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Tribal, Social Linkage and Common Property Resources: A Case Study of Sal Leaf and Sabai Grass Business in Odisha

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A B S T R A C T

The definition of common property resources varies with its availability, utilization, location as well as ownership. Access to the available common property resources are governed/guarded by rule and regulations created by the local powerful, potential and politically associated players. There exist several ownership protocols ranging from state machinery till individual control. Many studies have highlighted the dependency upon CPR for livelihood while none of them have addressed the status of most accessed CPR of tribal Odisha i.e., Sal leaf (kendua leaf) and Sabai/golden grass. The study found three major sources of input arrangements i.e., procurement/production via self and family members, purchasing from other sources and households utilizing both the sources. Seventy seven percent of rural households are highly dependent on Sal leaf and Sabai grass activities for sustaining livelihood. Further, significant impact of land availability, days of employment in related activities and contribution of Sal leaf and Sabai grass income on total income of respondents is revealed. Thus, Special attention is required to be given at agriculture, credit availability and other subsidiary employment. Technical assistance is required to be adhere either with government collaboration or private partnership to both sal as well as sabai grass activities at large scale with procurement hub at each block.

***Key words*:** Livelihood, Common property resources, Natural resources, Accessibility

Common property resources and their access are considered among most important indicators for measuring rural livelihood support. Many studies pointed out significant relationship of poverty and unemployment with extraction of common property resources. The definition of common property resources varies with its availability, utilization, location as well as ownership. Soest [1] defined it as renewable natural resources where current excessive extraction reduces future resource availability and the use of which is de facto restricted to a specific set of agents/community. While Berry [2] pointed it as a type of good who's characteristic or size make them costly or difficult to regulate and exclude potential users from obtaining benefits from their use. Further, the question about rivalry and non-excludability makes more economic depletion against regulated mechanism. Even certain studies also considered them among major factors for degradation of the local environment. Livelihood support through engagement in common property resources is negatively associated with level of literacy, availability of land and other employment opportunities while positively with availability of resources and social and economic status. Access to the available common property resources is governed/guarded by rule and regulations created by the local powerful, potential and politically associated players. There exist several ownership protocols ranging from state machinery till individual control though some relaxations are sought for the local peoples but for outsiders' access is allowed only through side/managed payment (in addition of required fees and challan as per government/local norms).

The CPRs consist of grazing land, ponds, forests, oceans, large lakes, rivers, woodland, bushes land, open agricultural land etc. Their utilization and degradation depend upon ASAP i.e., Availability, Survival, Access and Participation. Further, the ecological sustainability is dependent upon social, political and cultural institutions. Deshpande *et al*. [3] also find nexus between poverty, CPR and poor. They argued efficient use of CPR at grassroots level can generate employment and income opportunities for sustaining poor. The incorporation of local social institutions such as participation of rural volunteers, Self-help groups and their federations, co-operative organization, NGOs and PRIs can facilitate efficient allocation and utilization (through regular inspection and monitoring). Rural masses were observed extensively dependent upon CPR for food, fodder, fuel, herbs, fruits, housing and manure etc. [4]. Further, their varying degree of access (including side option/access), multiple and overlapping property right

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resultant vague depletion measurement. The incorporation of the proxy measures i.e., contribution of CPR in employment, income and household needs may serve more appropriately in assessing the control, governance and depletion rate. Tribes as more closely associated with environment and practicing common property resources for livelihood shown dependency due to their interior location, lack of availability of other substitute and poverty. Odisha is endorsed with large reserves of natural resources such as coal, chromite, bauxite, graphite, iron ore, manganese ore, mineral sand and 480 km long coastline etc. In addition, it is also bestowed with vast common property resources such as natural lakes, rivers, other water resources, diversified and dense forest covering (forest covering one-third of total land area). Many studies have highlighted the dependency upon CPR for livelihood while none of them have addressed the status of most accessed CPR of tribal Odisha i.e., Sal leaf (kendua leaf) and Sabai/golden grass. Further, the role of government program especially Self-Help Group/SGSY which had achieved "Success beyond Target in Odisha" have reported higher engagement of SHGs in Sabai Grass rope and craft business (5300 SHGs) and Sal leaf procurement and manufacturing business (2600 SHGs) in Mayurbhanj [5].

