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Upholding Culture, Empowering the Community: Exploring 'Agroforestry' as a Development Model for Dongria Kondh

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ABSTRACT

This study explores the potential, as well as the viability of 'Agroforestry' as a sustainable livelihood model for the Dongria Kondh tribe, residing in the Niyamgiri hilly region, Odisha. The community faces socio-economic marginalisation, limited access to commercial markets, and external threats to their traditional forest-based livelihood. This research accessed the applicability of 'Agroforestry' through secondary data analysis, policy reviews and semi-structured virtual interviews with stakeholders. Key challenges such as Land Rights, Market Accessibility, and Environmental Concerns are addressed, proposing a Structured Development Model integrating Biodiversity Conservation, Commercialisation of Non Timber Forest Products (NTFPs), and Cooperative based Market Linkage. The study contributes to policy discussions by highlighting gaps in the Forest Rights Act (2006) and the National Agroforestry Policy (2014). Findings suggest that Agroforestry can enhance livelihood resilience, ensuring economic and ecological sustainability for the Dongria Kondh.

Introduction

The Dongria Kondh, classified as a Particularly Vulnerable Tribal Group (PVTG), have been the traditional custodians of the Niyamgiri Hills, an ecologically rich and culturally significant region in Odisha. Their livelihood primarily depends on Shifting Cultivation, Non-Timber Forest Products (NTFPs) collection, and traditional agricultural practices. However, modern development pressures; such as large-scale mining, deforestation, and policy misalignment, threaten their self-sufficient way of life. Additionally, socio-economic marginalisation, limited market access, and inadequate policy support have further pushed the Dongria Kondh towards economic vulnerability.

This study investigates 'Agroforestry' as a viable alternative to ensure sustainable development without compromising their cultural heritage and ecological balance. Agroforestry is a well-documented model for promoting environmental conservation while offering economic security through diversified farm-based income sources. The integration of fruit bearing trees, medicinal plants, and other timber species alongside traditional crops has shown promising results in several indigenous communities nationwide. Given the Dongria Kondhs' existing ecological knowledge and forest stewardship, Agroforestry presents itself as a natural extension of their traditional livelihood practices.

Rationale

The rationale for selecting Agroforestry over other developmental models, stems from its ability to align with the ecological sensitivities and socio-cultural ethos of the Dongria Kondh. Unlike industrial agriculture or commercial forestry, Agroforestry maintains Biodiversity, Prevents soil degradation, and Provides sustained economic returns without displacing traditional land-use patterns. Furthermore, Agroforestry is a recognised model

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under the National Agroforestry Policy (2014), though its implementation among indigenous communities remains limited. This study aims to bridge the gap by providing policy recommendations and practical implementation strategies, tailored to the Dongria Kondhs' socio-economic context. The research employs secondary data analysis, existing policy reviews, and virtual consultations with stakeholders to evaluate the feasibility of Agroforestry-based interventions in the locality. The findings will contribute to policy discussions on sustainable tribal development, offering insights into the role of Agroforestry in enhancing economic resilience, ensuring food security, and fostering long-term ecological sustainability.

Review of Literature

The literature on agroforestry and its potential for the Dongria Kondh in Odisha's Niyamgiri Hills collectively underscores its capacity to integrate economic, ecological, and social benefits, aligning with the tribe's traditional practices. However, gaps in localization, policy implementation, and socio-political considerations necessitate a tailored approach. Pandey (2017) highlights the Dongria Kondh's socio-economic marginalization, noting their exclusion from formal economies, limited education, and restricted market access due to neoliberal policies. This qualitative insight frames the need for development models that preserve cultural practices but lacks specific solutions for agroforestry integration.

Ecological and economic benefits of agroforestry are well-documented. Ulman et al. (2021) demonstrate through biodiversity surveys in Assam that agroforestry systems support 364 animal species, with home gardens hosting 311, suggesting a model for balancing conservation and livelihoods. Similarly, Handa et al. (2020) quantify agroforestry's carbon sequestration potential, aligning with the Dongria Kondh's sustainable forest management practices. Raj et al. (2019) and Dubey (2008) emphasize economic gains, with Raj noting enhanced soil fertility and farmer incomes, and Dubey highlighting small-scale forestry's role in rural economies. However, Ulman's Assam-specific data and Dubey's pre-2008 perspective limit their applicability to Niyamgiri, while Raj overlooks socio-political barriers like land tenure disputes.

