



# Sustainable Livelihood System of the Tribes in Chhattisgarh State of India: A Tribe's Perspective Analysis

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## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

An attempt has been made in this paper to investigate the sustainable livelihood system of the tribes living in Bilaspur district of Chhattisgarh during the year 2014-2015. The ex-post facto research design was employed for this investigation. The sample size of 135 tribes was selected randomly from the nine villages of the Bilaspur district. In this study in order to assess the overall sustainable livelihood system of the tribes the six capitals of sustainable livelihood namely human capital, physical capital, natural capital, social capital, financial capital and information communication capital were analyzed. The findings of this study depicted that the tribes had 40.17% extent of status with respect to their overall sustainable livelihood. With regard to six capitals of sustainable livelihood it was found that the tribes had medium level of extent of status for their human and social capitals while for remaining four capitals they had low level of extent of status. Correlation analysis indicated that out of 15 selected variables, only 13 variables were significantly correlated with extent of sustainable livelihood either at 0.05 or at 0.01 level of

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probability. The  $R^2$  value of multiple regression analysis reveals that all the selected 15 variables in the study jointly exhibits 66.40% contribution towards variation in the extent of sustainable livelihood of the respondents. From this study, it may be concluded that for increasing the existing level of sustainable livelihood of the tribes the emphasis should be given to improve all six capitals in general and physical, natural, financial and information communication capitals in particular. In this way, findings of this study will helps the planners and policy makers in planning and implementation of more relevant, ground based and successful tribal development programmes and policies in the Bilaspur district in particular and in the Chhattisgarh state in general.

*Keywords: Sustainable livelihood; ex-post facto research design; tribes; correlation analysis; multiple regression analysis.*

## 1. INTRODUCTION

The sustainable livelihoods idea was first introduced by the Brundtland Commission on Environment and Development, and the 1992 United Nations Conference on Environment and Development expanded the concept, advocating for the achievement of sustainable livelihoods as a broad goal for poverty eradication. The Sustainable Livelihoods Chronology initiated by World Commission on Environment and Development published its report: Our Common Future during 1987 [1]. Later on, the year 1988 IIED (International Institute for Environment and Development) followed World commission on Environment and development and publishes papers from its 1987 conference: The Greening of Aid: Sustainable Livelihoods in Practice [2]. Further, UNDP (United Nations Development Programme), Oxfam (Oxford committee for famine relief), CARE (Cooperative for American Relief Everywhere), UN holds World Summit for Social Development and livelihood and DFID (Department for International Development), all adopted and implemented household livelihoods security as a programming framework in their relief and development work. More recently the Institute for Development Studies (IDS) and the British Department for International Development (DFID) have been putting into operation the sustainable livelihood concept and approach. Leading proponent Ian [3] of IDS proposed a modified definition of sustainable livelihood, which states that "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base."

DFID stresses the importance to livelihoods of capital assets and distinguishes five categories

of such assets: human (the skills, knowledge, ability to labour and good health important to the ability to pursue different livelihood strategies), social (the social resources including networks, membership of groups, relationships of trust, access to wider institutions of society, upon which people draw in pursuit of livelihoods), natural (the natural resource stocks from which resource flows and services useful for livelihoods are derived e.g. land, water, wildlife, biodiversity, environmental resources), physical (the basic infrastructure viz. transport, shelter, water, energy and communications and the production equipment and means that enable people to pursue livelihoods), and financial (the financial resources which are available to people whether savings, supplies of credit or regular remittances or pensions and which provide them with different livelihood options) [4].

However, in this study suitable modification has been made for the sustainable livelihood capitals that is; human capital (availability of medical institutions for treatment, access to health institutions, means of transport in case of emergency, nutrition, education and labour availability), physical capital (available transport, type of house/residence, source of sanitized drinking water, source of energy for house hold/domestic purpose and material possessions that enable people to pursue livelihoods), natural capital (the natural resource stocks from which resource flows useful for livelihoods are derived that includes type of irrigation facilities and livestock compositions are taken in to account), social capital (the social resources like extent of trust on social relations and social participation) upon which people draw in pursuit of livelihoods), financial capital (the financial resources/services which are available to people i.e. credits and savings) and Information Communication (IC) capital (under this capital ownership of mass media and information and communications technologies (ICTs) and extent of mass media

and information and communications technologies (ICTs) utilization are included). These six capitals/assets are bases of the research and analyze the accessibility of these assets by tribes in the surveyed area. This is based on the fact that, most of the research on sustainable livelihoods focused on poverty reduction programs, and examined ways to develop strategies for poverty eradication [5].