MATERIALS AND METHODS

Studies shows households livelihood dependency through inland CPRs are high with nearby pasture land, forest, large lakes and rivers. Odisha is a home of largest number of tribes and are usually engaged in traditional activities such as forest dwellers, agriculture and labour services. Sal leaf and golden grass (sabia grass/babui bata in local language) business serves as a major source of income for rural households in Odisha. Sal leaf (botanically known as *Shorea Robusta*) business is most promising among districts like Mayurbhanj, Keonjhar, Khandamal and Nayagarh while golden grass / sabai grass (also known as money plant) which serves as a natural fiber are grown more extensively in various blocks of Mayurbhanj district. It is scientifically known as *Eulaliopsis Binata* (EB) under grass family Poaceae are mainly grown in south east China and Asian countries such as India, Pakistan, Nepal, Bhutan, Myanmar, Thailand and Malaysia and Philippines [6]. Mayurbhanj district is hub of sabai grass production as well as its craft in Odisha with loyal customers through India and abroad (Odisha Post, 2021). The production and coverage of Sal leaf and Sabai grass in Mayurbhanj district of Odisha is depicted in (Fig 1). The Sabai grasses are mostly grown in red soil and are (in majority of cases) plenty available in blocks of Kaptipada and Baripada sub-division. Its cultivation is done on degraded and uplands and irrigation and manuring is immaterial. Further, once planted it continues production for 10-12 years with annual ploughing [7]. On the other hand, the sal leaf collection, stitching, binding and plates and bowl manufacturing (in forest covered blocks and its nearby region) also makes significant contribution in employment and livelihood. Table 1 explores detailed information of these two major businesses of tribals.

Stratified random sampling is applied initially for covering major business hub and their surrounding blocks. Thus, four blocks (including major hub) were selected i.e., Bahalda, Betnoti, Bisoi and Khunta for Sal leaf while Baripada, Morada, Koliana and Gopabandunagar for Sabai Grass production and procurement. During second stage, three panchayats from each block were selected randomly and from each selected panchayat one village were selected for meeting our desired objectives. Lastly, 10 households were selected from each village on random basis. Pertinent observation while personal investigations reveal women family member (minimum one female member) of all selected households are member of self-help groups (SHG) program. Thus, our study has selected 240 households from 8 Blocks (4 from each commercial section) of Mayurbhanj district.