Market and policy dynamics further shape agroforestry's feasibility. Pandey et al. (2016) and Rao and Rao (2024) focus on non-timber forest products (NTFPs), arguing that regulated markets can boost indigenous incomes and biodiversity. Their qualitative and economic analyses highlight challenges in securing fair prices but lack Odisha-specific strategies. Alavalapati et al. (1995) identify land tenure security, policy incentives, and market access as critical for adoption, yet their dated framework predates the Forest Rights Act (2006). Policy studies, including Puri and Nair (2004), Sarap et al. (2013), and the CPF Report (2013), critique the National Agroforestry Policy (2014) and Forest Rights Act for poor implementation, citing bureaucratic hurdles and low tribal awareness. The Ministry of Tribal Affairs' Annual Report (2021) notes the absence of targeted agroforestry programs, underscoring a policy-practice gap.

Synthesizing these findings, the literature supports agroforestry's potential to enhance biodiversity, economic resilience, and climate mitigation for the Dongria Kondh. Quantitative data on biodiversity and carbon sequestration complement qualitative insights on market and policy barriers. However, regional specificity, outdated analyses, and insufficient focus on socio-political constraints limit direct applicability. This study addresses these gaps by proposing a community-driven agroforestry framework that leverages the Dongria Kondh's ecological knowledge, strengthens land rights, and fosters cooperative market linkages for sustainable development.

Methodology

This study primarily followed the process of conducting qualitative semi-structured virtual interviews to validate and to further extend the findings from secondary data analysis, including policy analysis, comparative case study analysis, market assessment, and geospatial evaluation of the proposed location; Niyamgiri Hills (Majorly Rayagada and Kalahandi district of Odisha), determining the viability of an agroforestry model for the Dongria Kondh; tribal community living there. The methodology of the study involved the below mentioned steps.

Semi structured and Open Ended virtual interviews were conducted with i) two government officials (Section Officers) from Odisha Forest, Environment and Climate Change Department; responsible for forest policies incorporated in the state of Odisha, ii) one field officer; specified on the basis of Tribal Concentrated Block List (Tribal Sub-plan Areas) from ST & SC Development, Minorities & Backward Classes Welfare Department, Government of Odisha; which ensures minority and tribal welfare and their livelihood enhancement, iii) one official from Directorate of Soil Conservation and Watershed Development under Department of Agriculture & Farmers' Empowerment, Government of Odisha, and iv) two postgraduate students from Odisha University of Agriculture & Technology (OUAT), Bhubaneswar.

Horizontal(Trend) Analysis method was followed to study the 'State-wise Scale of Finance report 2022–23' of NABARD (National Bank for Agriculture and Rural Development) to understand the funding pattern over the years for the selected location, and the current on-going active projects in districts of Rayagada and Kalahandi were analysed; accessing them from the 'Project Locator' feature available on the NABARD website.

Virtual focused interviews with two members of Dongria Kondh Gram Sabhas (Village Councils) were also conducted, as they are the Decision-Making Bodies for the

land and forest use in the locality. Opinions and statements from Dongria Kondh Youth Leaders were also collected, as they engage in Advocacy for tribal indigenous rights. Indirect Consultation from NGOs; working there with the Dongria Kondh community on Sustainable Farming Practices, was also taken into consideration for this study.

Comparative Analysis and Case Studies of existing agroforestry development models were done. That features Bastar Agroforestry Model (Chhattisgarh), Koraput Organic Coffee Farming (Odisha), and NABARD's Eucalyptus Agroforestry Model (Odisha).

The methodology also included evaluation of the impact of existing policies on tribal community members with regard to their socio-economic empowerment, that are Odisha State 'Sub-Mission on Agroforestry under Rashtriya Krishi Vikas Yojana' (2021-22), Community Forest Right (CFR) provisions under Forest Rights Act (FRA) (2006), National Agroforestry Policy (2014), Odisha Millet Mission (2017).

