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## Preserving tribal identity and ecology: Sustainable livelihoods in India's mining regions

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### Abstract

The marginalized tribal groups who live in the mining areas of India confront a variety of difficulties and problems. It is widely believed that one of the primary reasons for the marginalization of many tribal people in India is that these communities were historically ignored. After considering the anguish experienced by residents living near locations where mining activities are carried out, the relevant policies have been implemented. Individuals residing in areas where mining activity has a direct impact on their daily lives should be eligible for financial benefits derived from the revenues generated by mining operations. Some of the most impoverished regions in India are also home to some of the country's most abundant mineral reserves. It is common knowledge that individuals have the legal right to profit from the natural resources located in their region. In this article, we will focus on the emancipation of India's indigenous peoples, sustainable livelihoods, and environmental conservation. The Paper addresses how tribal livelihoods may preserve their culture as well as their natural surroundings. Additionally, it will discuss how sustainable alternative livelihoods have the potential to improve the general well-being of tribal people by utilizing existing policies.

**Keywords:** Livelihood, mining areas, policy, sustainability, tribal area

### Introduction

Marginalised tribal communities in mining districts in India face various challenges and issues. The marginalisation of numerous tribal communities in India is widely attributed to the significant factor of historical neglect towards these groups. Mining activities and mining-induced displacement have significant mental health implications for Adivasi (tribal) communities. The displacement process resulting from land alienation has impacted the livelihoods of tribal communities (Dash, 2022) [18]. A lack of economic and social opportunity, a primitive way of life, geographical isolation, and educational backwardness characterise the groups that are part of India's Scheduled Tribes (Kant *et al.*, 2022) [32]. Sustainable livelihoods are crucial for protecting tribal culture and the environment. Tribal communities possess a profound understanding of their local ecosystems and have developed sustainable practices that ensure the preservation of both their cultural heritage and the environment. Studies have shown that enforcing customary environmentalism is linked to securing livelihood sources for tribal peoples (Oka, 2018) [45]. The incorporation of Indigenous Ecological Knowledge (IEK) is imperative for the effective ecological management of tribal landscapes and the sustainable utilization of natural resources (Das *et al.*, 2021) [17]. Despite this, the unchecked expansion of mineral-based enterprises in tribal areas has led to the deprivation of the local population's traditional means of subsistence (Meher, 2009) [41]. Food security, job opportunities, and the ability to generate revenue are three of the primary reasons why sustainable agricultural and forest-based livelihoods are essential for indigenous groups (Kumar *et al.*, 2015; Patidar *et al.*, 2018) [33, 65]. Traditional knowledge related to biodiversity, both natural and human-managed, can be investigated for sustainable management of natural assets, with a focus on addressing local people's concerns about maintaining a sustainable way of life (Vardan *et al.*, 2010) [89]. By gaining an understanding of the environmental philosophies and traditions of indigenous societies, one can gain insights into environmentally responsible lifestyles and conservation practices (Balehegn, 2016) [5]. Therefore, sustainable livelihoods are crucial for preserving tribal culture and the environment, as well as promoting the well-being of tribal communities.

## Literature Review

### Effect of mining on India's tribal communities

The literature on the effects of mining on India's tribal communities shows a clear pattern of environmental damage, social disruption, and cultural loss, which often worsens inequality and marginalization. The Gandhamardan movement in western Odisha originated due to the Bharat Aluminum Company's mining activities, which harmed sacred forests, temples, and local livelihoods. This led to indigenous resistance focused on ecological justice and Indigenous rights (Rout, 2023) [71]. Poor enforcement of protective laws, such as the Panchayats (Extension to Scheduled Areas) Act and the Forest Rights Act, along with pressure and dishonest practices by the state and mining companies, undermines tribal consent and self-governance. As a result, many tribal people face displacement and loss of resources from the forest (Pandey, 2020; Mining Information Clearinghouse of India, 2012) [63, 43]. Though tribal communities make up only 8.2% of India's population, they represent over 55% of those displaced by mining. They deal with land loss, pollution, and cultural breakdown, and tribal women are especially at risk for economic and social marginalization (Narasimham & Subbarao, 2018) [51]. Mining has a significant impact on traditional farming among the Maria tribe, particularly harming women by limiting access to resources and reinforcing male-dominated systems (Mukherjee, 2014) [48]. This displacement is often referred to as "cultural genocide," as tribal communities lose their spiritual and physical connections to the land. This situation is compounded by increasing poverty and weakened community bonds (Padel & Das, 2010) [58]. Insufficient rehabilitation and compensation exacerbate financial instability and social fragmentation, while the environmental consequences of mining are largely overlooked by policymakers (Meher, 2009) [41]. Overall, these studies advocate for sustainable policies that prioritize community involvement, equitable benefit sharing, culturally sensitive rehabilitation, and robust enforcement of tribal rights to mitigate the adverse impacts of mining and foster sustainable development.

