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From the Desk of Editor-in-Chief

We are excited to present the inaugural issue of the International Journal of Academic Research and Development (IJAR&D). This launch represents the culmination of extensive efforts from a diverse group of scholars committed to advancing academic knowledge and fostering practical applications.

In today's rapidly evolving academic landscape, high-quality research is more crucial than ever. It drives the development of robust theories that have tangible impacts in various fields. The International Journal of Academic Research and Development aims to provide a platform for scholars across disciplines to share innovative and impactful research. Our journal welcomes a wide range of methodological approaches and philosophical perspectives, reflecting our commitment to inclusivity and interdisciplinary dialogue.

As a distinguished publication by Bharti Publications, this journal is poised to stand at the forefront of academic research with a global perspective. What sets it apart is its profound commitment to embodying the true spirit of Indian Knowledge Systems (IKS), delving deep into the rich tapestry of ancient Indian traditions and methodologies in business administration and industry. This journal promises a harmonious fusion of contemporary research in emerging fields with time-honoured practices, creating a unique confluence that will distinguish it in the realm of academic publishing. By integrating modern insights with traditional wisdom, it aims to offer unparalleled contributions to the scholarly discourse, ensuring relevance and reverence in equal measure. This distinctive blend not only enhances the journal's appeal but also underscores its dedication to preserving and propagating the invaluable heritage of India's scholarly legacy, making it a beacon of innovation and tradition in the publication domain.

I extend my deepest gratitude to all our contributors whose dedication and hard work have made this issue possible. Being part of IJAR&D is a privilege, as we continually strive for excellence in research and publication. The articles in this issue have undergone rigorous peer review, and the constructive feedback from our expert reviewers has significantly enhanced the quality of the work presented. I am immensely grateful to our editorial team, whose tireless efforts have been invaluable: Dr. R.K. Uppal, Dr. R.S. Mishra, Dr. Sumanta Datta, and Mr. Pradeep Kumar Panda.

We are also profoundly thankful to our reviewers for their valuable time and insightful contributions. Their expertise ensures the academic rigor and integrity of our publications.

The International Journal of Academic Research and Development aspires to reach a global audience, contributing to the broader academic discourse and addressing contemporary issues. We hope that our readers will find the articles in this issue thought-provoking, relevant, and intellectually enriching.

Thank you for your interest in IJAR&D. We look forward to your continued support and engagement with our journal.

Prof. (Dr.) Rajeev Sijariya
Editor-in-Chief
Professor (Former Dean),
Atal Bihari Vajpayee School of Management and Entrepreneurship (ABVSME).
Jawaharlal Nehru University, New Delhi.

From the Desk of Managing Editor

Dear IJAR&D Readers,

Greetings !!!

We are glad to present nineteenth issue of IJAR&D which consists of 6 papers on various aspects namely Localisation of Sustainable Development Goals (SDG), Education & SDG, Gandhian Values & SDG, Mining & Sustainable Development, Green Future and Tribal Healthcare Infrastructure in India.

The joint paper of K C Rath and L P Panda embodies a pioneering exploration into the synergy between SDGs and the rural landscapes of India. The manuscript embarks on a journey to unveil the revolutionary capacity of SDGs in reshaping rural India, magnifying the significance of grassroots endeavors in propelling community development.

The joint paper of Nishu Bhadoriya, Aarti Dwivedi and Vinay Dwivedi presents examines the complex relationship between education and sustainable development, emphasising the transforming role that education plays in developing social justice, fostering environmental stewardship, and fostering individual empowerment. The paper emphasises the need for comprehensive and inclusive education systems that foster critical thinking, ethical decision-making, and a thorough understanding of the interconnectedness of ecological, social, and economic systems.

Dr. Amna Mirza's paper provides an essential blueprint for balancing concerns of growth and welfare in a holistic manner. As 2030 draws closer, the paper attempts to narrate the significance of SDGs and underline that Gandhian values carry immense potential as a guiding light for better outcomes. The paper also discusses the significance of the Gandhian approach as a globally beneficial approach that can augur well for economic development with social equity and inclusion.

Pradeep Kumar Panda's paper presents case study of Keonjhar District Mineral Fund, largest in the country, from point of view of Mining and Sustainable Development. Mining is essential for the economic growth of a nation and can be a partner in achieving the SDGs. Mineral wealth can be a blessing, provided the right measures are taken to transform it into sustainable development.

The joint paper of Adrija Bhattacharyya and Mohua Chatterjee aimed to assess conservation behaviour of a group of higher education students of West Bengal in respect of sex, level of education, and discipline studied, and to ascertain the relationship of conservation behaviour with environmental attitude.

Satrughan Behera's paper highlights the critical issue of infrastructure inadequacies in tribal regions and underscores the imperative of targeted interventions to rectify these deficiencies. The findings underscore the importance of strengthening healthcare facilities and augmenting the healthcare workforce in tribal regions as a means to achieve the goals of Universal Health Coverage and the health-related SDGs.

We thank all the authors for their insightful papers which will certainly enrich our readers. We take this opportunity to thank all our reviewers for their structured efforts. We express our heartfelt thanks to all our journal subscribers and readers for their relentless support which provide our team motivation to bring out journal issue in desirable shape. We commit ourself to bring out high quality issues in future.

Best Wishes from IJAR&D !!!

Thanking You

Pradeep Kumar Panda
Managing Editor

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Empowering Rural India: Localizing SDGs for Community Development

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Abstract

"Empowering Rural India: Localizing SDGs for Community Development" embodies a pioneering exploration into the synergy between Sustainable Development Goals (SDGs) and the rural landscapes of India. The manuscript embarks on a journey to unveil the revolutionary capacity of SDGs in reshaping rural India, magnifying the significance of grassroots endeavors in propelling community development. The narrative unfolds through the prism of customized SDGs, envisaging an empowered rural India where localization is the linchpin for fostering comprehensive societal advancement. The discourse navigates the current rural milieu, spotlighting emergent paradigms that usher in a novel era of SDG localization for holistic progress. This investigation stands testament to the transformative potency of indigenous initiatives, underscored by a compendium of poignant case studies that effectively infuse SDGs into the rural fabric. As the chapters unravel, a tapestry of best practices and community-led triumphs takes center stage, setting a guiding light for analogous undertakings. With visionary zeal, the manuscript culminates in a forward-looking synthesis, positing SDG localization as the bedrock for a future rural India characterized by prosperity, inclusivity, and sustainability. In this tapestry of ideas, the potential for a brighter, more equitable rural India emerges, woven together by the threads of localized SDGs and ignited by local innovation."

Keywords: *Empowering Rural India, SDGs, Rural Transformation, Community-led Triumphs, Emergent Paradigms, Prosperity and Sustainability.*

1. Introduction

The chapter "Empowering Rural India: Localizing SDGs for Community Development," explores the connection between India's rural areas and the United Nations' Sustainable Development Goals (SDGs). Emphasizing grassroots innovation, it delves into rural challenges and showcases various strategies for improving living standards while aligning with the SDGs. Effective SDG implementation relies on a bottom-up approach, with 65% of targets requiring local engagement, emphasizing the role of local authorities, civil society, and grassroots actors. Tailoring the SDGs (Bardal et al., 2021) to specific socio-economic, environmental, and cultural contexts is crucial for comprehensive success. Engaging local actors, including governments and NGOs, fosters ownership and innovative solutions, supported by capacity-building and multi-stakeholder partnerships for successful local SDG integration.

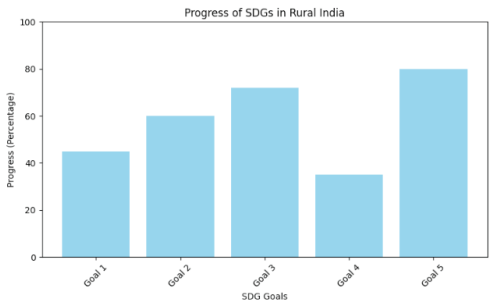
The approach to implementing the Sustainable Development Goals (SDGs) has traditionally been top-down. However, to effectively attain the SDG targets, a shift towards a bottom-up approach is imperative (Tiwari et al, 2021). Regrettably, numerous Indian city governments currently assign low priority to the Sustainable Development Goals (SDGs). This paper emphasizes tailored SDGs and envisions rural India's empowerment through localization, involving grassroots participation and institutions like village councils. It acknowledges the need to align universal sustainability goals with diverse local contexts, emphasizing organic, community-driven development.

The chapter highlights localization's transformative potential with real-life examples, like a Rajasthan village addressing water scarcity through traditional and modern techniques, uplifting well-being, and offering practical inspiration. Ultimately, the manuscript paints a vivid picture of a future where rural India, guided by local innovation and SDG localization, emerges as a model of prosperity, inclusivity, and sustainability (Khalid, 2021).

This content delves into aligning SDGs with rural India, emphasizing grassroots initiatives and showcasing case studies for a more prosperous, inclusive, and sustainable future.

1.1 Importance of SDGs in reshaping rural India and promoting community development.

The array of government initiatives in rural India has been instrumental in addressing multifaceted challenges and improving the lives of its citizens. Programs like the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) have provided crucial livelihood security by offering wage employment during agricultural off-seasons, while the Pradhan Mantri Awaas Yojana (PMAY) endeavors to provide affordable housing with basic amenities to rural households. Initiatives such as the Swachh Bharat Abhiyan promote cleanliness and sanitation by constructing toilets in rural households, and the National Rural Livelihood Mission (NRLM) empowers rural communities through self-help groups (SHGs) and skill development. Other programs like the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) enhance agricultural productivity, and the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) reduce unemployment through skill development for rural youth. Meanwhile, healthcare access is improving through the National Rural Health Mission (NRHM) and Ayushman Bharat. Rural electrification, digital connectivity, road development, water supply, food security, watershed management, and vocational training further underscore the government's commitment to holistic rural development.



While these programs have made substantial improvements in rural India, there remains an ongoing imperative for sustained government investment in rural development to ensure comprehensive coverage and equitable benefits for all.

Result Analysis:

- Average Progress: 58.40%
- SDG Goal with Max Progress: **Goal 5**

2. Empowering Rural Communities through localization of SDGs

Successful localization of SDGs in rural areas hinges on active community involvement in planning, aided by strengthening local institutions and providing necessary resources. Customizing SDGs means adapting global goals to community-specific needs, necessitating targeted strategies and resource allocation for effective implementation. Strategic investments in robust infrastructure, including transportation and utilities, are essential drivers of economic and social progress. For example, climate-smart practices are important and it is included to use less water and fertilization (Kasinathan, at al. 2022). Furthermore, guaranteeing high-quality education that is accessible to all, irrespective of gender or social background, is fundamental for cultivating a skilled workforce. The empowerment of women through education, healthcare, leadership opportunities, and sustainable agricultural practices constitutes the foundation for the prosperity of rural communities. Encouraging microfinance with small loans supports entrepreneurial endeavors, fostering economic growth. Addressing discrimination against marginalized groups, including women and individuals with disabilities, is essential for societal cohesion and prosperity.

Customizing the SDGs involves tailoring global objectives to the specific needs of each community, taking into consideration their unique challenges and opportunities. This entails the development of targeted strategies and the mobilization of resources for effective implementation. Critical to this process is investing in robust infrastructure, including transportation and utilities, which plays a pivotal role in driving economic

and social progress. Additionally, ensuring equitable access to quality education, regardless of gender or social background, is crucial for nurturing a skilled workforce. Empowering women through education, healthcare, leadership roles, and sustainable agricultural practices forms the bedrock for fostering prosperity within rural communities. By acknowledging and harnessing local wisdom, culture, and resources, these endeavors serve as catalysts for comprehensive development, propelling rural India toward a more prosperous, inclusive, and sustainable future (Khalid and Dubey, 2021).

2.1 Benefits of Localized SDGs

Localized SDGs yield several advantages. Firstly, they ensure that development efforts are efficient and enduring, as they are tailored to the distinct requirements of local communities. Secondly, they foster trust and collaboration among local governments, communities, and other stakeholders. Lastly, localized SDGs promote social inclusion and uplift marginalized groups.

2.1.1. Strategies for Localizing the SDGs in Rural India

Effectively localizing development efforts in rural communities entails a multifaceted approach. It begins with participatory planning, engaging communities to identify specific needs and co-create strategies. Capacity building empowers community members to actively contribute, ensuring project sustainability. Strengthening local institutions like panchayats enhances their influence, while resource mobilization and continuous monitoring enable responsive and effective localization. Localizing the SDGs in rural India empowers communities, promoting fairness through initiatives such as women's entrepreneurship in microfinance, sustainable agriculture, and enhanced access to healthcare and education, all driving progress towards a more equitable and sustainable future.

3. Unveiling the Synergy between SDGs and Rural India

In the serene rural landscapes of India, a profound transformation is taking shape, propelled by the United Nations' Sustainable Development Goals (SDGs). Amidst this natural beauty, the SDGs have become a tangible force, instigating tangible change. Success stories emerge from remote corners, like Sudha's farm in Bihar, where sustainable agricultural practices have uplifted communities from poverty, exemplifying SDGs 2, 12, and 15. In Gujarat's Kutch region, empowered women artisans are breaking free from traditional constraints, aligning with SDGs 5, 8, and 10. Even in the conflict-ridden terrain of Dantewada, quality education embodies SDG 4, offering a transformative path. This synergy between the SDGs and rural India is not merely policy-driven but deeply rooted in culture and ecology, preserving local uniqueness while addressing disparities. Rural India's progress hinges on the SDGs, promising a brighter, more inclusive, and sustainable future, one village at a time. Kerala's remarkable reduction in poverty, from 59.74% in 1973 to 0.73% in 2019, stands as a testament to the impact of social movements, land reforms, and comprehensive literacy campaigns. The People's Plan Campaign's decentralized approach aligns development with local needs, while a robust social safety net safeguards against poverty's grip, encompassing food assistance, healthcare, and pensions (Elamon, 2022).

3.1 Exploring the foundational connection between SDGs and rural development

The Sustainable Development Goals (SDGs) established by the United Nations provide a comprehensive framework to address global challenges (Jimmy, 2023) and promote sustainable development across various dimensions. In the context of India, a country with a significant rural population, understanding the foundational connection between SDGs and rural development is crucial. This article delves into the interplay between SDGs and rural development in India, highlighting key goals and providing a case study to illustrate their real-world impact (Khalid, 2021). The SDGs and Their Relevance to Rural Development:

SDG 1: No Poverty- Poverty alleviation is a primary concern in rural India, where a substantial portion of the population lives below the poverty line.

- **Case Study:** The Pradhan Mantri Jan Dhan Yojana (PMJDY) has expanded banking services to rural households, reducing financial exclusion and aiding poverty alleviation.

SDG 2: Zero Hunger -Rural development is closely linked to agriculture, and SDG 2 emphasizes the need for food security and sustainable agriculture.

- **Case Study:** The Green Revolution in India, initiated in the 1960s, significantly increased food production and reduced hunger in rural areas.

SDG 3: Good Health and Well-being - Access to healthcare services is a critical aspect of rural development, contributing to improved health and well-being.

- **Case Study:** The National Rural Health Mission (NRHM) in India has aimed to provide accessible and affordable healthcare services in rural areas, leading to better health outcomes.

SDG 4: Quality Education - Education is a fundamental driver of rural development, enabling individuals to acquire skills and improve livelihoods.

- **Case Study:** The Sarva Shiksha Abhiyan (SSA) is a program focused on universalizing elementary education in rural India, increasing school enrollment and literacy rates.

SDG 6: Clean Water and Sanitation - Access to clean water and sanitation facilities is essential for rural development, reducing waterborne diseases and improving living conditions.

- **Case Study:** The Swachh Bharat Abhiyan (Clean India Mission) has made significant strides in rural sanitation, constructing toilets and promoting hygiene practices.

SDG 7: Affordable and Clean Energy - Sustainable energy sources can enhance rural development by powering agriculture and promoting economic activities.

- **Case Study:** The Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) aims to provide continuous power supply to rural areas, facilitating economic growth.

SDG 8: Decent Work and Economic Growth - Rural development relies on creating job opportunities and promoting economic growth in rural regions.

- **Case Study:** The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) guarantees 100 days of wage employment to rural households, reducing unemployment and boosting income.

SDG 11: Sustainable Cities and Communities - Sustainable rural development balances urban growth and migration. SDG 11 aims for inclusive, safe, and eco-friendly cities with affordable housing, efficient planning, sustainable transport, and heritage preservation, promoting livable and sustainable urban environments. **(Vidya and Charatjee, 2020)**

- **Case Study:** The Amrut Mission focuses on developing sustainable infrastructure and services in rural and urban areas, promoting balanced development.

SDGs offer a framework for rural development in India, showcasing impactful policies and initiatives. Case studies underscore the connection between SDGs and rural development (Coonord, 2019). Achieving these goals is essential for building a more equitable and prosperous future for rural communities in India and across the globe.

Table- 1: SDG Parameters, Indicator of India comparison in 2021 & 2023

SDG	Parameter	Indicator	Year 2021 Value	Year 2023 Estimate
SDG 1	Poverty Rate	%	21.9	20.5
SDG 2	Malnutrition Rate	%	20.7	19.2
SDG 3	Maternal Mortality Rate	Per 100,000	113	105
SDG 4	Literacy Rate	%	74	76.5
SDG 6	Access to Clean Water	%	69.3	72.1
SDG 7	Rural Electrification Rate	%	85.2	87.5
SDG 8	Rural Unemployment Rate	%	7.8	7
SDG 11	Access to Adequate Housing	%	62.5	64.8

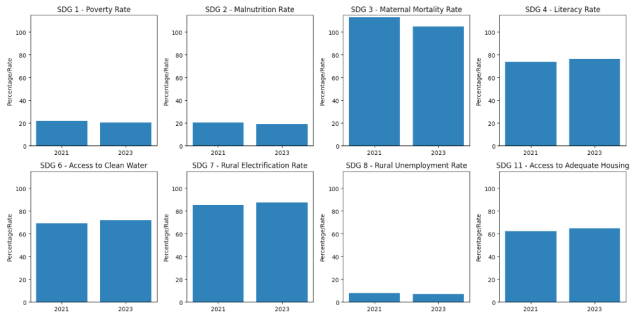


Figure 1: SDG Parameters, Indicator of India comparison in 2021 & 2023

Result Analysis:

SDG 1 - Poverty Rate: The graph shows a decrease in the poverty rate from 21.9% in 2021 to 20.5% in 2023. This indicates progress in poverty reduction efforts in rural India over this period.

SDG 2 - Malnutrition Rate: The graph displays a decline in the malnutrition rate from 20.7% in 2021 to 19.2% in 2023. This suggests positive developments in addressing malnutrition issues in rural areas.

SDG 3 - Maternal Mortality Rate: The graph shows a decrease in the maternal mortality rate from 113 per 100,000 in 2021 to 105 per 100,000 in 2023. This points to improved maternal healthcare services and outcomes in rural India.

SDG 4 - Literacy Rate: The graph reveals an increase in the literacy rate from 74.0% in 2021 to 76.5% in 2023.This signifies progress in promoting education and literacy in rural regions.

SDG 6 - Access to Clean Water: The graph illustrates an improvement in access to clean water, with an increase from 69.3% in 2021 to 72.1% in 2023. This reflects efforts to provide safer water sources to rural communities.