Chhattisgarh state of India is a tribal dominant state where tribal population contributes the almost 31.00% of total population. To ensure the sustainable development of tribal area of Chhattisgarh it is imperative that the policy makers should know the existing status of sustainable livelihood of such tribes. Hence very few studies have been taken on this aspect in the entire state. With this regard this study may help the policy makers to obtain the data relevant to sustainable livelihood of the tribes. This will help the policy makers to plan and implement the more relevant, ground based and successful tribal development programme in the state. So, by keeping all such things in view the emphasis is given in this paper to investigate sustainable livelihood system of the tribes in Bilaspur District of Chhattisgarh which is basically a tribe's perspective analysis.

## 2. MATERIALS AND METHODS

In the present investigation, ex-post facto research design was employed. This design was appropriate because the phenomenon had already occurred. Ex-post-facto research is the most systematic empirical enquiry in which the researcher does not have any control over independent variables as their manifestation has already occurred or as they are inherent and not manipulatable thus, inferences about relations among variables were made without direct intervention from concomitant variation of independent and dependent variables.

The study was conducted in Bilaspur district of Chhattisgarh state during the year 2014-2015. Bilaspur district was selected purposively because the maximum tribal population residing in Chhattisgarh plains, comes under this district. Out of total 7 blocks in the Bilaspur district, Pendra, Gaurela and Kota blocks were selected purposively because maximum numbers of tribes are residing in these blocks. Three villages were selected randomly from each selected block to make a total of 9 villages in the sample. Villages namely Kodgar, Ghaghara, Bamnih, Kevachi,

Taraigaon, Piperkhutee, Chaparapara, Bhasko, Barnarva were selected for the study. Then, 15 tribes were selected randomly from each selected village. In this way, total 135 tribes (9X15=135) were considered as respondents for this study. The data were collected personally by using pre-tested interview schedule.

To analyze the extent of sustainable livelihood of respondents, the sustainable livelihood index was used. The sustainable livelihood index is the ratio of total actual score obtained by the respondent from all the six capitals and maximum obtainable score from all the six capitals. The following formula was applied to calculate sustainable livelihood index:

$$\text{Sustainable livelihood index (SLI)} = \left( \frac{\text{Total score obtained by the respondent under the 6 capitals of sustainable livelihood}}{\text{Maximum obtainable score from all the 6 capitals}} \right) \times 100$$

On the basis of sustainable livelihood index (SLI), the respondents were categorized in to the following categories of extent of sustainable livelihood:

Categories	Score
• Low (Up to 33.33%)	1
• Medium (Between 33.34 to 66.66%)	2
• High (Above 66.66%)	3

To determine the extent of status of the sustainable livelihood and its 6 capitals the following formula is used:

$$\text{Extent of status} = \left( \frac{\text{Mean score obtained by the respondents}}{\text{Maximum obtainable score}} \right) \times 100$$

In this way extent of status for the overall sustainable livelihood and its 6 capitals was worked out individually.

After this the level of extent of status of overall sustainable livelihood and its 6 capitals was worked out separately in the following manner:

Level of extent of status	Score
• Low (Up to 33.33% extent of status)	1
• Medium (Between 33.34 to 66.66% extent of status)	2
• High (Above 66.66% extent of status)	3

For calculating the extent of gap, the extent of status was deducted from the 100 (i.e. the maximum value for the extent of status). In this way extent of gap for overall sustainable livelihood and its 6 capitals was worked out separately.

### 3. RESULTS AND DISCUSSION

#### 3.1 Extent of Sustainable Livelihood

In order to analyze the extent of sustainable livelihood of the respondents its six capitals were studied and data are presented in Tables 1 to 7 and Figs. 1 to 6.

##### 3.1.1 Human capital

Under this capital health, nutrition intake, education facilities, labour availability (Family labour) in the family were studied.