To develop a sustainable livelihood framework for tribal areas, it is essential to consider various aspects that can contribute to the well-being and economic empowerment of these communities. Several studies provide valuable insights into sustainable practices that can enhance the livelihoods of tribal populations. A socio-ecological approach to integrated landscape management, explored in various studies, emphasizes sustainable livelihoods for vulnerable tribal communities through participatory action research. This approach combines traditional ecological knowledge with scientific methods to address issues such as dwindling forest resources, environmental degradation, and climate change (Roy & Mukhopadhyay, 2020) [72]. Initiatives such as the Jharkhand State Forest Development Corporation's (JSFDC) entrepreneurial model capitalize on tribal strengths, including community work, local resources, and market access, to foster a circular economy (Gupta, 2023) [26]. The SCSTRTI-IBRAD framework proposes a convergence approach that integrates health, education, agriculture, and livelihoods to enhance tribal self-reliance and improve the Human Development Index (HDI), aligning with the Sustainable Development Goals (SDGs). It highlights community involvement, fair benefit sharing, and institutional changes, such as empowering Gram Sabhas under PESA and using the Forest Rights Act (FRA) for

sustainable resource management (SCSTRTI & IIBRD, 2022). Migration, studied in Wayanad, Kerala, using the FAO's Sustainable Livelihood Framework, increases financial and physical capital but decreases natural and social capital. This situation calls for policy interventions to address health issues, stress, and exploitation (Mano Sandesh *et al.*, 2020) [38]. Traditional practices, such as pig-based production systems and non-timber forest product (NTFP) enterprises (Patidar *et al.*, 2018) [65], continue to be crucial. Innovations in storage, value addition, and market connections help improve income and conservation. The NABARD-supported WADI model in Odisha rejuvenates degraded lands through horticultural plantations and intercropping, reducing dependence on shifting cultivation (Tripathy, 2018) [86]. However, problems such as economic vulnerability, limited market access, and poor infrastructure persist. This situation highlights the need for focused efforts, including more diverse economic opportunities, customized education, and stronger government support to promote sustainable tribal development (Naik, 2023) [49]. By integrating these findings, a sustainable livelihood framework for tribal areas could involve promoting traditional practices, such as pig and goat farming, encouraging innovation and entrepreneurship, implementing sustainable agricultural practices, and fostering social empowerment through initiatives like horticultural plantations. This holistic approach can contribute to the sustainable development and economic empowerment of tribal communities.

### Existing policy related to mining area welfare in India

The Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) is a vital welfare initiative launched by the Government of India in September 2015. It aims to improve the social and economic conditions of communities negatively affected by mining operations. The program gets its funding from District Mineral Foundations (DMFs) and focuses on developing various projects in areas impacted by mining. It prioritizes key sectors, including education, healthcare, drinking water supply, and environmental protection. This approach aims to ensure that local populations benefit directly from mining activities and the revenues they generate. PMKKKY makes a distinction between areas directly affected by mining, including excavation sites and waste disposal zones, and those that suffer indirect effects, such as poor water quality and reduced resources. It classifies affected individuals as "affected families" and "displaced families," based on the guidelines from the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. The District Mineral Foundations are essential for keeping accurate records of affected communities and managing funds for welfare projects. This highlights the importance of local governance in implementing projects (PMKKKY Guidelines, 2024) [35]. Despite having clear goals and a structured funding system, PMKKKY faces significant challenges in its implementation. Problems such as bureaucratic delays, a lack of public input in fund allocation, and governance issues have raised concerns about fund mismanagement and underutilization. Reports indicate that a low percentage of the allocated funds have been effectively utilized, raising questions about the program's overall impact and the timely delivery of support to mining-affected communities. Critics say that insufficient transparency and community

involvement in decision-making make PMKKKY's work less effective. This highlights the need for changes to enhance accountability and ensure that projects effectively address the genuine needs of local communities. (Parliamentary Committee Report, 2018) [64].

Various policies and laws govern mining and tribal welfare in India. The economic Liberalization, Privatization, and Globalization (LPG) model for growth in India has led to an uncontrolled expansion of mineral-based companies in tribal territories, which has resulted in the deprivation of tribal people of their traditional methods of maintaining a sustainable life (The Relationship Between Forests and Tribal Peoples: An Anthropological Study in South Bengal, 2023) [85]. However, the government of India has implemented several plans, aid programmed, and other initiatives to support the tribal people of India (Dr. Basavaraj Bheemaraya, 2022) [21]. The Ministry of Tribal Affairs (MoTA) is responsible for formulating plans, policies, and coordinating programs aimed at promoting the progress and empowerment of Scheduled Tribe communities in India (Satapathy, 2022) [77]. The National Green Tribunal has implemented a ban on conventional, craft-based, and rat-hole coal mining in the Jaintia Hills of Meghalaya as a measure to safeguard the environment and preserve biodiversity (Nomani *et al.*, 2021) [53]. The safeguarding of the rights of indigenous and tribal communities during natural resource management endeavors falls under the purview of the government (Saly & APHA, 2020) [75]. Approximately 8.6% of India's total population comprises tribal populations, with over 53 million tribal individuals belonging to 550 communities and 227 ethnic groups (Phondani *et al.*, 2010; Bhalakiya & Modi, 2019) [67, 6]. Achieving sustainable development objectives depends on the optimal health of tribal populations (Mavalankar, 2016) [39]. The initial documentation of sickle haemoglobin in India was reported among the Nilgiri hill tribes residing in the southern region of the country (Jawarkar & Bhatia, 2018) [31].