SDG 7 - Rural Electrification Rate: The graph indicates an increase in rural electrification, rising from 85.2% in 2021 to 87.5% in 2023. This suggests expanded access to electricity in rural areas, which can stimulate economic activities.

SDG 8 - Rural Unemployment Rate: The graph shows a decrease in the rural unemployment rate from 7.8% in 2021 to 7.0% in 2023. Mentioned points to improved employment opportunities and livelihoods in rural India.

SDG 11 - Access to Adequate Housing: The graph displays a rise in access to adequate housing, increasing from 62.5% in 2021 to 64.8% in 2023. This indicates progress in providing better housing conditions to rural residents.

The intricate link between rural development and the Sustainable Development Goals (SDGs) highlights rural areas' pivotal role in global sustainability, encompassing dimensions like poverty alleviation, healthcare, education, gender equality, and environmental stewardship. Recognizing these ties emphasizes the need for context-specific policies and collaborative efforts for a fairer, sustainable future.

4. SDGs serve as a framework for addressing diverse challenges in rural areas of Odisha.

Rural development in Odisha, an eastern Indian state, has faced enduring challenges such as poverty, limited access to education, healthcare, clean water, and economic opportunities, which resonate with rural areas worldwide. To address these multifaceted issues and promote sustainable development, the United Nations introduced the Sustainable Development Goals (SDGs). Odisha, like other Indian states, has wholeheartedly embraced the SDGs as a comprehensive framework to tackle these challenges, implementing various innovative programs and initiatives.

4.1 The SDGs in Odisha:

Odisha's rural landscape is characterized by its diversity, from the tribal hinterlands of Koraput to the coastal regions of Puri. The implementation of the SDGs takes into account these regional disparities and aims to create inclusive and equitable development for all.

Creating customized SDGs tailored to unique socio-economic, cultural, and environmental characteristics of Odisha is essential to empower its rural communities and drive localized sustainable development.

Customized SDGs and their significance in empowering rural Odisha through localization include:

SDG 1: No Poverty: Odisha Government not only initiated Krushak Assistance for Livelihood but also the KALIA scheme implemented as support to SDG.

SDG 2: Zero Hunger: Addressing food security through sustainable food production and schemes like Mission Shakti.

SDG 3: Good Health and Well-Being: Odisha Government followed Mukhyamantri Swasthya Sevika Scheme to bridge the healthcare gaps.

SDG 4: Quality Education: Improving school access and quality through initiatives like Biju Krushak Kalyan Yojana (BKKY).

SDG 5: Gender Equality: The government of Odisha runs Mission Shakti scheme to empower women and gender equality.

SDG 6: Clean Water and Sanitation: Providing safe drinking water, sanitation, and hygiene awareness.

SDG 7: Affordable and Clean Energy: Promoting clean and affordable energy sources, including decentralized solar energy.

SDG 8: Decent Work and Economic Growth: Enhancing livelihoods through skill development, local entrepreneurship, and sustainable employment.

SDG 9: Industry, Innovation, and Infrastructure: Improving rural infrastructure, digital connectivity, and market access.

SDG 10: Reduced Inequalities: Empowering marginalized groups and ensuring equitable access to resources.

SDG 11: Sustainable Cities and Communities: Planned development, waste management, and eco-friendly practices for vibrant rural communities.

SDG 12: Responsible Consumption and Production: Promoting sustainable agriculture, reducing food waste, and responsible consumption.

SDG 13: Climate Action: Community-based climate adaptation, afforestation, and sustainable land use.

SDG 14: Life Below Water: Efforts in rural Odisha include promoting sustainable fishing practices and biodiversity conservation to safeguard local ecosystems.

SDG 15: Life on Land: Localized SDG 15 initiatives in rural Odisha focus on afforestation and biodiversity conservation to preserve local ecosystems and maintain livelihoods.

SDG 16: Peace, Justice, and Strong Institutions: Fostering community-based conflict resolution, transparency in local governance, and access to justice.

SDG 17: Partnerships for the Goals: Strengthening collaborations between local governments, NGOs, and communities for collective progress.

4.2 Schemes and Initiatives in Odisha:

Mission Shakti in Odisha (SDG 5) empowers women through self-help groups, promoting gender equality, economic growth (SDG 8), and poverty reduction (SDG 1) in rural areas. Simultaneously, the Biju Swasthya Kalyan Yojana (SDG 3) provides free healthcare, reducing financial burdens and supporting well-being, in line with SDG 3's objective of ensuring healthy lives.

The Biju Krushak Kalyan Yojana (SDG 2 and 8) offers financial assistance to farmers during challenging times, fostering food security (SDG 2) and rural livelihoods (SDG 8). The Har Ghar Jal initiative (SDG 6) ensures access to clean water, aligning with SDG 6's clean water and sanitation goal. Odisha Adarsha Vidyalaya (SDG 4) model schools provide quality rural education, bridging the urban-rural education gap envisioned by SDG 4.

The impact of these schemes can be seen in various ways. Poverty rates have decreased in many rural areas due to improved livelihoods, health indicators have improved with better access to healthcare, and the literacy rate has seen positive trends. Additionally, Odisha has made significant progress in clean water access and sustainable agricultural practices

5. SDG Goal with Indicators targets and achievements over the period of time 2018-2020

An examination of two specific Sustainable Development Goals, particularly SDG 1 (No Poverty), which strives to eliminate poverty in all its facets, reveals its reliance on various technical indicators for assessment and monitoring. These indicators encompass measuring the proportion of individuals living below the national poverty line, assessing the employment opportunities provided under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), and evaluating the percentage of households with members covered by health schemes or health insurance. In 2018, both India and Odisha achieved approximately 84.75% and 84.76%, respectively, in providing employment under MGNREGA, with slight improvements noted in 2019. Notably, Odisha made commendable progress, reaching 98.96% employment coverage. However, there remains room for improvement, as only 28.7% of the Indian population typically enjoys employment coverage, compared to 47.7% in Odisha.

On the other hand, Sustainable Development Goal 2 (SDG 2) sets its sights on achieving "Zero Hunger" through strategies that encompass ensuring food security, enhancing nutritional standards, and promoting sustainable agricultural practices. The goal includes specific targets, such as eradicating malnutrition, doubling agricultural productivity, and instituting sustainable farming methods to guarantee widespread access to nutritious food. SDG 2 holds significant importance within the United Nations' broader 2030 Agenda for Sustainable Development. Furthermore, it is noteworthy that approximately 95% of the population benefits from the National Food Security Act (NFSA), yet a challenge persists, with around 34% of children in both India and Odisha being underweight (Table -2)

Table 2: Performances of SDGs Indicators of Goal -1 & 2
India / Odisha over the period of time 2018 -2020

Goal -1 (No Poverty)						
	2018		2019		2020	
Indicators	India	Odisha	India	Odisha	India	Odisha
Persons provided employment as a percentage of persons who demanded employment under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)	100 (84.75)	84.76	100 (85.26)	85.8	98.95 (84.44)	98.96
Percentage of population living below the national poverty line	10.95 (21.92)	32.59	10.96 (21.92)	32.59	10.96 (21.92)	32.59
Percentage of households with any usual member covered by a health scheme or health insurance	100 (28.7)	47.7	100 (28.7)	47.7	100 (28.7)	47.7
Proportion of the population (out of total eligible population) receiving social protection benefits under Maternity Benefit	100 (36.4)	72.6	100 (36.4)	72.6		
Percentage of the population (out of total eligible population) receiving social protection benefits under Pradhan Mantri Matru Vandana Yojana (PMMVY)					100 (91.38)	
Number of homeless households	0 (10.39)	7.11				
Percentage of households living in katcha houses			0 (4.2)	14.2	0 (4.2)	14.2
Goal – 2 (No Hunger)						
% of Children under 5 years who are stunted	21.03 (38.4)	34.1	2.5 (34.7)	29.1	6 (34.7)	29.1
% of beneficiaries under NFSA					100 (99.51)	94.98
% of pregnant women aged 15-49 years who are anemic	23.57 (50.3)	47.6	23.57 (50.3)	47.6	25.2 (50.4)	47.6
Ratio of rural households covered under public distribution system to rural households where monthly income of highest earning member is less than ₹ 5000/-	1.29 (1.01)	0.93	1.29 (1.01)	0.93		
Rice what and core cereals produced annually per unit of area	5018.442 (2509.22)	1485.15	5033.34 (2516.67)	1820	5322.08 (2995.21)	2003.84
Percentage of children aged 6-59 months who are anemic (Hb<11.0 g/dl)			14 (40.5)	37.2		
% of children under 5 years who are underweight			0.9 (33.4)	29.2	1.9 (33.4)	29.2

Source : https://sdgindiaindex.niti.gov.in/#/

6. Discussing the role of local knowledge, culture, and institutions in tailoring SDGs to rural communities.

Effectively implementing the Sustainable Development Goals (SDGs) in rural areas requires respecting local knowledge, culture, and institutions. Engagement through inclusive methods ensures SDGs align with specific rural needs. Multiple avenues, like utilizing local wisdom for sustainable agriculture and fostering social cohesion through cultural practices, empower communities. By integrating these elements, SDGs become attainable and sustainable, as evident in Odisha's successful adaptation.

5.1 Here are some specific examples of how to navigate the current rural environment:

Navigating rural environments involves adapting and thriving in settings distinct from urban areas, which come with unique challenges and advantages. Promoting sustainable agriculture is essential for food security, poverty reduction, and environmental preservation, achieved by educating farmers, providing resources, and supporting sustainable farm businesses. Leveraging Indigenous Local Knowledge Practices (ILKP) like shifting cultivation (Jhum) holds promise for forest and biodiversity conservation, aligning with SDGs such as Preventing poverty (SDG-1), eradicating hunger (SDG-2), and sustaining terrestrial ecosystems (SDG-15). (Dasgupta et al., 2023).

Example 1: Odisha has promoted sustainable rice cultivation through the System of Rice Intensification (SRI). Farmers are trained in SRI techniques, which use less water and fewer seeds while increasing yields.

Odisha Government's Action: The Odisha government, through the Directorate of Agriculture and Food Production, actively promotes sustainable agriculture by training farmers, distributing improved seeds, and providing financial incentives for adopting sustainable farming practices.

Developing Rural Tourism: Rural tourism means having people visit the countryside to enjoy its culture and natural beauty. This can make money and jobs for people in rural areas. To do this, we can tell people about the interesting things in rural places, make sure there are good roads and places for tourists to stay, and help local businesses in rural tourism.

Example-2: The scenic village of Raghurajpur in Odisha, renowned for its traditional Pattachitra art, has been endorsed by the government as a rural tourism destination, inviting tourists to experience the richness of local art and culture.

Odisha Government's Action: The Odisha Tourism Department has developed infrastructure like guesthouses and information centers in rural areas. They organize cultural festivals and promote eco-tourism to attract tourists to rural destinations.

Using ICT to Improve Access to Services: We can use technology (like computers and phones) to make it easier for people in rural areas to get education, healthcare, and other important services. This means giving people access to the internet, creating online classes, and using mobile phones for healthcare.

Example-3: The Odisha government has introduced an e-Governance platform that allows residents of remote villages to access government services, apply for various certificates, and receive updates through a digital portal.

Odisha Government's Action: The Odisha State Wide Area Network (OSWAN) project endeavors to extend internet connectivity to the remotest regions of the state, facilitated by Common Service Centers (CSCs) in rural areas offering digital services like telemedicine and e-learning.

Supporting Social Entrepreneurship: Social entrepreneurs aim to solve local problems and improve communities, and supporting them includes providing funding, teaching skills, and creating a supportive environment.

Example: "MILLET," a social enterprise in Odisha, focuses on reviving traditional millet cultivation. They provide training to farmers and create a market for millet-based products, benefiting both farmers and consumers.

Odisha Government's Action: The government has set up the Odisha MSME Development Policy to encourage and support micro, small, and medium enterprises. They offer financial aid, technical assistance, and create a conducive environment for social entrepreneurs to thrive.

Fostering Community- Based Development: Community-based development means that the people who live in a community work together to make their area better. We can help by supporting community groups, teaching community leaders, and giving money for community projects."

Example: In a coastal village prone to cyclones, the community has come together to build storm shelters

and educate residents on disaster preparedness. This initiative has made the village more resilient.

Odisha Government's Action: The Odisha Disaster Management Authority (OSDMA) collaborates with local communities to develop disaster resilience plans. They provide funds for community-based projects, conduct training programs, and support the formation of Village Disaster Management Committees.

6. Analyzing gaps in current approaches and the potential for SDG localization to fill these gaps.

Analyzing the shortcomings in current methodologies and the potential of localizing Sustainable Development Goals (SDGs) is an essential endeavor. It involves a comprehensive assessment of the limitations in current strategies compared to the opportunities presented by SDG localization. This evaluation helps identify areas where conventional approaches may not adequately meet sustainable development goals and emphasizes the capacity of localized initiatives to effectively address these gaps. By scrutinizing these disparities, we can pave the way for more targeted and context-specific efforts that align with the core principles of the SDGs, ultimately driving progress toward a more equitable and sustainable future (Chatterjee, 2021).

Here are some specific examples of how existing development initiatives are aligned with the SDGs:

Several international organizations, including the Global Alliance for Improved Nutrition (GAIN), World Health Organization (WHO), United Nations Environment Programme (UNEP), and the World Bank, are actively working in alignment with SDGs to address critical global challenges. GAIN focuses on improving nutrition and health, with a particular emphasis on targets related to hunger, malnutrition, and health. The World Health Organization (WHO) is dedicated to advancing global health. It focuses on the Sustainable Development Goals (SDGs) related to reducing child mortality, enhancing maternal health, and combating diseases like HIV/AIDS, malaria, and tuberculosis. UNEP's mission is centered on environmental protection, particularly concerning climate change, sustainable consumption and production, and the conservation of terrestrial ecosystems in line with the SDGs. The World Bank, as a financial aid provider to developing nations, aligns its efforts with the SDGs, working through lending programs and technical assistance to contribute to these global goals, although the journey towards their full attainment continues, necessitating ongoing support and innovative strategies for a more promising future for all.

7. Conclusion

In summary, the chapter titled "Empowering Rural India: Localizing SDGs for Community Development," with a specific focus on the Odisha case study, underscores the considerable potential of sustainable development goals to bring about transformative improvements in rural India. It emphasizes the adaptability of these goals to address the unique challenges of diverse regions. Through real-life examples and case studies, it vividly illustrates how collaborative efforts within communities, tailored to their specific contexts, can lead to remarkable progress in rural development. This chapter not only inspires by showcasing the opportunities presented by sustainable development goals but also reaffirms the pivotal role of localized initiatives in driving substantial positive changes in rural India.

8. Future scope:

Looking ahead, the potential for advancing rural development in India through localized Sustainable Development Goals (SDGs) is promising, with customization to rural needs, technology integration, and strong partnerships across government, NGOs, and the private sector. Capacity building, community empowerment, monitoring, and scaling of successful models will be pivotal, fostering sustainability, innovation in agriculture and climate resilience, and engaging youth for a more inclusive and prosperous rural India.

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Education and Sustainable Development: Empowering Individuals and Building a Sustainable Future

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Abstract

Education is essential for promoting sustainable development because it gives people the knowledge, skills, and morals they need to tackle the world's most difficult problems. This chapter examines the complex relationship between education and sustainable development, emphasising the transforming role that education plays in developing social justice, fostering environmental stewardship, and fostering individual empowerment. This chapter presents various educational approaches, initiatives, and policies that support sustainable development, drawing on the most recent research and references. It emphasises the need for comprehensive and inclusive education systems that foster critical thinking, ethical decision-making, and a thorough understanding of the interconnectedness of ecological, social, and economic systems.

Keywords: *Education, Sustainable Development, Transformative Learning, Environmental Stewardship, Social Justice.*

Introduction

An essential human right and effective means of promoting sustainable development is education. The Sustainable Development Goal 4 (SDG 4) of the United Nations acknowledges the crucial role that education plays in advancing the larger sustainable development agenda. When combined with sustainability principles, education has the power to address urgent global issues including biodiversity loss, inequality, and climate change. This chapter discusses the connections between education and sustainable development, showcasing the most recent studies and sources that highlight how crucial education is to creating a sustainable future.

A method of educating with the goal of empowering people and communities to actively contribute to the creation of a more sustainable and just future is known as education for sustainable development (ESD). It acknowledges that education must take a holistic and transformative approach in order to address sustainability concerns like climate change, biodiversity loss, poverty, and social injustice.

ESD goes beyond the conventional emphasis on skill development and knowledge acquisition. It combines the environmental, social, and economic facets of sustainability while fostering ethical reasoning, critical thinking, and proactive participation in sustainable

practises. The objective is to empower people to comprehend how social, economic, and environmental concerns are interconnected and to be able to make decisions that contribute to a sustainable future.

1. The following are important tenets of education for sustainable development:

1.1: Learning that is holistic and cross-disciplinary is encouraged by ESD, which integrates sustainability's environmental, social, and economic elements. It encourages a comprehensive comprehension of intricate problems and the connections between various systems.

1.2: Systems Thinking: ESD promotes a systems thinking strategy that places an emphasis on comprehending the interactions and relationships within systems. It enables students to understand how their choices affect numerous facets of sustainability and motivates them to think about the long-term effects of their choices.

1.3: Experiential and Participatory Learning: ESD encourages active learning strategies like problem-solving, project-based learning, and collaborative methods. It motivates students to work with others, tackle real-world problems, and put their knowledge and abilities to use.

ESD places a strong emphasis on critical thinking abilities that allow students to analyse complicated sustainability concerns, challenge presumptions, and consider other viewpoints. It promotes self-reflection on beliefs, attitudes, and behaviours, which fosters a sense of agency and responsibility for sustainable development.

1.4: Global and Local Perspectives: ESD understands how local and global sustainability challenges are intertwined. It challenges students to think about their local environments and difficulties while also understanding the wider effects of their decisions. It encourages a sense of global citizenship and a dedication to solving the world's sustainability problems.

1.5: Ethical Considerations: ESD promotes moral reflection and decision-making based on ideals. In order to achieve sustainable development, it emphasises the significance of social justice, equity, and human rights. It encourages compassion, tolerance of difference, and knowledge of how the social, economic, and environmental facets of sustainability are interconnected.

By incorporating these tenets into educational practises, ESD aims to improve societies by enabling people to take an active role in bringing about change. By building a thorough grasp of sustainability issues, developing critical thinking abilities, and encouraging responsible and ethical behaviour, it seeks to create a more sustainable future.

Formal education (schools, colleges, and universities), non-formal education (community-based organisations, NGOs), and informal education (media, public awareness campaigns) are all educational levels and contexts where ESD can be implemented. To ensure the integration of sustainable development principles throughout curriculum and educational practises, collaboration is needed among educators, policymakers, and communities.

2: Sustainable Development Education: A Transformative Approach

2.1: Education Has the Power to Transform Lives

Education has the ability to change lives in ways that go beyond simply imparting knowledge and skills. It has the capacity to significantly influence people, communities, and society, bringing about favourable change in a number of areas. The following are some significant ways that education can transform:

2.2: Personal Development: Education offers chances for personal expansion and improvement. It gives people knowledge, critical-thinking skills, and problem-solving talents. Education helps people become more self-aware, self-confident, and empowered so they can reach their full potential and achieve their objectives.