###### 3.1.1.1 Health

Table 1 indicates that majority of the respondents (77.04%) in the study area used public health centre for medical treatments. However, 40.74% respondents were still dependent on traditional/indigenous medical practitioners. With regard to distance to medical facilities majority of the respondents (48.89%) were getting medical facilities by travelling less than 5 km distance. However, only 30.37% respondents were getting medical facilities within their villages. In respect of means of transport during emergency, majority of the respondents (91.11%) were using bicycle. While, only 28.15% were using ambulance.

###### 3.1.1.2 Nutrition intake

Table 1 also presents that majority of the respondents (88.15%) in the study area had medium level of nutrition intake followed by 08.89% had high and 02.96% had low level of nutrition intake.

###### 3.1.1.3 Education facilities

Majority of the respondents (69.63%) in the surveyed area were sending their children to school, while 30.37% were not sending their children to school. With regard to distance of school from village, majority of the respondent's children (47.87%) were getting the educational facility within their village.

###### 3.1.1.4 Labour availability (Family labour)

It can be inferred from Table 1 that majority of the respondents in the study area (47.40%) had medium level (Between 3 to 4 members) of adult family labour. While, with regard to child labour (Who were involved in collection of NTFPs) the data shows that majority of the sample households (48.89%) had medium level (Between 2 to 3 children) of child labour.

Finally, the distribution of the respondents according to human capital is presented under Fig. 1. The data illustrates that majority of the respondents (93.33%) had medium level of human capital followed by 03.71% had low and 02.96% had high level of human capital. It might be because of moderate availability of basic facilities such as health, nutrition, education etc. and services like labour availability in the study area. [6] reported that the nearest health clinic was located in the neighboring village of Kanakal about 7km from Byalal. The village had one school which is designated for children at primary education level (1st – 4th standard out of 12 standards).

##### 3.1.2 Physical capital

Under this capital, available transport, type of house or building, source of sanitized drinking water, source of energy for household /domestic purpose and material possession by the respondents were studied.

###### 3.1.2.1 Available transport

Table 2 indicates that majority of the respondents in the district (93.33%) used bicycle as means of transport followed by public transport (60.00%), auto (22.22%) and motor bike (11.11%).

###### 3.1.2.2 Type of house

Majority of the respondents in the survey area (80.00%) had traditional type of house followed by 14.07% had moderate (mix of kaccha and pakka) house and 05.93% had modern (Pakka) house.

###### 3.1.2.3 Source of sanitized drinking water

Table 2 also reveals that majority of the respondents (55.56%) got sanitized drinking water from dug well followed by hand pump (36.30%), other sources like tank, pond etc. (19.26%) and only 05.93% got sanitized drinking water from tap water.

**Table 1. Existing scenario of the respondents according to human capital**

<b>Particulars</b>	<b>Frequency</b>	<b>%</b>
<b>1. Health</b>		
a) Medical treatment centers*		
• Traditional/Indigenous medical practitioners	55	40.74
• Public Health Center	104	77.04
• Government hospital	72	53.33
• Private Clinic	51	37.78
b) Distance to medical facilities in km*		
• Within village	41	30.37
• Less than 5 km	66	48.89
• Between 5-10 km	00	00.00
• Above 10 km	50	37.04
c) Means of transport in emergency*		
• Bicycle	123	91.11
• Public transport	40	29.63
• Ambulance	38	28.15
• Auto	26	19.26
• Motor Bike	15	11.11
<b>2. Nutrition intake</b>		
• Low (Up to 16 score)	04	02.96
• Medium (Between 17 to 29 score)	119	88.15
• High (Above 29 score)	12	08.89
<b>3. Education facilities</b>		
a) Are you voluntarily sending your children to school		
• Yes	94	69.63
• No	41	30.37
b) Distance of school from village (n=94)		
• Within village	45	47.87
• Less than 5 km	18	19.15
• Between 5-10 km	10	10.64
• More than 10 km	21	22.34
<b>4. Labour availability (Family labour)</b>		
a) Adult family members		
• Low (Up to 2 members)	48	35.56
• Medium (Between 3 to 4 members)	64	47.40
• High (Above 4 members)	23	17.04
b) Children (Who involved in NTFPs collection)		
• Low (Up to 1 children)	59	43.70
• Medium (Between 2 to 3 children)	66	48.89
• High (Above 3 children)	10	07.41

\*Data are based on multiple responses

#### 3.1.2.4 Source of energy for household /domestic purpose

Table 2 further explains the sources of energy used by respondents for household /domestic purpose and it reveals that majority of the respondents (95.56%) were using firewood followed by cow dung cake (92.59%), electrical

energy (91.85%), crop straw (57.78%), kerosene (48.15%) and LPG (11.85%).