### Policy for tribal livelihood

The analysis of the references suggests that there are several gaps and limitations in the current welfare programs designed to support the welfare of mining host tribal communities. The studies indicate that the state's welfare programs have not been able to address the backwardness and lack of access to basic amenities among the tribal people (Harsha, 2018) [27]. The welfare reforms have had varying impacts on individuals residing in rural reservations and urban areas (Ward *et al.*, 2000) [90]. Primary Health Centers (PHCs) were established to provide curative, preventive, and promotive health services, as well as family welfare services. However, they have been unable to effectively address the high incidence of oral mucosal lesions among the adult population (Ananda *et al.*, 2019) [2]. Mining enterprises owned by foreign entities often delegate the responsibility of safeguarding the well-being of the populace to the business sector (Schnoor, 2021) [79]. Furthermore, it has been noted that there exists an uneven allocation of wealth among societies that are affected by mining exploration and exploitation, whether directly or indirectly (Resnawaty, 2018) [70]. The blueprint for augmenting the mining sector's contribution to the welfare of affected individuals has been established; however, its efficacious execution is yet to be realized (Michel & Kime, 2021) [42]. Therefore, mining host tribal communities require

more effective and clear welfare programmed that address their specific needs and challenges in addition to existing central government initiatives such as Pradhan Mantri Janjatiya Vikas Mission (PMJVM) and Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN), etc. (PIB, 2024) [35].

### Importance of sustainable livelihood

A stable economy is essential for the development of India's tribal communities. In India, the unchecked expansion of mineral-based companies in tribal areas has stripped locals of their traditional sources of income, thanks to the country's adoption of a globalized economic model. India's agricultural extension system could be improved by introducing creative initiatives aimed at promoting sustainable production, such as encouraging and organizing rural and tribal communities to adopt environmentally friendly farming methods (Suman *et al.*, 2014) [84]. For the growth of India's tribal inhabitants, it is crucial to create policies and initiatives that priorities socioeconomic development, community empowerment, sustainable livelihoods, and improved quality of life (Rath, 2018) [68]. Food security, medical benefits, and the creation of new jobs are just a few ways in which traditional medicinal trees may contribute to the long-term prosperity of indigenous communities (Rathod *et al.*, 2022) [69]. Income-generating activities are crucial for tribal livelihoods, and the study indicates a noteworthy and affirmative correlation between agricultural modernization and the attainment of sustainable livelihood among non-tribal farmers (Singh *et al.*, 2022; Mayur *et al.*, 2014) [81, 40]. The Wadi model, which focuses on economic betterment, social empowerment, quality of life improvement, and women's empowerment through sustainable agriculture, can be effective for tribal development in India (Tripathy, 2018) [86]. The livelihoods of tribal communities in India are complex, dynamic, and multidimensional, and promoting tribal entrepreneurship through initiatives such as the Pradhan Mantri Van Dhan Vikas Yojna can improve tribal livelihoods and sustainably harness the wealth of the forest (Chuadhari *et al.*, 2022; Srivastava, 2022) [15, 82]. Sustainable agriculture is also crucial for tribal communities, as forest-based livelihoods offer employment and income generation opportunities. Therefore, sustainable livelihoods are crucial for tribal empowerment in India, and promoting sustainable practices can improve the well-being of tribal communities.

### Exploration of various sustainable livelihood options for tribal communities in mining Areas

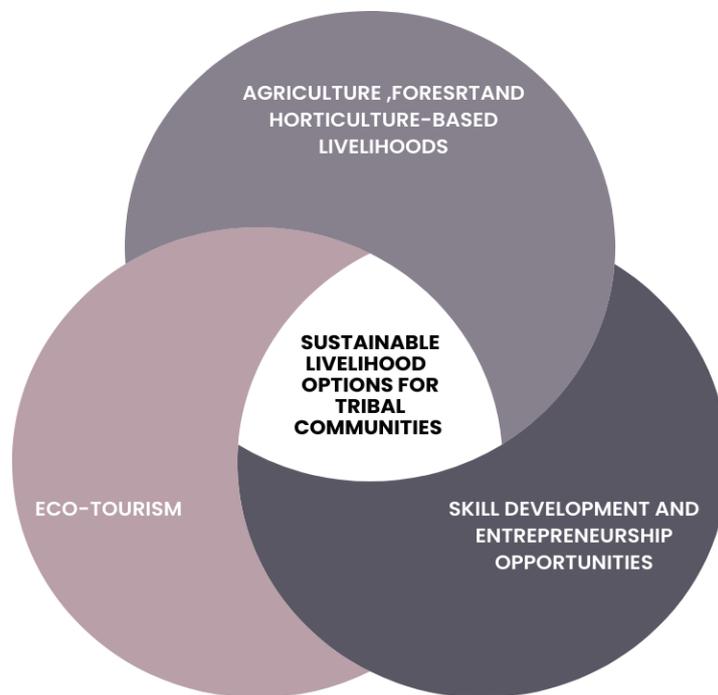
**Agriculture and horticulture-based livelihoods:** Sustainable livelihood options, such as Agriculture and Horticulture-Based livelihoods and forest-based livelihoods, are crucial for tribal communities in India's mining districts. Due to the unchecked development of mineral-based companies in tribal areas, indigenous people have lost access to their traditional sources of income. Agriculture- and horticulture-based livelihoods, however, can provide food security, employment, and income generation for tribal communities. The Wadi model, which focuses on economic betterment, social empowerment, quality of life improvement, and women's empowerment through sustainable agriculture, can be effective for tribal development in India. Horticulture-based livelihoods, such as cultivating medicinal plants, can also provide income generation and employment opportunities for tribal

communities. Forest-based livelihoods, such as the collection of Non-Timber Forest Products (NTFPs), can offer employment and income-generating opportunities for tribal communities. The sustainable management of natural resources, such as bamboo, can also provide employment and income generation for tribal communities (Moharana Choudhury *et al.*, 2019). Promoting sustainable forest-based livelihoods can also contribute to the preservation of biodiversity and the environment. Therefore, sustainable livelihood options, such as agriculture- and horticulture-based, and forest-based livelihoods, are crucial for tribal communities in India's mining districts. Promoting sustainable practices can improve the well-being of these communities.

