

Ecosystem Services Improvement Project: Baseline Report of Socio-Economic Status of Project Areas of Chhattisgarh



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FOREWORD

Global climate change is a threat having perceptible and tangible impacts upon human kind and nature. The role of forests in maintaining ecological balance, environmental stability, sustainable development and the ecosystem services provided by forests are well known. Forests are now integral part of international protocols dealing with climate change mitigation. Responding to global call for nationally appropriate mitigation actions, Government of India released its National Action Plan for Climate Change (NAPCC) with eight National Missions. Green India Mission is one of the flagship missions under NAPCC. The World Bank supported Ecosystem Services Improvement Project (ESIP) is supporting Green India Mission in states of Madhya Pradesh and Chhattisgarh. The ESIP will support the goals of GIM by demonstrating models for adaptation-based mitigation through sustainable land and ecosystem management and livelihood benefits.

ESIP, in many ways, brings a new and novel approach to address some of the challenges in sustainable management of ecosystems and land. It will introduce new tools and technologies for better management of natural resources, including biodiversity and carbon assets and the use of advanced monitoring systems. The pilot in Chhattisgarh and Madhya Pradesh will help demonstrate the potential for nationwide scaling up of the ESIP and will directly support India's Nationally Determined Contribution. ICFRE as one of the project implementing agencies of ESIP and working on scaling up sustainable land and ecosystem management (SLEM) best practices in selected landscapes of Chhattisgarh and Madhya Pradesh.

The baseline surveys were conducted to assess the outcomes and impacts of the implementation of ESIP activities mainly related to upscaling of SLEM best practices, awareness generation and capacity building of the local communities on SLEM in the state of Chhattisgarh.

I have great pleasure in presenting this 'Baseline Report of Socio-Economic Status of Project Areas of Ecosystem Services Improvement Project of Chhattisgarh'. I am hopeful that the findings of this report will serve as framework for assessing the impact of project activities and will be a guiding document for effective implementation of ESIP activities in the state of Chhattisgarh.

Date: 02/06/2020

(Arun Singh Rawat)

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PREFACE

Global climate change, population pressure, increasing demand for fuelwood, fodder and other natural resources and many other anthropogenic factors pose severe threats to natural resources and biodiversity thereby resulting into deforestation and forest degradation. One of the biggest challenges faced by humanity, therefore, is to manage natural resources in such a way that trade-offs between the increasing human needs and sustainability of ecosystem health are maintained.

The Ecosystem Services Improvement Project (ESIP) with financial support from the GEF Trust Fund and administered by the World Bank is being implemented in the states of Chhattisgarh and Madhya Pradesh. The project is designed to support Government of India's ambitious Green India Mission (GIM) and aims at increasing forest and tree cover, improvement in ecosystem along with provisioning services like fuel, fodder, small timber and non-timber forest produces. The project also aims at enhancing forest-based livelihood opportunities of the stakeholders specially forests dwellers, small and marginal farmers living in forest fringe areas. By adding additional forest and tree cover, ESIP attempts to contribute towards India's NDC of creating an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent and improve the quality of forest through better management of natural resources, reversing land degradation and conservation of biodiversity. ICFRE is one of the project implementing agencies and is mandated in scaling up of sustainable land and ecosystem management (SLEM) best practices in selected landscapes to benefit small and marginal farmers and other rural poor, enhance productivity on private and community land, building local knowledge and capacity on SLEM best practices.

The 'Baseline Report of Socio-Economic Status of Project Areas of Chhattisgarh' is intended to collect information related to the present socio-economic status of the villages for implementation of SLEM best practices. The baseline report provides information on land holding, occupation, major crops, income sources, family size, livestock population, pattern of energy consumption etc. Information is collected through detailed PRA exercises, community meetings and focus group discussions. The findings of the baseline report will help to measure the effectiveness related to monetary or non-monetary benefits from forests to the communities; land area under sustainable land and ecosystem management best practices and gender participation in the SLEM activities. The base line report will also serve as a bench mark to gauge the overall project benefits during different phases of project implementation in the states of Chhattisgarh.

Date: 02/06/2020

(Anurag Bhardwaj)



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We are grateful Shri Arun Singh Rawat, Director General, ICFRE and Dr. Suresh Gairola, Former Director General, ICFRE for constant guidance, support and encouragement for conducting various project activities. We are thankful to Sh. S.D. Sharma, Deputy Director General (Research), ICFRE and Former Project Director, ESIP for valuable guidance and supports for conducting the field surveys in the ESIP area of Madhya Pradesh.

Our sincere thanks to Mr. Andrew M. Mitchell, Task Team Leader-ESIP, Dr. Anupam Joshi, Co-Task Team Leader-ESIP and Ms. Versha Mehta, Social Development Consultant from World Bank for their valuable suggestions and guidance. We owe our thanks to Shri K. Murugan, APCCF (JFM) and Project Director, ESIP, Chhattisgarh for coordination, feedback and various kind of supports provided for carrying out the socio-economic survey and meetings in the project areas of Chhattisgarh.

We also gratefully acknowledge the various kinds of logistics support provided by the Officers and field staff of Forest Department of Chhattisgarh during the field survey. We sincerely thank all the field staff of Pandariya West, Pali, Marwahi and Raghunathnagar Forest Ranges, JFMC members and the villagers for their support and active participation during field surveys.

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We also acknowledge the efforts put up by the entire ESIP Team of ICFRE for their valuable suggestions for preparation of the report. We are also thankful to Mr. Umang Thapa, Establishment and Secretariat Expert in designing and type setting of this report.

We are hopeful that the baseline report on 'Socio-Economic Status of Areas of Ecosystem Services Improvement Project of Chhattisgarh' will be a benchmark document to measure the impact of project activities to be implemented in the project areas.

Report Preparation Team





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ABBREVIATIONS



CBOs	-	Community Based Organizations
DAY-NRLM	-	Deendayal Antayodaya Yojana-National Rural Livelihood Mission
ESIP	-	Ecosystem Services Improvement Project
FGD	-	Focus Group Discussion
Fig	-	Figure
GEF	-	Global Environment Facility
GIM	-	Green India Mission
GIS	-	Geographic Information System
ha	-	Hectare
Hr	-	Hour
IAY	-	Indira Awas Yojana
ICFRE	-	Indian Council of Forestry Research & Education
JFMCs	-	Joint Forest Management Committees
kg	-	Kilogram
km	-	Kilometre
KVKs	-	Krishi Vigyan Kendras
LPG	-	Liquefied Petroleum Gas
MGNREGA	-	Mahatma Gandhi National Rural Employment Guarantee Act
mm	-	Millimetre
MoA&FW	-	Ministry of Agriculture & Farmers Welfare
MoEF&CC	-	Ministry of Environment, Forest and Climate Change
m	-	Metre
msl	-	Mean Sea Level
NDCs	-	Nationally Determined Contributions
NAPCC	-	National Action Plan for Climate Change
NRM	-	Natural Resource Management
NTFP	-	Non-Timber Forest Product
OBC	-	Other Backward Class
PIU	-	Project Implementing Unit
PMU	-	Project Management Unit
PRA	-	Participatory Rural Appraisal
PVTG	-	Particularly Vulnerable Tribal Group
q	-	Quintal
SC	-	Scheduled Caste
SE	-	Standard Error
SEBS	-	Socio Economic Baseline Survey
SFD	-	State Forest Department
SHGs	-	Self Help Groups
SLEM	-	Sustainable Land and Ecosystem Management
sq	-	Square
SRI	-	System of Rice Intensification
ST	-	Scheduled Tribe
TGA	-	Total Geographical Area