2.3: Social Mobility: Education is an effective instrument for promoting social mobility and ending the cycle of inequality and poverty. People can obtain greater work possibilities, raise their socioeconomic standing, and give back to their communities. Education can aid in bridging social divides, encouraging inclusivity and lowering inequalities.

2.4: Empowerment and Agency: Education gives people the knowledge, abilities, and information they need to make wise decisions. It fosters a sense of agency, empowering people to actively engage in civic life, assert their rights, and make a positive difference in society. Education fosters social responsibility and critical thinking, enabling people to take an active role in their communities.

2.5: Communities Can Be Transformed: Education Has the Power to Change Whole Communities. All community members can benefit from receiving a high-quality education, which helps to break the cycle of poverty and build more inclusive and

sustainable societies. By tackling social, economic, and environmental issues, educated people can positively impact their communities.

2.6: Values and ethics formation: Education is crucial in forming values, attitudes, and ethical viewpoints. It instills social justice, empathy, respect, and tolerance values. Education encourages people to become ethical and responsible citizens, promotes inclusivity, and builds an understanding of variety. It aids in the creation of a society that is more just and caring.

2.7: Innovation and Progress: Education fosters creativity, critical thinking, and problem-solving abilities, which fuel innovation and progress. It gives people the information and abilities they need to take on challenging problems and come up with creative solutions. Education supports social progress, economic expansion, and advances in science and technology.

2.8: Cultural Preservation and Appreciation: Education protects and advances diversity and cultural heritage. It encourages respect and intercultural understanding by fostering an appreciation for various cultures, customs, and viewpoints. The retention of indigenous information, languages, and cultural practises depends heavily on education.

2.9: Sustainable Development: Achieving sustainable development is crucial. It provides people with the information and understanding they need to understand environmental, social, and economic challenges. Promoting ethical and sustainable behaviour, education for sustainable development equips people to tackle issues like climate change, biodiversity loss, and inequality.

3: Integrating Sustainability Throughout Educational Systems

For people to be equipped with the information, skills, and values necessary to address urgent environmental, social, and economic concerns, sustainability must be integrated across educational institutions. Here are some important factors to take into account when integrating sustainability into educational systems:

3.1: Integrate sustainability into the curriculum by incorporating it into all courses and disciplines. Include in lesson plans and instructional materials the ideas of sustainability, environmental stewardship, social justice, and economic resilience. Place a focus on multidisciplinary methods for comprehending challenging environmental concerns.

3.2: Training and opportunities for professional development for teachers should be made available, with a focus on sustainability education. Give instructors the information, pedagogical techniques, and tools they need to teach sustainability principles and promote inquiry- and experiential-based learning.

3.3: Practises and Policies in Schools: Adopt sustainability-related practises and policies in educational institutions. Encourage sustainable business practises, such as waste reduction, water conservation, and energy efficiency. Implement eco-friendly building techniques, sustainable transportation methods, and environmental management systems in school buildings.

3.4: Encourage experiential learning and outdoor education to promote a close relationship with the natural world and the environment. Include field trips, outdoor activities, and hands-on projects to give children the opportunity to interact with sustainability challenges in authentic settings. Encourage your children to learn about their local ecosystems and how they contribute to environmental preservation.

3.5: Encourage partnerships and collaborations with neighbourhood businesses, NGOs, and community organisations to further sustainability education. Participate in service-learning initiatives with students that address regional sustainability issues, such as community gardens, recycling programmes, or campaigns for environmental advocacy. Encourage students to take an active role in their communities and be changemakers.

3.6: Utilise technology and online learning platforms to improve the teaching of sustainability. Use interactive tools, virtual simulations, and online resources to understand complex systems and sustainability ideas. In order to address environmental challenges, such as e-waste management or sustainable digital practises, promote digital literacy and responsible technology use.

3.7: Global Perspectives and Cultural Diversity: Make a point of including these concepts into sustainability teaching. Examine various cultural stances on sustainability and encourage awareness of various viewpoints on environmental and social issues. Encourage cooperation, respect, and empathy among students from all cultures and backgrounds.

3.8: Develop appropriate evaluation and assessment techniques to gauge the success of sustainability education. Evaluate the information, skills, attitudes,

and behaviours that students have learned about sustainability. Review and adapt the curriculum as needed, taking into account student comments and evaluation findings.

3.9: Support for Education Policy and Leadership: Ensure that leaders and policymakers in the field of education give sustainability a high priority. Promote legislation that funds professional development, supports sustainability education, and incorporates sustainability into frameworks and standards for education. Encourage stakeholder cooperation to spur systemic change.

We can equip future generations with the information, skills, and values required to confront difficult sustainability challenges by incorporating sustainability across educational systems. It gives people the skills they need to become engaged, knowledgeable, and responsible world citizens who can make a positive impact on a more sustainable and just society.

4. Learning through Experience and Place for Environmental Stewardship

Environmental stewardship education can be effectively delivered through experiential and place-based learning. They offer interactive, hands-on learning opportunities that immerse students in their surroundings and promote a deeper understanding and appreciation of nature. These methods can be used in the context of environmental stewardship in the following ways:

4.1: Experiential Learning: Active participation and reflection on actual experiences are part of experiential learning. It focuses on the notion that individual involvement and self-reflection are the greatest ways for people to learn. Experiential learning in the context of environmental stewardship might involve endeavours like field trips, outdoor exploration, citizen science initiatives, and ecological restoration projects. These opportunities give students the chance to engage in environmental problem-solving, study ecological processes, and directly interact with the environment.

4.2: Place-Based Learning: Place-based learning places a strong emphasis on the value of regional settings and communities as the cornerstones of education. It acknowledges that a location's special qualities and difficulties can work as potent teaching resources. Place-based learning for environmental stewardship entails researching and tackling neighbourhood environmental problems, comprehending the region's cultural and ecological value, and working with local groups and organisations. This method motivates students to take action to preserve and defend their local environment by fostering a sense of connection and responsibility towards it.

4.3 : Advantages of Place-Based and Experiential Learning for Environmental Stewardship:

4.3.1: Authentic engagement: Place-based learning and experiential learning offer real-world learning opportunities that go beyond traditional classroom instruction. Learners can create a strong feeling of connection and personal involvement in environmental stewardship by engaging in activities that are relevant to their daily lives and physically interacting with the environment.

4.3.2: Holistic understanding: Using these methods, students can investigate the intricate interconnections between ecological, social, and economic systems. Students can better appreciate the interconnection of different variables and create a comprehensive perspective on environmental challenges by getting hands-on with the environment.

4.3.3: Development of practical skills: Experiential and location-based learning offer chances to hone practical abilities relevant to environmental stewardship. Data gathering and analysis, problem-solving, critical thinking, cooperation, and communication are a few examples. The capacity to apply these abilities in practical situations equips learners to take an active role in environmental preservation and sustainability initiatives.

4.3.4: Community involvement: Place-based and experiential learning both encourage community engagement and cooperation. Students can develop alliances, understand community needs and viewpoints, and support regional environmental activities by directly collaborating with their local communities. This involvement strengthens the sense of civic duty and motivates students to take an active role in environmental stewardship in their local communities.

5: Sustainable Consumption and Production

Promoting sustainable development and resolving environmental issues both require education for sustainable consumption and production (SCP). In order to reduce negative environmental effects, save resources, and advance social and economic well-being, it tries to educate both individuals and communities about responsible consumption and production habits. An

outline of education for sustainable consumption and production is provided below:

5.1: Awareness and Understanding: The first step in educating people about SCP is to make them aware of the negative effects that unsustainable production and consumption patterns have on the environment, society, and the economy. It entails educating people about how linked global systems are, as well as about how unsustainable practises are causing social injustice, resource depletion, climate change, and pollution.

5.2: Systems Thinking: SCP education promotes systems thinking, in which students comprehend the complete lifespan of goods and services, from the gathering of raw materials through their disposal. It highlights the idea of a circular economy, which encourages resource reduction, reuse, and recycling in order to reduce waste and adverse environmental effects. Students are urged to consider the effects of various production and consumption decisions on society, the economy, and the environment.

5..3: Responsible Consumer Behaviour: Education for SCP encourages educated decision-making in order to promote responsible consumer behaviour. The emphasis is on educating people about product labelling, eco-labels, and certifications that make it easier to identify environmentally and socially responsible items. In order to avoid greenwashing and make sustainable decisions, it also promotes critical analysis of marketing and advertising strategies.

5.4: Sustainable Production Practises (SPP): SPP adoption is emphasised in SCP education at the individual, community, and industry levels. It promotes the use of renewable energy sources, resource efficiency, cleaner production methods, and eco-design concepts. People who receive this education are more prepared to adopt sustainable practises in both their personal and professional lives.

5.5: Collaboration and collaborations are encouraged through Education for SCP, which works with a variety of stakeholders, including businesses, governments, and civil society organisations. It promotes discussion, knowledge exchange, and teamwork in order to support sustainable consumption and production. A wider impact is guaranteed by this multi-stakeholder strategy, which also makes it possible to share best practises and innovations.

5.6: Education in Formal and Informal environments: Curricular material, projects, and extracurricular activities can be used to include education for SCP into formal educational environments including schools, colleges, and universities. Additionally, it can occur in unofficial venues like neighbourhood associations, non-profits, and public awareness campaigns. These numerous educational options support lifelong learning for sustainable consumption and production and appeal to students of all ages and educational backgrounds.

6: The advantages of education for sustainable production and consumption are as follows:

6.1: Empowerment: Education gives people the knowledge, abilities, and morals they need to make wise choices and carry out their responsibilities. It enables people to actively affect change in their communities and personal lives.

6.2: Environmental Stewardship: SCP education fosters a feeling of environmental responsibility and stewardship. It aids people in comprehending the environmental effects of their decisions and encourages them to adopt sustainable behaviours that conserve resources, cut down on waste, and lessen adverse effects on the environment.

Education helps to promote sustainable consumption and production habits, which benefits social and economic well-being. It stimulates fair trade, supports local and sustainable business practises, and creates social solidarity within communities. It also facilitates a more equitable distribution of resources.

6.3: Resilience and Adaptability: Education for SCP gives people the knowledge and abilities they need to adjust to shifting socioeconomic and environmental circumstances. It promotes the creativity, critical thinking, and problem-solving skills necessary to tackle new problems and come up with lasting solutions.

6.4: Global Citizenship: By highlighting the interconnection of nations, cultures, and ecosystems, education for SCP promotes a sense of global citizenship. It promotes solidarity and cooperation for a more sustainable and just society and challenges people to think about how their consumption and production decisions affect the planet as a whole.

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Gandhian Values & Sustainable Development Goals

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Abstract

Sustainable Development Goals are global goals essential for holistic development. Expanding the agenda of Millennium Development Goals, they attempt to present an essential blueprint for balancing concerns of growth and welfare in a holistic manner. The post-pandemic phase has seen states working on new ideas for balancing concerns of economy, ecology, health, etc. Within this, there has been a realization that earlier models which gave priority to sheer emphasis on greed, profits, and ends regardless of means have done more harm than good. As 2030 draws closer, the paper attempts to narrate the significance of Sustainable Development Goals and underline that Gandhian values carry immense potential as a guiding light for better outcomes. The paper also discusses the significance of the Gandhian approach as a globally beneficial approach that can augur well for economic development with social equity and inclusion.

Keywords: *Sustainable Development Goals, Gandhian Ideals, Truth, Nonviolence, Decentralization.*

Introduction

The Sustainable Development Goals (SDGs) stand as a pivotal global initiative, aiming to redefine the trajectory of human development in a way that is both sustainable and equitable. Building upon the foundation laid by the Millennium Development Goals (MDGs), the SDGs provide a comprehensive roadmap for addressing multifaceted challenges in our increasingly interconnected world. They encompass a wide spectrum of issues, from poverty eradication and gender equality to climate action and good governance, setting a bold agenda for nations to transform their societies.

In the aftermath of the global pandemic, the urgency of these goals has become even more apparent. Nations across the globe are reevaluating their strategies, recognizing that models centered solely on profit maximization and relentless economic growth have often come at the cost of environmental degradation, social inequality, and compromised well-being.

Gandhian philosophy, as exemplified by Mahatma Gandhi's principles of ahimsa (non-violence), satyagraha (truth and nonviolent resistance), and swaraj (self-governance), offers profound insights. These values, rooted in ethics and humanism, possess the potential to serve as guiding beacons toward a future where economic growth coexists harmoniously with social equity and environmental sustainability.

This article delves into the critical interplay between the Sustainable Development Goals and the timeless Gandhian values of truth, non-violence, and decentralization. As we approach the 2030 deadline set for achieving the SDGs, it becomes increasingly clear that traditional approaches may fall short in delivering the holistic development that our world needs. It not only explores the profound significance of the Sustainable Development Goals but also contends that the integration of Gandhian ideals into the global development agenda can pave the way for a more compassionate, balanced, and inclusive world. By acknowledging the enduring relevance of these values in our contemporary context, we hope to foster a dialogue that inspires positive change and helps us collectively shape a better, more sustainable future.

Review of Literature

The integration of Gandhian values with the United Nations' Millennium Development Goals (MDGs) and later the Sustainable Development Goals (SDGs) has sparked scholarly discussions that underscore the timeless relevance of Mahatma Gandhi's philosophy in the contemporary world. This section presents an overview of influential literature that explores the connections between Gandhian principles, MDGs, and SDGs, shedding light on the profound potential for holistic and sustainable development.

"Hind Swaraj" by Mahatma Gandhi Ji - as the foundational text for understanding Gandhi's philosophical underpinnings, "Hind Swaraj" presents a scathing critique of modern civilization and its detrimental impacts on society and the environment. Gandhi's advocacy for self-reliance, non-violence, and decentralized governance laid the groundwork for discussions on sustainable development and the pursuit of well-being over mere materialism. "Gandhi and Globalisation" edited by Thomas Weber: This compilation of essays explores the contemporary relevance of Gandhian thought, particularly in the context of globalization and development. It delves into the intersections between Gandhi's principles and issues related to economic globalization, social justice, and environmental sustainability.

Further , "The Millennium Development Goals: Raising the Resources to Tackle World Poverty" by Sakiko Fukuda-Parr: Fukuda-Parr's work critically assesses the MDGs and the international efforts to achieve them. It highlights the crucial role of resource mobilization in poverty alleviation and sustainable development, aligning with Gandhian ideals of equitable resource distribution. "Transforming Our World: The 2030 Agenda for Sustainable Development" (UN Publication): This official UN publication outlines the 17 SDGs adopted in 2015, setting the global agenda for sustainable development. It emphasizes the interconnectedness of social, economic, and environmental goals and the importance of inclusive development, resonating with Gandhian principles of non-violence and social equity.

Another important work in this discussion is that of ' Gandhi's Political Philosophy: A Critical Examination" by Bhikhu Parekh: Parekh's comprehensive analysis of Gandhi's political thought offers insights into its contemporary relevance. The book explores how Gandhian values such as non-violence, truth, and self-governance can inform modern political and development strategies, aligning with the ethos of the SDGs. In "The Art of Convening: Authentic Engagement in Meetings, Gatherings, and Conversations" by Craig Neal and Patricia Neal, there are important insigts. While not explicitly centered on Gandhian principles or global development goals, this work discusses the transformative power of authentic engagement and dialogue. Gandhian ideals of truth and non-violence find resonance in the promotion of open and constructive conversations, which are crucial for advancing the SDGs.

These works collectively illuminate the synergies between Gandhian values and the global development agenda, emphasizing the potential for a more compassionate and sustainable world. "Hind Swaraj" stands as an enduring testament to Gandhi's belief in self-reliance, non-violence, and decentralized governance as key elements of holistic development.

Furthermore, the examination of the MDGs and SDGs in the context of Gandhian thought reveals the shared commitment to addressing poverty, inequality, environmental degradation, and social justice. Fukuda-Parr's critique of the MDGs underscores the importance of resource mobilization, an aspect that aligns with Gandhian ideals of equitable distribution of resources. The UN's 2030 Agenda, as articulated in the SDGs, embraces a holistic approach that encapsulates the essence of Gandhian principles. It recognizes that development should not be pursued at the expense of social and environmental well-being. Parekh's exploration of Gandhi's political philosophy reaffirms the enduring relevance of Gandhian values, offering insights into their potential as guiding principles for achieving sustainable development.

In conclusion, the literature reviewed in this section highlights the convergence of Gandhian values with the MDGs and SDGs, demonstrating the transformative potential of integrating ethics, non-violence, and equity into global development agendas. As we delve deeper into this discourse, we aim to elucidate how Gandhian values can serve as a guiding light for achieving the SDGs and ushering in a more equitable and sustainable future for all.

Understanding the Transition from Millennium Development Goals to Sustainable Development Goals

The transition from the Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs) marked a pivotal moment in the global pursuit of development, emphasizing a more comprehensive, inclusive, and sustainable approach. This section explores the key factors and dynamics that drove this transition and how it reflects humanity's evolving understanding of development.

1. **The Limitations of the MDGs:** The MDGs, established in the year 2000, were a significant step forward in focusing global attention on critical development issues

such as poverty, education, and health. However, they had certain limitations. Critics argued that the MDGs lacked comprehensiveness, often ignoring issues like inequality, environmental sustainability, and peace. Furthermore, they adopted a top-down approach that didn't fully involve all stakeholders, including marginalized communities.

2. **The Post-2015 Development Agenda:** As the end of the MDG period approached, it became evident that while progress had been made in several areas, many challenges persisted. The United Nations recognized the need for a more holistic and ambitious framework to address the complex and interrelated challenges facing the world. This realization laid the foundation for the post-2015 development agenda, which culminated in the adoption of the SDGs.
3. **Consultative and Inclusive Process:** Unlike the formulation of the MDGs, the development of the SDGs was characterized by a more consultative and inclusive process. The United Nations engaged in extensive consultations with governments, civil society, academia, and other stakeholders from around the world. This participatory approach aimed to ensure that the goals truly represented the needs and aspirations of people everywhere.
4. **Comprehensive Scope of the SDGs:** The SDGs, comprising 17 goals and 169 targets, expanded the development agenda significantly. They encompass a wide range of issues, including poverty eradication, gender equality, clean energy, climate action, and peace and justice. This comprehensive scope reflects a deeper understanding that development cannot be pursued in isolation but must address multiple dimensions simultaneously.
5. **Integration of Environmental Sustainability:** One of the most significant shifts from the MDGs to the SDGs was the explicit inclusion of environmental sustainability as a core element. Goal 13 (Climate Action) and Goal 15 (Life on Land) emphasize the urgent need to protect the planet, recognizing that environmental degradation poses a fundamental threat to development.
6. **Emphasis on Leaving No One Behind:** The principle of "leaving no one behind" is a cornerstone of the SDGs. It underscores the commitment to ensure that progress benefits all individuals and communities, regardless of their social, economic, or geographical circumstances. This commitment reflects an understanding that inequality and exclusion must be tackled to achieve sustainable development.
7. **Global Recognition of Interconnectedness:** The SDGs recognize the intricate web of interconnectedness that defines the modern world. Economic, social, and environmental issues are intertwined, and addressing one aspect without considering the others can lead to unintended consequences. The SDGs promote a holistic approach that acknowledges these interdependencies.
8. **Universal Applicability:** Unlike the MDGs, which primarily target developing countries, the SDGs are universal. They apply to all nations, recognizing that challenges such as climate change, inequality, and conflict affect both developed and developing countries. This universality reflects a more equitable and cooperative vision of global development.