**Tribal eco-tourism:** It is a sustainable livelihood option for tribes. It includes community development and environmental preservation (Mohanty *et al.*, 2021) [47]. Tribal ecotourism helps preserve culture and the environment (Chang *et al.*, 2020) [14]. Ecotourism, with a focus on local communities, has emerged as one of the most popular trends worldwide, particularly in developing countries (Gebremariam, 2018) [23]. Tribal tourism must include cultural, social, and environmental systems to be sustainable (Liu *et al.*, 2017) [36]. Tourists' economic,

environmental, and social benefits may enhance the quality of life for tribal populations and support tourist growth. Tourism may cause indigenous people to resist and reduce their quality of life (Chang *et al.*, 2019) [12]. Tourism eco-efficiency has been widely studied, with positive outcomes (Lu *et al.*, 2021) [37]. Due to the adverse effects of traditional tourism, eco-tourism is growing (DOLUI & Chakraborty, 2022) [20]. Eco-tourism is closely linked to sustainable development in community-based conservation organizations, protected areas, and environmental and habitat preservation efforts (Ogweno, 2021) [55]. Tribal agro-eco tourism may support regional development (Suamba *et al.*, 2021) [83].

**Skill development and entrepreneurship opportunities:** Opportunities for Business Creation and Skill Improvement abound in indigenous communities. Building SHG clusters among the tribal population and transforming them into Tribal Van Dhan Kendra is the primary goal of the Pradhan Mantri Van Dhan Vikas Yojana, a market-linked development programmed for tribal entrepreneurs (Srivastava, 2022) [82]. The woods provide most of the food, medicine, and other necessities for the tribal groups, and bamboo is an important part of the diet of the indigenous people (Bhatt *et al.*, 2005) [8].



**Fig 1:** Sustainable livelihood options for mining host tribal community

**Case studies showcasing the successful implementation of sustainable livelihood initiatives**

Several case studies showcase the successful implementation of sustainable livelihood initiatives in mining-affected tribal areas. The study entitled "Pig-Based Production System Contributing Towards Sustainable Livelihood of the Tribes in Govindpur and Ormanjhi Blocks, Dhanbad and Ranchi Districts, 2013-14" represents an example of research in this field (Kumar *et al.*, 2015) [33]. Utilizing the sustainable livelihood paradigm of the Department for International Development (DFID), an additional study examines the correlation between Artisanal and Small-Scale Mining (ASM) and livelihood within the Prestea mining region of Ghana (Arthur *et al.*, 2015) [4].

sustainable development, local procurement, and shared Value, and are also analyzed in a case study of Mongolia's mining industry (Fraser *et al.*, 2021) [22]. These studies show how crucial it is to consider the interconnected and interdependent nature of the problems that plague mining, traditional lifestyles, and sustainable development. There are also studies that provide a policy viewpoint on how weak interdependencies may be exploited to promote sustainable livelihoods in rural Sierra Leone, as well as research that advocates an integrated framework for building a sustainable natural resource management practice for tribal people (Cartier & Bürge, 2011) [10]. However, other research warns that mining communities' livelihood assets might slowly drain once a mine closes, leading to the

collapse of coping methods and livelihood outcomes (Ackermann *et al.*, 2018) <sup>[1]</sup>.

### Challenges faced in implementing sustainable livelihood initiatives

Implementing sustainable livelihood initiatives for mining-affected tribal areas faces several challenges. One of the primary obstacles is the issue of economic instability, which arises from limited access to supplies and markets, coupled with a low level of education and literacy within tribal communities (D.M. *et al.*, 2021) <sup>[16]</sup>. Furthermore, the incorporation of mining into the developmental agenda has resulted in a plethora of social and environmental concerns, including but not limited to displacement, exploitation, resettlement, alterations in livelihood, and ecological degradation (Tzudir & Srikanth, 2022) <sup>[88]</sup>. The mining and other enterprises that are devouring the ecological systems of these indigenous peoples and impoverished farmers have not provided them with better or more secure livelihoods. In addition, the tribes' means of sustenance and survival have been threatened by rising rates of deforestation and eco-degradation caused by expanding industries, mining, and other development projects (Sahu, 2019) <sup>[74]</sup>. Sustaining crop production and productivity without damaging the resources and environment poses a significant challenge to tribal farming. Other challenges include the need to address factors that must be addressed before favorable environments for fostering sustainable mining can be achieved (Gilberthorpe *et al.*, 2016) <sup>[24]</sup>, as well as the impact of agricultural modernization on the extent of sustainable livelihoods among tribal farmers (Mayur *et al.*, 2014) <sup>[40]</sup>.

### Conclusion

The maintenance of sustainable livelihoods in mining-affected areas is a crucial component in preserving both indigenous culture and the surrounding environment. In many cases, tribals have developed a strong connection with the natural environment in which they live, as well as traditional knowledge and practices that have enabled them to maintain their way of life for generations. There are several ways in which maintaining sustainable livelihoods contributes to the protection of indigenous traditions and the surrounding environment. The Maintenance of Previously Acquired Skills and Knowledge: Traditional tribal tribes can continue to practice their traditional skills, knowledge, and cultural practices because they have sustainable livelihoods. These practices are directly related to the environment. Tribal groups can ensure the continuation of their cultural traditions and the transmission of their ancestral wisdom to future generations by engaging in activities such as subsistence farming, fishing, hunting, and gathering. The Panchayats Extension to Schedule Areas (PESA) Act, 1996, and other constitutional provisions, along with government policies, can promote sustainable livelihoods among the tribes in mining-affected areas, thereby protecting their culture and environment.