EXECUTIVE SUMMARY

Ecosystem Services Improvement Project (ESIP) is being implemented in the state of Chhattisgarh. The State Forest Department (SFD) has identified four forest ranges i) Pandariya West (Kawardha Forest Division), ii) Pali (Katghora Forest Division), iii) Marwahi (Marwahi Forest Division) and iv) Raghunathnagar (Balrampur Forest Division) for implementation of the project activities. The project has targeted to cover 12500 ha of land coverage and 2500 beneficiaries for upscaling of SLEM best practices in the state of Chhattisgarh. The purpose of a baseline report was to assess the outcomes and impacts of the ESIP activities mainly by upscaling of SLEM best practices, SLEM awareness generation and capacity building of the local communities through a variety of indicators reflecting: i) poverty and households; ii) productivity change observed through application of SLEM best practices; iii) adoption of SLEM best practices; iv) improvement in ecosystem services and forest quality; and v) institutional change. Out of the 35 villages under four forest ranges, 31% villages i.e. 11 villages, were randomly selected for socio-economic survey. For household survey, simple random sampling with a 10% sampling intensity subject to minimum 18 households were undertaken in each selected village.

Among the selected villages, Neur village (Pandariya West Forest Range) has highest population of 2500 persons. Karanawadhi village (in Pali Forest Range) has the minimum population of 242. Kodar village of Pali Forest Range has the maximum area of 5098 ha and Ameratikra village (Marwahi Forest Range) has minimum area of 203 ha. The average number of persons per households varies from 3 to 6 persons in the selected villages. Majority of the population was dominated by Baiga tribes in Pandariya West Forest range. The other dominant tribe found was Gond in Marwahi, Raghunathnagar and Pali Forest Ranges. Out of the total population of 11208, 83% belong to scheduled tribes (ST) and 7.1% belong to scheduled castes (SC). The average literacy rate was 64.5%. Average annual income per household was about Rs. 30,000/-, which accounts for Rs 2500 per month approximately. Farming and agriculture labour were the primary occupation in ESIP area. Majority of the population were residing in kutcha houses. Agriculture was mainly rain-fed. The average land holdings of the ESIP area was 2.2 acre per household. The highest proportion of households belongs to small category of land holdings (43.75%) and the lowest proportion of households belongs to the large holdings (6%). In Raghunathnagar Forest Range, wells were the major source of drinking water, where 59% of the population depends on wells for their drinking water needs. Hand pumps were installed in all the selected Forest Ranges and quench the thirst of almost all the villages. Pandariya West Forest Range has maximum handpumps which caters for 98% of drinking water needs. Nearly 57% of the households in all the four forest ranges depend on rain for irrigation. Other sources of irrigation were river, pond, well and canal which were limited to few households depending upon their economic status and accessibility.

Paddy (*Oryza sativa*), kodo (*Paspalum scrobiculatum*), arhar (*Cajanus cajan*), tilli (*Sesamum indicum*), maize (*Zea mays*), kutki (*Panicum sumatrense*), chana (*Cicer arietinum*) were the major crops grown in all four forest ranges. Major tree species grown in their agriculture fields were munga (*Moringa oleifera*), mahua (*Madhuca indica*), saja (*Terminalia tomentosa*), amla (*Phyllanthus emblica*), harra (*Terminalia chebula*), behra (*Terminalia bellirica*), tendu (*Diospyros melanoxylon*), sal (*Shorea robusta*), kusum (*Schleichera oleosa*), char (*Buchanania lanzan*), palash (*Butea monosperma*) and kalam (*Mitragyna parviflora*). All households were using cow dung and fuelwood for cooking and heating purposes.



Commonly used fuelwood species were saja (*Terminalia tomentosa*), sena (*Lagerstroemia parviflora*), saliha (*Boswellia serrata*) and dharwa (*Anogeissus latifolia*). Nearly, all villagers including landless in all four forest ranges own livestock. Only 15% of the households earn regular income from livestock by selling milk mainly in Pali Forest Range. However, 75% of villagers rear animals for their own consumption of milk produce and earn once or twice in a year by selling the animal offsprings. Goats were reared mainly to supplement their income which fetch them Rs. 2700-3500 per goat in the local market. Role of male and female in family decision making was equal in ESIP area. Women contribute about 15% in total family income apart from looking after the household chores. Self Help Groups (SHGs) were formed in each of the four forest ranges under *Deendayal Antayodaya Yojana-National Rural Livelihood Mission (DAY-NRLM)*. Among all the members interviewed, 62% were members of SHGs. About 72% of the women representatives (as *Gram Sarpanch*) of Gram Sabha were observed in all the four forest ranges. SLEM Best Practices activities for up scaling in ESIP area in selected villages of Chhattisgarh were Wadi - A tree-based farming system model for SLEM, lac cultivation for livelihood generation and biodiversity conservation, system of rice intensification for sustainable land and ecosystem management, rain water harvesting and augmentation of water resources and climate-proofing fish farming.



1. Introduction

Chhattisgarh is one of the youngest states of India, carved out of Madhya Pradesh in the year 2000. It is the seventh largest state of the country in terms of area. There are 18 districts in the state. The total geographical area of the state is around 135,192 sq km which constitutes 4.11% of the total geographical area of the country (FSI, 2017). The state has a tremendous agricultural potential with a diversity of soil and climate, mountains, plateau, rivers, natural vegetation and forest. Out of the 25.6 million population of the state, 80% were engaged in agriculture practices (Census of India, 2011). Land use pattern of the state is given in Table 1. Paddy was the main crop grown in kharif covering about 3.83 million ha which was mostly rain-fed in both uplands and shallow lowlands. Other crops grown were *arhar* (0.07 million ha), wheat (0.11 million ha), pulses (0.88 million ha) and oilseed (0.30 million ha) (MoA&FW, 2017). Productivity level of food grains in the state compare to the national average is given in Table 2. Total degraded land of the state is 2.64 mha which constitutes 2.5% of the total geographical area of the country (MoEF&CC, 2015). The major land degradation processes affecting the state is through vegetal degradation (1.89 mha) followed by water erosion (0.71 mha) (MoEF&CC, 2015). Area under land degradation of the state is given in Figure 1.