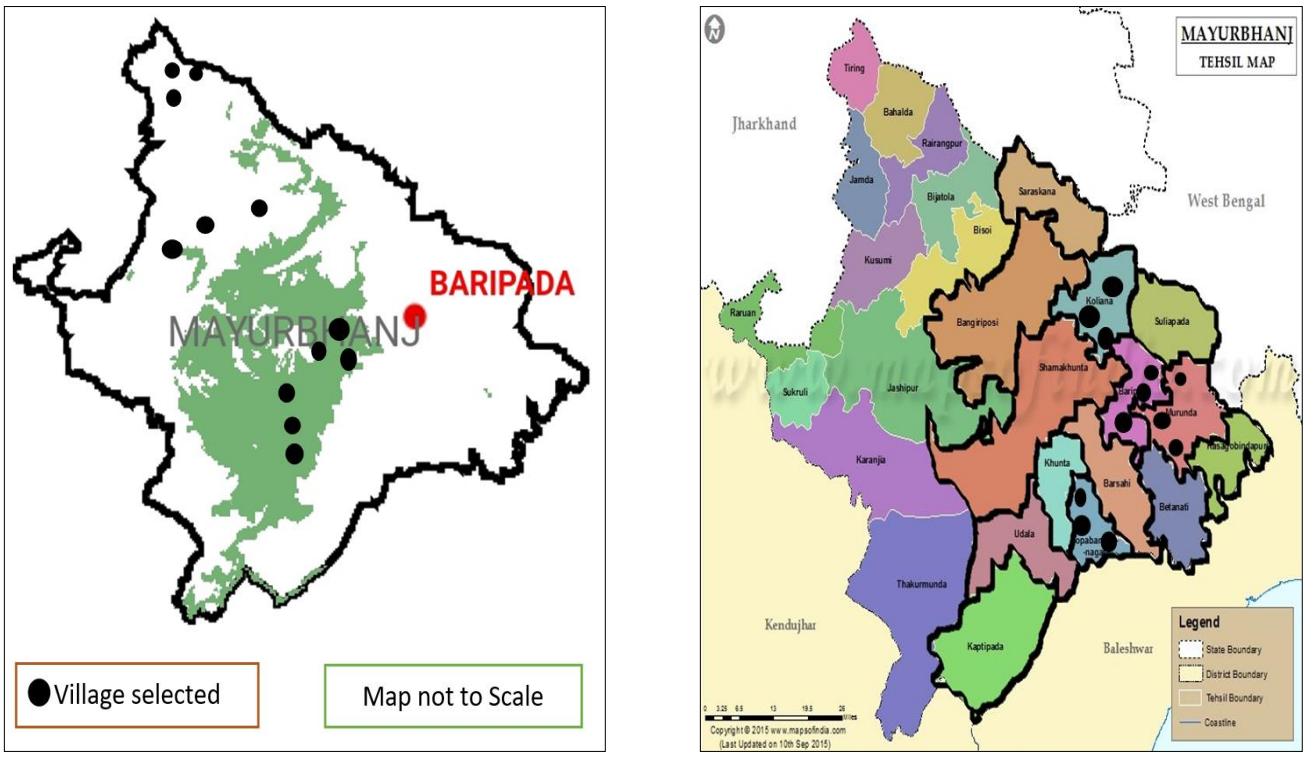

Fig 1 Mayurbhanj district map showing coverage and production of Sal leaf and Sabai grass

Table 1 Major facts about Sabai grass and Sal leaf procurement in Mayurbhanj

Major item	Geographical coverage (Blocks)	Items manufactured/ processed	Duration of Raw materials availability	Process of procurement
Sabai Grass (Morada and Suliapada as Major Hub)	Morada, Koliana, Bangiriposi, Suliapada, Rasgobindpur, Udala, Kaptipada, Khunta, Badsahi, Gopabandhunagar, Shamakhunta and Baripada	Traditional rope which is more suitable for weaving bed (charpai), chair etc. Modern households and fancy items, sofa sets, paper pulp, etc.	This grass is harvested once or twice in the year mainly before rainy season (May or June) depending upon fertility and rainfall and people purchase and store it for round the year employment	Procurement is done in month of September to December. Its height ranges from 1.5 – 2 meter. Once cultivated it continues yielding for 10 – 12 years.
Sal leaf (Betnoti as Major Hub)	Bisoi, Jashipur, Karanjia, Thankurmunda, Bahalda, Rairangpur, Saraskana, Bangiriposi, Shamakhunta, Thakurmunda and Betnoti	Manufacturing of traditional plates through stitching and modern hot compressed structured plate and bowls.	Officially the collection of leaf is allowed for 4 – 6 months but extraction occurs 7 – 8 months on an average. The major collection centres are Betnoti of Mayurbhanj and Rupsa of Balasore district.	The leaves of sal and Siali are collected from core forest and are dried for making semi-furnished plates. The finalization is done as per desired need.