### AI tool use

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### References

1. Ackermann M, Botha D, Van der Waldt G. Potential socio-economic consequences of mine closure. *J Transdiscip Res S Afr.* 2018;14(1). <https://doi.org/10.4102/td.v14i1.458>
2. Ananda S, Kumar S, Narayanan V, Kavitha A, Krupashankar R. Prevalence and risk indicators of oral mucosal lesions in adults visiting health centers in Kodagu district. *J Family Med Prim Care.* 2019;8(7):2337. [https://doi.org/10.4103/jfmpe.jfmpe\\_344\\_19](https://doi.org/10.4103/jfmpe.jfmpe_344_19)
3. Arthur F, Agyemang-Duah W, Gyasi RM, Yeboah JY, Otioku E. Nexus between artisanal and small-scale gold mining and livelihood in Prestea, Ghana. *Geogr J.* 2016;2016:1-18. <https://doi.org/10.1155/2016/1605427>
4. Arthur F, Agyemang-Duah W, Gyasi RM, Yeboah JY, Otioku E. Nexus between artisanal and small-scale gold mining and livelihood in Prestea, Ghana. *J Min.* 2015;2015:1-18. <https://doi.org/10.1155/2015/493580>
5. Balehegn M. Ecological and social wisdom in camel praise poetry sung by Afar nomads of Ethiopia. *J Ethnobiol.* 2016;36(2):457-472. <https://doi.org/10.2993/0278-0771-36.2.457>
6. Bhalakiya HL, Modi DNR. A comprehensive review on *Maerua oblongifolia* (Forsk.) A. Rich. *Int J Res Advent Technol.* 2019;7(4):721-727. <https://doi.org/10.32622/ijrat.742019184>
7. Bhaskar P, Kaushik M. Women's leadership trends in tribal enterprises: A study in cooperatives in Jharkhand, India. *Int J Multidiscip Appl Bus Educ Res.* 2022;3(1):19-30. <https://doi.org/10.11594/ijmaber.03.01.03>
8. Bhatt B, Singh K, Singh A. Nutritional values of some commercial edible bamboo species in NE Himalayan region. *J Bamboo Rattan.* 2005;4(2):111-124. <https://doi.org/10.1163/1569159054699317>
9. Carbrey EA, Clark LG, Kresse JI. *Leptospira icterohaemorrhagiae* subspecies Incompleta from wildlife in Pennsylvania. *Public Health Rep.* 1963;78(4):355. <https://doi.org/10.2307/4591801>
10. Cartier LE, Bürge M. Agriculture and artisanal gold mining in Sierra Leone: Alternatives or complements? *J Int Dev.* 2011;23(8):1080-1099. <https://doi.org/10.1002/jid.1833>
11. Centre for Science and Environment. Mining and environment. Available from: <https://www.cseindia.org/page/mining-and-environment>
12. Chang HM, Hung CH, Huang YC. Mediating effect of quality of life on tourism impact and support attitude in Alishan tribes. *Open J Appl Sci.* 2019;9(12):857-869. <https://doi.org/10.4236/ojapps.2019.912069>
13. Chang HM, Lin CH, Chuang YW. Study on sustainable development strategy of indigenous tribal tourism. *E3S Web Conf.* 2021;257:03045. <https://doi.org/10.1051/e3sconf/202125703045>
14. Chang HM, Lin CJ, Hung CJ. Ecotourism sustainable