Economic and Geospatial Analysis was also conducted with the help and guidance of local sellers and vendors that includes, 'Price Trend and Market Demand Analysis' of agroforestry based non-timber forest products; that are turmeric, honey, millets, bamboo, and alongside this Value Chain Mapping was also done, identifying the intermediaries in tribal agro-markets. The methodology also included 'Remote Sensing Data Extraction'; these data insights are published by the Odisha Forest, Environment & Climate Change Department, to investigate the Deforestation Trends, Biodiversity Hotspots, and potential Agroforestry Zones for the implementation of the proposed model.

Findings & Discussions

The study findings reveal a complex yet promising landscape for introducing agroforestry as a sustainable development model for the Dongria Kondh community. The insights were gathered through a blend of virtual interactions with government officials from accountable departments, as well as with community members, secondary data analysis, and geospatial-economic evaluations. These insights collectively validate the hypothesis that agroforestry can enhance ecological sustainability while providing socio-economic stability for indigenous populations in Odisha's Niyamgiri hilly region.

Stakeholder Perspectives

The virtual semi-structured interviews conducted with state-level government departmental representatives, particularly from the Odisha Forest, Environment & Climate Change Department and the ST & SC Development, Minorities and Backward Classes Welfare Department, suggest that while there is administrative awareness about the potential of agroforestry development model, the respective model's targeted tribal-specific interventions are still underdeveloped. Study of State-wise Scale of Finance report and on-going projects by NABARD, emphasised the need for location-specific financial mechanisms, which are currently lacking in Rayagada and Kalahandi district. It also indicates that agroforestry schemes are often generalised, lacking the tailoring for Scheduled Tribe beneficiaries. The finance report by NABARD also highlights the concern about high default rates among tribal loans has led to over-cautious disbursement policies, restricting large-scale investment in agroforestry and related agricultural development models by tribals and minority groups.

This table illustrates an asymmetry between policy formulation and grassroot implementation. While all four stakeholder institutions perceive agroforestry positively, each one of them points to systemic gaps such as; lack of credit innovation, inadequate grassroots training mechanisms, and weak interdepartmental coordination.

The most significant barrier appears to be the absence of formal integration between tribal self-governance institutions and agroforestry policy delivery mechanisms. This sets the stage for participatory reform, especially through institutional convergence at the block, village councils, and panchayat levels. These perspectives also reinforce the necessity of adapting institutional frameworks that not only align with ecological goals but also secure community participation.

Table 1: Key Observations Stakeholder Interviews

Stakeholder	*Insight Collected*	*Implementation Blockage*
Forest, Environment & Climate Change Dept., Govt. of Odisha	Working towards agroforestry integration with CFR lands	Policy overlapping and interdepartmental horizontal coordination
NABARD	High Market Potential but tribal credit profiles remain the primary thing to lookout	Need for credit-linked insurance disbursal mechanisms
ST & SC Development, Minorities and Backward Classes Welfare Dept., Govt. of Odisha	Recognises livelihood issues in Dongria Kondh Community	Absence of localised skill developing training infrastructure
Sub-Mission on Agroforestry under RKVY	Scaling up agroforestry programs	Limited cooperation with Gram Sabhas and Members