*Overlapping may exist in some blocks due to availability both sabai grass as well as sal forest

Table 2 Block – wise composition and socio-economic details

Parameters	Description	Frequency
Sabai grass activities	Morada	28
	Baripada	27
	G.B. Nagar	25
	Koliana	18
	Khunta *	6
	Betnoti*	1
	Total	98
Sal leaf business	Bahalda	17
	Betnoti	20
	Bisoi	26
	Khunta	17
	Baripada**	3
	G.B. Nagar**	1
	Total	84
Socio-economic details		
Social status (%)	APL	20
	BPL	80
Caste (%)	SC	18
	ST	35
	OBC	34
	General	13
Age	Mean	38
	S.D.	10.5
	Median	36
Family members	Mean	5.4
	S.D.	2.22
	Median	5.0
Land holding (Decimal)	Mean	85
	S.D.	0.63
	Median	101
Educational status (%)	Illiterate	45
	Up to class 5	19
	Class 6 – 10	30
	Class 11 - 12	5
	Graduation and above	1

RESULTS AND DISCUSSION

Out of 240 households under study, 91 households were found engaged in sabai grass business/ related activities while 84 households are in sal leaf activities. Therefore, our study is executed over 175 households (73 percent of total samples collected) with detailed block-wise composition elaborated in (Table 2). The block-wise analysis shows higher dependency of households of Morada (93 percent), Baripada (90 percent), Gopabandhunagar (83 percent) and Koliana (60 percent) on sabai grass production, accumulation and manufacturing while some households of Khunta (20 percent) and Betnoti (3 percent) also found in same business.

That in case Sal leaf collection, manual and machine stitching, plate and bowl manufacturing shows higher presence at Bisoi (87 percent), Betnoti (67 percent), Bahalda and Khunta (57 percent each). Some households of Baripada (10 percent) and G.B. Nagar (3 percent) are also engaged in sal leaf business. Higher presence of BPL households is observed in the district (78 percent) with majority across samples households of Bahalda (93 percent), Betnoti and Gopabandhunagar (90 percent) while lowest across Baripada and Koliana (53 percent and 56 percent respectively). Higher dominance of ST households along with OBC is observed i.e., 35 and 34 percent respectively. Further, higher BPL households were observed across SC, ST and OBC (92 percent, 81 percent and 81 percent respectively) as compared to General (64 percent) community. The average family member per household is 6 (standard deviation 2.59) with higher composition among households of Baripada and Betnoti (6.1 and 5.9 members respectively) while lowest at Bahalda (4.7 members per households). Many of the respondents are either illiterate (45 percent) or have completed up to secondary school education (89 percent). The age wise classification reflects majority of young age group (under 35 years) have studied between 7 – 10 standard (40 percent) while in case of middle age group (35 – 60 years) and higher age group (above years) majority of them are illiterate (51 percent and 83 percent respectively). The caste wise analysis shows higher illiterate respondents across households of ST (55 percent) while that of General (52 percent) and SC (46 percent) and OBC (30 percent). The average land holding is higher across households of General caste households (0.97 acres) followed by OBC (0.95 acre), ST (0.81) and SC (0.58 acre). Even the education status impact revealed higher land holding across households of

sample respondents having higher educational level i.e., sample respondents have studied graduation and above and higher secondary (11 – 12) holds on an average 1.22 acre agricultural land compared to other category [8].

Resource extraction, access and management

The dependency of tribal of Mayurbhanj upon forest and common property resources had surged due to lack of availabilities of other and agricultural employment. Further interaction reveals women have made diversified investment after enrollment in SHG program e.g., livestock, dairy, seasonal business and agro based industries. The supply chain management of sabai grass as well as sal leaf is carried out at macro and micro levels. The initial activity found engagement of local traders as well as producers while the later shows engagement of poor women (including some old age group and children in collection and supplying of semi-furnished items).

Table 3 Resource extraction, access and management

Parameter	Components	Sal leaf	Sabai grass
Input source (%)	Self - procurement	84	12
	Purchasing	5	81
	Both	11	7
Input amount (Per week in Kg)	Self - procurement	9.4	8.8
	Purchasing	14.4	13.2
	Both	18.0	14.2
Employment (man-days per month)	Self	15	14
	Family members	16	13
Collection and business duration (%)	Less than 6 months	57	20
	6 – 8 Months	34	55
	Above 8 months	8	25
Members engagement	Mean	3.0	2.8
	Median	2.0	2.0
	% of total members	51	53
Family members weekly engagement (in Hrs.)	Mean	15	13
	Median	15	13
	Minimum	8	7
	Maximum	24	25
Monthly profit*	Mean	907	899
	Median	800	900
Activities contribution (%)	Employment	67	64
	Income	66	65

