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Effect of Forest Rights Acts 2006 on the Livelihoods of Tribals: An Empirical Study of the Juang Tribe in Keonjhar District, Odisha

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ABSTRACT

In response to the impacts of external factors on forest vegetation, biodiversity, and the livelihoods of forest-dwelling tribes, various policies have been established to conserve these forests. The Forest Rights Act of 2006 is one such policy. However, this act's unclear implementation procedures and overlap with the Indian Forest Act of 1927 have attracted significant criticism. Limited studies have assessed the impact of FRA 2006 on the livelihoods of the resident tribes. To fill this gap, this study aims to examine the effects of the Forest Rights Act on household income sources, using data from the Juang tribe in Keonjhar District. A range of statistical analysis tools, including correlation, partial correlation, and multilevel regression models, were employed. Data were gathered through structured interviews from 117 tribal households belonging to the Juang tribe in Odisha. The results highlighted the importance of agricultural income for tribal households. The correlation result reveals that landholding size ($r = 0.811$) and the number of earning members ($r = 0.764$) were strongly correlated with household annual income. However, the existing laws and strategies do not directly foster income growth. The findings emphasise the need to enhance laws in a manner that respects local conditions and cultural contexts to help reduce poverty.

1. INTRODUCTION

More than 5,000 distinct tribes constitute the world's indigenous population, which is roughly 476 million people spread throughout almost 90 countries. At 70.5% of the world's indigenous population, Asia and the Pacific are the continents with the largest concentration of indigenous peoples. The remaining indigenous population groups are found throughout Africa, Latin America, the Caribbean, and North America [1].

Through a variety of international treaties and declarations, nations all over the world have safeguarded the rights of indigenous peoples, including: American Declaration on the Rights of Indigenous Peoples (OAS, 2016), UN Declaration on the Rights of Indigenous Peoples (UNDRIP, 2007), Convention on Biological Diversity (CBD, 1992), Rio Declaration on Environment and Development (1992), ILO Convention No. 169 (1989), International Covenant on Civil and Political Rights (ICCPR, 1966), International Covenant on Economic. Social and Cultural Rights (ICESCR, 1966) and Social and Cultural Rights (ICESCR, 1966).

Approximately 104 million individuals, or 8.6% of India's total population, are members of 705 scheduled tribes [2]. To safeguard the rights of tribal peoples, the Indian government has passed several laws, such as The Forest Act of 1865, The Forest Act, 1878, Forest Policy Resolution Act 1894, Forest Act-1927, The Dhebar Commission 1961, The Dube Committee, 1972, Tribal Sub-Plan (TSP) 1974-75, The Panchayats (Extension to Scheduled Areas) Act, PESA Act, 1996, the Forest Rights Act of 2006, and the Constitution of India. These laws have been frequently criticized for having ambiguous implementation procedures and having clauses that overlap with the Indian Forest Act of 1927. As a result, concerns have been raised concerning the role of these laws or regulations in reducing poverty among forest-dwelling tribes. Only a few studies have attempted to analyze how these policies affect local tribes' livelihoods.

According to the Indian Forest Act of 1927, forests were divided into reserved or protected forests. However, about 55% in northeastern India remained unclassified, that is, they are not managed by forest acts and are controlled by local communities. The sweeping expansion of the definition of forest in the Forest Rights Act 2006, which was proposed to be incorporated into the Indian Forest Act, threatened the customary forest rights of the tribal communities residing in these areas. This study focuses on the challenges faced by tribal communities due to the ambiguities and issues related to the subsections of the Forest Rights Act of 2006, particularly the lack of clarity in delineation (the procedures for habitat rights claims) [3].

The implementation of the Forest Rights Act of 2006 has been markedly slow, despite the passage of considerable time

since its enactment. Forest-dwelling tribes were expected to gain rights that would enable significant improvements in their socio-economic conditions; however, the actual implementation has fallen far short of the envisioned outcomes [4]. Therefore, this study aims to assess the extent to which the Act has impacted the socio-economic livelihoods of tribal communities. In the existing literature, there is a lack of studies conducted to evaluate the effects of these Acts on tribal livelihoods in the Keonjhar District.

The primary objective of the study is to analyze household income patterns and their correlation with the demographic characteristics of tribal families, as well as to evaluate the impact of the FRA 2006 on income-generating activities. The study examines three income categories: agricultural, non-agricultural, and forest-based income. The significance of the study lies in determining the effect of governmental strategies and legislation on tribal household livelihoods, thereby supporting the formulation of future policies that reconcile forest conservation with rural advancement.