The transition from the MDGs to the SDGs represents a profound evolution in our understanding of development. It reflects a shift from a narrow focus on specific targets to a holistic and inclusive approach that recognizes the complexity of global challenges. The SDGs call for collaborative action, sustainability, and leaving no one behind, embodying a shared commitment to building a more equitable and sustainable world. This transition not only sets ambitious goals for the future but also signifies humanity's willingness to work together to address the pressing issues of our time.

Agenda 2030: A Vision for a Sustainable Future

Agenda 2030, encapsulated in the Sustainable Development Goals (SDGs), represents a transformative global vision aimed at addressing some of the most pressing challenges facing humanity. Adopted by all United Nations Member States in September 2015, this agenda outlines a comprehensive roadmap for sustainable development over the next 15 years.

At its core, Agenda 2030 envisions a world where prosperity, equity, environmental stewardship, and social justice are not just aspirational ideals but achievable realities for all. The agenda comprises 17 interconnected goals, each with specific targets that span diverse sectors, from poverty eradication and health to climate action and gender equality.

One of the key strengths of Agenda 2030 is its universality. It applies to all countries, recognizing that global challenges like climate change, inequality, and conflict transcend borders. Developed nations are just as responsible for these challenges as developing ones, and Agenda 2030 calls for collective responsibility and shared action.

Furthermore, the agenda emphasizes the principle of "leaving no one behind." It underscores the commitment to ensure that development benefits all individuals and communities, regardless of their background or circumstances. This commitment reflects a profound

understanding that sustainable development must be equitable, and inclusive, and address the needs of the most vulnerable.

It also marks a significant departure from the limitations of the previous Millennium Development Goals (MDGs). While the MDGs were pivotal in focusing attention on key issues, the SDGs take a more holistic approach. They integrate economic, social, and environmental dimensions, recognizing their interdependence.

As we approach the deadline of 2030, Agenda 2030 challenges governments, civil society, businesses, and individuals to work collaboratively. It calls for innovation, resource mobilization, and bold policies to turn these ambitious goals into tangible outcomes. Success will require not only political will but also active engagement at the grassroots level.

In sum, Agenda 2030 is a beacon of hope, offering a shared vision of a sustainable and inclusive future. It acknowledges the urgency of global challenges while affirming our capacity to address them through cooperation and a commitment to the well-being of people and the planet. The path to 2030 may be challenging, but it is also filled with opportunities to create a world where no one is left behind, and the principles of peace, justice, and sustainability guide our collective journey.

Ideas have an important interface with policy success

The trajectory of policy success is intrinsically linked to the quality and relevance of the ideas that underpin it. Ideas serve as the intellectual foundation upon which policies are built, and their effective implementation often hinges on the resonance and adaptability of these concepts.

First and foremost, ideas set the direction and purpose of policy initiatives. They define the problem at hand, articulate goals and objectives, and provide a framework for decision-making. Whether addressing issues as diverse as healthcare reform, environmental conservation, or economic development, the clarity and coherence of the underlying ideas greatly influence the policy's potential for success.

Moreover, ideas shape the public discourse and garner support or opposition from various stakeholders. Policymakers must navigate a complex landscape of competing ideas and interests, requiring them to not only craft well-reasoned policies but also to effectively communicate and negotiate their ideas.

Ideas also evolve over time, adapting to changing circumstances and new insights. Flexible policymaking that incorporates updated ideas is more likely to be effective in the long run. Furthermore, successful policies often engage a wide array of stakeholders, from experts and activists to communities and businesses. The capacity to engage and align diverse perspectives is contingent on the capacity to convey ideas that resonate and inspire collective action.

In sum, ideas play a pivotal role in the policy process, serving as the blueprint for change, a driving force for public discourse, and a catalyst for successful implementation. Policymakers and advocates must recognize the transformative power of innovative and well-articulated ideas in shaping a better future.

Gandhian Values: Brief Outline

Gandhian values, rooted in the philosophy and teachings of Mahatma Gandhi, are a profound set of principles that have left an indelible mark on the world. These values encompass a holistic approach to life and society, emphasizing moral and ethical conduct, non-violence, truth, self-sufficiency, and decentralized governance. In this brief outline, we delve into the key Gandhian values and their enduring relevance in today's world.

1. **Ahimsa (Non-Violence):** Ahimsa is perhaps the most well-known and cherished of Gandhian values. It advocates the rejection of violence in all its forms, be it physical, verbal, or psychological. Gandhi believed that non-violence was the highest form of resistance and a powerful tool for social change. Ahimsa not only signifies refraining from harming others but also encompasses empathy, compassion, and a commitment to resolving conflicts through dialogue and reconciliation. In today's conflict-ridden world, the principle of non-violence continues to inspire movements for peace and justice.
2. **Satyagraha (Truth and Nonviolent Resistance):** Satyagraha, a term coined by Gandhi, combines "satya" (truth) with "agraha" (insistence or holding firmly). It represents the idea of holding steadfast to the truth while resisting oppression or injustice through non-violent means. Satyagraha is a potent force for change, relying on the moral power of truth to confront injustice. It calls for civil disobedience, boycotts, and peaceful protests to challenge oppressive systems. In a world grappling with human rights violations and social injustices, Satyagraha offers a powerful strategy for effecting positive change.
3. **Swaraj (Self-Governance):** Swaraj, often translated as self-governance or self-rule, was central to Gandhi's vision of a just society. He believed that individuals and communities should have the autonomy to govern themselves at the grassroots level. This principle emphasizes the importance of

decentralized governance, local decision-making, and self-sufficiency. In an era marked by concerns about centralized power and global governance, Swaraj remains a relevant concept for fostering participatory democracy and community empowerment.

4. **Sarvodaya (Welfare of All):** Sarvodaya, meaning "the welfare of all," encapsulates Gandhi's commitment to social equity and the well-being of every individual. It promotes the idea that progress and development should uplift the most marginalized and vulnerable in society. Gandhi envisioned a world where the benefits of development reach every corner and every stratum of society. In an age characterized by growing income inequality and social disparities, the principle of Sarvodaya serves as a reminder of the need for inclusive and equitable development.
5. **Trusteeship:** Gandhi's concept of trusteeship is an economic philosophy that calls for the responsible and equitable use of resources. He believed that wealth should be viewed as a trust to be managed for the benefit of society as a whole. Business leaders and individuals should use their wealth and resources to meet the needs of the less fortunate. This concept resonates with contemporary discussions on corporate social responsibility (CSR) and sustainable business practices.

In conclusion, Gandhian values offer timeless guidance for navigating the complexities of the modern world. They emphasize the importance of moral and ethical conduct, non-violence, self-sufficiency, equitable governance, and the welfare of all. In an era marked by global challenges such as environmental degradation, social inequality, and conflict, these values provide a moral compass for individuals, communities, and nations striving to create a more just and peaceful world. By embracing and applying these values, we can draw inspiration from Gandhi's enduring legacy and work towards a more compassionate and sustainable future.

Significance of Gandhian Ideas for Sustainable Development Goals

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, represent a universal call to action to end poverty, protect the planet, and ensure prosperity for all by 2030. Rooted in principles of equity, environmental sustainability, and social justice, the SDGs resonate strongly with the timeless ideals of Mahatma Gandhi. This section explores the profound significance of Gandhian values in the context of the SDGs, highlighting their potential to guide and enrich the pursuit of sustainable development.

1. Ahimsa (Non-Violence) and Goal 16 (Peace, Justice, and Strong Institutions):

At the heart of Gandhi's philosophy, Ahimsa, or non-violence, serves as a guiding light for fostering peaceful societies. Goal 16 of the SDGs, "Peace, Justice, and Strong Institutions," resonates deeply with this value. Non-violent conflict resolution and the promotion of justice and accountable institutions are central to achieving this goal.

Gandhi's advocacy for peaceful resistance and dialogue finds resonance in efforts to prevent conflicts, reduce violence, and ensure access to justice for all. Ahimsa encourages the resolution of disputes through negotiation and reconciliation, which aligns with Goal 16's vision of building inclusive and just societies.

2. Satyagraha (Truth and Nonviolent Resistance) and Goal 5 (Gender Equality):

Satyagraha, the concept of truth and nonviolent resistance, is intrinsically linked to Goal 5 of the SDGs, "Gender Equality." Gandhi believed in the moral power of truth and the need to confront injustices, including gender-based discrimination, through non-violent means.

Satyagraha inspires movements for gender equality by challenging oppressive systems and advocating for the empowerment of women and girls. It calls for addressing deeply entrenched gender norms and stereotypes, aligning with Goal 5's ambition to eliminate all forms of discrimination against women and girls.

3. Swaraj (Self-Governance) and Goal 11 (Sustainable Cities and Communities):

Swaraj, or self-governance, is central to Goal 11 of the SDGs, "Sustainable Cities and Communities." Gandhi envisioned local self-governance as a means to empower communities and promote sustainable urbanization.

In the context of Goal 11, Swaraj encourages participatory decision-making at the community level, fostering inclusive and sustainable cities. Empowering local communities to shape their development aligns with the goal's aim of creating cities that are resilient, inclusive, and sustainable.

4. Sarvodaya (Welfare of All) and Goal 1 (No Poverty):

Sarvodaya, emphasizing the welfare of all, parallels Goal 1 of the SDGs, "No Poverty." Gandhi's commitment to social equity and the well-being of every individual finds resonance in the global goal of eradicating poverty in all its forms.

Sarvodaya underscores the importance of addressing the needs of the most marginalized and vulnerable. It calls for inclusive development that leaves no one behind,

aligning with Goal 1's ambition to ensure economic growth benefits all and lifts people out of poverty.

5. Trusteeship and Goal 12 (Responsible Consumption and Production):

Gandhi's concept of trusteeship, viewing wealth as a trust for the benefit of society, aligns with Goal 12 of the SDGs, "Responsible Consumption and Production." Trusteeship advocates for the responsible use of resources and equitable distribution of wealth.

In the context of Goal 12, trusteeship encourages sustainable consumption and production patterns that minimize waste and environmental impact. It calls on individuals and businesses to use resources responsibly, reflecting the goal's aspiration to ensure sustainable consumption and production.

6. Synergy between Gandhian Ideals and Goal 13 (Climate Action):

The urgency of climate action, articulated in Goal 13 of the SDGs, resonates deeply with Gandhian values, particularly the principles of Ahimsa and trusteeship. Climate change poses a global threat that demands non-violent responses and responsible stewardship of the planet's resources.

Gandhian values inspire individuals and communities to take non-violent action to address climate change. They emphasize the interconnectedness of all life and underscore the ethical imperative of preserving the environment for future generations. Aligning with Goal 13, these ideals advocate for sustainable practices, renewable energy, and a commitment to mitigating climate change.

7. Role of Gandhian Ideals in Promoting Local Solutions:

One of the distinctive features of Gandhian ideals is their emphasis on local solutions and community-led development. This approach aligns closely with the SDGs' call for action at the grassroots level. Gandhi's belief in Swaraj and community self-governance empowers local communities to take ownership of their development initiatives.

Local solutions, rooted in Gandhian values, often prove to be more sustainable and contextually relevant as they promote self-sufficiency, reduce dependency on external resources, and foster a sense of responsibility among communities to address their unique challenges.

The significance of Gandhian ideals for the Sustainable Development Goals is profound. These timeless values offer a moral and ethical compass to navigate the complex challenges of our time. They emphasize non-violence, truth, self-governance, and social equity, principles that resonate with the core aspirations of the SDGs. By integrating Gandhian values into the pursuit of sustainable development, we can foster a world that is more just, equitable, and harmonious, where the welfare of all is prioritized, and the planet is protected for future generations. Gandhi's legacy reminds us that the path to sustainable development is not merely about achieving goals but also about upholding values that promote the well-being of humanity and the planet.

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Mining and Sustainable Development: A Case Study of Keonjhar, Odisha

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Abstract

Mining is essential for the economic growth of a nation. Although mining is seen as an extractive sector, it can be a partner in achieving the Sustainable Development Goals. Odisha contributes the largest value of mineral production (excluding fuel oil and atomic minerals) in the country. It is endowed with rich mineral resources with a variety of metallic and non-metallic minerals that include Chromite, Bauxite, Graphite, Iron-ore, Manganese ore and many more. The mining and quarrying subsector contributed 8.29 per cent of state GVA (relative to 2.26 per cent at the all-India level) as per the advance estimates (AE) for 2021-22 at current prices. In terms of reserves in India, Odisha accounts for 96 per cent of Chromite, 92 per cent of Nickel, 51 per cent of Bauxite, 33 per cent of Iron ore, 43 per cent of Manganese ore and 24 per cent of Coal reserves in the country. Government of India has formulated Pradhan Mantri Khanij Kshetra Kalyan Yojana which is implemented by the District Mineral Fund (DMF) using the funds accruing to the DMF. These funds are used for the welfare of persons and areas affected by mining related operations. The DMF offers an opportunity to correct this historical injustice. It recognizes the right of people to benefit from the land and its natural resources, traditionally held by them either individually or as a community. DMF Keonjhar is largest DMF in the country. In its current state, DMF accrual will only flow from the extracting companies to the various departments of the Government, without passing through the hands of the citizens. It is proposed that all or part of the accrual be invested in an Alaska-type permanent fund and an annual dividend from the investment be transferred directly to citizens, so that they can decide how it is to be spent. Mineral wealth need not be a curse. It can even be a blessing, provided the right measures are taken to transform it into sustainable development.

Keywords: *Mining, Minerals, Socio-economic development, DMF, Basic Income, Wealth Fund, Koenjhar, Odisha, India.*

JEL Code: L71, L78, O14, Q01, Q32, R11, R58.

Introduction

Mining and Sustainability

The famous physicist Max Planck said, however: Mining is not everything but without mining everything is nothing.

Although mining is seen as an extractive sector, it can be a partner in achieving the Sustainable Development Goals. The fact that it harnesses directly the natural resources for its operation makes it all the more an antithesis to the concept of sustainability. So, the question which arises is if the mining activity sustainable and if yes how?

The clearest definition of the concept of sustainable development is included in the 27 Principles of Sustainable Development contained in a document signed at the Earth Summit, held in 1992 in Rio de Janeiro. The three pillars were of economic growth, protection of natural resources and environment and social responsibility towards the various stakeholders.

Sustainability or sustainable development is not a static phenomenon but an ongoing dynamic process. To a layman, sustainability talks about only protecting the environment and hence in mining it means how to take care of the ill effects of mining on the environment but in reality it is a broader concept. It should also focus on the social aspects which is about the society or the local communities which are directly or indirectly affected by the mining activities.

Literature Review

Mining is essential for the economic growth of a nation. It provides the raw materials for the various industries in the first go. It provides revenue which helps in opening new opportunities for economic prosperity. There are several counterviews about the mining sector. To start with the popular Singer Prebisch Hypothesis which says nations which produce primary products will give a deteriorating term of trade in the long run and hence as mining comes into this category will eventually make the country worse in terms of declining growth. Then comes the Dutch disease argument which says the focus on mining sector would lead to more exploitation of nature, neglecting of other sectors and ultimately making the mining sector more prone to shocks.

Mining plays an important role in the development process by converting mineral resources into a form of capital that contributes to a nation's output (Davis and Tilton, 2005). Thus exploration of mineral resources is an essential condition for successful economic development of an economy (Bogdetsky et al., 2005; Mensah, 2011).

However, even though mining activities provide an impetus for economic growth and development, they are also responsible for a host of adverse impacts, foremost degradation of the environment and natural resources (Mishra, 2009; Li et al., 2011).

Evidence of imbalance in the distribution of mineral resources is found in earlier studies. It is recognized, for instance, that a deficit exists in the access to electricity by a significant part of the population from parts of Latin America, Sub-Saharan Africa, China, and India, among others (Dubinski, 2013). In contrast to that, a positive correlation has been reported between the exploitation of mineral resources and the economic growth in some countries such as Chile, Indonesia, Botswana, China and India, being the last two the greatest responsible for the significant increase in the rate of exploitation of minerals that started in the 1980s (Dubinski, 2013 and Horsley, et. al. 2015).

Mining Contribution to Odisha Economy

The industry sector has four sub-sectors namely, mining & quarrying, manufacturing, electricity-gas water supply & other utility services, and construction. The size and growth rate of these sub-sectors are critical for the growth of GSDP given Industry's share in overall economy.

Odisha contributes the largest value of mineral production (excluding fuel oil and atomic minerals) in the country. It is endowed with rich mineral resources with a variety of metallic and non-metallic minerals that include Chromite, Bauxite, Graphite, Iron-ore, Manganese ore and many more. The mining and quarrying subsector contributed 8.29 per cent of state GVA (relative to 2.26 per cent at the all-India level) as per the advance estimates (AE) for 2021-22 at current prices.

In terms of reserves in India, Odisha accounts for 96 per cent of Chromite, 92 per cent of Nickel, 51 per cent of Bauxite, 33 per cent of Iron ore, 43 per cent of Manganese ore and 24 per cent of Coal reserves in the country.

Table 1: Share and Growth of Industry Sector and its Sub-Sectors (in percent).

Sector and Sub-Sector	Share in GSVA in 2021-22 (AE)	Average Growth			
		Pre CoVID During CoVID phase		During CoVID phase	
		2012-13 to 2015-16	2016-17 to 2019-20	2020-21	2021-22 (AE)
Industry	39.5	5.7	9.3	-10.8	14.5
Mining and Quarrying	8.3	9.6	3.3	-23.3	18.1
Manufacturing	22.1	4.8	17.1	-8.4	14.3
Construction	6.7	1.1	4.5	-3.1	13.2
Electricity, gas, water supply & other utility services	2.4	9.8	0.04	-1.7	8.0

Source: Directorate of Economics & Statistics (DE&S), Odisha

Mining also generates revenues for the government at both the central and state levels. For the state government, minerals generate (i) statutory revenues from royalties, rent etc, (ii) profits and interest income received from public enterprises functioning in the sector. As Odisha is a mineral rich state, it contributes substantial amount of revenues for the State government. The production, dispatch of minerals, and collection of mineral revenue in Odisha from 2016-17 to 2020-21 is presented in Table 2.

Table 2: Production and dispatch of minerals and revenue collection (2016-17 to 2020-21)

Year	Production (in million tonnes)	Dispatched (in million tonnes)	Revenue Collection (INR Crore)
2016-17	264.84	285.25	4925.66
2017-18	270.84	287.67	6130.97
2018-19	295.45	310.08	10479.18
2019-20	312.6	313.16	11019.86
2020-21	294.8	320.43	13918.20

Source: Directorate of Mines, Odisha

The table 3 shows the major export products from Odisha. The bulk of the exports are mineral and metal products. However, electronics and software and marine exports are gaining significance.