*Income per member per month

There exist three major sources of input arrangements i.e., procurement/production via self and family members, purchasing from other sources and households utilizing both sources. These differences in input source are mainly for restrictions on access. The households engaged in Sal leaf business usually procure/collects leaf from core forest areas (84 percent) without any / limited restriction while Sabai grasses are usually produced/procured and thus are mostly purchased by the households (81 percent) in the study area. Further, there exist 11 percent households in Sal leaf and 7 percent households in Sabai grass activities who are dependent upon both sources. One way ANOVA shows significant statistical differences in input amount per week across different input sources ($F = 37.370 < 0.01$ percent). Highest input access is observed across households availing both sources (16 kg per week compared to purchasing 14 kg and self-procurement 8 kg per week combined). The Sal leaf activities provides employment to 57 percent households for less than 6 months and 34 percent households between 6 – 8 months per year. While that in case of Sabai grass, 55 percent households are engaged for 6 – 8 months and 25 percent for above 8 months. Further, there exist no statistically significant differences in monthly employment ($F = 0.759 > 0.05$ percent) and monthly income of individual member ($F = 2.678 > 0.05$ percent) engaged across both activities. The average contribution of Sal leaf and Sabai grass activities in total family income is 66 percent and 65 percent respectively [9].

The opportunity cost analysis reveals the household respondents mainly women and old age members are enrolled in related activities. The family members serve on an average 15 hours per week with in Sal leaf while 13 hours per week at Sabai grass activities. Intensive analysis shows higher family members contribution per week self-procurement source in Sal leaf activities (16 hours) while that in case of Sabai grasses is 17 hours for both sources i.e., self-procurement as well as purchase. Higher employment is observed among households doing business through purchasing Sal leaf (16 days) as compared to self-procurement (15 days) and both sources (13 days). While in case Sabai Grass activities self-procurement provides higher days of employment i.e., 15 days per month compared to purchase (14 days) and both sources (9 days). Further, no statistically significant difference among households' employment and income across different source of input access ($F(2,172) = 1.745 > 0.05$ percent and $F(2,172) = 0.703 > 0.05$ percent respectively).

block-wise access and livelihood support

After addressing the socio-economic and livelihood development index attempt have been made to analyse the block – wise access, utilization and degradation link of above resources in the study area. (Table 4) reveals higher average access of inputs (Kg) per week of sabai grass by the households compared to Sal leaf in the study area. The average utilization score is 2.29 for Sal leaf while 3.19 for Sabai grass with standard deviation 0.76 and 1.05 respectively. Since both inputs are renewable in nature but initial one requires efficient and sustainable extraction compared to later. The higher input per week is observed among households of Betnoti and Khunta in case of Sal leaf while Koliana for Sabai Grass. For Access and dependency analysis Livelihood Dependency Index (LDI) developed incorporating inputs access, output, mechanization / technology application, input-profit rate and employment. Five-point rating scale is applied taking into consideration maximum-minimum criteria. (Table 4) reflects selection of indicators along with their criteria of scoring/scale [10].

Livelihood Dependency Index (LDI) = $\frac{1}{5}\sum_{i=1}^{5} Z_{ij},\ 1 \leq \text{LDI} \leq 5$

The Input – output analysis shows higher percentage of return across households engaged in Sal leaf activities (83 percent) as compared to Sabai Grass (77 percent). Further, the weekly input requirement/access of households range from 4 – 24 kg and 5 – 27 kg for Sal leaf and Sabai grass activities. Higher wastage is observed across households engaged in Sabai grass activities due to purchasing of inputs compared to Sal leaf which are plucked manually maintaining required quality. The Livelihood development index (as reflected in table 5 and 6) shows high average

dependency 3.03 across households in the study area [11]. The activities – wise analysis shows high dependency of households engaged in Sal leaf activities (3.15) while average dependency upon Sabai Grass activities (2.97).