Table 1: Land use pattern in Chhattisgarh

S. No.	Land use types	Area (in 000' ha)
1.	Total Geographical Area	13,519
2.	Forests	6331
3.	Reporting area for land utilization	13,790
4.	Not Available for land cultivation	1027
5.	Culturable wasteland	349
6.	Permanent Pastures and other Grazing land	882
7.	Land under misc. tree crops	1
8.	Land available for cultivation	351
9.	Fallow lands other than current fallows	254
10.	Current fallow Land	260
11.	Net Area Sown	468

Source: FSI, 2017

Total population of the state is 25.6 million accounting to 2.11% of India's population (Census of India, 2011). Urban, rural and tribal population comprises of 23.24, 76.76 and 30.62%, respectively. Percentage of male and female population was 50.24 and 49.76%, respectively. ST population was 30.6% and accounts for about 7.5% of the total STs population in India. There are 7 districts with more than 50% of ST population. Abujh Maria, Baiga, Birhor, Bharia, Hill Korwa, Kamar and Sahariya tribes are particularly



vulnerable tribal groups (PVTGs) of the state. Average population density of the state was 189 persons per sq km, which is lower than the national average of 382 persons per sq km. Gender ratio in the state was 991 females per 1000 males. Total literacy percentage was 70.28% with male and female literacy of 80.27% and 59.58%, respectively. Total working population belongs to farmers (49.45%) followed by others (26.3%), agriculture labour (22%) and industry workers (2.25%) (Census of India, 2011).

Table 2: Productivity levels of different crops in Chhattisgarh compare to national average

S.No.	Crop	State Yield (kg/ha)	National Yield (kg/ha)
1	Rice	1455	2077
2	Wheat	1024	2713
3	Maize	1370	2039
4	Gram	713	813
5	Arhar	603	672
6	Soybean	882	1210
7	Rape and Mustard seed	412	1151

Source: Pandey et al, 2012

Climate of Chhattisgarh is mainly tropical, humid and sub-humid. The climate is hot because of its positioning in the tropic of cancer. The state is completely dependent on the monsoons for rains. Average annual rainfall varies from 1,100 to 1,700 mm (FSI, 2017). The eighteen districts of the state are divided into three agro-climatic zones (Table 3), of which eleven districts are in plain region, four districts in plateau region and the remaining three districts in northern hilly region. Rainfed agriculture is the main cultivation practice and about 74% of the plain region, 97% of the Bastar plateau region and 95% of the Northern hilly region are under rainfed agriculture in the state. Drought is a recurring phenomenon in the rainfed lowland ecosystems and consequently, the average productivity was low in the state. The forest cover in the State is 55,547sq km which was about 41.09% of the state's geographical areas (FSI, 2017).

Table 3: Agro-climatic zones and districts of Chhattisgarh State

Chhattisgarh Plains	Raipur, Durg, Rajnandgaon, Bilaspur, Dhamtari, Mahasamund, Korba, Raigarh, Kabirdham, Janjgir-Champa and Kanker
Bastar Plateau	Bastar, Narayanpur, Bijapur and Dantewada
Northern Hills	Surguja, Jashpur and Korja (Baikunthpur)

Source: Pandey et al, 2012

Water is the major constraint in agriculture production system. The net sown area in the state varies from 18.6% to 63%. Net sown area is highest in Durg district (21%), followed by Dhamtari (16%), Bilaspur (13%), Kawardha (11%), Rajnandgaon (10%) and Raipur (7%) (Trivedi, 2010). The productivity of principal crops was very poor because of the poor soil fertility and rainfall dependent risk prone agriculture. Nearly 35% household target areas have paddy to meet their requirement for six months. Farmers use organic manure on their fields and use only limited amount of chemical fertilizer during the transplanting of rice. In general paddy is grown once a year, except in few areas where natural sources of water are available, summer rice production is in practice. The *biasi* (beushening) system of rice cultivation is widely practiced in the state. Sloppy and undulating topography, rocky & hilly land are utilized for selected crops cultivation like arhar (*Cajanus cajan*) and bhatta (local rice variety) (Pandey et al., 2012). In the state, 91% of the households



depend on fuelwood, dung cakes etc. as their primary source of for cooking (Census of India, 2011). Chhattisgarh is an example of mixed crop livestock system where crop production meets most of the feed and fodder requirements of livestock and they provide draught power and dung manure for crop production. The 19th Livestock Census (2012) has reported a total livestock population of 15.04 million (excluding 0.038 million stray cattle) in Chhattisgarh, out of which cow constitutes highest with 65.24% followed by goat 21.44%, buffalo 9.24% and sheep 1.12%.

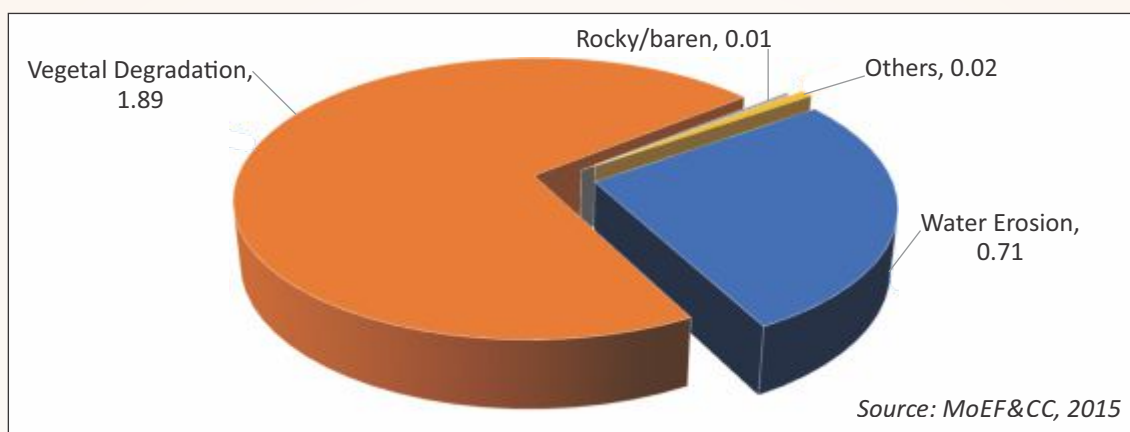


Fig 1: Area under land degradation in Chhattisgarh

1.1. Project Areas under ESIP:

Ecosystem Services Improvement Project (ESIP) is being implemented in the state of Chhattisgarh. The State Forest Department (SFD) has identified four forest ranges namely Pandariya West (in Kawardha Forest Division), Pali (Katghora Forest Division), Marwahi (Marwahi Forest Division) and Raghunathnagar (in Balrampur Forest Division) for implementation of the project activities. The scope of the project *inter alia* includes about 12,500 ha coverage of land for upscaling the sustainable land and ecosystem management (SLEM) best practices with beneficiaries of 2500 population targeted in the state of Chhattisgarh. Details of project villages of Chhattisgarh with populations, numbers of households and areas are given in Table 4. The forest types as per Champion and Seth (1968) in the selected ESIP area of Chhattisgarh are Dry Peninsular Sal Forest (5B/C1c), Northern Dry Mixed Deciduous Forest(5B/C2), Dry Bamboo Brakes (5/E9), Southern Moist Mixed Deciduous Forest (3B/C2), Moist Peninsula Low Level Sal forest (3C/C2e), Southern Dry Mixed Deciduous Forest (5A/C3), Dry Peninsula Sal forest(5B/C1C).