2. METHODOLOGY

2.1 Study sample

The study was conducted in Keonjhar district, especially on one of the primitive tribes in Odisha, 'Juang' located in the Banspal, Harichandanpur, and Telkoi blocks (Figure 1). As the target population Juang tribe, it is relatively homogeneous with respect to socio-economic characteristics, which reduces the likelihood of significant variation in key variables. Therefore, this study has taken 117 as representative sample households to achieve more stability and consistency of regression estimates.

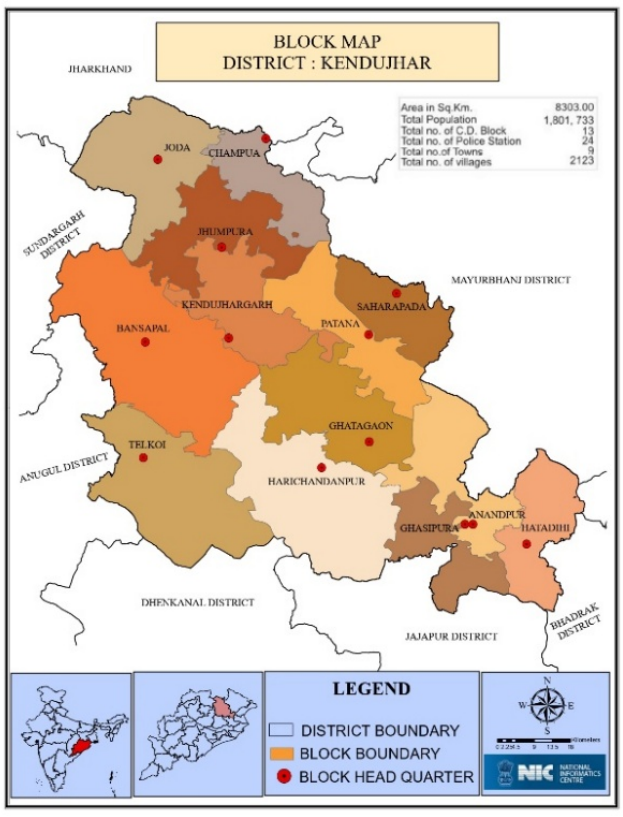

Figure 1. Study area
Source: National Informatics Centre

2.2 Data collection

Data on the socio-economic status of Juang households were collected using an interview schedule. Households were selected randomly through a reliability-based sampling technique. The researchers encountered several challenges during data collection, stemming from the isolated nature of the community, significant communication barriers, the forest-dwelling lifestyle of the tribe, and difficulties in encouraging participants to respond and articulate their socio-economic conditions. As a result, participant observation was incorporated to gain a deeper understanding of their livelihoods.

The study method began with preparation, where survey questions were developed based on consultations with experts and stakeholders, followed by the training of research assistants to ensure proper data collection. The fieldwork phase involved conducting scheduled interviews through personal interactions, where the prepared questions were administered to participants. After data collection, the analysis stage commenced, which included transcribing interview responses into SPSS (v20) for statistical processing, organizing transect walk results into structured tables, and employing various analytical tools to interpret the findings. A final report was then compiled to present the study's outcomes. The lessons learned from this process were documented to guide and improve future research endeavours, ensuring more efficient and effective methodologies in subsequent studies.

2.3 Data analysis

The reliability and validity of the interview schedule were assessed through several steps. First, question clarity was tested by presenting the questionnaire to ten tribal respondents. Second, Cronbach's alpha was used to measure internal consistency, yielding a score of 0.87 for the questionnaire items, indicating strong reliability. Third, topics were reviewed for their relevance to the research objectives, and sections were labelled according to the field survey structure. The accuracy of the results was cross-validated with a subset of participants to ensure they reflected reality. For data analysis, various statistical and econometric tools were utilized, including regression analysis and multilevel logistic regression, as appropriate.

The data were analyzed using a multilevel regression model, which allows for the estimation of varying regression effects across different levels. The model is specified by the following equation:

$$y_{ij} = \beta_0 + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \cdots + \beta_n X_{nij} + \mu j + e_{ij} \quad (1)$$

To validate the use of the multilevel regression approach, the author first estimated a null model with no predictors to assess the baseline variance across clusters (villages). The Intraclass Correlation Coefficient (ICC) was calculated at 0.17, indicating that 17% of the total variance in household income was attributable to between-village differences. This supports the appropriateness of a multilevel modeling framework. Moreover, the model's goodness-of-fit was evaluated using the Akaike Information Criterion (AIC). The AIC of the final multilevel model was 1635.01, which showed a significant improvement over the null model (AIC = 1298.42), thus

confirming the added explanatory value of the included predictors.