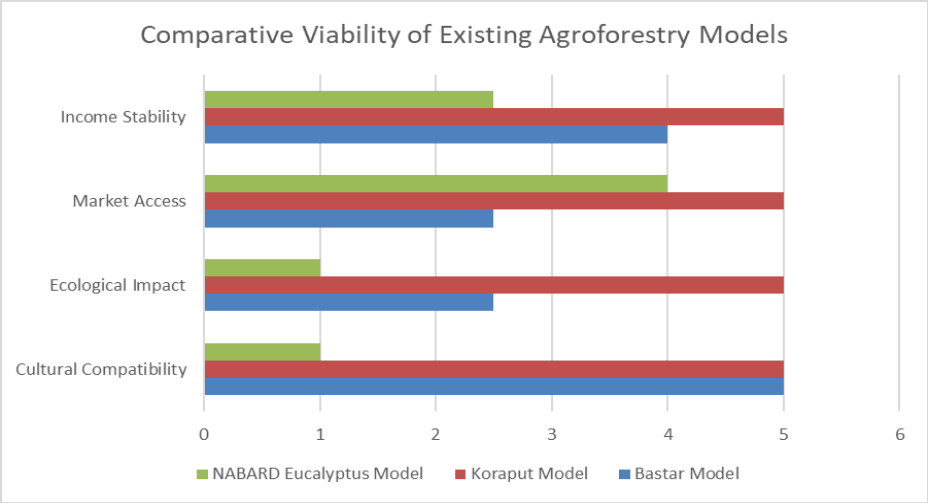

Figure 1: The numeric representations of 5, 2.5, and 1 on the X-axis demonstrate the values 'High', 'Moderate', and 'Low' respectively. Y-axis features 4 preferable consequential factors that are generally used to analyse any agricultural model.

Community-Level Insights

Virtual interactions with Dongria Kondh Gram Sabha Members and the opinions of Youth Leaders highlighted skepticism regarding land-use transformation. Their primary concern revolved around autonomy and the fear of land alienation under commercial agroforestry initiatives. However, when the existing model of Koraput was presented to them, there was a beam of interest in participatory schemes that ensure community ownership, knowledge transfer and required market access. The NGOs offered critical validation, emphasising that traditional agricultural knowledge of Dongria Kondh aligns properly with agro-ecological principles present in the agroforestry model.

Their Historical experiences of coercive displacement, especially during anti-mining protests, have cultivated mistrust towards externally designed 'development' schemes. Youth leaders stressed the requirement that any program, even before being successful, must not disrupt their cultural relationship with Niyam Raja (they consider Niyamgiri Hills as their mountain deity and they refer the hilly region as the king of their locality), affirming the role of sacred ecology in shaping land-use ethics, particularly in mixed cropping techniques and water conservation practices.

Comparative Evaluation of Existing Models

The comparative analysis of Bastar, Koraput and NABARD's Eucalyptus-based agroforestry in Odisha revealed key insights (Figure 1). Bastar's model, focused on tribal ownership and cooperative production, was found to be more culturally adaptable. Koraput's coffee model demonstrated that tribal farmers can manage premium-value crops successfully if collective marketing systems and post-harvest support are ensured. The Eucalyptus model exhibited economic gains but with ecological and social drawbacks, such as groundwater depletion and resistance from forest-dwelling communities.

The Koraput model outperforms other two models, offering both ecological harmony and income diversification through organic certification and export channels. Its alignment with tribal farming traditions and sacred landscape considerations makes it a replicable template for the Dongria Kondh community. The Bastar Model requires enhancement in ecological sustainability practices, while the Eucalyptus Model was found to have adverse groundwater effects and minimal cultural compatibility. These comparative insights strongly support and advocate for adapting a hybrid model customised for Niyamgiri's ecological sensitivity and socio-political context.

Economic and Market Findings

The Market analysis revealed that major non-timber products such as turmeric, millets, bamboo and honey have local, as well as export market demand. However, the absence of market aggregation centres and the long intermediary chains drastically reduce producer margins. The study's value chain mapping indicates that the primary producer; the Dongria Kondh farmers, retain only 20-30% of the final market price due to the existence of a multi-layered intermediary mechanism in tribal product markets.

The table 2 reveals that although market demand for NTFP based agroforestry products is strong, the economic empowerment of tribal producers remains limited due to inefficient value chains. For instance bamboo and honey, both with high final market prices, yield less than 25% profit margins for Dongria farmers. This calls for interventions such as Farmer Producer Organisations (FPOs) to compress supply chains, ensuring value retention at the producer and community level.