Table 4: Details of Project villages of Chhattisgarh under ESIP

Forest Division	Forest Range	Village	Population	No. of Households	Area of village(ha)
Katghora	Pali	Chanwari Para*	285	57	200
		Jamnipani*	64	16	281
		Kanhaiya Para*	261	52	381
		Kodar	1543	419	5098
		Karanawadhi*	242	60	924
		Karanawapara*	775	163	623
		Parsapani*	135	27	261



Forest Division	Forest Range	Village	Population	No. of Households	Area of village(ha)
Marwahi	Marwahi	Bagharra	896	208	381
		Bahrijhorki	246	64	130
		Danikundi	859	216	429
		Matiyadand	1507	481	1076
		Mouharitola	460	119	360.7
		Naka	1581	368	2091
		Patharra	1946	492	724
		Madai	1532	419	1047
		Banshital	779	182	383
		Ameratikra	859	217	203
		Rumga	2266	614	1825
		Kolbira	589	138	344
		Silpahari	1809	478	1580
Kawardha	Pandariya West	Amania	705	140	399
		Bhangitola*	463	93	400
		Rahidand*	930	186	409
		Rokhani	446	94	609.9
		Amilitola	350	105	212
		Neur	2500	296	768
		Rukhmidadar*	337	73	346
		Taitirni*	752	150	400
Balrampur	Raghunathnagar	Kesari	2290	369	1250
		Naugai	1413	205	1340
		Raghunathnagar	2650	658	771
		Rameshpur	962	54	58
		Girwani (Manbasa)*	1244	250	1211
		Babhani	1270	229	626
		Shankarpur	1750	138	291
Total			36696	7830	27432.6

*Number of households and populations were taken from the respective villagers during field surveys.

(Sources: 1. Project Proposal for Ecosystem Services Improvement project, F.D.A. & Divisional Forest Officer, Kawardha Forest Division, Kabirdham (C.G); Landscape-L2-2A6D4A2, Balrampur Forest Division, Year 2017-18 to 2022-23, Surguja, CG; Project Proposal for Ecosystem Services Improvement project, F.D.A. & Divisional Forest Officer, Katghora Forest Division, Korba (C.G). 2. Census of India 2011)



2.

Purpose of the Socio-Economic Baseline Survey

The purpose of baseline survey was to assess the outcomes and impacts of the ESIP activities mainly upscaling of SLEM best practices, awareness generation on SLEM and capacity building of the local communities through a variety of indicators reflecting: i) poverty and households; ii) productivity enhancement observed through application of SLEM best practices; iii) adoption of SLEM best practices; iv) improvement in ecosystem services and forest quality and v) institutional changes. The baseline socio-economic survey was conducted in the year 2018 with following objectives: i) to establish baseline information of the villages related with respect to their present socio-economic status; ii) to understand the household requirement for natural resources and iii) to prioritize village specific needs for upscaling of SLEM best practices.



A. In village Girwani



B. In village Banshital



C. In village Kodar



D. In village Amilitola



E. In village Danikundi



F. In village Karanawadhi

Focus group discussions with the communities



3. Methodology

The survey was undertaken in four forest ranges namely Pandariya West (Kawardha Forest Division), Pali (Katghora Forest Division), Marwahi (Marwahi Forest Division) and Raghunathnagar (Balrampur Forest Division) for implementation of ESIP activities. One day class room training on community mobilization and participatory rural appraisal (PRA) followed by hands on was organised for the frontline staff of State Forest Department and local community members/youth before conducting the field survey. The local educated youths along with the forest staff members were involved in data collections. Out of the 35 villages under ESIP area of four forest ranges, 31% villages i.e. 11 villages, were randomly selected. The survey village consists of 2371 households of which a total of 315 households were surveyed during the month of October 2018 (Table 5). For household survey, sampling intensity of 10% subject to minimum 18 households were undertaken in each selected village. Location of the villages surveyed for socio-economic survey under ESIP area of Chhattisgarh is given in Figure 2. For the purpose of survey, farmers were categories into four classes on the basis of land holdings namely i) Marginal i.e. those own less than 1 acre of land, ii) Small i.e. those own 1-2 acre of land, iii) Medium i.e. those own 2-4 acre of land and, iv) Large i.e. those own more than 4 acre.

Table 5: Details of the villages surveyed for socio-economic survey

Forest Range	Villages	No. of Households	Geo-Coordinates	No. of Households surveyed
Raghunathnagar	Babhani	229	23°52'34.13'N 82°53'21.7'E Altitude:415 m (msl)	22
	Manbasa (Girwani)	250	23°50'58'N 83°01'25.9'E Altitude:445 m (msl)	25
Marwahi	Banshital	182	22°55'36.2''N 82°06'07.8 E Altitude:549 m (msl)	23
	Ameratikra	217	22°54'14.3N 82°04'40.02E Altitude:563 m (msl)	33
	Madai	419	22°50'12.3 N 82°05'47.5E Altitude:567 m (msl)	40
	Thiatola (Rumga)	56	22°51'31.34''N 82°05'09.94''E Altitude:582 m (msl)	18
	Kolbirra	138	22°51'38.5N 82°04'21.9E Altitude:565 m (msl)	20



Forest Range	Villages	No. of Households	Geo-Coordinates	No. of Households surveyed
Pali	Kodar	419	22 ^o 27'05.64N 82 ^o 10'35.94E Altitude:355 m (msl)	40
	Karanawadhi	60	22 ^o 55'52.9'N 82 ^o 06'10.3'E Altitude:550 m (msl)	25
Pandariya West	Amilitola	105	22 ^o 24'58.2''N 81 ^o 19'02.5'E Altitude:500 m (msl)	20
	Neur	296	22 ^o 24'07.9'N 81 ^o 18'26.45E Altitude:470 m (msl)	49
Total		2371		315

Participatory Rural Appraisal (PRA) was conducted during the survey. Focus Group Discussions (FGD), an important tool of PRA was used. FGD helps to understand the need and perception of the villagers, prioritising the area requiring desired attention and in enhancing people's participation. FGDs were held in all the surveyed villages which were attended by 8-12 members comprising of self help group (SHG), farmers, Panchayat, women, joint forest management committees (JFMCs), forest dwellers, landless individuals and wage labourers. The qualitative information related to the perceptions, attitudes, beliefs, opinion or ideas related to agriculture crops, agro forestry and horticulture practices, level of participation of female members, suggestions on sustainable land and ecosystem management best practices etc. were collected with the help of FGD. Data pertaining to relevant parameters were collected by way of a detailed set of questionnaires containing both qualitative and quantitative information (Annexure - A). The survey includes information on land holding, occupation, major crops, income sources, family size, livestock population and energy consumption etc. The key indicators, tools and survey methodology followed during surveys are given in Table 6.

Table 6. Summary of the objectives, key indicators, tools and survey methodology

Objectives	Key indicators	Methodology
To establish baseline information of the villages related with respect to their present socio-economic situation	Profile of members of the household, land holdings, cropping pattern, occupation, level of education, income and household size, types of houses, source of irrigation, livestock population, nature of energy consumption and level of participation of female members in income generation.	Household Survey (adult members including female and children above 16 years), discussion with the members and focus group discussion (FGD).
To understand the household requirement for natural resources	Availability and sources of household amenities like water, fuelwood and fodder, etc. Availability and access to irrigation, seed, fertilizers (both organic and chemical). Sources of income and expenditure in agriculture practices	Door to door survey, interaction and FGD.



