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### Impact of Joint Forest Management on livelihoods and forest resource utilization in Malrajura village of Akola district in Maharashtra

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#### Abstract

This study examines the socio-economic impacts of Joint Forest Management (JFM) on forest-dependent communities in Malrajura Village, Akola District, Maharashtra. The research analyzes 120 respondents to assess how JFM influences livelihoods, income generation, and community participation in forest management. Results show that forest resources, particularly Non-Timber Forest Products (NTFPs), play a significant role in supporting the economic stability of these households, with 65% of respondents relying on NTFP collection for income. JFM initiatives, including plantation work and ecotourism, have contributed to increased income, with participants earning an average of INR 30,000 annually, significantly higher than the INR 18,500 earned by non-participants. Furthermore, JFM activities have generated employment, addressing seasonal unemployment, especially among tribal households. A regression analysis revealed that JFM participation, landholding size, and employment generation are key factors influencing household income. JFM is a vital strategy for enhancing socio-economic conditions in forest communities, promoting both forest conservation and economic development. However, to ensure the sustainability of JFM, ongoing investments in education, capacity-building, and inclusive policies are essential.

**Keywords:** Joint Forest Management, non-timber forest products, regression analysis

#### Introduction

The economic growth, stability, and sustainability of rural livelihoods in the country are significantly influenced by forest resources and density [38]. Forests offer a diverse range of resources, including as timber, fodder, fuelwood, medicinal plants, and non-timber forest products (NTFPs), essential for the survival and economic prosperity of these communities [11]. According to the Forest Survey of India (FSI) 2023, India's forest and tree cover constitutes around 25.17% of the total geographical area, reflecting an extensive number of forest resources and biodiversity. India occupies approximately 2% of the global forest cover, with forests contributing about 1% to the national GDP [20]. Numerous scientific studies have indicated that over 1.6 billion individuals globally rely directly or indirectly on forests and forest resources for their livelihoods [19, 24]. As per FAO (2015), over 3,999 million hectares of forest sustain the livelihoods of 1,000 million rural individuals, with around 25% of the global population relying on forest resources for essential needs, sustenance, and employment (UN strategic plan 2017-30). Approximately 80% of the population in developing nations fulfils their fundamental

needs, including medicinal requirements for primary healthcare, through various forest products such as food, fuelwood, housing materials, and non-timber goods [29]. Indigenous communities are highly reliant on forest resources and utilize traditional ecological knowledge to safeguard the natural reserve [8]. Revenue derived from forests immediately supports forest inhabitants in sustaining their families and contributes widely to poverty alleviation within society [32].

Approximately 275 million individuals residing at the forest periphery derive their income from forest resources, including food, edible fruits, fodder, leaves, honey, gums, and medicinal plants, thereby sustaining their livelihoods [17]. The significant extent of deforestation in tropical and subtropical regions in recent decades has been exacerbated by extensive human-induced pressures and global climate change [33]. Consequently, land degradation and deforestation occur owing to uncontrolled urbanization, the execution of numerous projects, and the conversion of forest area into agricultural land [27]. The substantial loss of forests adversely impacts both the forest-dwelling tribal communities and the nation's economic stability. Joint