Table 2: Value Chain Mapping for Key Agroforestry Products

Product	*Intermediaries*	*Producer Share (approx.)*	*Final Market Price (approx. per Kg)*
Turmeric	Collector - Trader - Retailer	30%	150/-
Honey	Collector - Trader - Exporter	25%	400/-
Bamboo	Govt. Market - Retail Contractor	20%	100/-
Millets	Farmer - Local Trader - Retailer	35%	80/-

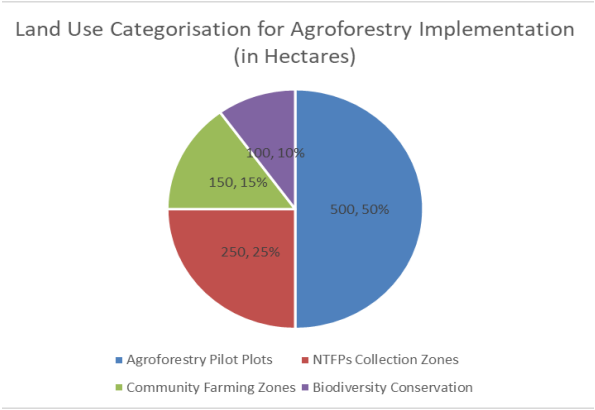

Figure 2: Missing capiton

Geospatial and Environmental Findings

The remote sensing data, taken from the Odisha Forest, Environment and Climate Change Department resources and GIS analysis, revealed that out of the total proposed region, approximately 500 hectares are viable for agroforestry without infringing upon core forest zones or ecologically sensitive habitats (Figure 2). These include areas classified as 'degraded revenue forest lands' and 'abandoned Podu cultivation fields', which do not fall under critical wildlife corridors.

The proposed agroforestry pilot plots account for 50% of the mapped landscape, offering scalable zones for integrating multi-strata species like bamboo, neem, moringa and shade-grown turmeric. The 250 hectares currently used for non-timber product collection provide opportunities for formal agroforestry registration and sustainability tracking. Meanwhile 150 hectares of community farming land offer possible convergence sites with schemes like Odisha Millet Mission. Importantly 100 hectares, mostly along riverine tracts and hill slopes, have been designated for ecological conservation, consistent with the Forest Rights Act (2006). This reflects an integrated zoning logic that aligns with both ecological integrity and socio-cultural sanctity.

Recommendations

In view of the findings, this study recommends a multi-prolonged and community-centric approach for implementing agroforestry as a sustainable livelihood model for the Dongria Kondh community. Firstly, the integration of agroforestry must be facilitated through the institutional recognition of Gram Sabhas as the principal decision making bodies. This will uphold the motive of Forest Rights Act, 2006 and ensure that agroforestry development does not encroach upon customary autonomy.

Secondly, localised skill development and capacity building modules should be introduced to intersect agroforestry knowledge aligned with traditional farming practices. Collaboration with NGOs possessing community linkages, can help incorporate these efforts in culturally appropriate methods.

Third, the formation of Dongria Kondh community members-led Farmer Producer Organisations (FPOs) is imperative to enhance market access and bypass the existing exploitative intermediary structures. The FPOs should receive financial and logistical support from NABARD and the ST & SC Development, Minorities and Backward Classes Welfare Department should invest in value addition units, storage facilities and marketing strategies that will reflect indigenous identity and ecological ethics.

Additionally, the Odisha state Sub-Mission on Agroforestry under RKVY must formulate a tribal specific extension strategy that will facilitate post-harvest support, market aggregation points, and tailored financial schemes. Integrating agroforestry development models under ongoing government initiatives such as the Odisha Millet Mission, can serve as a convergent platform to optimise existing resources.

The geospatial data and remote sensing method must continuously guide land-use planning to balance conservation priorities with livelihood needs, ensuring that no biodiversity hotspots or sacred ecological spaces are compromised in the process.

Conclusion

This research has underscored the potential of agroforestry as a culturally sensitive development model for the Dongria Kondh community in Odisha's Niyamgiri Hills. By merging qualitative data insights with spatial and economic evaluations, the study has demonstrated that agroforestry, when adapted to local socio-ecological contexts and governed by community institutions, can

address both livelihood vulnerability and environmental degradation.

However, successful implementation hinges upon policy realignment, institutional collaboration and support, and sustained investment in tribal specific areas. Agroforestry must not be introduced as a top-down intervention but as a co-created model that respects the community's traditional relationship with the forest. With the right mixture of autonomy, innovation and state support, agroforestry can serve as a viable alternative to ecologically harmful livelihood practices, leading the way towards a better future where economic resilience and environmental protection go hand in hand.

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