Table 3: Major Export Products from Odisha (INR Crore)

Products	2019-20	2020-21	Share in Value of Exports (per cent)
Metallurgical	24811.40	38122.95	47.46
Engg. Chemical and Allied	4434.18	7854.68	9.78
Minerals	14627.10	26189.58	32.61
Agriculture and Forest	187.18	177.85	0.22
Marine	3028.88	3114.16	3.88
Handloom	0.90	0.09	0.00
Handicraft	3.08	7.74	0.01
Textile	131.64	205.5	0.26
Pharmaceutical	6.34	8.8	0.01
Electronics and Software	4500.00	4600.00	5.73
Others	11.62	36.97	0.05

Source: Directorate of Export Promotion and Marketing, Govt. of Odisha

As seen from the Table 4, there is a significant rise in export destinations for traditionally exported products like metallurgical, engineering and chemical, and mineral products. Besides, agriculture, handicraft, textile, electronics and software are also some of the important export products where there is a significant rise in destination countries.

Table 4: Rise in export destination from Odisha

Category	2015-16	2020-21
Metallurgical	40	92
Engineering & Chemical	79	111
Minerals	5	41
Agriculture and Forest	4	24
Marine	39	33
Handloom	13	8
Handicraft	7	19
Textile	2	17
Pharmaceutical	3	27
Electronics and Software	6	40

Source: Odisha State Economic Survey (various rounds), Govt. of Odisha

Mining Base of Odisha

Table 5 shows the top 11 districts of Odisha with the respective major mineral availability.

Table 5: Major Minerals and Districts

Sl. No.	District	Major Mineral
1	Koraput	Bauxite, Chinaclay, Dolomite, Limestone, Mica, Quartz
2	Mayurbhanj	Asbestos, Fireclay, Chinaclay, Iron Ore, Kyanite, Quartzite, Soapstone, Talc, Base metal (Lead and Copper), Coal, Dolomite, Manganese, Nickel Ore, Vanadiferous/Magnetite, Gold.
3	Malkangiri	Limestone, Tin ore, Quartz
4	Nabarangapur	Chinaclay, Iron ore.
5	Rayagada	Bauxite, Graphite, Manganese, Quartz
6	Sundergarh	Lead, copper, Coal, Dolomite, Fireclay, Iron ore, Limestone, Manganese, Quartz, Bauxite.
7	Sambalpur	Coal, Base metal (Lead and Copper), Chinaclay, Fireclay.
8	Keonjhar	Asbestos, Pyroxenite, Iron Ore,Chromite, Chinaclay, yrophyllite, Manganese, Gold, Dolomite, Limestone, uartzite, Quartz
9	Kadhamal	Graphite
10	Balasore	Vanadiferous / magnetite
11	Phulbani	Graphite

Table 6: Socio Economic Profile of Mining Districts of Odisha

Sector	Indicator	Odisha	Keonjhar	Sundargarh	Angul	Jajpur	Jharsaguda
Poverty	Population who are multidimensionally poor (%)	29.4	41.8	24.75	24.57	20.75	18.62
Drinking Water	Households with FHTC (%)	42.5	65.8	25.9	50.4	43.2	43.8
Education	Average performance in NAS (Class 8)	44	42	43	50	52	44
Healthcare	Institutional delivery (%)	92.2	80.4	91.3	85.7	93.8	98.6
Women & Child	Children under 5 who are stunted (%)	31	36.2	32.9	28.1	25.5	27.1
Livelihood	Households with monthly income of highest earning household member - Rs. 10,000 or more (%)	4.7	4.4	4.8	9.7	7.6	7.9
Skill Development	Households with salaried job (%)	6.8	6.7	7.6	11.8	11.1	11.6
Sanitation	Population living in households that use an improved sanitation facility (%)	60.5	47.6	65.5	66.4	47.4	70
Housing	Households with Kuchha roof (%)	64	69.2	84.5	57.5	61.1	74
Afforestation	Change in Forest Cover between 2001 & 2021(%)	6.8	-4.7	4.2	5	19.7	21.4

Source: NFHS-4, NFHS – 5, Other Reports

Source: Department of Steel & Mines, Government of Odisha

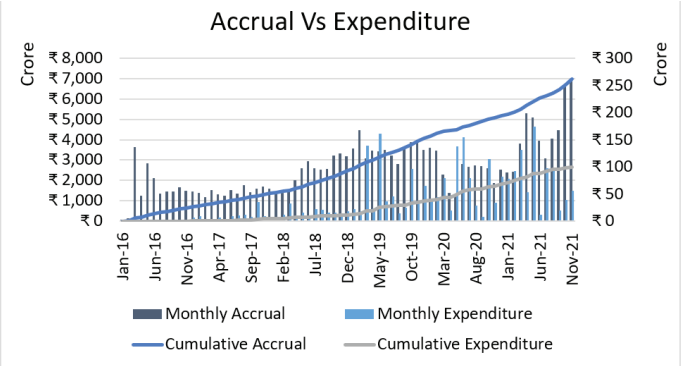
Pradhan Mantri Khanij Kshetra Yojana (PMKKKY) & District Mineral Fund (DMF)

Government of India has formulated Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) which is implemented by the District Mineral Fund (DMF) using the funds accruing to the DMF. These funds are used for the welfare of persons and areas affected by mining related operations. Utilisation of funds has two aspects: 60% of PMKKKY funds to be utilized under High Priority sectors and 40% of PMKKKY funds to be utilized under Other Priority sectors. DMFs will prepare and maintain an updated list of directly and indirectly affected areas as well as affected people. Affected people to include both "affected family" and "displaced family".

Case Study: DMF Keonjhar

DMF Keonjhar is largest DMF in the country. The District Mineral Foundation (DMF), a non-profit statutory trust, set up under the Mines and Minerals (Development and Regulation) Act (amended in 2015), in every district affected by mining operations, offers an unprecedented potential to positively impact the lives of millions of people affected due to mining.

Figure 1: Accrual Vs Expenditure of DMF Keonjhar



A. Area: Nutrition/WCD

Major Indicators (NFHS-5)

- Underweight: 37% (Keonjhar), 30% (Odisha)
- Stunting: 36% (Keonjhar), 31% (Odisha)
- Wasting: 24% (Keonjhar), 18% (Odisha)
- Severe Wasting: 6% (Keonjhar), 6% (Odisha)
- Anaemia (Pregnant): 75% (Keonjhar), 62% (Odisha)

Understanding

- First 1000 days critical for optimum brain development & most vulnerable to nutrition deficit
- Children under 3 cannot feed themselves
- In tribal/mining areas mothers leave infants behind to engage in har labour to support families
- Combination of poor purchasing power, lack of knowledge of care givers, inadequate feeding and absence of dietary diversity
- AWCs do not look after children between 06 months to 03 years
- Only hand over THR - once a week/fortnight
- Huge deficit in protein-energy nutrition offered to pregnant women/lactating mothers through THR under SNP of ICDS viz-a-viz Recommended Dietary Allowance (RDA)
- Considering high poverty, unlikely that deficit will be met fully at household level from other sources
- THR also often shared with other members of family
- THR fails to provide MDD – consumption of 5 or more food groups
- Poorest households in Keonjhar often consume only rice, dal and salt
- Pregnant women also do not prefer to consume IFA as they claim to suffer from gastritis
- 1000+ AWCs do not have their own buildings and operate out of rented premises/AWW's residence etc.
- Many AWC buildings are old/dilapidated
- None of the AWCs are child friendly
- Most AWWs cook meal using firewood - time taking and Indoor Air Pollution (IAP)

Solutions

- Denial of malnutrition
- Engaging existing machinery for additional tasks
- Lack of credible NGOs to work on scale
- Risk of setting up parallel systems in the district
- Huge delay in construction
- Poor capacity of WCD Dept
- Scale up Creches (1000+)
- Scale up NRCs (10+)
- Upgradation of AWCs (1000+)
- Introduce Hot Cooked Meal (HCM) for pregnant women/ lactating mothers
- Establish nutri-gardens to improve dietary diversity in high malnutrition pockets
- Expand Mid Day Meal from elementary to secondary level
- Supplement nutritional value of Take Home Ration (THR) provided under SNP to children between 06 months to 3 years
- Roll out intervention for regular screening and counselling of adolescents/pregnant women/ lactating mothers for reducing IDA
- Introduce iron-fortified rice under MDM

B. Area: Health

Major Indicators (NFHS-5)

- Institutional Births: 80% (Keonjhar), 92% (Odisha)
- Full Immunization: 86% (Keonjhar), 90% (Odisha)
- 4 ANCs: 57% (Keonjhar), 78% (Odisha)
- IMR: 524 out of ~30,000 live births (Keonjhar), 38 (Odisha)
- MMR: 13 out of 30,000 live births (Keonjhar), 9.7 (Odisha)

Understanding

- Shortage of doctors - major challenge in rural areas
- Only 1 doctor for 13,154 people in rural Odisha against state average of 1:2323 & WHO norm of 1:1000
- Huge shortage of specialists such as paediatricians, gynaecologists, orthopaedic surgeons, anaesthetists, radiologists etc. even in DHH
- Pregnant women in remote tribal pockets do not deliver in institutions leading to high infant/ maternal mortality/morbidity, pre-term delivery due to malnutrition/other complications, ambulances not reachable, high OPE
- Almost 75% of infant deaths within 1 month of birth – a large proportion on day 0/1
- 25% of infant deaths due to LBW & 15% due to birth asphyxia
- > 25-30 patients referred from district to SCB Cuttack every day due to poor tertiary health services
- Navigating SCB overwhelming for patients/ attendants – often duped/ mistreated
- Huge deficit in EIF in all health institutions
- No functional OT/ ICU/ MGPS even in DHH
- Faulty Medical College Hospital design – significant deviations from mandatory norms (MCI/NBC/ AERB) & design guidelines

Solution

- Twin challenge of improving public health indicators & running hospitals/ health centres efficiently
- Logistics of establishing Medical College Hospital in parallel
- Distractions due to COVID management
- Onboarding private sector partners for specialized services
- Risk of setting up parallel systems in the district
- Poor capacity of Health Dept
- Scale up Digital Dispensaries (50+)
- Scale up Maternal Waiting Homes (10+)
- Support commissioning of Medical College Hospital
- Upgrade PHCs/CHCs/SDHs/DHH to meet various standards/ accreditations/ certifications – IPHS/ NQAS/ Kayakalpa/ LaQshya etc.
- Establish Paediatric/ Neonatal ICU in DHH
- Introduce MMUs for screening/ treatment/ referral - pulmonary/occupational diseases in mining areas
- Develop ARC into an Integrated Disability Rehab Centre
- Set up Common Bio-Medical Waste Treatment Facility (CBWTF), STP & ETP in DHH
- Introduce Centralized Mother-Child Tracking & Counselling System (MCTCS)
- Establish advanced diagnostics/pathology/radiology facilities in all CHC/ SDHs & DHH
- Establish Trauma Care Units (Level II) in SDHs/ DHH
- Establish Multi-Speciality Hospital

C. Area: Education

Major Indicators (NFHS-5 & UDISE)

- NER at Primary Level: 91% (Keonjhar), 87% (Odisha)
- Annual dropout at Primary level: 6.3% (Keonjhar), 5.4% (Odisha)
- NER at Upper Primary Level: 92% (Keonjhar), 85% (Odisha)
- Annual dropout at Upper Primary level: 9.4 % (Keonjhar), 6.9 % (Odisha)
- Retention at Elementary level: 61% (Keonjhar), 73% (Odisha)
- NER at Secondary level: 65% (Keonjhar), 56% (Odisha)
- Annual dropout at Secondary level: 5% (Keonjhar), 5.4% (Odisha)
- Retention at Secondary level: 89% (Keonjhar), 95% (Odisha)
- Transition from Secondary to Higher Secondary level: 88% (Keonjhar), 93% (Odisha)
- Women - 10+ years of schooling: 30% (Keonjhar), 33% (Odisha)

Understanding

- Large number of out-of-school children
- High drop out at Primary & Upper Primary level
- Low retention at Elementary level
- Low enrolment at Secondary level
- Low learning outcomes at all levels/ average pass % in class X
- Wide gap in learning levels of General/OBC and SC/ ST children

- Low aspirations of teachers/students/parents
- Poor socio-economic conditions and consequent engagement of school going children in formal/ informal labour
- Distance from habitation – especially high schools & lack of RTE entitlements post elementary level
- Poor learning levels and consequent loss of interest of children to study further
- No incentive for parents/teachers to motivate students to complete full education cycle
- Poor infrastructure in schools
- Lack of even basics like bench-desks in classrooms
- ~ 3/4th of schools not even connected to electricity

Solution

- Denial of out-of-school children
- High focus on infrastructure development viz-a-viz improving learning outcomes
- Huge delay in construction
- Schools shut down due to COVID
- Lack of credible NGOs to work on scale
- Risk of setting up parallel systems in the district
- Poor capacity of Education Dept
- Scale up High School transformation program (e-learning, science labs, WASH, sports, libraries, etc)
- Scale up ISO certification of tribal complexes in saturation mode
- Re-start and scale-up DMF Scholarships (Class III, V, VIII & BSE)
- Put in place system to identify, track, pull-back and rehabilitate out-of-school/ drop out children
- Develop residential facilities at high schools to address low enrolment at Secondary level
- Extend RTE entitlements (MDM) to high school students
- Roll out initiative for improving learning outcomes – foundational literacy and numeracy at Primary level
- Roll out initiative in high schools for achieving 100% pass percentage in Class X
- Roll out initiative for digital literacy for high school students
- Set up sports nurseries at select schools/ locations in district to nurture budding sportspersons
- Establish Model Residential Schools (4) – 2500+ capacity each
- Roll out initiative for career counselling for high school students

D. Area: Livelihood

Major Indicators

- Households in rural areas with heads earning below Rs. 5000 per month: 90%
- Annual Production (Agriculture) Crops:

Paddy: ~ 60,00,000 Quintal (Y: ~ 32 Quintal/Ha)

Maize: ~ 35,000 Quintal

Pulses: ~ 1,50,000 Quintal

- Annual Production (Horticulture) Crops:

Mango: ~ 45,000 MT, Jackfruit: ~ 20,000 MT

Banana: ~ 18,000 MT, Cashew: ~ 5,000 MT

Ginger: ~ 10,000 MT, Onion: ~ 7,500 MT

Tomato: ~ 1,40,000 MT, Brinjal: 1,70,000 MT

Cabbage: ~ 72,000 MT, Cauliflower: 62,000 MT

- Annual Production NTFP:

Sal Seed: ~ 10,000 Quintal, Tamarind: ~ 4,000 Quintal

Mahua Seed: ~ 1,000 Quintal, Chara Seed: 500 Quintal

Understanding

- Traditionally, tribal and forest dwelling communities dependent on subsistence/shifting agriculture and forest produce for livelihood
- 25% cultivators, 40% agricultural labour, 3% industrial workers
- Out of total cultivated area – 53% highlands & 34% medium lands
- Small and marginal farmers constitute ~ 80% of total cultivators
- Average size of land holding is ~ 1 Ha
- Agriculture is largely rainfed and limited to kharif only
- High population pressure on land, raising cost of inputs, informal sources of credit, growing vulnerabilities to climate extremities and lower than remunerative prices – migration of male members in search of wage employment for 6-8 months time
- Goat rearing – ATM of tribal people
- Tasar (pre-cocoon) – high returns in 2-3 months

Solution

- Pre-agriculture/ hunting-gathering/ subsistence level livelihood activities
- Poor irrigation potential due to hydro-geological limitations
- Low input consumption (fertilizers/ pesticides/ certified seeds)
- Poor yield
- Traditional techniques / skill sets
- Need for immediate returns/ lack of entrepreneurial spirit
- Poor capacity of line departments
- Lack of credible NGOs to scale
- Difficulty in monitoring/ evaluating returns at beneficiary level
- Scale up WADI project
- Scale up TASAR project
- Scale up APC project
- Roll out initiative in poultry sector for small holders
  - Broiler (600 birds/batch)
  - Layer (400 birds/batch)
  - Pullet (500 birds/batch)
  - Feed plant + Integrated Parent Farm + Hatchery
- Roll out initiative in goat rearing sector among tribal families
  - Support services for preventive/curative disease control
  - Breed improvement
  - Feeding and shelter improvement
  - Marketing linkage
  - Community insurance
- Roll out initiative in inland fisheries sector
  - Training around standard PoP
  - Fingerlings production
  - Ice Box/ Cooling Chambers
  - Support to fishing cooperatives
- Horticulture based Food Parks for processing/ value addition

Table 7: Impact of DMF Keonjhar: NFHS 5 (2019-21) Vs NFHS 4 (2015-16)

Particular	Keonjhar	Odisha
Reduction in Stunting	19%	9%
Reduction in Underweight	16%	14%
Increase in Institutional Births	11%	8%
Increase in improved drinking water access	9%	2%

Source: NFHS 4 (2015-16), NFHS 5 (2019-21)

Case for DMF Wealth Model

While mining has led to unimaginable wealth for a handful of mining companies, the local communities who have lived there for centuries, on the very land and its resources, have silently suffered physical displacement, environmental degradation and poverty, with little or no compensation or rehabilitation. What makes things more complicated is that 90% of India's coal and 80% of its other minerals are found in tribal areas, inhabited by undoubtedly the most deprived social group in the country, whose very survival is closely linked with the fate of these lands and the forests standing over them. According to the Twenty-ninth Report of the Commissioner of the Scheduled Castes and Tribes (1990), over 40% of those displaced for development in the country are tribal people, though they constitute only about 8% of the total population.

The DMF offers an opportunity to correct this historical injustice. It recognizes the right of people to benefit from the land and its natural resources, traditionally held by them either individually or as a community. Mining companies operating in the districts now have to pay 10% of the royalty paid to the state governments (or 30% in case of leases granted after 12 January 2015) for major minerals and 10% of the royalty (or 30% in case the lease has not been grated through auctions) in the case of minor minerals to the DMFs. According to the Union Ministry of Mines (February 2017), the total DMF collection across various mining affected districts in the country since the institution of the DMFs in 2015, stands at Rs 5800 Cr. Keonjhar district of Odisha, rich in iron ore deposits, tops the chart with an annual accrual of Rs 600-800 Cr under the DMF, which is expected to continue for the next 30-40 years.

Challenges

Though the potential is unprecedented, the districts are facing enormous challenges to utilize the funds effectively for the development of people affected due to

mining. Districts administrations/ors are used to typical government schemes, where funds are granted from above, with clear design, guidelines and instructions. This is perhaps the first instance, where funds (of such magnitude) are generated locally and are to be spent locally and the state governments have largely left it to the district administrations to plan and execute projects under the DMF, with minimal interference (a rare laissez-faire within the bureaucracy). Without requisite administrative set up or resources for planning, district administrations across the country have started allocating funds under the DMF for different works, often in an ad-hoc manner. In most districts, systematic planning has been a non starter. Due to the huge fund inflow (often at the rate of Rs 1-2 Cr/day in mining intensive districts) and the intense pressure to show quick results, neither situational analysis nor need assessment has been carried out prior to project selection. Without planning, projects have been selected in a top-down manner, based on recommendations from government line departments only. Even though approval of plans, programmes and projects by Gram Sabha is mandatory in Scheduled Areas as the provisions of the Panchayats (Extension to Scheduled Areas) Act, there has been no serious effort in this regard, in letter or spirit. Most of the projects taken up under DMFs are scattered across sectors and geographies and stand in silos, without any inter-relation, either spatially or temporally, due to which the opportunity for integrated development (a Key Performance Indicator under schemes like Sansad Adarsh Gram Yojana) of mining affected villages/clusters is lost.