- development strategy of Cinsibu Atayal tribe in Taiwan. *IOP Conf Ser Earth Environ Sci.* 2020;505(1):012033. <https://doi.org/10.1088/1755-1315/505/1/012033>
15. Chaudhari RU, Chauhan NM, Chaudhary KL. Analysis of livelihood security among tribal farmers. *Gujarat J Ext Educ.* 2022;34(1):24-29. <https://doi.org/10.56572/gjoe.2022.34.1.0005>
  16. D.M B, B N, Prasad TS G, Naik J. Spatial distribution and socio-economic status of tribal settlements in Western Ghats. *Int J Adv Res.* 2021;9(12):178-191. <https://doi.org/10.21474/ijar01/13890>
  17. Das M, Das A, Seikh S, Pandey R. Nexus between indigenous ecological knowledge and ecosystem services. *Environ Sci Pollut Res.* 2021;29(41):61561-61578. <https://doi.org/10.1007/s11356-021-15605-8>
  18. Dash DAD. Displacement and tribal livelihood in mining areas of Keonjhar district, Odisha. *Int J Engl Lit Soc Sci.* 2022;7(5):045-057. <https://doi.org/10.22161/ijels.75.8>
  19. Deshmukh A, Pradip N, Dhatrak S, Nandi S. Dust and silica exposure in Indian stone mining: A case study. *Curr World Environ.* 2017;12(3):661-669. <https://doi.org/10.12944/cwe.12.3.17>
  20. Dolui S, Chakraborty S. Selection of preferable eco-tourism destinations using AHP in Purulia, West Bengal; 2022. <https://doi.org/10.21203/rs.3.rs-2080258/v1>
  21. Bheemaraya B. Indian tribal welfare schemes and their implementation: A study. *EPRA Int J Econ Bus Rev.* 2022 Jun 17:16-21. <https://doi.org/10.36713/epra10579>
  22. Fraser J, Bat-Erdene Z, Lyons J, Kunz N. Local procurement and sustainable development in Mongolia's mining sector. *Bus Strategy Dev.* 2021;5(3):222-231. <https://doi.org/10.1002/bsd2.193>
  23. Gebremariam KZ. Challenges and prospects of community-based eco-tourism in Maichew Cluster, Ethiopia. *Edelweiss Appl Sci Technol.* 2018:187-200. <https://doi.org/10.33805/10.33805/2576.8484.137>
  24. Gilberthorpe E, Agol D, Gegg T. 'Sustainable mining'? CSR, migration, and livelihoods in Zambia. *J Dev Stud.* 2016;52(11):1517-1534. <https://doi.org/10.1080/00220388.2016.1189534>
  25. Goessling KP. Mining-induced displacement and mental health. *Int J Adv Couns.* 2010;32(3):153-164. <https://doi.org/10.1007/s10447-010-9096-y>
  26. Gupta HS. Tribal entrepreneurship in forested hinterlands of Jharkhand. *Int J Manag Value Supply Chain.* 2023;14(2).
  27. Harsha BD. Access to basic amenities among primitive scheduled tribes: A micro-study in Karnataka. *Asian Rev Soc Sci.* 2018;7(2):80-83. <https://doi.org/10.51983/arss-2018.7.2.1425>
  28. Hoelscher K, Miklian J, Vadlamannati KC. Hearts and mines: Maoist conflict in India. *Int Area Stud Rev.* 2012;15(2):141-160. <https://doi.org/10.1177/2233865912447022>
  29. Indian Bureau of Mines. Nagpur: IBM. Available from: [https://ibm.gov.in/index.php?option=com\\_content&view=article&id=107&Itemid=107](https://ibm.gov.in/index.php?option=com_content&view=article&id=107&Itemid=107)
  30. Jammu C. Health status of particularly vulnerable tribal groups in KR Puram, India. *Int J Res Appl Sci Eng Technol.* 2019;7(6):106-117. <https://doi.org/10.22214/ijraset.2019.6022>
  31. Jawarkar A, Bhatia V. HPLC patterns and red cell parameters in sickle cell anemia. *Int J Res Med Sci.* 2018;6(7):2390. <https://doi.org/10.18203/2320-6012.ijrms20182823>
  32. Kant R, Dwivedi G, Mishra A, *et al.* Health status of tribes in Uttar Pradesh: A review of Tharu tribe. *Indian J Med Res.* 2022;156(2):186. [https://doi.org/10.4103/ijmr.ijmr\\_3271\\_21](https://doi.org/10.4103/ijmr.ijmr_3271_21)
  33. Kumar M, Gupta J, Radhakrishnan A, Singh M. Pig-based production for tribal livelihoods in Jharkhand. *Res J Anim Husb Dairy Sci.* 2015;6(1):27-31. <https://doi.org/10.15740/has/rjahds/6.1/27-31>
  34. Kumar M, Gupta J, Radhakrishnan A, Singh M. Pig-based production for tribal livelihoods in Jharkhand. *Res J Anim Husb Dairy Sci.* 2015;6(1):27-31. <https://doi.org/10.15740/has/rjahds/6.1/27-31>
  35. Press Information Bureau. Latest guidelines of PMKKKY. 2024. <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2002708>
  36. Liu SY, Yen CY, Tsai KN, Lo WS. Agri-food tourism as an eco-innovation strategy. *Sustainability.* 2017;9(10):1683. <https://doi.org/10.3390/su9101683>
  37. Lu F, Qin W, Wang YX. Tourism eco-efficiency in China: Dynamic evolution under cloud computing. *Sci Program.* 2021;2021:1-12. <https://doi.org/10.1155/2021/1951264>
  38. Mano Sandesh VV, Kumar AA, Smitha KP. Migration and livelihoods of tribal people. *Int J Curr Microbiol Appl Sci.* 2020;9(11):3720-3730. <https://doi.org/10.20546/ijcmas.2020.911.446>
  39. Mavalankar D. Doctors for tribal areas: Issues and solutions. *Indian J Community Med.* 2016;41(3):172. <https://doi.org/10.4103/0970-0218.183587>
  40. Mayur MP, Rakesh NP, Rakesh DD, Khattubhai DS. Agricultural modernization and livelihood in tribal vs. non-tribal farmers. *J Agric Ext Rural Dev.* 2014;6(4):138-142. <https://doi.org/10.5897/jaerd12.143>
  41. Meher R. Globalization, displacement and livelihood issues of tribal and agriculture-dependent poor people. *J Dev Soc.* 2009;25(4):457-480. <https://doi.org/10.1177/0169796X0902500403>
  42. Michel SL, Kime MB. Roadmap for increasing Congolese mining industry involvement in local community development. *Community Dev J.* 2021;57(3):509-532. <https://doi.org/10.1093/cdj/bsab004>
  43. Mining & Communities. In: MICI, Mining & Communities, 2012.
  44. Ministry of Mines, Government of India. Ministry of Mines, Government of India, Home. Available from: <https://mines.gov.in>
  45. Ministry of Tribal Affairs, Government of India. Ministry of Tribal Affairs, Government of India. Available from: <https://tribal.nic.in/>
  46. Ministry of Tribal Affairs, 2024. Available from: <https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=153230&ModuleId=3#:~:text=Alongside%20the%20Dharti%20Aaba%20program...>
  47. Mohanty PP, Mishra NR, Tiwari S. Local people's attitude and perception towards eco-tourism development: empirical evidence from India. *J Bus Hosp Tour.* 2021;7(3):295. <https://doi.org/10.22334/jbhost.v7i3.333>
  48. Mukherjee S. Mining and women: the case of the Maria