#### 3.1.2.5 Material possession by the respondents

Table 2 portrays that majority of the respondents (94.81%) had bicycle followed by mobile (37.78%), radio (31.11%), T.V. (14.81%), bullock

cart (14.07%), motor bike (11.11%) and sewing machine (05.19%).

Finally, the distribution of the respondents according to physical capital is presented under Fig. 2. The data illustrates that majority of the respondents (57.04%) had low level of physical capital followed by 40.00% had medium and 02.96% had high level of physical capital. The probable result might be because of the poor infrastructure development of the study area in respect of transport facility, house type, sources of sanitized drinking water, sources of energy etc. and poor possession of modern materials like T.V, mobile phone etc. by the respondents.

The study of [7] revealed that majority of the respondents (50.80%) had medium level of

physical capital followed by 26.70% had high level of physical capital while only 22.50% were fall under the category of low level of physical capital.

### **3.1.3 Natural capital**

Under this heading types of irrigation facilities and livestock possession were studied.

Table 3 reveals that majority of the respondents (85.19%) in the survey area had no irrigation facilities followed by 08.89% respondents were using dam and only 05.93% respondents were using river as a source of irrigation. Regarding the livestock possession, majority of the respondents (54.07%) had possessed less than 4 animals, whereas 07.41% respondents had no animals.

**Table 2. Existing scenario of the respondents according to physical capital**

<b>Particulars</b>	<b>Frequency</b>	<b>%</b>
<b>1. Available Transport*</b>		
• Bicycle	126	93.33
• Public transport	81	60.00
• Auto	30	22.22
• Motor Bike	15	11.11
<b>2. Type of house</b>		
• Traditional (kaccha) type house	108	80.00
• Moderate (mix of kaccha and pakka) house	19	14.07
• Modern (Pakka) house	08	05.93
<b>3. Source of sanitized drinking water*</b>		
• Other (Tank, pond etc.)	26	19.26
• Dug well	75	55.56
• Hand pump	49	36.30
• Tap water	08	05.93
<b>4. Source of energy for household/ domestic purpose*</b>		
• Cow dung cake	125	92.59
• Firewood	129	95.56
• Crop straw	78	57.78
• Kerosene	65	48.15
• LPG	16	11.85
• Electrical energy	124	91.85
<b>5. Material possession by the respondents*</b>		
• Radio	42	31.11
• Bicycle	128	94.81
• Bullock cart	19	14.07
• Sewing machine	07	05.19
• Mobile phone	51	37.78
• T.V.	20	14.81
• Motor bike	15	11.11

*\*Data are based on multiple responses*

**Table 3. Existing scenario of the respondents according to natural and social capital**

Particulars	Frequency	%
<b>I. Natural capital</b>		
1) Type of irrigation facility		
• Not available	115	85.19
• River	08	05.93
• Dam	12	08.89
2) Livestock possession		
• No livestock	10	07.41
• Less than 4 animals	73	54.07
• Between 4 to 19 animals	33	24.44
• Greater than 19 animals	19	14.08
<b>II. Social capital</b>		
1) Extent of trust on social relations		
• To a small extent (Up to 8 score)	03	02.22
• To a moderate extent (Between 9 to 16 score)	23	17.04
• To a great extent (Above 16 score)	109	80.74
2) Social participation		
• No participation	74	54.81
• To a small extent (Participation in at least one social organization)	39	28.89
• To a moderate extent (Participation in two to three social organization)	21	15.56
• To a great extent (Participation in more than three social organization)	01	00.74

Finally, the distribution of the respondents according to natural capital is presented under Fig. 3. The data illustrated that majority of the respondents (71.11%) had low level of natural capital followed by 27.41% had medium and 01.48% had high level of social capital. It might be due to unavailability of irrigation facility, poor livestock possession etc. with the respondents in the study area. The findings of [6] portrayed that there were 29 open wells and 13 bore wells in Byalal, which meant that only 25.00% of landowners had irrigation for their fields.