A brief analysis of the various projects sanctioned under the DMF shows that they are largely physical infrastructure oriented. Construction of roads, bridges and buildings are a common feature that can be seen across districts. Even in 'soft' sectors like health and education, allocations are skewed towards construction. For e.g. in Keonjhar, almost the entire allocation under the education sector is only for the construction of additional classrooms. Though it is relatively well recognized and widely understood that infrastructure matters to economic growth, how much (scale) and which (type) infrastructure to develop is not as clearly settled. More infrastructures may not necessarily cause more growth. Infrastructure is expensive and infrastructure spending is often inefficient.

The effect of infrastructure on growth will also depend on the ability of the local population to take advantage of it. However, little investment has been made into building human capacities of the mining affected population under DMF. Also, efforts to improve the quantity and quality of service delivery by utilizing the existing infrastructure is also largely missing. Another major practical challenge is that since the funds are now locally allocated to different line departments, there is no mechanism in place to verify whether a project taken up under DMF by a line department already exists on the ground or has also been sanctioned/approved under the state budget for the concerned department. This leads to the risk of duplication and misappropriation.

Lastly, there seems to be a wide-spread (but misplaced) assumption that the funds flowing into the DMFs, will continue in perpetuity. However, the fact is that depending on the quantum of mineral reserves in the district and the rate of extraction, the lifespan of the DMFs would vary from one district to the other. In the case of a district like Keonjhar, at the current rate of extraction (which is below average), it would be possible to economically mine iron ore for the next 40-60 years. However, if the rate of extraction increases (say to the level of 2008-09), the lifespan of mining operations in the district and therefore that of the DMFs, would reduce significantly (to ~25-30 years). It is therefore important to look at DMF as wealth and not as revenue to be frittered away in a limited time period.

Recommendation:

The fund flowing into the DMFs is inherited wealth from a non-renewable resource and not revenue, to be squandered away in consumption. It is therefore important to utilize it thoughtfully for the development of the current generation and also invest it wisely for the welfare of future generations to come, who will otherwise neither have the mineral wealth nor the money. It is recommended that the funds accruing under the DMFs be saved as a corpus in a permanent Sovereign Wealth Fund (SWF) and invested in real and financial assets. The annual returns/earnings from the investment should be paid as a dividend (Basic Income) to all mining affected persons, after inflation proofing the corpus.

Case of Keonjhar DMF Wealth Model

Let us considering a hypothetical situation (see Box below) where Keonjhar district of Odisha, which receives about Rs 800 Cr per annum, decides not to spend the money and rather invest the amount in a Sovereign Wealth Fund (SWF). Let us assume that the district continues to receive Rs 800 Cr per annum into the DMF account, for the next 40 years, after which the mineral reserves are exhausted. Let us also assume that the district gets an annual return of 10% on the investment, out of which it retains half of the amount for inflation proofing and distributes the remaining amount equally to all mining affected persons in the district (including children). In such a scenario, each person in the mining

affected villages of Keonjhar will get an annual dividend of Rs 941 and each family (of say 5 persons) will get an annual dividend of Rs 4706, in the first year.

The annual dividend will continuously raise and in the 17th year each mining affected family will receive more than Rs 1,00,000 per annum and in the 40th year, when the mining reserves get exhausted, the annual dividend per person will climb up to Rs 71,400 and each family will receive Rs 3,57,000. The cumulative principle amount at that point of time will be Rs 96,640 Cr.

After the 40th year, when the district will no longer receive fresh inflows (i.e. Rs 800 Cr per annum) into the DMF and the annual dividend per family will continue to grow at a constant rate of 3.75% and reach a figure of Rs 5,61,125 in the 50th year, Rs 12,97,104 in the 75th year and Rs 32,59,826 in the 100th year. At that point of time, the principle amount available will be more than Rs 18,00,000 Cr.

Considering an annual inflation of 5%, the annual dividend is inflation proofed till the 33rd year. However, it can be reasonably assumed that the Y-o-Y inflation in the country will ease to the level of 1-2% (as in developed countries) after 33 years, thereby ensuring that the annual dividend will continue to grow in real terms every year, well into the future.

Let us considering a hypothetical situation where Keonjhar district of Odisha decides not to spend the DMF inflows immediately and rather invest it in a Sovereign Wealth Fund (SWF).

Assumptions made:

- Average annual fund accrual: Rs 800 Cr
- Lifespan of fund accrual: 40 years
- Average annual Return on Investment (RoI): 10%

Year	Principal (in Cr)	RoI @10% (in Cr)	Inflation Proofing @ 5% (in Cr)	Total amount for payment of dividend (in Cr)	Mining affected Population	Dividend per person/ annum (Rs)	Dividend per family/ annum (Rs)	Annual % Growth of dividend
1	800.0	80.0	40.0	40.0	425000.0	941.2	4705.9	
2	1640.0	164.0	82.0	82.0	430100.0	1906.5	9532.7	102.6
3	2522.0	252.2	126.1	126.1	435261.2	2897.1	14485.6	52.0
4	3448.1	344.8	172.4	172.4	440484.3	3914.0	19569.9	35.1
5	4420.5	442.1	221.0	221.0	445770.1	4958.3	24791.4	26.7
10	10062.3	1006.2	503.1	503.1	473166.0	10633.0	53164.8	12.7
25	38181.7	3818.2	1909.1	1909.1	565875.9	33736.8	168684.0	6.0
50	157416.1	15741.6	7870.8	7870.8	762489.8	103225.0	516125.2	3.8
75	533066.7	53306.7	26653.3	26653.3	1027417.3	259420.8	1297103.8	3.8
100	1805153.2	180515.3	90257.7	90257.7	1384393.9	651965.2	3259825.8	3.8

- Average annual inflation: 5%
- Total number of mining affected persons: 425,000 (in 491 villages)
- Average annual population growth: 1.2%
- Average size of a household: 5 persons

Advantages of a Permanent Fund and Basic Income under DMF:

First and foremost, the corpus is protected and invested for healthy returns, into a permanent fund. It is not spent like revenue/income and therefore will continue to exist indefinitely. The mining affected families will continue to benefit from the mineral wealth in the form of annual dividends, across generations, long after the mineral is exhausted and mining operations come to a halt. The affected community, which has suffered decades of injustice will benefit directly and immediately. The incompetence and mediocrity of the bureaucracy in planning and implementation will no longer affect the development of the community. It may simply be the fastest way of reducing poverty. Direct benefit transfer in the form of Basic Income will prevent corruption, misappropriation, wastages, leakages and inefficiencies in the delivery system that currently plagues the implementation of myriad schemes of the Centre and

State. It will also help break the infamous contract-bureaucrat- politician nexus, which is ubiquitous with public service delivery in the country. It will also keep the size of the government machinery small and nimble and will promote the philosophy of 'minimum government, maximum governance'.

The Basic Income will help break the idea of citizen as a passive beneficiary of government benevolence and will empower him to become an agent of change, defined interms of his own values and goals. It will give the mining affected persons, the freedom of choice to spend with dignity on goods and services that fulfils his needs. Greater cash flow in the mining affected areas will also help naturally attract private investments, especially in the tertiary/service sectors like education (private schools), healthcare (nursing homes), retail (small shops), transport (private buses) etc. This will greatly improve the quality of life of mining affected families, increase job creation and entrepreneurial opportunities and also reduce the burden of service delivery on government institutions.

Research from across the world has shown that resource richness weakens democracy. In mining areas, local satraps and mining mafia flout laws with impunity, buy political patronage, intimidate the poor indigenous population, purchase social license to operate through regular cash doles and savagely suppress discontent, if expressed by any section. In such a scenario, the idea of transparent and regular payments to all mining affected persons and their future descendants (from legal mining operations) will give them a strong reason to fight back illegal mining. Paying annual dividends and then attempting to shore up state coffers from tax and non-tax sources through local Panchayats will not only strengthen the financial health of the PRIs but also fuel public demand for a transparent, efficient and responsive government, leading to the strengthening of democracy at grass-root level.

As the Basic Income is fully funded by mineral wealth, it will not lead to increase in taxes for the general population. While critics to the Basic Income (at the national level) worry that Basic Income will replace myriad welfare schemes like MGNREGA, PMAY, NHM, MDM, PDS, SBA etc due to fiscal limitations, this is not the case with BI under DMF, as it only supplement the existing schemes.

Conclusion

Mining is essential for the economic growth of a nation. Although mining is seen as an extractive sector, it can be a partner in achieving the Sustainable Development Goals. Odisha contributes the largest value of mineral production (excluding fuel oil and atomic minerals) in the country. It is endowed with rich mineral resources with a variety of metallic and non-metallic minerals that include Chromite, Bauxite, Graphite, Iron-ore, Manganese ore and many more. The mining and quarrying subsector contributed 8.29 per cent of state GVA (relative to 2.26 per cent at the all-India level) as per the advance estimates (AE) for 2021-22 at current prices. In terms of reserves in India, Odisha accounts for 96 per cent of Chromite, 92 per cent of Nickel, 51 per cent of Bauxite, 33 per cent of Iron ore, 43 per cent of Manganese ore and 24 per cent of Coal reserves in the country. Government of India has formulated Pradhan Mantri Khanij Kshetra Kalyan Yojana which is implemented by the District Mineral Fund (DMF) using the funds accruing to the DMF. These funds are used for the welfare of persons and areas affected by mining related operations. The DMF offers an opportunity to correct this historical injustice. It recognizes the right of people to benefit from the land and its natural resources, traditionally held by them either individually or as a community. DMF Keonjhar is largest DMF in the country. In its current state, DMF accrual will only flow from the extracting companies to the various departments of the Government, without passing through the hands of the citizens. It is proposed that all or part of the accrual be invested in an Alaska-type permanent fund and an annual dividend from the investment be transferred directly to citizens, so that they can decide how it is to be spent. Mineral wealth need not be a curse. It can even be a blessing, provided the right measures are taken to transform it into sustainable development.

Way Forward

Capacity Building: Ensure that the capacities/ capabilities of Government Departments at districts are adequately built/bolstered in order to improve their ability to absorb DMF funds, in addition to own budget

Monitoring & Evaluation: Ensure that projects/ initiatives are monitored using digital tools & technologies as per pre-defined KPIs/ schedules and delays/deviations, if any are flagged immediately and course corrections are undertaken

Process: Ensure that due process is followed at each and every step including obtaining necessary board approvals, undertaking procurement as per GFRs/PWD Codes, signing contracts with clear terms & conditions, routing funds as per rules.

Planning: Ensure that projects/ initiatives sanctioned are need/ evidence based and will help achieve pre-determined goals, targets and indicators in a time-bound manner using SDG/ADP type framework

Design: Ensure that projects/initiatives are designed/ detailed out after extensive research, benchmarking and analysis of all possible alternatives, with active participation of Line Departments

Partnership: Ensure DMF partners with right/ reputed organizations with capabilities/ commitments to appropriate solutions and create strong and symbiotic linkages between Govt. Depts and Partner Organizations for success of initiatives

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A Green Future: Exploring College Students Engagement towards Environment Sustainability

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Abstract

The present study aimed to assess conservation behaviour of a group of higher education students of West Bengal in respect of sex, level of education, and discipline studied, and to ascertain the relationship of conservation behaviour with environmental attitude. 273 students comprising 125 males and 148 females, 151 pursuing graduation and 122 doing postgraduation, 90, 94 and 89 studying social science, science and humanities respectively were selected from different colleges and universities of West Bengal, following purposive sampling technique. The Pro-nature Conservation Behaviour Scale (Barbett et al., 2020) and the Shortened version of the Environmental Attitude Scale (Milfont and Duckitt, 2010) were administered on the samples, along with a general information schedule. Pearson's product-moment correlation and Three-way Anova were applied. The findings indicated that sex made significant variation in respondents' pro-nature conservation behaviour and all its domains, namely, organized social engagement, individual engagement, wildlife except planting. Significant variation was found regarding level of education, in all domains of conservation behaviour, except planting. However, no significant variation was noted in conservation behaviour based on discipline. The interaction effect of sex and education level was significant in overall conservation behaviour, and individual engagement and wildlife domains. The interaction effect of sex and discipline was also found to be significant in the domain of organized and social engagement. The relationship between pro-nature conservation behaviour and environmental attitude was observed to be positive, but not significant.

Keywords: *Pro-nature Conservation Behaviour, Environmental Attitude, Environment, SDG*

Introduction

In the pursuit of modernization, we are gradually distancing ourselves from nature and biodiversity, and are overlooking a pressing concern - extinction of biodiversity, which poses a threat to human health and ecological functions (Ceballos et al., 2017, Cardinale et al., 2012; Rockström et al., 2009). Individual actions, such as choices in consumption (Koger and Winter, 2010), management of personal gardens (Gaston et al., 2005), and integration into social processes through participation in voting (Koger and Winter, 2010) influence biodiversity.

Actions involving individual behaviours to support and safeguard wildlife from local to international levels, and preservation of ecosystem, is known as pro-nature conservation behaviours (Barbett, 2020). Regular exposure to everyday nature during childhood (Giusti et al., 2014), time spent in natural settings, exposure to positive role models, and reading about nature foster a sense of connectedness with nature (Stevenson et al., 2014).

As stated by Barbett et al. (2020), pro-environmental behaviour encompasses the positive actions that not

only favour the environment conservation goals but also influence nature conservation. Masud and Kari (2015) observed that demographic variables like age, gender, education, occupation, income, environmental well-being, awareness, and social issues had positive and significant impacts on attitudes towards environmental conservation behaviour. Saulick et al. (2024) found that demographic parameters such as sex, education levels, and age group had an impact on conservation behaviour.

Researchers observed gender differences in environmental citizenship behaviours, with women displaying more consistent ecological attitude and behaviour than men (Siagian et al., 2023, Nepras et al., 2023; Raman, 2016; Medina and Bruno, 2016; Rahman, N. A., 2016; Muderrisoglu et al., 2010; Zelezny et al., 2000). However, Chen et al. (2017), and Sarvestani (2012) reported no differences in the pupils' environmental attitudes and actions in respect of their gender, and Moody-Marshall (2023) found males to possess statistically higher environmental attitude and practice scores than females. Kasapoğlu and Turan (2008) revealed that the undergraduate students had a highly positive environmental attitude but their responses to behaviours were found to be low. Natural Science students had statistically greater environmental attitude and environmental practice scores than Social Science students (Moody-Marshall, 2023). Levels of environmental awareness, concern and behaviour were higher among biological science students than those studying social science, humanities, physical science, and environmental science (Arshad et al., 2020). Additionally, researchers discussed the impact of environmental education on students' environmental views and actions. (Raman, 2016; Rahman, N. A., 2016).

Methodology

Hypotheses

Hypothesis 1: There is no significant variation in conservation behaviour of the respondents in respect of sex.

Hypothesis 1a: There is no significant variations in organized or social engagement dimension of conservation behaviour of the respondents in respect of sex.

Hypothesis 1b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of sex.

Hypothesis 1c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of sex.

Hypothesis 1d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of sex.

Hypothesis 2: There is no significant variation in conservation behaviour of the respondents in respect of level of education.

Hypothesis 2a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of level of education.

Hypothesis 2b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of level of education.

Hypothesis 2c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of level of education.

Hypothesis 2d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of level of education.

Hypothesis 3: There is no significant variation in conservation behaviour of the respondents in respect of discipline studied.

Hypothesis 3a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of discipline studied.

Hypothesis 3b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of discipline studied.

Hypothesis 3c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of discipline studied.

Hypothesis 3d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of discipline studied.

Hypothesis 4: There is no significant variation in conservation behaviour of the respondents in respect of interaction between sex and level of education.

Hypothesis 4a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of interaction between sex and level of education.

Hypothesis 4b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of interaction between sex and level of education.

Hypothesis 4c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of interaction between sex and level of education.

Hypothesis 4d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of interaction between sex and level of education.

Hypothesis 5: There is no significant variation in conservation behaviour of the respondents in respect of interaction between sex and discipline studied.

Hypothesis 5a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of interaction between sex and discipline studied.

Hypothesis 5b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of interaction between sex and discipline studied.

Hypothesis 5c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of interaction between sex and discipline studied.

Hypothesis 5d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of interaction between sex and discipline studied.

Hypothesis 6: There is no significant variation in conservation behaviour of the respondents in respect of interaction between level of education and discipline studied.

Hypothesis 6a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of interaction between level of education and discipline studied.

Hypothesis 6b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of interaction between level of education and discipline studied.

Hypothesis 6c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of interaction between level of education and discipline studied.

Hypothesis 6d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of interaction between level of education and discipline studied.

Hypothesis 7: There is no significant variation in conservation behaviour of the respondents in respect of interaction among sex, level of education and discipline studied.

Hypothesis 7a: There is no significant variation in organized or social engagement dimension of conservation behaviour of the respondents in respect of interaction among sex, level of education and discipline studied.

Hypothesis 7b: There is no significant variation in individual engagement dimension of conservation behaviour of the respondents in respect of interaction among sex, level of education and discipline studied.

Hypothesis 7c: There is no significant variation in planting behaviour dimension of conservation behaviour of the respondents in respect of interaction among sex, level of education and discipline studied.

Hypothesis 7d: There is no significant variation in wildlife dimension of conservation behaviour of the respondents in respect of interaction among sex, level of education and discipline studied.

Hypothesis 8: There is no significant relationship between environmental attitude and pro-nature conservation behaviour of the respondents.

Tools used

To verify the hypotheses the following tools were used:

General Information Schedule

The questionnaire developed by the present investigators contained items regarding demographic variables like age, sex, mother tongue, educational qualification, discipline studied, name and nature of the educational institution, address and locality of the residence, jurisdiction authority of the residence, and duration of stay at the present locality.

Pro Nature Conservation Behaviour Scale (ProCoBS)

The Pro Nature Conservation Behaviour Scale developed by Barbett et al. (2020) is a psychometrically validated questionnaire. It assesses proactive actions that specifically aid in biodiversity protection across 4 dimensions, namely, organized or social engagement, individual engagement, planting and wildlife.

The scale comprises a total number of 18 items, divided into four subscales, namely, organized or social engagement, individual engagement, planting and wildlife. Two subscales, "individual engagement" (item numbers 4,5,6,8, and 9) and "organized/social engagement" (item numbers 1, 2, 3, and 7) are used to evaluate the non-gardening component of "Civil Action" behaviours. The final two subscales, "planting" (items 10, 11, 15, and 16) and "wildlife" (items 12, 13, 14, 17, and 18), deal with the gardening component.

It is a 7-point scale with response categories ranging from 1 (strongly disagree) to 7 (strongly agree). High score obtained on the scale indicates the presence of pro-nature conservation behaviour.

The Coefficient Alpha reliability coefficients for the total ProCoBS, the two sub scales of civil action and gardening had been found to be 0.893, 0.858 and 0.872 respectively. The reliability coefficients of the four factors, namely, Individual Engagement, Social Engagement, Planting and Wildlife were found to be 0.864, 0.797, 0.876 and 0.781 respectively.