- of Chhattisgarh. Soc Change. 2014;44(2):229-247. <https://doi.org/10.1177/0049085714525500>
49. Naik B. Empowerment of tribal communities through innovation and entrepreneurship: a path to sustainable progress. *Int J Res Rev.* 2023;10(11):334-343. <https://doi.org/10.52403/ijrr.20231140>
  50. Nanda SP, Panda BP, Pradhan A. Mining activities influencing nutritional status of soil and water near chromite mining in Odisha, India. *Environ Qual Manag.* 2022;32(2):151-159. <https://doi.org/10.1002/tqem.21931>
  51. Narasimham S. Impact of mining on tribal socio-economic and environmental risks in India. *Econ Aff.* 2018;63(1). <https://doi.org/10.30954/04242513.2018.00150.24>
  52. Naresh R. A study of tribal vs non-tribal culture and life of tribal population. *Int J Sociol Anthropol.* 2014;6(8):227-234. <https://doi.org/10.5897/IJSA2014.0544>
  53. Nomani M, Osmani AR, Salahuddin G, Tahreem M, Khan SA, Jasim AH *et al.* Environmental impact of rat-hole coal mines on biodiversity of Meghalaya, India. *Asian J Water Environ Pollut.* 2021;18(1):77-84. <https://doi.org/10.3233/AJW210010>
  54. Norris DE, Gibson RG. Propagation variability and localization accuracy of infrasonic networks. *J Acoust Soc Am.* 2002;112(5):2380-2380. <https://doi.org/10.1121/1.4808604>
  55. Ogwen EO. Improving sustainable development of eco-tourism in Kenya. *East Afr J Bus Econ.* 2021;3(1):98-103. <https://doi.org/10.37284/eajbe.3.1.327>
  56. Oka NO. Cross-cultural knowledge, ethno-conservation and sustainability pragmatism. *Manage Sustain Dev.* 2018;10(1):61-72. <https://doi.org/10.2478/msd-2018-0009>
  57. Ole MJ, Broadhurst JL. Sustainable development in mining communities: Case of South Africa's West Wits Goldfield. *Front Sustain Cities.* 2022;4. <https://doi.org/10.3389/frsc.2022.895760>
  58. Padel F, Das S. Cultural genocide and the rhetoric of sustainable mining in East India. *Contemp South Asia.* 2010;18(3):333-341. <https://doi.org/10.1080/09584935.2010.503871>
  59. Pai S, Zerrihi H. A novel dataset for analysing sub-national socioeconomic developments in Indian coal industry. *IOP SciNotes.* 2021;2(1):014001. <https://doi.org/10.1088/2633-1357/abdbbb>
  60. Paliwal P, Pancholi S, Patel R. Pharmacognostic parameters for evaluation of rhizomes of *Curcuma caesia*. *J Adv Pharm Technol Res.* 2011;2(1):56. <https://doi.org/10.4103/2231-4040.79811>
  61. Panchayat Extension in Scheduled Area (PESA), Jharkhand. DEPT of Panchayat Raj & Welfare, Govt. of Jharkhand, 2021. Available from: <https://www.panchayat.gov.in/documents/448457/0/Presentation+of+Jharkhand+...>
  62. Panda SM. Towards sustainable natural resource management of tribal communities: Study from hill regions of eastern India. *Environ Manage.* 1999;23(2):205-216. <https://doi.org/10.1007/s002679900180>
  63. Pandey D. Mining and tribal land rights: What development costs for India's marginalised, 2020. Available from: <https://sprf.in/wp-content/uploads/2021/01/Mining-and-Tribal-Land-Rights.pdf>
  64. PRS Legislative Research. Implementation of District Mineral Foundation and PMKKKY, 2018. Available from: <https://prsindia.org/policy/report-summaries/implementation-of-district-mineral-foundation-and-pradhan-mantri-khanij-kshetra-kalyan-yojana>
  65. Patidar J, Kumhar B, Mhaske S, Jat S. Importance of sustainable agriculture in India's tribal communities. *Int J Bio-Resource Stress Manag.* 2018;9(2):253-256. <https://doi.org/10.23910/ijbsm/2018.9.2.3C0550>
  66. Patidar J, Kumhar B, Mhaske S, Jat S. Importance of sustainable agriculture in India's tribal communities. *Int J Bio-Resource Stress Manag.* 2018;9(2):253-256. <https://doi.org/10.23910/ijbsm/2018.9.2.3C0550>
  67. Phondani PC, Maikhuri RK, Rawat LS, Farooquee NA, Kala CP, Vishvakarma SR, Rao KS, Saxena KG. Ethnobotanical uses of plants among Bhotiya tribal communities in Central Himalaya. *Ethnobot Res Appl.* 2010;8:233-244. <https://doi.org/10.17348/ERA.8.0.233-244>
  68. Rath NK. Strategy of tribal development in Odisha. *Contemp Soc Sci.* 2018;27(4):147-158. <https://doi.org/10.29070/27/58316>
  69. Rathod KLM, Pajapati D, Dhaka R, Jaliya RM, Jha SS, Desai BS, Rot J. *Sterculia urens*: Traditionally important medicinal tree. *J Med Plants Stud.* 2022;10(1):23-26. <https://doi.org/10.22271/plants.2022.v10.i1a.1358>
  70. Resnawaty R. Empowered community vs dependent community: CSR implications by mining companies in South Sumatra Province. *Mediterr J Soc Sci.* 2018;8(5-1):69-78. <https://doi.org/10.2478/mjss-2018-0098>
  71. Rout B. The detrimental consequences of mining and inspiration for the Gandhamardan movement in western Odisha, India. *Nat Resour Forum.* 2023;48(3):887-902. <https://doi.org/10.1111/1477-8947.12350>
  72. Roy SB, Mukhopadhyay R. Socio-ecological approaches to integrated landscape management for tribal livelihoods. *Int J Econ Res.* 2020;17(1).
  73. Sachana PC, Bonny BP. Factors influencing tribal farming: Case of Attappadi tribes in Kerala. *Int J Curr Microbiol Appl Sci.* 2020;9(6):3561-3569. <https://doi.org/10.20546/ijcmas.2020.906.419>
  74. Sahu GB. Primitive tribes and undernutrition: Katkari tribe, Maharashtra, India. *J Soc Econ Dev.* 2019;21(2):234-251. <https://doi.org/10.1007/s40847-019-00084-Y>
  75. Saly JN, APHA JM. Government responsibility in management of natural resources for protection of economic, social & cultural rights in Balaesang region. *J Indones Adat Law.* 2020;1(1):146-173. <https://doi.org/10.46816/jjal.v1i1.19>
  76. Sarmah R, Arunachalam A, Melkania U. Utilization pattern of NTFPs by tribal people in Arunachal Pradesh, India. *J Non-Timber For Prod.* 2011;18(2):105-118. <https://doi.org/10.54207/BSMPS2000-2011-15ZB3C>
  77. Satapathy SS. Digital mainstreaming of tribals in India. In: *Advances in Multimedia and Interactive Technologies.* 2022;148-159. <https://doi.org/10.4018/978-1-6684-5907-2.ch013>