The dependent variable is tribal household income, primarily derived from forest-based, agricultural, and other sources of income. Other sources of income include labor and other activities that compensate for income losses caused by poor implementation of the Forest Rights Act and are essential for sustaining livelihoods. These economic losses stem from forest regulations that conflict with the traditional livelihood practices of tribal communities, forcing a decline in household income and pushing individuals to seek alternative sources of sustenance. In the absence of such restrictive laws, tribal populations would continue to rely sustainably on forest resources, maintaining both economic stability and cultural continuity. However, when displaced from their customary means of subsistence without viable alternatives, they often face increased impoverishment.

The independent variables include demographic and asset-based household characteristics as explained in Table 1.

Table 1. Explanation of the independent variables

Variable and Symbol	U
Age (x1)	Number of completed years
Highest_level_education (x2)	Completed year of schooling
Landholding size (x3)	Acre
No. of earning members (x4)	Total in numbers

3. RESULTS

3.1 Sources of income for tribal households

Table 2 presents the absolute and relative annual income distribution among sample households. Some households opted not to disclose income data. Forest-based income constituted the largest share (42.70%), highlighting its critical role amidst ongoing legal transformations related to forest and habitat rights. Agriculture also contributed significantly (36.64%). Variations in income sources among households were tied to ownership of agricultural assets, including farmland and livestock.

Table 2. Absolute and relative annual income sources among sampled tribal households

Source of Income	Average of Annual Absolute Income	Standard Deviation	Relative Annual Income (% of Total)
Agriculture income	84348	103772.1	36.64
Forest income	98308	48876.07	42.70
Income from other sources (non-agriculture and non-forest)	47564	53597.38	20.66
Total	230219.62	-	100

Source: Field survey

3.2 Tribal forest management

Village populations were unevenly distributed, unlike in non-forest villages. Households engaged in agriculture and livestock rearing often cooperated in farming activities. Portions of land were allocated to forest officials for afforestation programs, resulting in the loss of land previously used by residents (Table 3).

Table 3. Synthesis of field survey observations

Resource Category	Utilization Patterns	Challenges Identified	Potential Through Forest Rights	Community Perception
Forest-based resources	Gathering of wild edibles, fodder collection for livestock, and procurement of firewood for domestic use.	Legal entitlement to access forest resources remains unrecognized.	Legal recognition of community forest rights could facilitate greater autonomy in resource management.	Forests are regarded as vital for sustenance and ecological balance.
Hydrological resources	Utilized for domestic water needs (drinking, bathing, washing) and traditional fishing practices.	Water sources are seasonal and not consistently available year-round.	Stream diversion projects may improve irrigation and agricultural resilience.	Rivers are considered lifelines, integral to daily survival and cultural identity.
Livestock and domestic produce	Grazing of cattle and collection of animal products such as milk, eggs, and meat for subsistence and trade.	Restrictions on livestock grazing within reserved forests limit traditional pastoral practices.	Formation of cooperatives could enhance economic returns from dairy and livestock-based livelihoods.	Livestock functions as a fallback resource during agricultural or forest-based livelihood disruptions.
Agricultural practices	Engagement in subsistence farming and shifting cultivation; land preparation through manual clearing of plots.	Declining yields due to shortened fallow cycles and shrinking communal landholdings.	Recognition of habitat rights may enable the continued practice of swidden agriculture.	Agricultural viability is increasingly constrained by land scarcity and external pressures.
Cultural and spiritual associations	Ritualistic reverence of natural elements such as rivers, trees, and hills; integral to traditional belief systems and festivals.	Sacred landscapes are at risk due to deforestation and state-led development interventions (e.g., check dams).	Legal protection of sacred groves through community rights could mitigate degradation from external interventions.	Sacred grove destruction is perceived as a harbinger of moral and ecological decline (symbolic of Kalyug).