Objectives	Key indicators	Methodology
To prioritize village specific needs for upscaling of SLEM best practices	Cropping pattern, income, livelihood, female participation, source of irrigation, agriculture production, land under sustainable land and ecosystem management practices	FGD and interactions.

3.1 Training

Training on Community mobilization and participatory rural appraisal (PRA) was organised for the frontline staff of State Forest Department at Bilaspur on 12 September 2018. The main purpose of the training was to enable the participants to understand the participatory rural appraisal and survey tools for gathering both quantitative and qualitative data with accuracy. The tools of PRA, information to be acquired in the socio-economic baseline survey (SEBS), community mobilization process, phases and planning strategy of community mobilization and group exercises were included in the training programme. 60 participants participated in the training programme.



Training on Community mobilization

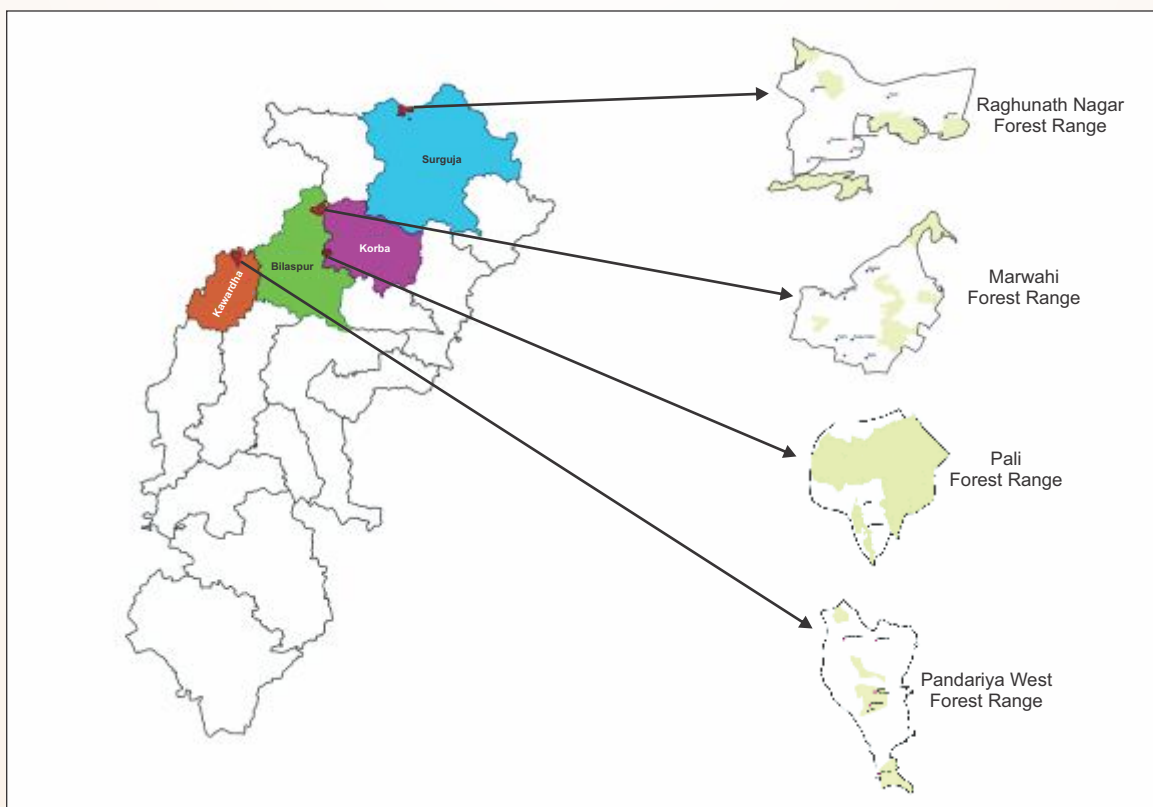


Fig 2: Location of the villages surveyed for socio-economic survey under ESIP areas of Chhattisgarh





4. Socio-economic Profile of Villages

4.1 Population and Family Size

Survey was conducted in the villages under four Forest Ranges of the ESIP area namely Pandariya West (Kawardha Forest Division), Pali (Katghora Forest Division), Marwahi (Marwahi Forest Division) and Raghunathnagar (Balrampur Forest Division) of Chhattisgarh state. Total eleven (11) villages were randomly selected for the survey which comprises of five villages from Marwahi Forest Range and two villages each from Pandariya West, Raghunathnagar and Pali Forest Ranges. Total population and area of the villages are 11,208 persons and 12,641 ha, respectively. Among the selected villages, Neur village under Pandariya West Forest Range has highest population of 2500 persons. Village Karanawadhi of Pali Forest Range has the minimum population of 242 persons. Kodar village of Pali Forest Range has the maximum area of 5098 ha and Ameratikra village of has minimum area of 203 ha under Marwahi Forest Range. The average number of persons per households varies from 3 to 6 persons in the surveyed villages. It is interesting to note that Amilitola village having minimum family size (3 persons per household) and Neur village having maximum family size (6 persons per household) both fall under Pandariya West Forest Range. The overall average family size per household in ESIP area was 4 persons. Table 7 reflects the population and average family size of household in ESIP area.

Table 7: Population and average family size of households in the ESIP area

Forest Range	Village	Family size	Male	Female	Total	Area of village (ha)
Marwahi	Madai	4	735	797	1532	1047
	Banshital	4	398	381	779	383
	Ameratikra	4	443	416	859	203
	Thiatola (Rumga)	4	175	125	300	1825
	Kolbira	4	295	294	589	344
	Total	4	2046	2013	4059	3802
Pandariya West	Amilitola	3	185	165	350	212
	Neur	6	1400	1100	2500	768
	Total	5	1585	1265	2850	980
Raghunathnagar	Manbasa (Girwani)	4	644	600	1244	1211
	Babhani	6	649	621	1270	626
	Total	5	1293	1221	2514	1837
Pali	Kodar	4	758	785	1543	5098
	Karanawadhi	4	116	126	242	924
	Total	4	874	911	1785	6022
					Total Population	11,208
					Total area (ha)	12,641



4.2 Caste Distribution

Majority (98.9%) of the population was dominated by Baiga tribe in Pandariya West Forest Range. Baiga tribe comes under the particularly vulnerable tribal group (PVTG) of Chhattisgarh state. Only 2.2% of the population are under other backward classes (OBC) in Pandariya West Forest Range. The other dominant tribe found in the ESIP area of Marwahi, Raghunathnagar and Pali Forest Ranges is Gond. Table 8 shows the caste wise population distribution in the ESIP area. Out of the total population of 11,208 in the ESIP area, 83% belong to scheduled tribes (ST) and 7.1% belong to scheduled castes (SC). The highest percentage (23.9%) of scheduled caste population was recorded in Kodar village of Pali Forest Range. While the lowest population (2%) of SC was found in Karanawadhi and Kolbira villages of Pali and Marwahi Forest Ranges. Population of SC was not reported from Madai village in the ESIP area of Marwahi Forest Range, Amilitola and Neur villages of Pandariya West Forest Range and Manbasa (Girwani) village of Raghunathnagar Forest Range.