To evaluate the validity of the scale, Pearson's r was computed between related constructs and the ProCoBS scale, as well as independently for the civic action and gardening subscales. With r ranging from 0.260 to 0.651, all the scales showed a substantial ($p < 0.001$) positive correlation with all the evaluated components

Environmental Attitude Scale

The Environmental Attitude Scale (EAI-S) is a condensed form that was created by Milfont and Duckitt (2010) to measure people's attitudes towards the environment, how it is managed, and the variables that impact its quality along 12 different dimensions, namely, enjoyment of nature, support for interventionist conservation policies, environmental movement activism, conservation motivated by anthropocentric concern, confidence in science and technology, environmental fragility, altering nature, personal conservation behaviour, human dominance over nature, human utilization of nature, eco-centric concern, and support for population growth policies.

EAI-S comprises a total number of 72 items, each sub-scale consisting of 6 items. It is a 7-point scale with response categories ranging from 1 (strongly disagree) to 7 (strongly agree). A high score obtained in the scale indicates a favourable attitude towards the environment.

The 12 EAI-S subscales' test-retest reliability coefficients have an average of 0.82 and range from 0.62 for the "conservation motivated by anthropocentric concern" scale to 0.90 for the "personal conservation behaviour" scale. The mean inter-item correlations ranged from 0.22 for the "conservation motivated by anthropocentric concern" scale to 0.67 for the "environmental movement activism", with an average of 0.47. These findings show that all of the EAI-S subscales have sufficient internal consistency and homogeneity.

Sample

The present sample consisted of male and female undergraduate and postgraduate students studying at different colleges and universities of West Bengal. Initially, a considerable number of higher education institutions of West Bengal were selected. The representatives of the management of the selected institutes were personally met to get permission for collecting data from their students. Finally, a total number of 273 students (comprising 148 female and 125 male) were selected, using purposive sampling technique. Among the selected respondents 151 students were pursuing undergraduate courses, whereas 122 students were continuing with postgraduate courses. In respect of disciplines, 90 students were from social science stream, 94 were selected from science stream (including pure and bio science) and 89 were studying humanities.

Selection criteria

i) Students within the age range from 18 to 23 years were considered.

ii) The respondents must be currently enrolled in either undergraduate or postgraduate course.

iii) Students from humanities, pure science, bio science and social science disciplines were considered.

iv) The respondents must be Indian citizens.

v) The respondents must be residents of West Bengal.

vi) Only those residing in urban and sub urban areas of West Bengal were considered.

vii) The higher education institutes situated in West Bengal were considered.

viii) Institutes were considered irrespective of their nature (public or private).

ix) The study only took into consideration individuals who agreed to participate.

Procedure

The questionnaires were administered following a pre-arranged programme schedule. Before proceeding with data collection, the respondents were given a brief introduction about the purpose of the research, and formal consents were obtained from them.

Statistical Analysis of Data

To depict a typical picture of the general characteristic feature of the participants, descriptive statistics like mode values and percentages were calculated for both male and female respondents. Apart from calculating means and standard deviations, three-way ANOVA was computed to assess the impacts of sex, level of education and discipline studied on the respondents' pro nature conservation behaviour, both in terms of individual dimension scores and total scores on the ProCoBS. To ascertain the relationship, Pearson's product moment correlation was also computed on conservation behaviour with environmental attitude based on the total scores on the tests.

Ethical Consideration of the Study

- The tests were administered following the standard methods of administration.
- Data were collected only after getting the respondents' informed consents.
- It was ensured by the present investigator that the responses given by the subjects remained confidential and used solely for academic purposes.

Results and Discussion

Table 1: General Characteristics of the respondents

General Characteristics of the respondents (N = 273)	Values
Age in years (Mode Value)	21
Sex (%)	
Female	54.212
Male	45.787
Mother Tongue (%)	
Bengali	90.91
Hindi	9.091
Educational Qualification (%)	
Under Graduate	55.311
Post Graduate	44.689
Discipline studied (%)	
Social Science	32.967
Science (Bio Science & Pure Science)	34.432
Humanities	32.601
Nature of Institution (%)	
Government	64.463
Government Aided	8.678
Private	26.860
Locality of residence (%)	
Urban	71.074
Sub Urban	28.926
Jurisdiction Authority of the Residential Area (%)	5.372
Gram Panchayat	94.628
Municipal Corporation	
Duration of Stay in the Present Residence in years (Mode Value)	20

Table-1 depicts the typical characteristic features of the present sample based on certain demographic variables. Majority of the participants were the residents of urban areas of West Bengal. All the participants had been found staying at their respective locations mostly since birth. The respondents were aged around 21 years. The sample comprised 54.21% of females and 45.79%. of males. More than half of the respondents were pursuing under graduation studies, in the Government institutions. Almost equal numbers of students from the disciplines of Social science, Science (comprising of bioscience and pure science), and Humanities participated in the study.

Table 2: Distribution of Means and Standard Deviations of Pro Nature Conservation Behaviour Scores of Male and Female Students

Pro Nature Conservation Behaviour Scale Dimensions	Female		Male	
	Mean	S.D.	Mean	S.D.
Organized or social engagement	17.838	6.703	20.928	6.638
Individual Engagement	13.264	5.740	15.696	5.567
Planting	18.304	5.495	19.000	4.876
Wildlife	19.831	7.748	23.616	6.762
Total	69.237	20.544	79.240	19.080

Note: *High score indicates high level of conservation behaviour*

Table 2 reveals that in all the domains of conservation behaviour, the male respondents have scored higher than the females, indicating greater inclination towards environment friendly behaviours and practices among the males. The finding aligns with the observations of Moody-Marshall (2023) and Levine and Strube (2012), that is, males have higher environmental knowledge, awareness and practice scores than females, but is in contradiction with a good number of research observations suggesting that females are more predisposed to conservation behaviors than males (Siagian et al., 2023; Nepras et al., 2023; Trelohan, 2022 Medina and Bruno, 2016; Raman, 2016; Rahman, N. A., 2016; and Muderrisoglu et al., 2010;). The discrepancy between the present and the previous observations may be ascribed to the cultural variations, and differing practices between Eastern and Western countries. More specifically, the dimension of organized social engagement highlighted stark contrasts in scores between females and males. This aligns with Trelohan's (2022) findings suggesting that women tend to adopt more pro-environmental behaviors than men in private spheres, but not necessarily in public spheres.

Table 3: Distribution of Means and Standard Deviations of Pro Nature Conservation Behaviour Scores of Undergraduate and Postgraduate Students

Pro Nature Conservation Behaviour Scale Dimensions	Under Graduate		Post Graduate	
	Mean	S.D.	Mean	S.D.
Organized or social engagement	18.146	6.835	20.623	6.615
Individual Engagement	13.483	6.034	15.484	5.265
Planting	18.543	5.405	18.721	5.010
Wildlife	20.212	8.079	23.238	6.464
Total	70.384	21.618	78.066	18.156

Note: *High score indicates high level of conservation behaviour*

Table 3 indicates that the Post Graduate students are keener for practicing pro-environmental behaviours than those studying at Under Graduate level. The PG students' higher age level (Saulick et.al., 2024; Kasapoğlu and Turan, 2008), more extensive knowledge about environmental issues and greater exposure to the conservation practices might have played a role here.

Table 4: Distribution of Means and Standard Deviations of Pro Nature Conservation Behaviour Scores of Students across Disciplines

Pro Nature Conservation Behaviour Scale Dimensions	Social science		Science		Humanities	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Organized or social engagement	19.344	7.491	19.021	6.399	19.405	6.662
Individual Engagement	14.468	6.119	13.979	5.704	14.708	5.542
Planting	18.168	5.339	18.702	5.172	19.000	5.183
Wildlife	20.289	7.996	21.564	6.794	22.854	7.678
Total	72.267	21.748	73.266	19.595	75.966	20.086

Note: *High score indicates high level of conservation behaviour*

Table 4 shows that in all the domains of pro conservation behaviour, the students from Humanities discipline have secured higher average scores than those studying Science and Social Science subjects, indicating greater inclination among the former group towards practicing environment friendly behaviours than the latter. The classroom-bound education system in our country and the excessive load of the curriculum of the Science subjects might prevent the students from thinking beyond the boundaries and applying the theoretical knowledge in shaping ecological behaviour to make the earth a better place for living. Ahmad et al. (2015) observed that in spite of possessing a good knowledge of the environment, the students' level of knowledge and pro-environmental behaviour has a weak relationship. Liefländer et al. (2013) found that educational interventions in schools can enhance students' connectedness with nature, only in the short term. Individual motivation and willingness to adopt new behaviors are insufficient to drive change without conducive social and contextual conditions. This is also applicable in the present context.

In the non-gardening aspect, the Social Science students have better scores than the Science students, whereas in the gardening aspect, the opposite trend is observed. The Science students have a more enriched theoretical knowledge base regarding the impact of different species on the ecosystem, conservation of biodiversity and the strategies for preservation and protection of wildlife, more than their counterparts from Social Science background, owing to their curriculum. The finding is supported by observations of Al Balushi, and Ambusaidi (2023), Ling et al. (2023), Adrita, U. W., & Mohiuddin, M. F. (2020), and Vicente-Molina et.al. (2013), that is, environmental knowledge had a significant impact on environmental attitudes and behaviour.

Table 5: F ratios based on Pro Nature Conservation Behaviour Scores of Respondents

Sources of variance	Sum of square	Degrees of freedom	Variance	F-ratio
Sex	5871.592	1	5871.592	15.610***
Level of Education	3583.472	1	3583.472	9.527***
Discipline	413.905	2	206.952	0.550*
Interaction between Sex and Level of education	2193.438	1	2193.438	5.831**
Interaction between Sex and Discipline	1335.125	2	667.562	1.775*
Interaction between Level of education and Discipline	388.409	2	194.205	0.516*

Interaction among Sex, Level of Education and Discipline	238.616	2	119.308	0.317*

Note: ** Not significant, ** significant at 0.05 level, *** significant at 0.01 level*

Table 5 shows that pro nature conservation behaviour of the respondents has varied significantly regarding their sex and level of education, while the variation is not significant in respect of discipline of study. Hence, Hypotheses 1 and 2 are rejected, and Hypothesis 3 is accepted. Previous researchers (Siagian et al., 2023; Moody-Marshall, 2023; Nepras et al., 2023; Medina and Bruno, 2016; Raman, 2016; Salehi, 2016 Rahman, N. A., 2016; Muderrisoglu et al., 2010; Trelohan, 2002) also reported about sex differences, and influence of level of education and age group in conservation behaviors (Saulick et.al., 2024; Kasapoğlu and Turan, 2008). The finding concerning insignificant variation in conservation behaviour in respect of discipline of study contradicts those of Moody-Marshall (2023), Arshad et al. (2020), and Rahman, N. A. (2016), who observed that environmental studies as a discipline fostered pro conservation behaviour among those who attended such programme. The present sample of science group consisted of students of both Pure and Biological Sciences. It is conceivable that the attitudes and behaviors of students studying Botany and Zoology differ from those studying Physics, Chemistry, Mathematics and Statistics, thus obscuring clear differences in the obtained data due to limited sample size in each discipline.

Moreover, the effect of interaction between sex and level of education on conservation behaviour is found to be significant. Hence, Hypothesis 4 is rejected. This is in conformity with Saulick et al. (2024), who demonstrated that demographic factors, including gender, level of education, and age group influenced pro-environmental behaviour. The effects of sex and discipline, level of education and discipline, and sex, level of education and discipline have not been found to be significant. Therefore, Hypotheses 5, 6 and 7 are accepted.

Table 6: F ratios based on the dimensions of Pro nature conservation behaviour scores of respondents

Dimension-1 Organized or Social Engagement				
Sources of variance	**Sum of square**	**Degrees of freedom**	**Variance**	**F-ratio**
Sex	575.032	1	575.032	13.609***
Level of education	408.846	1	408.846	9.676***
Discipline	7.172	2	3.586	0.085*
Interaction between Sex and Level of education	90.397	1	90.397	2.139*
Interaction between Sex and Discipline	441.706	2	220.853	5.227***
Interaction between Level of education and Discipline	7.786	2	3.893	0.092*
Interaction among Sex, Level of Education and Discipline	34.723	2	17.361	0.411*
Dimension-2 Individual engagement				
Sources of variance	**Sum of square**	**Degrees of freedom**	**Variance**	**F-ratio**
Sex	320.493	1	320.493	10.625***
Level of education	212.318	1	212.318	7.039***
Discipline	5.562	2	2.781	0.092*
Interaction between Sex and Level of education	287.297	1	287.297	9.525***
Interaction between Sex and Discipline	88.875	2	44.438	1.473*
Interaction between Level of education and Discipline	56.738	2	28.369	0.941*
Interaction among Sex, Level of Education and Discipline	63.061	2	31.530	1.045*
Dimension-3 Planting				
Sources of variance	**Sum of square**	**Degrees of freedom**	**Variance**	**F-ratio**
Sex	19.671	1	19.671	0.708*

Level of education	.994	1	.994	0.036*
Discipline	39.897	2	19.949	0.718*
Interaction between Sex and Level of education	37.142	1	37.142	1.336*
Interaction between Sex and Discipline	11.021	2	5.511	0.198*
Interaction between Level of education and Discipline	48.523	2	24.261	0.873*
Interaction among Sex, Level of Education and Discipline	7.613	2	3.807	0.137*
Dimension-4 Wildlife				
Sources of variance	**Sum of square**	**Degrees of freedom**	**Variance**	**F-ratio**
Sex	918.637	1	918.637	18.211***
Level of education	579.557	1	579.557	11.489***
Discipline	246.159	2	123.079	2.440*
Interaction between Sex and Level of education	203.980	1	203.980	4.044**
Interaction between Sex and Discipline	69.930	2	34.965	0.693*
Interaction between Level of education and Discipline	36.532	2	18.266	0.362*
Interaction among Sex, Level of Education and Discipline	81.792	2	40.896	0.811*

Note: ** Not significant, ** significant at 0.05 level, *** significant at 0.01 level*

Table 6 depicts that organized or social engagement of the respondents has varied significantly in respect of sex and level of education, but not regarding discipline of study. Hence, Hypotheses 1a and 2a are rejected, and Hypothesis 3a is accepted. The interaction effect of sex and discipline has been significant, leading to rejection of Hypothesis 5a. No significant variations have been noticed in so far as the interaction effects of sex and level of education, of discipline and level of education, and of sex, discipline and level of education are concerned. Therefore, Hypotheses 4a, 6a, and 7a, are accepted.

Individual engagement has varied significantly regarding the impacts of sex, level of education, and interaction between them. Hence, Hypotheses 1b, 2b, and 4b are rejected. No significant variation is observed in respect of discipline of study. Therefore, Hypothesis 3b is accepted. Moreover, the effects of interaction between sex and discipline, discipline and level of education, and among sex, discipline and level of education on the samples' individual engagement in conservation behaviour have not been significant. Hence, Hypotheses 5b, 6b, and 7b are accepted.

Table 6 further shows that none of sex, level of education, discipline of study, and the interactions thereof have yielded significant variations in the respondents' planting behaviour. Hence, Hypotheses 1c, 2c, 3c, 4c, 5c, 6c, and 7c are accepted.

The respondents' behavioural practices to offer habitats or home or resources for wild plants and animals (wildlife domain) are found to vary significantly in respect of sex, levels of education, and the combination of sex and educational level. Hence, Hypotheses 1d, 2d, and 4d are rejected. No significant variations are noted in the participants' wildlife conservation behaviour, in respect of discipline of study, interactions between sex and discipline, discipline and level of education, and among sex, discipline and level of education. Therefore, Hypotheses 3d, 5d, 6d, and 7d accepted.

Further analyses of scores indicate that males possess greater inclination towards environmental conservation, and indulge more in civil and gardening activities than females. Several factors may contribute to this trend. Social norms and expectations often assign men responsibilities related to outdoor activities and stewardship of natural resources. Additionally, males may have greater access to outdoor recreational activities, fostering a deeper appreciation for nature and a stronger desire to conserve it.

The Post Graduate students have expressed higher involvement in conservation behaviours than the Under Graduate ones, potentially due to the Post Graduates' greater experience, advanced education and specialization in fields such as environmental science, sustainability, or conservation biology, causing a deeper commitment to conservation behaviour. The findings

suggest that socialization, educational opportunities, career aspirations, access to resources, and mentorship may influence gender-based and educational-level-based differences in conservation behaviour, although individual's motivation and behaviour remain highly variable and are influenced by a wide range of factors, such as, education and knowledge, personal identity, self-efficacy, personal values, moral norm, social influence, and so on. Through knowledge about the right environmental behaviours, students do show changes (Kurokawa et.al., 2023; Ling et al., 2023; Adrita, U. W., & Mohiuddin, M. F., 2020). Individual characteristics, such as, connectedness to nature, interpersonal altruism, motivation, and place attachment (Chan et al., 2023; Kuo et al., 2019), social identity, sense of location, creative behaviour, ecological activism, and perceived behaviour control (Wang et al., 2022) positively affect pro environmental behaviour. Response efficacy through self-efficacy has been found to indirectly influence pro-environmental behaviour (Shafiei and Maleksaeidi, 2020). The potential for restorative experiences in natural environment motivates people to behave ecologically, thereby protect the environment (Hartig et al., 2007). Through the influence of conservation ideas and personal standards, values shape pro environmental behaviour (Stern.et.al., 2000). Altruistic and biospheric values have been found to be positively linked to sustainable behaviours (Whitley et al., 2018; Liu et al., 2018; Gatersleben et al., 2014). Personal moral norm via pro-environmental intention determines pro-environmental behaviour (Bamberg and Möser, 2007). An individual feeling morally obligated to protect the environment, take up corresponding behaviour (Klockner, 2013). The leader's pro environmental behaviour at the work organizations significantly creates a positive impact on worker's intent to show pro environmental behaviour as well (Blok et al., 2015). Intrinsic motivation mediates the relationship between environmentally friendly behaviour and environmental identity (Lee and Jeong, 2018; Van der Werff et al., 2013).

Table 7: Relationship between Environmental Attitude and Pro nature conservation behaviour of respondents

Variables	Coefficient of correlation
Environmental Attitude and Pro nature conservation behaviour	0.059*

** Not significant*

Table 7 displays that environmental attitude and pro-nature conservation behaviour share an insignificant and positive relationship. Hence, Hypothesis 8 is accepted. The findings are consistent with those of Mullenbach and Green (2018), Salehi et al. (2016) Osman et al. (2014), Sarvestani (2012), Muderrisoglu et.al. (2010), and Thapa (1999) who revealed a weak but positive relationship between the said psychological constructs. Contradictory findings have been reported too. For instances, Sabzehei et al. (2016) and Vijayabanu and Amarnath (2013) found environmental attitude and pro-environmental behaviour to share a significant relationship.