### **3.1.4 Social capital**

Under this capital extent of trust on social relation and social participation of the respondents were studied.

Majority of the respondents in the survey area (80.74%) had great extent of trust on social relationship followed by moderate extent of trust (17.04%) and small extent of trust (02.22%) (Table 3). Table 3 also shows that majority of the respondents (54.81%) had no participation in any organisation.

Finally, the distribution of the respondents according to social capital is presented under Fig. 4. The data illustrates that majority of the respondents (68.15%) had medium level of

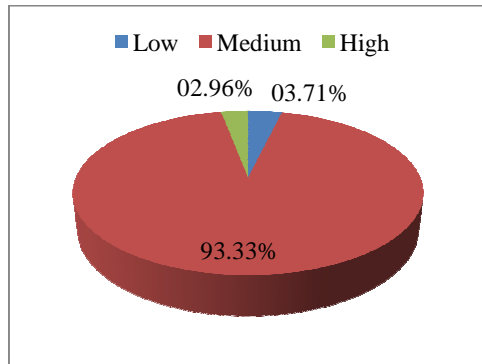
social capital followed by 29.63% had high and 02.22% had low level of social capital. The most probable reason behind this finding might be because of the fact that they had quite strong social relationship among them. [8] stated that almost all households (99.40%) were members to the funeral association, while 68.80% and 48.90% households had membership in the reciprocal/exchange work groups and the festive work groups respectively.

### **3.1.5 Financial capital**

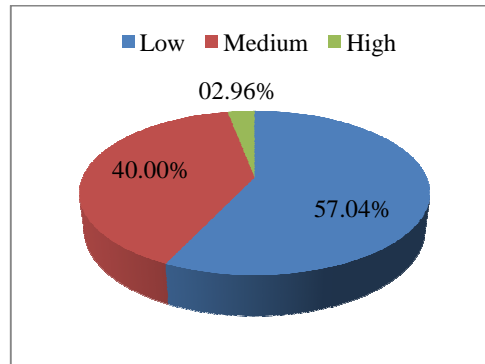
Under this heading the credit and saving status of the respondents was studied.

Table 4 described that majority of the respondents (72.59%) were not financially indebted, whereas the rest of them (27.41%) were financially indebted. With regard to terms of loan, out of all financially.

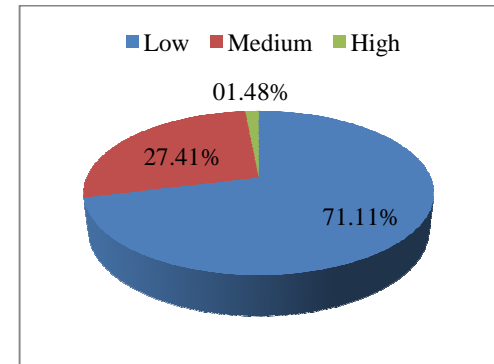
Indebted respondents (n=37) only 86.49% of them were taking short term loan, while rest of them (13.51%) were taking medium term of loan. Similarly, out of total financially indebted respondents (n=37), only 56.76% of them had low level of indebtedness. While, in the case of saving, majority of the respondents (77.04%) were go for saving, while rest of them (22.96%) were not go for saving.



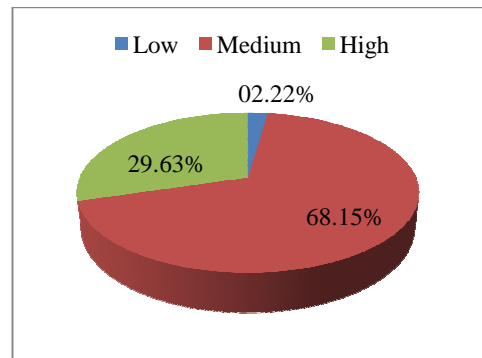
**Fig. 1. Distribution of respondents according to their human capital**



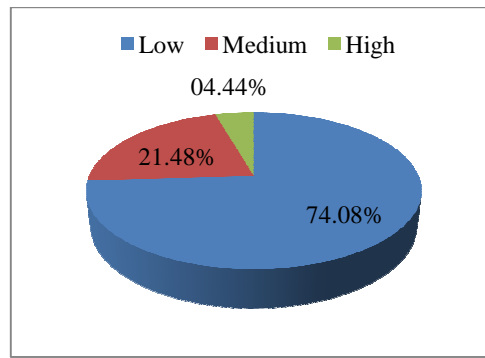
**Fig. 2. Distribution of respondents according to their physical capital**