Scheduled tribe (ST) population was highest (100%) in Amilitola village of Pandariya West Forest Range while lowest (27.8%) in Ameratikra village of Marwahi Forest Range. OBC population constitute 16.2% of the total population of all the four forest ranges. The highest (55.7%) population of OBC was recorded in Ameritikra village of Marwahi Forest Range whereas the lowest (2.1%) in Kodar village of Pali Forest Range. Only 2.2% of OBC population was reported in the Neur village of Pandariya West Forest Range. General category population was only recorded in the Raghunathnagar Forest Range with a representation of 0.3%.

Table 8: Caste wise distribution of population of ESIP area in Chhattisgarh (%)

Forest Ranges	Village	SC	ST	OBC	General
Marwahi	Madai	-	85.9	14.1	-
	Banshital	3	81.6	15.4	-
	Ameratikra	16.5	27.8	55.7	-
	Thiatola (Rumga)	10	85	5	-
	Kolbira	2	70.5	27.5	-
	Average	6.3	70	23.5	-
Pandariya West	Amilitola	-	100	-	-
	Neur	-	97.8	2.2	-
	Average	-	98.9	1.1	-
Raghunathnagar	Manbasa (Girwani)	-	85	15	-
	Babhani	4	70	25.3	0.7
	Average	2	77.5	20.15	0.3
Pali	Kodar	23.9	74	2.1	-
	Karanawadhi	2	98	-	-
	Average	13	86	1.05	-
Cumulative average		7.1	83.1	11.45	0.07

4.3 Education

The average literacy rate of the villages in all the four Forest Ranges was around 64.5%. During interaction, the local community informed that most of the literate persons were having education up to primary level. Only 10-15% of the people were educated above primary level. This was because of non-availability of higher secondary schools in the villages. Table 9 represents the literacy rate of the villages surveyed. Villages under Pandariya West Forest Range of the ESIP area has the highest literacy rate (72%), whereas villages under Pali Forest Range has lowest (55%) literacy rate.

**Table 9.** Literacy rate of the villages in the ESIP area

Forest Ranges	Male	Female	Total	Literacy rate (%)	Total literates	Total literates female	Total literates male
Marwahi	2046	2013	4059	64	2592	1036	1556
Pandariya West	1585	1265	2850	72	2052	780	1272
Raghunathnagar	1293	1221	2514	67	1682	672	1010
Pali	473	622	1095	55	602	240	362

4.4 Annual Income

Average annual income per household was about Rs. 30,000/-, which accounts for about Rs 2500 per month. Table 10 reveals that on an average of 64% of the households have annual income ranging from less than Rs. 10,000 to 30,000/- per year. While only 36% households have annual income more than Rs 30,000 per year. The highest number of households (42.55%) have annual income ranges from Rs 20,000-30,000/- per year in the villages of Raghunathnagar Forest Range. Highest number of households (43%) have annual income ranging between Rs 30,000- 40,000/- in the villages under Pali Forest Range. Village having the highest annual income above Rs 40,000/- was observed in the Pali Forest Range (7.1%) and lowest in the villages of Marwahi Forest Range (3.14%). The main sources of income were agriculture, labour works and Non-Timber Forest Product (NTFP) collection. It was observed that the villages under the Pali, Marwahi and Pandariya West Forest Ranges were involved in other income activities like fisheries (2%), dairy (4%), lac cultivation (50%) and selling of Moringa oleifera seed (10%) apart from agriculture and labour works.

Box 1: NTFP Collection

Chhattisgarh is home to many non-timber forest product (NTFP). The villagers of the ESIP area collect tendu patta (beedi leaf) and mahua from the forest for their livelihoods. The collection rate for tendu patta is Rs.2500/- per standard bag for the year 2018. One standard bag consists of 1000 bundles, each bundle contains 50 leaves. Other major NTFP is mahua. They collect mahua and sell at Rs 15/kg during the peak season. During the lean season they buy at the rate Rs.50/kg from the seller.

Table 10: Annual income of the villages in ESIP area

Annual Income (Rs)	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range	Average income per households
<10000	8.6	-	1.05	4.26	3.5
10000-20000	34.5	18.5	28.80	34.04	29
20000-30000	38.3	31.4	26.17	42.55	34.6
30000-40000	13.5	43.0	40.84	12.77	27.5
>40000	5.1	7.1	3.14	6.38	5.4



4.5 Occupation

Table 11 gives the distribution of occupation among male and female population in the surveyed villages. Farming and agriculture labour were primary occupation in the surveyed villages. The proportion of males in farming, agriculture labour and other occupation was higher than females. The highest percentage of male farmers was recorded in Pandariya West Forest Range (37.6%) while lowest in Pali Forest Range (30%). The highest percentage of female farmer and agriculture labour were found in Pandariya West (15.5%) followed by Pali (19.2%) Forest Ranges. Categories of other workers include individuals who were engaged in other income generation activities besides the farming or agricultural labour works.

Table 11: Distribution of occupation in villages of ESIP area (%)

Occupation	Sex	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range
Farming	Male	37.6	30	37	36
	Female	15.5	14.3	11	12
Agriculture labour works	Male	35	32.5	32	35
	Female	10.6	19.2	14.5	12.3
Others (services, business)	Male	1.3	2.5	4.5	3.5
	Female	0	1.5	1	1.2



Sources of income from agriculture and lac cultivation in the villages of ESIP area



4.6 Type of Houses

Types of houses¹ in ESIP area are given in Table 12. It has been observed that majority of the population were residing in kutcha houses. In villages under Marwahi Forest Range about 95% of the population lives in kutcha houses. In case of villages under Pali Forest Range, about 70% of the population lives in semi-pucca houses. The highest percentage of population (29.3%) residing in pucca houses was recorded in villages under Pandariya West Forest Range. The kutcha houses were made up of mud, wood and stone. Bamboo was also used in the roof tops. Among all the four Forest Ranges, Pandariya West Forest Range has maximum pucca houses as compared to other Forest Ranges.

Table 12: Types of houses of ESIP area in Chhattisgarh (%)

Types of houses	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range
<i>Kutcha</i>	63.8	60	95	77
<i>Semi-pucca</i>	6.9	38	3.5	18
<i>Pucca</i>	29.3	2	1.5	5



A. *Kutcha* House



B. *Semi-pucca* House



C. *Pucca* House

- ¹**Pucca house** : A pucca house is one whose walls and roofs are made of strong materials such as cement, concrete, oven burnt bricks, hollow cement, ash bricks, stone and stone blocks etc.
- Kutcha house** : A kutcha house is one which has walls and roof made of non-pucca materials.
- Semi-pucca house** : A house which cannot be classified as a pucca or a kutcha houses having walls or the roof but not both, made of strong materials.