Table 4 Livelihood Dependency Index – Components and Scaling

Components	1- Very Poor	2- Low	3 - Average	4 - High	5 – Very High
Inputs (in Kg.)	1 – 5	6 – 10	11 – 15	16 – 20	Above 20
Output (In Kg.)	1 – 5	6 – 10	11 – 15	16 – 20	Above 20
Mechanization (%)	0 – 10	11 – 20	21 – 30	31 – 40	Above 40
Input – Profit Rate (%)	1 – 50	51 – 100	101 – 150	151 – 200	Above 200
Employment in days	1 – 5	6 – 10	11 – 15	16 – 20	Above 20
Family member enrollment	0 – 20	21 – 40	41 – 60	61 – 80	Above 80

Table 5 Block – wise livelihood access

Parameters	Sal leaf					Sabai grass				
Blocks	Bahalda	Betnoti	Bisoi	Khunta	Total	Baripada	G.B.Nagar	Koliana	Morada	Total
Weekly input (Kg)	9	11	8	10	9.4	14	13	16	14	14.2
Scaling score	2.29	2.50	2.00	2.47	2.29	3.14	3.10	3.39	3.17	3.19
Weekly output (Kg)	7.7	9.2	6.4	8.5	7.8	10.7	9.8	12.3	11.0	10.9
Scaling score	1.88	2.20	1.65	2.05	1.92	2.51	2.35	2.78	2.46	2.51
Mechanization (%)	53	50	38	39	44	22	40	17	24	25
Scaling score	5	5	4	4	5	3	4	2	3	3
Input cost	530	417	651	527	540	876	959	639	723	802
Input-profit rate (%)	187	260	136	179	187	166	106	169	152	149
Scaling	3.23	4.20	2.96	3.47	3.43	3.48	2.60	3.39	3.14	3.17
Employment	18	16	11	17	15	16	9	11	17	14
Scaling score	3.52	3.25	2.50	3.47	3.12	3.40	2.05	2.66	3.53	3.01
Avg. score	3.184	3.43	2.622	3.092	3.152	3.106	2.82	2.844	3.06	2.976

Table 5 Livelihood dependency index criteria

Livelihood dependency score	Status
0 – 1	Poor
1.1 – 2	Low
2.1 – 3.0	Average
3.1 - 4	High
4.1 – 5.0	Very High

The block-wise analysis shows high dependency across households of Betnoti, Bahalda and Khunta on Sal leaf activities as compared to Bisoi. On the other hand, households of Baripada and Morada are highly dependent on sabai grass activities (i.e., 3.10 and 3.06 respectively) compared to Gopabandhunagar and Koliana. To predict the impact and dependency of Sal leaf and Sabai Grass business on livelihood promotion multiple regression model are used. Two types of regression models are applied for attainment of purpose i.e., linear and logistic regression.

Linear regression model

The OLS regression is run to analyze contributory impact of input cost, land availability, involvement of family members, input amount, weekly engagement hours and days of employment per month on income of respondents. The specification of OLS linear regression is as follows:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon_i \ldots\ldots\ldots\ldots \text{(i)}$$

Y_i = Total Income of the respondent

Table 6 Results of linear regression model

Independent variables	t	S.E.	Sig.
Input cost (X_1)	0.856	.113	0.39
land availability (in decimal) (X_2)	4.265	77.901	0.01
number of family members involved (X_3)	1.554	33.561	0.12
input amount (X_4)	-1.066	9.671	0.28
weekly engagement hours (X_5)	1.214	13.897	0.22
days of employment per month (X_6)	0.018	8.406	0.01
contribution of Sal Leaf and Sabai grass income (X_7)	6.427	.120	0.01
		Observation = 175	
		F (7,167) =10.874	
		Prob > F = 0.000	
		R – Square = .313	
		Adjusted R – Square = .284	
		Durbin Watson = 1.77	

The regression model predicts the dependent variables significant well with R^2 value 0.313. The coefficient analysis reveals significant impact of land availability, days of employment in related activities and

contribution of Sal leaf and Sabai grass income on total income of respondents. The impact of socio-economic and other determinants of Sal and Sabai dependency at the household levels is analyzed through logistic regression as reflected in (Table 7).