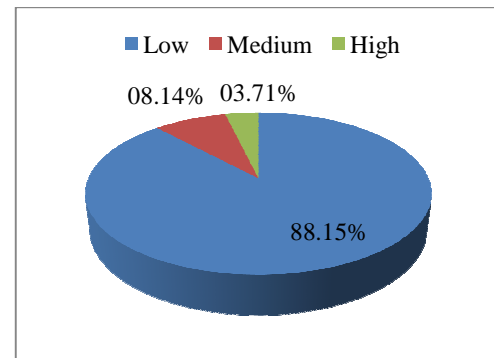
**Fig. 3. Distribution of respondents according to their natural capital**



**Fig. 4. Distribution of respondents according to their social capital**



**Fig. 5. Distribution of respondents according to their financial capital**



**Fig. 6. Distribution of respondents according to their IC capital**



**Table 4. Existing scenario of the respondents according to financial capital**

Particulars	Frequency	%
<b>1. Indebtedness</b>		
• Yes	37	27.41
• No	98	72.59
<b>2. Terms of loan (n=37)</b>		
• Short term	32	86.49
• Medium term	05	13.51
• Long term	00	00.00
<b>3. Amount of indebtedness (n=37)</b>		
• Low (Up to Rs 5,000)	21	56.76
• Medium (Between Rs 5,000 to 10,000)	11	29.73
• High (Above Rs 10,000)	05	13.51
<b>4. Savings</b>		
• Yes	104	77.04
• No	31	22.96

Finally, the distribution of the respondents according to financial capital is presented under Fig. 5 and the data illustrates that majority of the respondents (74.08%) had low level of financial capital followed by 21.48% had medium and 04.44% had high level of financial capital. It might be because of the poor awareness of local people about the available credit facilities, provided by the formal financial institutions in the study area. [9] reported that 55.40% of the households were using the credit while 44.60% were non-users. He also found that access to formal sources of credit was found to be weak in the district despite the number of organization such as Relief Society of Tigray (REST), Catholic Relief Society (CRS) and World Bank (WB) engaged in this activity.

### **3.1.6 Information communication capital**

Under this capital respondents' ownership of mass media and information and communications technologies (ICTs) tools and its extent of utilization by respondents were studied.

#### *3.1.6.1 Ownership of mass media and ICT tools*

With regard to ownership of mass media and ICT tools it was found that majority of the respondents (37.78%) had ownership of mobile phones followed by radio (31.11%) and television (14.81%). (Table 5)

#### *3.1.6.2 Extent of mass media and ICT tools utilization*

It can be inferred from the Table 5 that most of the respondents had fully utilized all the mass media and ICT tools possessed by them. In the case of radio it was found that out of 42 radio owners only 03 radio owners were never utilizing the radio. While, in the case of remaining mass media and ICT tools none of the respondents were fall in the category of no utilization of mass media and ICT tools.

Finally, the distribution of the respondents according to information communication capital is presented through Fig. 6 and the data illustrated that majority of the respondents (88.15%) had low level of information communication capital followed by 08.14% had medium and 03.71% had high level of information communication capital. It might be because of poor possession or ownership of mass media, ICT tools etc. by the respondents. The study of [7] reflected that information communication capital status of the respondents in the survey area was 68.75% while gap between existing and desired status of this capital was 31.25%.

**Table 5. Existing scenario of the respondents according to ownership of mass media and ICT tools and its extent of utilization**

Particulars	Ownership*		Extent of utilization					
	F	%	No utilization		Partial utilization		Full utilization	
			F	%	F	%	F	%
• Radio	42	31.11	03	07.14	11	26.19	28	66.67
• Mobile	51	37.78	00	00.00	24	47.06	27	52.94
• T.V.	20	14.81	00	00.00	08	40.00	12	60.00
• Newspaper	14	10.37	00	00.00	04	28.57	10	71.43
• Others (Magazine, leaflets etc.)	05	03.70	00	00.00	02	40.00	03	60.00

Note: F = Frequency \*Data are based on multiple responses

Table 6 presents the distribution of respondents according to their extent of sustainable livelihood. Table 6, describes that the majority of the respondents (82.96%) belongs to medium category of extent of sustainable livelihood followed by low category i.e. 17.04%. While, none of the respondents belongs to high category of extent of sustainable livelihood. It might be due to the fact that factors which are required for the better sustainable livelihood were available to the respondents in a moderate level.