Forest Management (JFM) has become a prominent participatory strategy for forest conservation and management in India [35]. In 1972, the Arabari forest range in the Paschim Medinipur district of West Bengal, India, initiated the first Joint Forest Management (JFM) initiative aimed at the conservation of reserve forests and the enhancement of rural livelihoods [6]. The Joint Forest Management (JFM) program is the collaborative protection and sustainable management of forest land by the government forest department together with local community participation, involving the equitable distribution of forest resource benefits [5]. The national forest policy of India, implemented in 1988, was a crucial policy regarding the rights of local populations over forest resources. The policy acknowledged the involvement of individuals in the utilization and preservation of forests and proposed that forest communities collaborate with state forest departments to develop and safeguard these areas [25]. It also asserted that forestry had to promote social and environmental objectives. This reform in forest policy has initiated a transformation in the protection and utilization of forests in India. The formulation of a protection and management strategy for Joint Forest Management (JFM) areas, fieldwork, involvement in decision-making, and the distribution of usufructs exemplify JFM activities [3]. In 1990, West Bengal became the first state to implement the Joint Forest Management (JFM) program [16]. Since 1990, the Joint Forest Management (JFM) guidelines issued by the union government have prompted all states to commit to implementing JFM, establishing it as one of the largest community-based natural resource management programs globally [12]. JFM has been executed in multiple regions of India, with numerous studies recording its effects on forest conservation and the socio-economic status of communities reliant on forests. In Maharashtra, where forests encompass more than 20% of the state's land area, Joint Forest Management (JFM) has emerged as an essential means for engaging local populations in forest management, especially in tribal areas [37]. Nonetheless, despite its potential, the execution of JFM meets obstacles such as restricted participation owing to insufficient awareness, inadequate infrastructure, and limited market access for forest products [34]. This study focuses on Malrajura Village in Akola District, Maharashtra, where JFM has been active for several years. By analyzing 120 households from different socio-economic backgrounds, this study seeks to evaluate the effectiveness of JFM in improving living conditions in a tribal region. The objectives of this study were to explore the socio-economic characteristics of respondents and assess the role of Joint Forest Management (JFM) in enhancing livelihoods through forest-based activities. The study also aimed to understand the economic contribution of forest-based activities. The impact of JFM participation on household income, revealing a significant difference between participants and non-participants was also evaluated.

### Material and Methods

The methodology of this study aims to assess the impact of Joint Forest Management (JFM) on the livelihoods of tribal households in Malrajura Village, located in Akola District, Maharashtra. The research utilizes both primary and

secondary data collection methods, with a primary focus on household surveys and statistical analysis, to examine socio-economic factors and the role of JFM in improving livelihoods.

### Study Site

The study was conducted in Malrajura Village, a community where JFM programs have been in place for several years. The village is predominantly populated by tribal communities who are heavily dependent on forest resources for their livelihoods. The region is rich in both timber and non-timber forest products (NTFPs), and the local community's engagement with forest management practices plays a critical role in their economic activities. The aim of this research is to evaluate how participation in these management practices has impacted the socio-economic conditions of the community.

### Methods of data collection

#### Primary data collection

Primary data were collected through structured household surveys, in-depth interviews, and focus group discussions (FGDs). A random sampling technique was employed to select 120 households, ensuring a representative sample that includes both participants and non-participants of JFM. This sampling approach allows for a comparative analysis of the effects of JFM on livelihoods. The household survey was designed to capture a range of socio-economic data, including demographic characteristics, landholding size, income from forest resources, and participation in JFM activities. In addition, qualitative insights were gathered through interviews with key informants, including community leaders, local forest department officials, and members of JFM groups. FGDs were conducted to explore the community's perceptions and experiences regarding the impact of JFM on their livelihoods.

#### Secondary data collection

Secondary data were sourced from government reports, records from the Forest Department, and existing literature on JFM and forest resource management in the region. These secondary sources provided context and complemented the primary data collected through fieldwork.

#### Variables and their measurement

The study focused on several key variables, including socio-economic characteristics such as age, gender, education level, and landholding size. The primary indicator for assessing the economic impact of JFM was income derived from forest-related activities, such as collection of NTFPs, timber harvesting, and income from JFM-based livelihood activities. In addition, the study examined employment generation through forest management activities like plantation work, soil and water conservation, and nursery rearing. Income differences between JFM participants and non-participants was also evaluated by one-way ANOVA, whereas Income Predictors were also evaluated through Regression Analysis. Participation in JFM activities, both direct and indirect, was also considered as a key factor influencing the livelihoods of the respondents. The regression analysis of predicted and observed income was also calculated.

**Data Analysis**

Data analysis was performed using SPSS (Statistical Package for the Social Sciences) for descriptive statistics, One-Way ANOVA, and regression analysis. Microsoft Excel was utilized for data organization, cleaning, and visualization, while R Studio was used for advanced statistical modeling and regression analysis. This methodological approach enables a comprehensive evaluation of the socio-economic impacts of JFM on tribal livelihoods in Malrajura Village.