Table 4. Correlation matrix

		Age	Highest Level Education	Landholding Size	No. of Earning Members	HH Annual Income
Age	Pearson Correlation	1	-.205*	-.123	-.224	-.095
	Sig. (2-tailed)		.027	.188	.176	.306
	N	117	117	117	117	117
Highest level education	Pearson Correlation	-.205*	1	.816**	.816**	.447
	Sig. (2-tailed)	.027		.000	.000	.105
	N	117	117	117	117	117
Landholding size	Pearson Correlation	-.123	.816**	1	1.000**	.811**
	Sig. (2-tailed)	.188	.000		.000	.009
	N	117	117	117	117	117
No. of earning members	Pearson Correlation	-.224	.816**	1.000**	1	.764**
	Sig. (2-tailed)	.176	.000	.000		.005
	N	117	117	117	117	117
HH annual income	Pearson Correlation	-.095	.447	.811**	.764**	1
	Sig. (2-tailed)	.306	.105	.009	.005	
	N	117	117	117	117	117

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 5. Partial correlation

Control Variables			Landholding Size	HH Annual Income
Highest_level_education	Landholding Size	Correlation	1.000	.048
		Significance (2-tailed)	.	.612
		df	0	114
	HH annual income	Correlation	.048	1.000
		Significance (2-tailed)	.612	.
		df	114	0
No_of_earning_members	Landholding size	Correlation	1.000	.
		Significance (2-tailed)	.	.
		df	0	114
	HH annual income	Correlation	.	1.000
		Significance (2-tailed)	.	.
		df	114	0

3.3 The relationship between household income and demographic characteristics

The correlation between household income and demographic characteristics reveals that household annual income is significantly correlated with the number of earning members in the family (R=.764), which indicates that the higher the earning members, the higher is the household income. Similarly, landholding size is significantly correlated with annual household income, which exhibits that the size of land is one of the key economic resources contributing to household income. The person with large land holding size can generate higher income. Annual household income is positively correlated with the household head's educational level (R=.447), household heads with basic education (even primary schooling) are slightly more engaged in alternative livelihoods (e.g., wage labor, petty trade) alongside forest-based work, marginally boosting income (Table 4).

As per the correlation results, level of education, the number of earning members and the landholding size significantly correlated with the annual household income. To further understand the strength of the relationship between landholding size and income, partial correlation was conducted by controlling for education and the number of earning members separately. When the effect of education was held constant, the relationship between landholding size and annual income remained unchanged (Table 5). However, when the number of earning members was controlled, the correlation between landholding size and annual income became statistically insignificant (Table 5). The outcome of partial correlation inferred that all variables are important to improve the household income.

Table 6. Results of multilevel logistic regression

Explanatory Variables	Symbol	Forest Income, log	Agricultural Income, log	Income Related to Other Works
Age	(x1)	**2.335**	**4.001**	**3.012**
Level of education	(x2)	**1.710**	**2.122**	**2.812**
Landholding Size	(x3)	**1.100**	**4.335****	**3.471****
No. of earning members	(x4)	**1.710**	**4.441****	**4.812****

Note: **: Significant at 0.01 level

The results of the multivariate regression analysis reveal that landholding size (x3) and the number of earning members in the household (x4) have a statistically significant and positive effect on both income from other work and agricultural income. This indicates that households with larger landholdings tend to generate higher earnings, likely due to increased production capacity and marketable surplus. Similarly, households with more earning members benefit from diversified income sources, which collectively boost total income. On the other hand, age (x1) and level of education (x2) show positive coefficients for all income categories, suggesting a general tendency toward higher

earnings with greater age and education. However, these effects are not statistically significant, indicating that neither variable exerts a strong influence on income in this context.. The effect of education is not productive due to the low level of formal education among respondents, which does not translate into enhanced skills or better employment opportunities. Similarly, age does not strongly influence income, especially in tribal areas where income-generating capacity often declines with age due to the physical nature of work (Table 6).

4. DISCUSSION

The results indicate a lack of evidence that government initiatives to increase forest areas enhance household income. Research suggests that forest conservation strategies may negatively impact local populations by restricting access to essential resources and livelihoods [5, 6]. This study thus adds to the existing body of literature by highlighting the absence of positive effects from forest rights legislation on community livelihoods. Moreover, restrictions on land use rights and resource benefits within forest areas point to the role of forest rights laws as external factors that shape livelihoods, warranting their consideration as mediating variables in future studies.