78. Scheduled Castes & Scheduled Tribes Research & Training Institute, Indian Institute of Bio-Social Research & Development. Developing framework for sustainable tribal development through convergence. Ministry of Tribal Affairs, Govt. of India; 2022.
79. Schnoor S. Governmentality and the new spirit of exploitation: politics of legitimacy and resistance to Canadian mining in Guatemala and Honduras, 2021. <https://doi.org/10.32920/ryerson.14662494.v1>
80. Tata Steel. Steel supplier & manufacturer in India | Tata Steel, 2017. Available from: <http://www.tatasteel.com/>
81. Singh G, Dubey MK, Singh SRK, Singh RB. Factors affecting the involvement of tribal youth in agricultural livelihood activities in Dindori district of Madhya Pradesh, India. *Asian J Agric Ext Econ Sociol.* 2022 Jul 4; 452-9. <https://doi.org/10.9734/ajaees/2022/v40i931027>
82. Srivastava D. Promoting and backing tribal entrepreneurship in North-East India by virtue of Pradhan Mantri Van Dhan Vikas Yojna. *Int J Soc Sci.* 2022 Aug 25;11(3). <https://doi.org/10.46852/2249-6637.03.2022.3>
83. Suamba IK, Sumiyati S, Tika W, Sulastri S, Agung Keswari Krisnandika A. Potential development of Balinese water-control system (Subak) based agro-tourism in the World Cultural Heritage site of Catur Angga Batukaru. *SOCA: Jurnal Sosial Ekonomi Pertanian.* 2021 Jan 31;15(1):210. <https://doi.org/10.24843/soca.2021.v15.i01.p19>
84. Suman KK, Murthy TKG, Chandrasekhar RC. Innovative approaches for sustainable productivity among tribal families of East Godavari district. *J Agric Ext Rural Dev.* 2014 Jan 31;6(1):5-10. <https://doi.org/10.5897/jaerd2013.0510>
85. The relationship between forests and tribal peoples: An anthropological study in South Bengal. *J Soc Sci Humanit.* 2023 Feb 28;5(2). [https://doi.org/10.53469/jssh.2023.5\(02\).08](https://doi.org/10.53469/jssh.2023.5(02).08)
86. Tripathy S. Tribal development through horticultural plantations under the wadi. *Hortic Int J.* 2018;2(3). <https://doi.org/10.15406/hij.2018.02.00033>
87. Tripathy S. Tribal development through horticultural plantations under the wadi. *Hortic Int J.* 2018;2(3). <https://doi.org/10.15406/hij.2018.02.00033>
88. Tzudir R, Srikanth Y. Socio-ecological impact of coal mining: A study in Molungkimong village, Nagaland. *Man Environ Soc.* 2022;3(1):23-36. <https://doi.org/10.47509/mes.2022.v03i01.02>
89. Vardan SR, Y SR, Shruti S. Indigenous knowledge and sustainable development in the Tones Valley of Garhwal Himalaya. *J Med Plants Res.* 2010 Oct 4;4(19):2043-2047. <https://doi.org/10.5897/jmpr10.191>
90. Ward C, Feinauer E, Hiwalker R, Davis J. Implications of welfare reform for community development: A case study comparing tribal and county food assistance programs serving the Northern Cheyenne Nation. *Community Dev Soc J.* 2000 Sep;31(2):254-276. <https://doi.org/10.1080/15575330009489706>
91. Centre for Science and Environment. Mining and environment. Available from: <https://www.cseindia.org/mining-684>
92. Indian Institute of Technology (ISM), Dhanbad. Centre of excellence in mining safety and automation. Available from:

<https://www.iitism.ac.in/index.php/centre-of-excellence-in-mining-safety-and-automation>