining ecological balance but also provide sustainable solutions to modern environmental problems. The integration of indigenous knowledge with modern scientific approaches offers a more holistic and effective pathway toward sustainable development. However, to fully utilize its potential, it is necessary to address existing challenges through proper documentation, policy support, education, and awareness. Therefore, recognizing and promoting indigenous knowledge is vital for achieving long-term sustainability goals and building a resilient future aligned with national development visions such as Viksit Bharat @2047.

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