4.7 Livestock Population

Livestock rearing is an integral part of village economy in all the four Forest Ranges. In Pandariya West Forest Range traditional practice daihan was followed for keeping the farm animals before taking them for grazing. Cows and goats were the main livestock reared in the area. Nearly all villagers including landless in all four forest ranges own livestock. Only 15% of the households earn regular income from animal husbandry by selling of milk which was observed in Pali Forest Range. However, 75% of villagers rear animals for their own consumption of milk produce and earn once or twice in a year by selling the animals. Goats were reared mainly to supplement their income which fetch them Rs.2700-3500 per goat in the local market. In Raghunathnagar Forest Range, pig rearing was popular in few villages. Table 13 shows that among the total livestock population, goat constitute highest with an average of 39.7% followed by cow 22.9%. In Pali Forest Range, goat constitute highest with 54% and cow in Marwahi Forest Range with 27%. Major source of fodder is from agriculture field and nearby forests. Maximum distance travelled for fodder collection by the villagers was 3 km. On an average 12-17 kg fodder was being collected per day per household in the ESIP area (Table 14). In summer season fodder collection was negligible and villagers feed dry straw (locally known as pera) to their cattle.

Box 3: Traditional Practice

In Pandariya West the farm animals are kept in a place fenced by four sides traditionally known as daihan and from there they are taken for grazing. This is one of the traditional practices of Baiga tribal community since ages for keeping the animals safe and prevent them from grazing in the farm land.

Table 13: Percentage of livestock recorded by the local community in the project areas

Livestock	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range	Average
Cows	14.29	13.5	27	37	22.9
Buffaloes	11.42	13.5	17	21	15.7
Goats	42.86	54	30	32	39.7
Poultry	14.29	8	14	0	9.07
Oxen	17.14	11	12	10	12.5

Table 14: Average Fuelwood and fodder collection in forest ranges

Categories	Pandariya West Forest Range	Pali Forest Range	Marwahi Forest Range	Raghunathnagar Forest Range
Fuelwood collection (kg)	36.03	15	11.7	16.7
Standard Error	±11.84	±3.45	±4.8	±13.05
Fodder collection (kg)	17.5	21	12.03	19.2
Standard Error	±8.18	±7.35	±7.82	±11.2



Livestock population in the ESIP area

4.8 Sources of Drinking Water

In the villages under Raghunathnagar Forest Range, wells were the major source of drinking water and 59% of the population depends on wells for their drinking water needs. Handpumps were installed among all the selected forest ranges and quench the thirst of almost all the villages. Villages under Pandariya West Forest Range has maximum hand pumps which caters for 98% of drinking water needs. Pali was the only forest range where traditional ponds, though in small quantity fulfills the need of drinking water of the villages. Table 15 shows the major sources of drinking water in all the four forest ranges.

Table 15: Sources of drinking water in the ESIP area of Chhattisgarh (%)

Sources	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range
Well	2	20	9	59
Hand pump	98	75	91	41
Pond	-	5	-	-



Community well for drinking and irrigation purposes in Karanawadhi village of Pali Forest Range



Hand pump: Common source of drinking water in Amilitola village of Pandariya West Forest Range

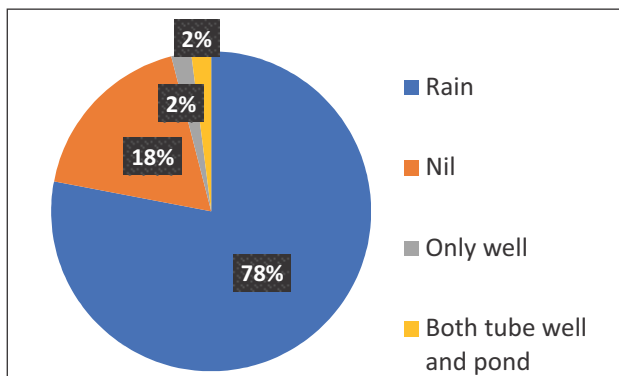
4.9 Irrigation Sources

Nearly 57% of the households in all the four forest ranges depend on rain for irrigation. Only about half of their land holdings were being utilised for agriculture due to acute shortage of water. In some villages it was also observed that villagers were using other sources of irrigation like seasonal river, pond, well and canal

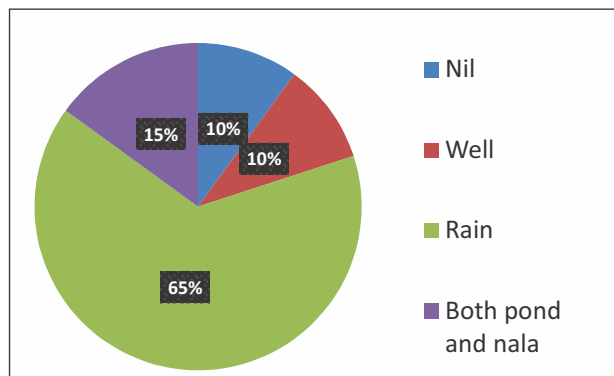


which were limited to few households depending upon their economic status and accessibility. A brief description of different sources of irrigation in the project area is as follows (Fig.3):

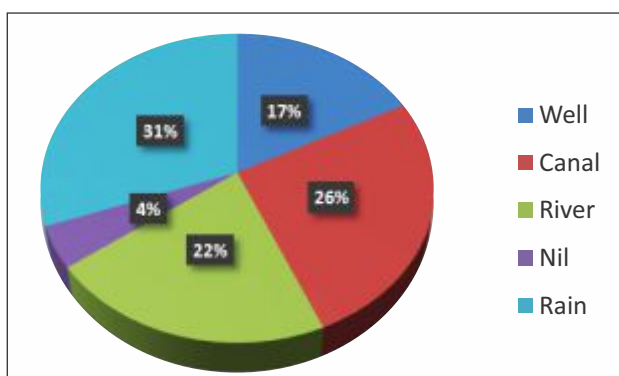
- I. Nearly 2% of the households use wells, tube wells and ponds for irrigation in addition to rain water in the villages of Pandariya West Forest Range. In Amilitola village there is a Sanjha Nala which links to village pond and receives water from adjoining forest area. It was suggested by the villagers to widen/deepen the ponds for water storage. This will enhance capacity of the village pond, which can be used for irrigation of adjoining fields and about 8-10 farmers will be directly benefitted.
- II. Irrigation sources available in the villages under Pali Forest Range were wells, nala and ponds. In total 10-11 ponds were recorded during the survey. These ponds are filled with water during rainy season, rest of the year they remain dry. Kharum Nala is one of the sources of irrigation for Kodar and Karanawadhi villages in Pali Forest Range. Paddy and vegetables were grown on either side of the *nala*.
- III. In Marwahi Forest Range, 26% of households depends on canal followed by river (22%) for irrigation. Around 17% household use well as other source of irrigation. In Banshital, Ameratikra, Kolbira, Madai and Thiatola (Rumga) villages Son river was main source of irrigation for the villagers. There were other sources of irrigation like Sukhar nala (for village Madai, Matiyadand, Bahrijhorki and Naka), *Timariya dam* (for Bargawa village) and *Jamun nala* (village Naka).
- IV. In villages of Raghunathnagar Forest Range, in addition to rain water, secondary sources of irrigation used by the villagers were well and river. In Girwani village *Lotaduba nala* which flows at high level for some time during the rainy season and cuts off the village during its peak flows making it difficult to attend the field operations across the stream. Similarly, *Ethigurry nala* in Girwani village gets filled with water during rainy season. Therefore, augmentation of water resources can improve productivity and livelihood in the area. Construction of water harvesting ponds/ deepening of existing ponds/ percolation tanks will help in conserving rain water for irrigation.