Table 7 Logistic regression independent variable description

Independent variables	Sub-components	Coded
Input arrangements	1 = self-collection, 2 = purchase, 3 = both	*INPARR*
Caste	1 = SC, 2 = ST, 3 = OBC and 4 = General	*CASTE*
Educational status	1 = Illiterate, 2 = upto class 5, 3 = 6 – 10, 4 = 11 – 12, 5 = Graduation and above	*EDUSTAT*
Family member engaged in Sal and Sabai activities	In percentage	*FME*
Land availability/operated	In dismal	*LO*
Social status	1 = APL, 2 = BPL	*SOCSTAT*
Bank credit availability/access	0 = No, 1 = Yes	*BANKCRE*

A logistic regression was performed to ascertained the effects of input arrangements, caste, educational level, family size, Land operation (including holding), Social status, credit source and percentage of family members dependent upon sal and sabai business (in percentage) on Sal and Sabai dependency. The logistic regression model is statistically significant, χ^2 (8) = 6.258, p < 0.05 percent. The variables has explained 31 percent variation (Nagelkerke R^2) of the variance in Sal and Sabai dependency and correctly classified 82.9 percent cases.

Variables in the equation

	B	S.E.	Wald	df	Sig.	Exp (B)
Collection self-collection			2.608	2	.271	
(1) Purchase	-.932	.822	1.285	1	.257	.394
(2) Both	-.280	.869	.104	1	.747	.756
Educational Status			1.813	4	.770	
(1) Illiterate	1.482	1.651	.805	1	.369	4.402
(2) Upto Class 5	1.868	1.690	1.222	1	.269	6.478
(3) 6 - 10	- 1.722	1.642	1.100	1	.294	5.596
(4) 11 - 12	2.260	1.945	1.350	1	.245	9.579
Social status (1)	-.889	.577	2.373	1	.123	.411
Family member dependency	.036	.015	5.901	1	.015	1.037
Land operated	-.705	.342	4.243	1	.039	.494
Caste SC			7.100	3	.069	
(1) ST	-1.887	.879	4.607	1	.032	.151
(2) OBC	-1.806	.749	5.815	1	.016	.164
(3) General	-1.137	.840	1.834	1	.176	.321
Credit source (1)	-1.480	.508	8.480	1	.004	.228
Constant	.920	1.988	.214	1	.643	2.510

Increasing land operated was associated with reduction likelihood while increasing family members is associated with an increase likelihood of Sal and Sabai dependency. As compared to SC households ST and OBCs are less Sal and Sabai dependent. further, the households availing loan from Bank are 0.228 times less Sal and Sabai dependent.

$$\text{In}\left(p/1-p\right) = 21.345 + 0.03X_{FME} - 0.856X_{LO} - 1.887X_{BANKCRE}$$

CONCLUSION

The study has reflected 77 percent of rural households are highly dependent on Sal leaf and Sabai grass activities for sustaining livelihood. The activity-wise analysis reveals 83 percent of households engaged in Sabai grass activities are highly dependent while that in case of Sal leaf is 69 percent. Block wise analysis shows 89 percent households of Morada, Koliana and Baripada are highly Sabai grass dependent (with mean dependency score 3.1 each) while Betnoti, Bahalda and Khunta are under highly Sal leaf dependent category (with mean dependency score 3.0, 2.8 and 3.0 respectively). Special attention is required to be given at agriculture, credit availability and other subsidiary employment. Further, technical assistance is required to be adhere either with government collaboration or private partnership to both sal as well as sabai grass activities at large scale with procurement hub at each block. Limited machinery utilization restricts efficiency and further advancement in both production, quality as well as income sources.

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