**Results**

**Socio-economic characteristics of respondents**

The socio-economic characteristics of the 120 respondents revealed diverse insights into their dependency on forest resources and JFM participation. The respondents were predominantly middle-aged, with 43.34% above 50 years, 33.33% aged 36-50 years, and 23.33% below 35 years. This indicates a generational involvement in forest-related activities, with older individuals relying on traditional practices and younger individuals participating in newer initiatives. More respondents (43.33%) had completed primary or middle school, and only 20% had higher education. This emphasizes the need for literacy and capacity-building programs to enhance the effectiveness of JFM. Male respondents accounted for 52.50%, while females constituted 47.50%, highlighting nearly equal participation in forest resource-based livelihoods and JFM

activities. A significant portion (40%) of households owned small or marginal landholdings (<2 hectares), making JFM a critical livelihood strategy.

**Income from forest-based activities**

Income from forest-based activities was a key livelihood source for many households. About 65% of households reported income from NTFP activities, including Tendu leaf collection, Mahua flower harvesting, and apiculture. Only 22% of households engaged in timber harvesting, primarily due to strict regulations and community-based monitoring under JFM. Approximately 68% of respondents reported earning income through JFM initiatives such as plantation work and ecotourism (Table 1).

**Employment generation**

JFM activities contributed significantly to employment creation, addressing seasonal unemployment in tribal households (Table 1). 30% of respondents were engaged in plantation work, offering wage labor opportunities. Soil and Water Conservation provided employment to 25%, particularly during off-season periods for agriculture. 22% of respondents were involved in nuresery rearing, with women playing a key role in sapling cultivation and maintenance. NTFP Collection supported 45% of households, offering supplementary income during lean agricultural months.

**Table 1:** Income Sources from Forest Resources and Employment Generated by JFM Activities (Percentage Contribution)

Income Sources from Forest Resources		Employment Generated by JFM Activities	
Activity	Frequency (%)	Activity	Frequency (%)
NTFP Collection	65.00	Plantation Work	30.00
Timber Harvesting	22.00	Soil and Water Conservation	25.00
JFM-related Activities	68.00	Nursery Rearing	22.00
Other Sources	15.00	NTFP Collection	45.00

**Income Differences Between JFM Participants and Non-participants**

A One-Way ANOVA test indicated significant differences in income levels (Table 2). JFM Participants had a mean annual income of INR 30,000, significantly higher than the

INR 18,500 earned by non-participants ( $p < 0.05$ ). This suggests that participation in JFM provides households with diversified income sources and improved economic stability.

**Table 2:** One-Way ANOVA Results

Group	Mean Income (INR)	Standard Deviation	p-value
JFM Participants	30,000	5,000	< 0.05
Non-participants	18,500	4,200	

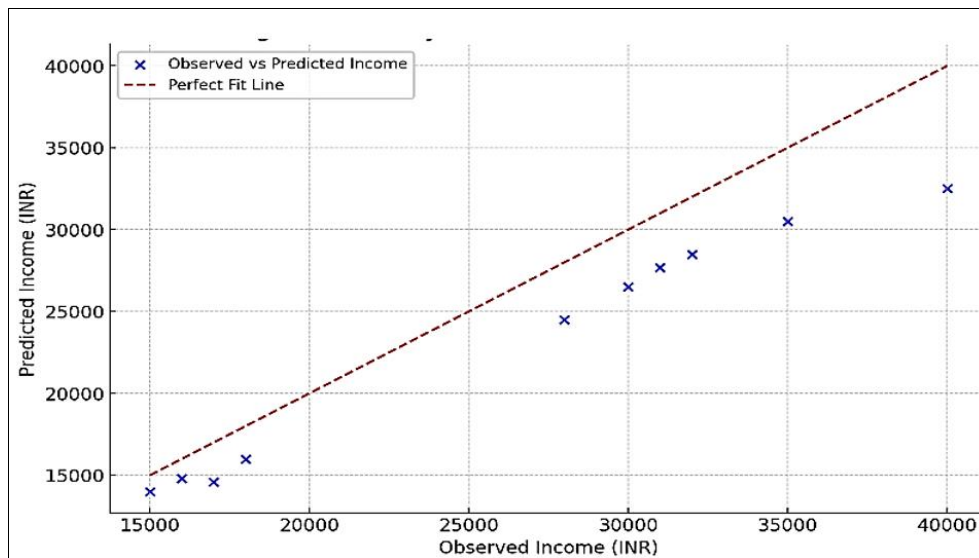
**Income Predictors Through Regression Analysis**

A multiple regression analysis was conducted to determine factors influencing household income (Table 3). JFM Participation emerged as the most significant predictor, with a coefficient of 0.45 ( $p < 0.01$ ). Landholding Size (0.35,  $p < 0.01$ ) and Employment Generation (0.25,  $p < 0.05$ ) also

contributed significantly. The model explained 75% of the variance in household income ( $R^2 = 0.75$ ), demonstrating the transformative impact of JFM participation. The regression analysis of observed income and predicted income was also determined (Fig 1).