**Table 6. Distribution of respondents according to their extent of sustainable livelihood**

Particular	Frequency	%
• Low (Up to 33.33%)	23	17.04
• Medium (Between 33.34 to 66.66%)	112	82.96
• High (Above 66.66%)	00	00.00

### 3.2 Existing Status of the Overall Sustainable Livelihood and Its Six Capitals

Under this heading the existing status of the overall sustainable livelihood and its six capitals are analysed and presented in Table 7.

Extent of status and extent of gap with reference to overall sustainable livelihood and its 6 capitals is presented in the Table 7. The data reveals that extent of status was maximum for social capital (65.61%) and it was minimum for information communication capital (13.70%). With regard to extent of gap, the maximum extent of gap was recorded in the case of information communication capital i.e. 86.30% and it was least for social capital i.e. 34.39%. In the case of overall sustainable livelihood of respondents, it was found that on an average all the respondents had medium level of overall sustainable livelihood and the extent of status for their overall sustainable livelihood was 40.17%. However, the respondents had 59.83% extent of gap in their overall sustainable livelihood.

With regard to level of extent of status of six capitals of the sustainable livelihood it was observed that social capital and human capital had medium level and remaining four capitals had low level of extent of status. The probable reason behind the medium level of overall sustainable livelihood of the respondents might

be due to medium level of extent of status of social capital and human capital. The study of [7] indicated that overall level of sustainable livelihood among the respondents was 65.60%. While the gap of existing status of sustainable livelihood was at a considerable level i.e. 34.40%.

The results of this study are also supported by the findings of [10-15].

### 3.3 Correlation Analysis and Multiple Regression Analysis of Independent Variables with Extent of Sustainable Livelihood

To determine the relationship of selected independent variables with the extent of sustainable livelihood of the respondents, the correlation analysis was worked out and correlation coefficients are presented in Table 8.

The findings reveal that variable cosmopolitanism and economic motivation were found to be positive and significantly correlated at 0.05 level of probability. While education, social participation, size of land holding, livestock possession, expenditure pattern, utilization of number of information sources, level of aspiration, annual income and employment generation by NTFPs were found to be positive and highly significantly correlated at 0.01 level of probability. The positive correlation between expenditure pattern and extent of sustainable livelihood might be due to the fact that the people are doing more expenditure only when they are economically sound. And if they are economically sound it means that they have better sustainable livelihood. The other two variables i.e. occupation and marketing pattern of Non-Timber Forest Products (NTFPs) were found to be negative and highly significantly correlated at 0.01 level of probability. The negative correlation between occupation and extent of sustainable livelihood might be because of the fact that if people are involving in more than one occupations, it means that earning comes from one occupation is not enough for sustaining their livelihood. It indicates that people who are involved in more number of occupation sources, have relatively poor extent of sustainable livelihood than people who have less number of occupation sources. Similarly, the negative correlation between marketing pattern of NTFPs and extent of sustainable livelihood might be due to the fact that the existing marketing pattern of NTFPs does not give the appropriate price to the tribes for

**Table 7. Existing status of the overall sustainable livelihood and its six capitals**

Particulars	Maximum obtainable score	Mean obtained score	Extent of status		Extent of gap
			%	Level	
Human capital	86	41.68	48.47	Medium	51.53
Physical capital	59	19.61	33.23	Low	66.77
Natural capital	19	5.21	27.45	Low	72.55
Social capital	28	18.37	65.61	Medium	34.39
Financial capital	8	1.82	22.78	Low	77.22
Information communication capital	24	3.29	13.70	Low	86.30
Overall sustainable livelihood	224	89.99	40.17	Medium	59.83

**Table 8. Correlation analysis and multiple regression analysis of the independent variables with the extent of sustainable livelihood of the tribes**