The positive relationship between the constructs implies that an individual with a favourable attitude toward the environment practices sustainable behaviour. However, there may be exceptions. Not all people possessing pro-environmental attitudes display environment friendly behaviours. While environmental attitudes serve as crucial indicators of individuals' beliefs and values regarding nature conservation, they often fail to directly translate into corresponding behaviours. The discrepancy between attitudes and actions can be attributed to various factors, including external barriers, social pressures, lack of knowledge or awareness, psychological influences, convenience, and cultural norms. Despite harbouring positive attitudes towards the environment, individuals may encounter obstacles that impede their ability to engage in pro-environmental actions. Therefore, fostering environmental behaviour necessitates addressing these complex influences and creating supportive environments that facilitate sustainable actions, rather than solely relying on changes in attitudes.

Limitations of the Study

To enhance understanding of the issue of pro conservation behaviour and practices, the comparison based on various demographic factors, such as age, socioeconomic status, racial background, and field of study might have been beneficial. The participants were selected exclusively from urban and suburban regions of West Bengal. Inclusion of rural inhabitants could have broadened the scope of the findings. Additionally, encompassing students from diverse disciplines, including vocational courses, such as law, engineering, and others might have improved the generalizability of the results.

Concluding Remark

Upon devouring much into the study of environment conservation behaviour, it is clearly understood that the need for conserving the environment is undeniable, given its critical importance for human survival, biodiversity conservation, ecosystem services, climate stability, and public health. By embracing sustainable practices, protecting natural habitats, and advocating

for policies that prioritize environmental conservation, for the benefit of present and future generations, we can create a more robust and sustainable future. It is not just a matter of choice but a moral imperative to safeguard our planet for the well-being of all living beings. Clean air, free from pollutants emitted by industries and vehicles reduces the risk of respiratory diseases, and promotes better respiratory health. Freshwater bodies, unpolluted by chemicals and waste support aquatic life and provide clean water essential for human survival. Lush forests and vibrant ecosystems not only harbour diverse species of plants and animals but also play a vital role in controlling the temperature, curbing soil erosion, and enhancing air quality. Furthermore, a healthy environment provides countless recreational opportunities from hiking in pristine forests to swimming in unpolluted rivers, enhancing our physical and mental well-being. In essence, the benefits of a thriving environment are manifold and extend far beyond the realm of ecology.

To address these pressing environmental challenges, it is imperative that we embrace sustainable conservation actions that put the long-term wellbeing of the earth before personal benefit. This entails adopting practices that minimize waste, lower carbon emissions, protect natural resources, and encourage the preservation of biodiversity. From embracing renewable energy sources, like solar and wind power to minimizing the use of single-use plastics and adopting eco-friendly modes of transportation, there are myriad ways in which individuals, communities, businesses, and governments can contribute to sustainable conservation efforts. Furthermore, promoting a culture of environmental sustainability requires education and awareness since these enable people to make wise decisions and work together to save the environment. By promoting environmental literacy, encouraging responsible consumption habits, and actively supporting the laws and reforms that promote sustainability, we can create a more resilient and a harmonious relationship with the natural world. Future research may attempt to advocate practices that can be adopted to fulfil the gap between attitude behaviour, and design interventions to safeguard the environment through practice of pro conservational behaviour.

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Requirement and Shortfalls of Tribal Healthcare Infrastructure in India

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Abstract

The scarcity of infrastructure facilities in tribal regions poses significant obstacles to the effective delivery of healthcare services to tribal communities. Addressing these deficiencies is crucial for realizing the objectives of Universal Health Coverage and the health-related Sustainable Development Goals. In light of these challenges, this paper endeavors to assess the availability of healthcare facilities, specifically Sub-Centres, Primary Health Centers (PHCs), and Community Health Centers (CHCs), with a specific focus on tribal areas, while also examining the primary challenges that need to be addressed. The paper exclusively scrutinizes the state-wise percentage shortfalls in public health centers, utilizing data from Rural Health Statistics. Regarding sub-centers, there remains a substantial deficiency in enhancing the capabilities of PHCs and CHCs in tribal areas. Notably, the study reveals that sub-centers and PHCs in the tribal-dominated North-Eastern states exhibit a more favorable health workforce situation compared to other regions of India. This research highlights the critical issue of infrastructure inadequacies in tribal regions and underscores the imperative of targeted interventions to rectify these deficiencies. The findings underscore the importance of strengthening healthcare facilities and augmenting the healthcare workforce in tribal regions as a means to achieve the goals of Universal Health Coverage and the health-related Sustainable Development Goals.

Keywords: *Tribal Health, Infrastructure, SDG, SCs, PHCs, CHCs, India.*

Introduction

Scheduled Tribes, constituting 8.6 percent of India's population, represent one of the most vulnerable segments of society. This diverse group is primarily concentrated in various regions across India, and they share common challenges of low literacy rates and poor health outcomes (Naidu, 2015). The health indicators for tribal populations are notably worse than the national averages. According to the National Family Health Survey 2015-16, the Infant Mortality Rate (IMR) among tribes was 44.4 per 1000 live births, and the Under-five Mortality Rate (U5MR) was alarmingly high at 57.2 per 1000 live births. Compared to the general population, these rates were 12 percent and 18 percent higher, respectively. This disparity extends to other social determinants of health, including literacy, employment, and housing conditions, all of which disproportionately affect tribal health (Government of India, 2019).

In general, India's tribal communities face a multitude of health challenges, including malnutrition, communicable diseases, maternal and child health issues, sickle cell disease, accidents, addiction, and more. Traditional healing practices strongly influence their healthcare-seeking behavior, although awareness of modern medicine and public health facilities has gradually improved in tribal villages over the years.

Healthcare is a fundamental right for all individuals, but the scarcity of quality healthcare infrastructure and trained healthcare providers in rural areas hinders

access for the general population and exacerbates the issue for tribal communities. The migration of healthcare professionals to urban areas further compounds the challenge of providing effective healthcare to tribal populations. Numerous studies have highlighted the severe shortage of healthcare workers in India's tribal healthcare services (Kaushik, 2008; Rao et al., 2011), and existing health services have struggled to address the growing health problems among tribal populations (Mukherjee et al., 2011). Among tribes, women and children are particularly vulnerable (Prakash et al., 1993). The Indian government has made efforts to address these workforce shortages through programs like the National Community Health Volunteer program (1978) and the National Rural Health Mission (2005), with varying degrees of success. However, challenges persist, and rural areas, especially tribal regions, continue to face a shortage of healthcare personnel.

The shortage of healthcare workers in tribal areas is particularly concerning, with rural India having only a fraction of the healthcare professionals found in urban areas (NSSO, 2005). Rectifying these deficiencies is essential for achieving the goals of Universal Health Coverage and the health-related Sustainable Development Goals (SDG-3). In light of these challenges, this study aims to assess the availability of healthcare infrastructure for tribal health and the key challenges that need to be addressed. The insights gained from this study will be instrumental in making healthcare more accessible to the marginalized sections of society.

Methodology:

This study utilized data from the Rural Health Statistics (RHS) and Census (2011) Reports, made available by the Government of India (GoI), to conduct an assessment of the state of public health infrastructure in tribal populations. The research is specifically focused on evaluating the status of healthcare facilities in rural tribal areas of India for the year 2021-22.

In rural India, the healthcare delivery system predominantly relies on a tiered approach, with Sub-Centres (SCs) serving as the primary level of care, followed by Primary Health Centres (PHCs), and then, for more extensive populations, Community Health Centres (CHCs). Given the uneven distribution of tribal populations across different regions of India, this study calculates the state-wise shortfalls in healthcare centers at each of these levels using a percentage-based methodology. The resulting data sheds light on the requirements and deficits in health infrastructure for tribal populations.

Analysis and Discussion:

Healthcare Infrastructure in Tribal Areas

Healthcare infrastructure serves as a vital gauge for understanding a country's healthcare delivery mechanisms. In India, the rural healthcare infrastructure has been structured as a three-tier system comprising Sub-Centres (SCs), Primary Health Centres (PHCs), and Community Health Centres (CHCs). This system aims to extend healthcare services to rural populations. Significantly, population norms for establishing these public health facilities differ between plain and tribal areas, reflecting a conscious effort by policymakers to ensure healthcare accessibility for tribal communities. For instance, in tribal areas, the population norms for setting up Sub-centres, PHCs, and CHCs are 3000, 20,000, and 80,000, respectively, as opposed to 5000, 30,000, and 1,20,000 in plain areas (National Health Mission, 2017).

Between 2005 and 2015, there has been a notable increase in the number of all three types of healthcare centers in tribal areas. However, these numbers remain insufficient to meet the prescribed population norms (Rural Health Statistics, 2014-15). Despite relaxed norms for establishing health centers, the desired transformation has not materialized. Recognizing the need for more comprehensive healthcare delivery, Ayushman Bharat Health and Wellness Centres (AB-HWCs) were introduced in February 2018. This initiative aimed to enhance existing sub-centres and PHCs to provide Comprehensive Primary Health Care (CPHC), encompassing preventive and health promotion services at the community level, including for tribal populations. To ensure healthcare reaches the doorsteps of tribal communities, an additional Mobile Medical Unit (MMU) is provided for tribal areas when patient demand exceeds 30 per day, in contrast to 60 per day in plain areas (Government of India, 2019).

The healthcare infrastructure in India is a critical component of healthcare delivery, with tailored population norms for tribal regions. The introduction of Ayushman Bharat Health and Wellness Centres represents a strategic step toward more comprehensive primary healthcare, acknowledging the unique needs of tribal populations and their accessibility to healthcare services.

Table 1: Number of Phcs, Chcs, and Sub-Centers Operating in Tribal Areas

S. No.	State/UT	(As on 31st March 2022)		
		Sub centre	PHCs	CHCs
1	Andhra Pradesh	955	158	17
2	Arunachal Pradesh #	367	131	57
3	Assam	844	188	36
4	Bihar *	N App	N App	N App
5	Chhattisgarh	2943	417	93
6	Goa *	N App	N App	N App
7	Gujarat	2756	422	88
8	Haryana *	N App	N App	N App
9	Himachal Pradesh	106	45	8
10	Jharkhand	2465	159	100
11	Karnataka	195	31	7
12	Kerala	285	40	13
13	Madhya Pradesh	3263	361	111
14	Maharashtra	2076	318	66
15	Manipur	239	48	8
16	Meghalaya #	459	147	28
17	Mizoram #	373	66	9
18	Nagaland #	452	136	23
19	Odisha	2701	445	134
20	Punjab *	N App	N App	N App
21	Rajasthan	1557	243	70
22	Sikkim	48	12	0
23	Tamil Nadu	545	96	21
24	Telangana	621	95	8
25	Tripura	486	53	9
26	Uttarakhand	121	13	2
27	Uttar Pradesh *	N App	N App	N App
28	West Bengal	970	102	39
29	A & N Islands	41	4	1
30	Chandigarh *	N App	N App	N App
31	Dadra & Nagar Haveli and Daman & Diu	49	6	0
32	Delhi *	N App	N App	N App
33	Jammu & Kashmir	169	60	2
34	Ladakh #	288	33	7
35	Lakshadweep #	9	4	3
36	Puducherry *	N App	N App	N App
All India		**25383**	**3833**	**960**

Source: RHS, 2021-22

Notes:

N App - Not applicable

#: States are primarily tribal regions.

*: UT/State does not have a distinct tribal population or area.

Exclusively in tribal regions, a total of 25,383 Sub-Centres, 3,833 Primary Health Centres (PHCs), and 960 Community Health Centres (CHCs) have been established (Table 1). Recognizing that tribal communities across different parts of India exhibit distinct cultural, social, economic, and political characteristics (Guha, 2007), it becomes imperative to scrutinize variations in healthcare facilities regionally. Eastern India, encompassing states like Bihar, Jharkhand, Odisha, West Bengal, and the Andaman and Nicobar Islands, boasts the highest numbers of Sub-Centres, CHCs, and Health and Wellness Centres attached to PHCs (HWCs-PHCs) in tribal areas. In contrast, North-Eastern India has a higher count of PHCs. Nevertheless, significant deficiencies persist at every tier of healthcare infrastructure, and notably, Central India has not proportionately matched the population growth of tribal communities with the development of health centers (Rural Health Statistics, 2021-22).

Healthcare services in India exhibit significant disparities across states, regions, and communities. The government of India has undertaken recent initiatives aimed at enhancing healthcare access and quality for its population, with the National Health Policy of 2017 being a prominent example. While these policies are designed to benefit the general public, special attention is directed towards addressing the healthcare needs of tribal areas. The effectiveness and outcomes of such initiatives in tribal regions merit thorough examination to assess their impact in terms of promoting social inclusiveness.

Table 2: Sub Centres, PHCS, and CHCS in Tribal Area Requirement and Deficiency

S.No.	State/ UT	(As on 31st March, 2022)									
		Estimated mid-year Tribal Population on 1st July 2022 in Rural Areas	Sub Centres			PHCs			CHCs		
			R	P	S	R	P	S	R	P	S
1	Andhra Pradesh	2235578	745	955	**	111	158	**	27	17	10
2	Arunachal Pradesh#	856243	285	367	**	42	131	**	10	57	**
3	Assam	4101442	1367	844	523	205	188	17	51	36	15
4	Bihar *	1516410	505	N App	N App	75	N App	N App	18	N App	N App
5	Chhattisgarh	8073397	2691	2943	**	403	417	**	100	93	7
6	Goa *	61949	20	N App	N App	3	N App	N App	0	N App	N App
7	Gujarat	8462631	2820	2756	64	423	422	1	105	88	17
8	Haryana *	0	N App	N App	N App	N App	N App	N App	N App	N App	N App
9	Himachal Pradesh	404760	134	106	28	20	45	**	5	8	**
10	Jharkhand	9086894	3028	2465	563	454	159	295	113	100	13
11	Karnataka	3449898	1149	195	954	172	31	141	43	7	36
12	Kerala	230835	76	285	**	11	40	**	2	13	**
13	Madhya Pradesh	16584104	5528	3263	2265	829	361	468	207	111	96
14	Maharashtra	9501900	3167	2076	1091	475	318	157	118	66	52
15	Manipur	848401	282	239	43	42	48	**	10	8	2
16	Meghalaya #	2378890	792	459	333	118	147	**	29	28	1
17	Mizoram #	536021	178	373	**	26	66	**	6	9	**
18	Nagaland #	1134576	378	452	**	56	136	**	14	23	**
19	Odisha	9635546	3211	2701	510	481	445	36	120	134	**
20	Punjab *	0	N App	N App	N App	N App	N App	N App	N App	N App	N App
21	Rajasthan	9977780	3325	1557	1768	498	243	255	124	70	54
22	Sikkim	130572	43	48	**	6	12	**	1	0	1
23	Tamil Nadu	634163	211	545	**	31	96	**	7	21	**
24	Telangana	2733521	911	621	290	136	95	41	34	8	26
25	Tripura	1043625	347	486	**	52	53	**	13	9	4
26	Uttarakhand	280175	93	121	**	14	13	1	3	2	1
27	Uttar Pradesh *	1182140	394	N App	N App	59	N App	N App	14	N App	N App
28	West Bengal	4896019	1632	970	662	244	102	142	61	39	22
29	A&N Islands (1)	25465	8	41	**	1	4	**	0	1	**
30	Chandigarh *	0	N App	N App	N App	N App	N App	N App	N App	N App	N App
31	Dadra & Nagar Haveli and Daman & Diu	153009	51	49	2	7	6	1	1	0	1
32	Delhi *	0	N App	N App	N App	N App	N App	N App	N App	N App	N App
33	Jammu & Kashmir	1291499	430	169	261	64	60	4	16	2	14
34	Ladakh #	208000	69	288	**	10	33	**	2	7	**
35	Lakshadweep#(1)	1904	0	9	**	0	4	**	0	3	**
36	Puducherry *	0	N App	N App	N App	N App	N App	N App	N App	N App	N App
	All India/Total	**101657344**	**33870**	**25383**	**9357**	**5068**	**3833**	**1559**	**1254**	**960**	**372**

Source: RHS, 2021-22

Notes:

N App - Not applicable

N A - Data not available

Utilising established parameters based on Tribal population, the demand is determined. By aggregating state-by-state shortfall numbers and ignoring current surpluses in some states, the overall shortfall for India is calculated. The mid-year tribal population for 2022 was derived using Census 2011 data on the percentages of tribal residents living in rural areas.

R: Required; P: In Position; S: Shortfall; **: Surplus, *: UT/ State does not have a distinct tribal population or area; #: States are primarily tribal regions.

The population is below the CHC average of 80,000 people.

In accordance with this, Table 2 provides insights into the state-wise percentage shortfalls of Sub-Centres, Primary Health Centres (PHCs), and Community Health Centres (CHCs) in tribal areas for the year 2021. Over the study period, several states managed to reduce the shortfall of Sub-Centres, although this positive trend was not consistently reflected in the case of PHCs and CHCs, except for a handful of states. Any reduction in the percentage of shortfalls in healthcare centers in tribal areas represents a noteworthy achievement. Notably, Nagaland, Gujarat, and Andhra Pradesh transitioned from states with shortfalls to those with surplus Sub-Centres, indicating a substantial improvement. Similarly, Goa, Gujarat, and Andhra Pradesh achieved surplus status for PHCs, signifying commendable progress in healthcare infrastructure development (Saalim, 2020).

In the fiscal year 2021-22, several major southern states, such as Andhra Pradesh, Kerala, and Tamil Nadu, exhibited no shortfall in Sub-Centres, indicating commendable coverage of healthcare infrastructure. However, it is noteworthy that Karnataka, despite reporting a surplus in 2018, experienced a higher extent of shortage in Sub-Centres. A similar trend was observed in Assam concerning both Sub-Centres and Primary Health Centres (PHCs). This situation raises important questions regarding the allocation of resources and the maintenance of already established healthcare infrastructure, as highlighted by George in 2016.

With the exception of Assam, Manipur, and Meghalaya, the remaining five states in North-Eastern India reported no shortfall in Sub-Centres for the year 2021-22. Interestingly, all regions, except Northern India, had at least two or more states with surplus Sub-Centres. Impressively, nine states and union territories boasted surplus numbers in all three types of healthcare centers, including three tribal-dominated North-Eastern states: Arunachal Pradesh, Mizoram, and Nagaland. It is undeniable that fortifying the physical healthcare infrastructure would undoubtedly enhance the quality of healthcare services provided to tribal communities, as emphasized by Shrivastava et al. in 2013.

Conclusion:

In the context of tribal populations in India, there exists a profound healthcare divide when compared to their non-tribal counterparts. Despite the targeted objectives set forth by the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), there remains a considerable gap in achieving good health and well-being for tribal populations. The challenges faced by tribal regions extend beyond the mere scarcity of healthcare facilities such as Sub-Centers (SCs), Primary Health Centers (PHCs), and Community Health Centers (CHCs). Accessibility to these healthcare resources poses a significant hurdle, exacerbated by the absence of adequate transportation and communication networks.

Tribal populations in India find themselves confronted with the daunting task of narrowing the health disparities that persist. Despite global commitments and government policies, these gaps persist, underscoring the necessity for all-encompassing strategies tailored to the unique healthcare challenges faced by tribal populations. In summary, the healthcare scenario for tribal communities in India is marked by substantial disparities, both in terms of infrastructure and accessibility. Achieving the health-related SDGs in these regions demands specialized attention and targeted interventions to ensure that tribal populations can access the quality healthcare they deserve.

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