The tribal communities, especially those residing in the Keonjhar district, typically inhabit small, geographically isolated settlements and have developed ways of life that are closely attuned to their forested environments. In the lowland areas, agriculture constitutes the primary source of livelihood. However, in the more rugged, mountainous regions, the reliance shifts toward hunting and gathering due to the difficult terrain. As a result, their economic activities are shaped more by environmental constraints than by a deep-rooted dependence on the forest itself. This often contributes to a cultural and social disconnection from the broader mainstream society. Numerous influences, including age, education, number of earning members, landholding size, and government policies, significantly affect their livelihoods, impacting access to resources, services, and infrastructure. Historical forest policies, both colonial and post-colonial, have often undermined tribal rights, transferring authority to governmental bodies [7]. Although initiatives like joint forest management aim to encourage community participation, the centralized nature of existing forest laws has restricted social justice and equality in tribal communities [8]. Contradictory narratives persist: one depicts tribes as protectors of natural forests, while the other claims that tribal practices threaten conservation efforts [9]. These conflicting views continue to influence the legal and social dynamics between tribes and forest resources, affecting access. Significant obstacles to successful implementation still exist despite new legislation aimed at improving the situation of tribal populations, calling for extensive reforms to address issues with tribal rights and livelihood [10].

The Juang tribe, which is classified as a Particularly Vulnerable Tribal Group (PVTG) in Odisha, makes its living mostly from shifting farming. Locally referred to as "Dahi," "Kaman," or "Tila," this technique is typical among primitive tribal communities in the hills and forested regions of Odisha [11]. While documentation of the Juang's agricultural practices is sparse, studies on other tribes indicate a reliance on traditional agricultural and animal husbandry knowledge [12]. Nevertheless, the Juang encounter socio-economic challenges, such as low income and malnutrition, which may hinder their agricultural productivity [13].

Research conducted on the Tharu tribe reveals that while various agricultural and animal husbandry practices are prevalent, advanced techniques, including seed processing and pest management, are rarely employed within tribal communities [12].

The secluded mountainous areas of Keonjhar present significant obstacles for tribal communities in accessing markets and healthcare. Poor road infrastructure, limited transport options, and the remoteness of healthcare facilities restrict their access to vital services [14]. Although these communities often depend on traditional crafts and local resources for their livelihoods, their limited product range and market access can result in economic stagnation [15].

Despite various approaches to tribal development, including isolationist and integrative strategies, their effectiveness remains debatable [16]. However, market engagement can improve skills, raise awareness, promote positive social changes, and benefit society [14]. The FRA 2006 seeks to protect the rights of Indian communities that live in forests, especially in areas like Odisha and Jharkhand [17]. However, the competing demands of livelihood sustainability and environmental protection have made it difficult to implement the FRA in Odisha, especially in protected areas [18].

Examining the application of the law in Keonjhar, particularly concerning the Juang community, reveals complexities in the claims process and forest dependency. The successful implementation of the FRA is hampered by issues such as unequal information distribution, poor coordination, undemocratic involvement, and a lack of accountability [18]. Even while Odisha has advanced more than Jharkhand, both states still face challenges such as a lack of workers and low claimant awareness. By securing land tenure over forest regions and reaffirming rights to forest products, the Forest Rights Act could improve livelihood options for those who live in forests [17].

It is worth noting that we were unable to obtain comprehensive details regarding the restrictions imposed by forest rights laws on access to forest resources, due to a lack of on-ground data and mobility constraints on the researcher within the forest. This limitation intersects with the study's findings, and as such, the results reflect an average impact of the Forest Rights Act on household income, considering the interplay of other factors influencing household income activities, such as restricted access to resources and labour. The use of multilevel regression models remains limited in identifying the factors influencing the interaction between government legalisations and tribal livelihoods.

5. CONCLUSION

In this study, the relationship between forest acts and demographic factors of tribal households with household income and living conditions was highlighted. It showed that FRA 2006 has limited potential to influence the living conditions of the population and can lead to an unhealthy relationship between forest conservation and poverty. This indicates a partial failure of these policies to improve household livelihoods. Therefore, there is a need to focus on the effective implementation of the FRA to significantly impact tribal livelihoods and protect their rights. Strategies

include localized implementation mechanisms involving Gram Sabhas in forest rights verification and mapping processes, ensuring they are culturally and contextually relevant; targeted legal literacy and awareness campaigns in local languages to help tribal communities understand and claim their rights under FRA; integration of livelihood support services, such as improved access to markets, agricultural inputs, and forest-based enterprises, to boost income; strengthened institutional coordination among forest departments, tribal welfare organizations, and local governments to streamline implementation and monitoring; and gender-inclusive approaches that explicitly empower female-headed households by ensuring their participation in decision-making and equitable resource access. These strategies aim to make the Forest Rights Act more effective in improving tribal livelihoods while balancing conservation goals.

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