Independent variable	Correlation coefficient "r" value	Regression coefficient	
		"b" value	"t" value
Education	0.375**	0.1409405	1.134(NS)
Family size	0.064(NS)	0.1084648	0.449(NS)
Social participation	0.367**	-0.0115458	-0.020(NS)
Experience in collection of NTFPs	-0.102(NS)	-0.0567092	-1.129(NS)
Occupation	-0.316**	-1.7899323	-1.979*
Size of land holding	0.596**	2.1717256	2.568*
Livestock possession	0.279**	0.0671028	1.619(NS)
Expenditure pattern	0.251**	-0.0000036	-0.090(NS)
Marketing pattern of NTFPs	-0.278**	-0.0565976	-1.174(NS)
Utilization of number of information sources	0.677**	1.4638779	4.682**
Cosmo politeness	0.172*	-0.0695602	-0.071(NS)
Level of aspiration	0.551**	0.6692223	2.703**
Economic motivation	0.180*	0.2978372	1.522(NS)
Annual Income	0.404**	0.0000291	1.507(NS)
Employment generation by NTFPs	0.312**	0.0341944	1.176(NS)

\* Significant at 0.05 level of probability, \*\*Significant at 0.01 level of probability, (NS) = Non-significant  
 $R^2 = 0.664$ , F value of R = 15.64\*\*

their NTFPs. Hence the income generating through selling of such NTFPs is not sufficient for sustaining their livelihood. The remaining two variables viz., family size and experience in collection of Non-Timber Forest Products (NTFPs) showed statistically non-significant relationship with extent of sustainable livelihood of the respondents.

Correlation analysis clearly indicated that for increasing the extent of sustainable livelihood of the respondents it is necessary to increase the variables viz. education, social participation, size of land holding, livestock possession, expenditure pattern, utilization of number of information sources, cosmopoliteness, level of aspiration, economic motivation, annual income and employment generation by NTFPs.

The findings of [11] revealed that improvement in household income and employment are statistically significant in all the sample villages

with the total livelihood capitals. In the study of [15] it was reported that economic motivation was found significant at 1% level of probability with that of sustainable rural livelihoods. [16] also stated that extent of sustainable livelihood was found to be positive and highly significantly correlated with utilization of number of information sources at 0.01 level of probability.

In the case of multiple regression analysis, out of selected 15 independent variables, variable size of land holding had shown positive and significant contribution at 0.05 level of probability. While, occupation had found negative and shows significant contribution at 0.05 level of probability. Utilization of number of information sources and level of aspiration had positive and highly significant contribution at 0.01 level of probability. The regression coefficient (b) indicated that a unit change in size of land holding, utilization of number of information sources, level of aspiration and occupation has reflected 2.17, 1.46, 0.67

and -1.79 unit changes, respectively in the extent of sustainable livelihood of the tribes. Remaining 11 variables did not contribute significantly in the extent of sustainable livelihood of the respondents. However, R2 value denotes that all the selected 15 variables jointly show 66.40% contribution towards variation in the extent of sustainable livelihood of the respondents. It means that remaining 33.40% variation may be due to those variables which are not included in this study. The significant F value (15.64) at 0.01 level of probability indicated the significant effectiveness of the fifteen variables in determining the extent of sustainable livelihood of the tribal people.

Based on the result from multiple regression analysis it can be concluded that improving the level of the three variables viz. size of land holding, utilization of number of information sources and level of aspiration will also improve the status of sustainable livelihood of the respondents to a considerable level. That means we can reduce the gap between desired level and existing status to a remarkable level. In the study of [17] it was found that all the 16 independent variables jointly contributed 23.00% (R2 value=0.23) towards the variation in sustainable livelihood of Loktak Lake Islanders.

#### 4. CONCLUSIONS

The study of sustainable livelihood system of tribes with its six capitals indicates that the tribes had medium level of overall sustainable livelihood with 40.17% extent of status for their overall sustainable livelihood. In this way 59.83% extent of gap was recorded in their overall sustainable livelihood. In order to increasing the existing level of sustainable livelihood of the tribes the emphasis should be given to improve all six capitals in general and physical, natural, financial and information communication capitals in particular. On the basis of this study it is recommended that, all the tribal welfare and development programmes should be built up on the basis of the outcomes that are obtained from the analysis of the existing sustainable livelihood system of the intended beneficiaries so that, all the tribal welfare and development programmes become more effective and more successful.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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