**Table 3:** Regression Analysis of Income Predictors

Variable	Coefficient	Standard Error	t-value	p-value
JFM Participation	0.45	0.10	4.50	< 0.01
Landholding Size	0.35	0.08	4.38	< 0.01
Employment Generation	0.25	0.09	2.78	< 0.05



**Fig 1:** Regression Analysis of observed income vs. predicted income

## Discussion

The socio-economic characteristics of the respondents in this study provide valuable insights into the demographic profile and economic dependencies of forest-dwelling communities participating in Joint Forest Management activities. The predominance of middle-aged respondents, suggests that forest resource use and management practices are deeply rooted in generational traditions, with older individuals maintaining traditional practices and younger individuals beginning to engage in newer forest-based initiatives [30, 36]. Also studied the different characteristics of respondents in Malrajura village and observed significant relationship of variables with NTFPs. The gender parity in JFM activities highlights the importance of ensuring that both men and women are actively involved in decision-making processes and economic activities related to forest resources from studies done in Gujarat, Andhra Pradesh and West Bengal [23]. This involvement is particularly significant as many forest-based activities provide crucial income opportunities, especially for women who play a key role in these tasks in West Bengal [9]. The positive impact of Women's participation in community forest governance was observed [1]. Similar socio-economic characteristics of respondents influenced by JFM were also studied by [13, 7, 22, 28].

Income from forest-based activities was a key livelihood source, reporting income from Non-Timber Forest Products (NTFPs) like Tendu leaves, Mahua flowers, and apiculture. This finding aligns with the literature that highlights the critical role of NTFPs in supporting rural economies, particularly in forest-dependent communities [21]. The substantial income generated from JFM activities such as plantation work and ecotourism highlight the multi-dimensional economic benefits of JFM. These activities not only provide direct income but also reported to contribute in conservation of forest resources, indicating that JFM serves as both an economic and an environmental strategy [18]. The income generation by selling and consumption of forest products was beneficial for forest fringe communities in Aravalis of Rajasthan [26]. Regarding employment generation, JFM activities were found to be significant in addressing seasonal unemployment, particularly in tribal

households. The status for employment opportunities after JFM programme was increased with significant difference in six forest ranges from East circle, Jammu Division [15]. [10] reported the increase in employment generation through JFM with huge margin than before existence of JFM in forest areas of Madhya Pradesh [2]. Also reported improvement in financial capital thereby improving living standards of people through JFM activities.

The statistical analysis using test revealed significant differences in income levels between JFM participants and non-participants. The strong positive relationship between JFM participation and income highlights the transformative potential of these programs. The finding is consistent with previous studies, which have shown that participation in community-based forest management programs can enhance household income by diversifying income sources and increasing access to forest resources [4, 14]. Reported the positive changes in assets and vulnerability due to JFM intervention in West Bengal. The 85% respondents were highly satisfied with the implementation of JFM project in vulnerable forest areas of West Bengal [6]. The JFM has also played the important role in capacity building of local communities in Kalam and Siran Forest Divisions [31].

## Conclusion

The study demonstrated that JFM is a critical tool for socio-economic development in forest-dependent communities, particularly for smallholders and marginalized groups. The involvement of both men and women in forest resource management and the generation of income from various forest-based activities emphasize the need for inclusive and sustainable forest management strategies. JFM serves as a vital strategy for promoting sustainable forest management while simultaneously improving socio-economic conditions in forest-dependent communities. However, for its long-term success, there is a need for continued investment in education, capacity-building programs, and inclusive policies that address the needs of all community members. By fostering equitable participation and supporting forest-based livelihoods, JFM can play a crucial role in achieving both environmental conservation and socio-economic development.

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