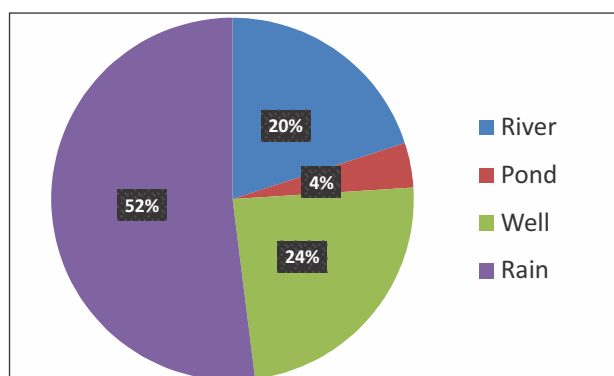
A. In Pandariya West Forest Range



B. In Pali Forest Range



C. In Marwahi Forest Range



D. In Raghunathnagar Forest Range

Fig 3: Sources of Irrigation in the villages of ESIP area in Chhattisgarh



Source of irrigation in Banshital village of Marwahi Forest Range



Kharum nala in Pali Forest Range



Sanjha nala of Pandariya West Forest Range



Son river an important source of irrigation in Marwahi Forest Range



4.10 Land Holdings

The average land holdings of the villages were 2.2 acre per household. Table 16 shows that the highest proportion of households (43.75%) belong to small category of land holdings and the lowest proportion of households (6%) belong to the large holdings. This pattern was observed across all the villages of all forest ranges. Villages under Marwahi Forest Range has the highest number of households under landless category (27%) while in Raghunathnagar Forest Range none of the villagers were landless. Among the large land holding category villages under Raghunathnagar Forest Range recorded highest (8%) and villages under Pandariya West Forest Range recorded lowest (4%) number of large land holdings.

**Table 16:** Distribution of households as per land holdings categories in the villages (%)

Forest Ranges	Category of land holdings (Land size class in acre)				
	Landless	Marginal	Small	Medium	Large
Pandariya West	18	30	25	23	4
Pali	10	0	35	50	5
Marwahi	27	0	59	7	7
Raghunathnagar	0	20	56	16	8
Average	13.75	12.5	43.75	24	6

4.11 Major Crops and Productivity

- i. **Pandariya West Forest Range:** Paddy (*Oryza sativa*) and kodo (*Paspalum scrobiculatum*) crops are cultivated by majority (26.5%) of the farmers. About 16% of the households grow paddy (*Oryza sativa*), kodo (*Paspalum scrobiculatum*) and arhar (*Cajanus cajan*) and 22% households grow only paddy. Other cultivated crops were tilli (*Sesamum indicum*), maize (*Zea mays*) and kutki (*Panicum sumatrense*). Average production of bhatta rice was 4 quintal per acre whereas in case of arhar it varies from 2.5 to 3 quintal per acre. Average production of small millets like kodo (*Paspalum scrobiculatum*) and kutki (*Panicum sumatrense*) varies from 5-6 quintal/acre.
- ii. **Pali Forest Range:** In this range 70% of the farmers were growing paddy and rest 30% were growing paddy (*Oryza sativa*) along with hirwa (*Macrotyloma uniflorum*), maize (*Zea mays*), arhar (*Cajanus cajan*) and chana (*Cicer arietinum*). Nearly 55% farmers were growing vegetables in their homestead. Average yield of paddy was 15 quintal/acre. Due to rain-fed agriculture practice in the ESIP area of Chhattisgarh, farmers were growing only single crop as water is not available for irrigation as informed by the villagers during focus group discussion. Under such circumstances SLEM best practices on system of rice intensification (SRI) offers viable alternative in the project area. This SLEM best practice reduces water requirement in rice cultivation while at the same time enhances yield and reduces the input in terms of cost of seeds, fertilizers and pesticides etc.
- iii. **Marwahi Forest Range:** Majority of the farmers grow paddy (*Oryza sativa*) (80%) along with maize (*Zea mays*). Average production of rice was 12-15 quintal per acre. Vegetables such as lima beans, cowpea, bottle gourd etc. were grown in their farmsteads. During the focus group discussion farmers suggested to provide seed kit of quality vegetables and provide training on crop diversification.
- iv. **Raghunathnagar Forest Range:** Major crops grown during kharif season are paddy (*Oryza sativa*), maize (*Zea mays*) and wheat in rabi season. Nearly 20% of the farmers grow other crops like kodo (*Paspalum scrobiculatum*) and sawa (*Echinochloa colonum*). Among these crops, the area under paddy was found to be highest (40%) followed by wheat (30%), maize (25%) and millets (5%). There is a need to encourage crop diversification in project villages. The total production of both paddy and wheat was around 20.38 q/acre/year.

4.12 Expenditure on Farming

Major portion of villagers' income was spent in purchase of fertilizers and seeds as informed by villagers of all four forest ranges. Table 17 reveals the following points:

- I. In Pandariya West Forest Range, on an average most of the households spent Rs.1500/- per year in buying of fertilizers. The other major part of expenditure includes procurement of seeds (31%), hiring of labour (18%), hiring of tractor (5%) and irrigation (2%).



- II. In Pali Forest Range, villagers were using organic manure and spent on an average approximately Rs. 500 to 1000/- per year in organic manure. 42% of the villagers were using chemical fertilizer. Majority of the villagers were using traditional seeds (35%) and 23% villagers were using both hybrid and traditional seeds.
- III. In Marwahi Forest Range, 20% of income was spent by the villagers in procurement of seeds, irrigation (2%) and hiring of tractor (7%). Expenditure on labour engagement was highest (35%). During sowing time labours cost about Rs. 5000/- per acre and around 20 to 30 labours were engaged for nearly 2.5 days per crop (as informed by the respondents) depending upon the availability of the land per crop.
- IV. In Raghunathnagar Forest Range, on an average Rs. 5000/- and Rs. 3000/- was spent in procurement of seeds and fertilizers respectively in the villages. Villagers spent 30% of their income in hiring of labours which was the highest among all other expenses like seed (20%), chemical fertilizer (27%) and organic manure (9%).

Table 17: Expenditure with respect to agriculture practices in the villages

Particulars	Percentage of expenditure in farming			
	Villages under Pandariya West Forest Range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range
Procurement of organic manure	25	15	6	9
Procurement of chemical fertilizer	17	42	30	27
Water charges for irrigation	2	5	2	5
Tractor rental	5	6	7	6
Labour charges	18	20	35	30
Power charges	2	2	-	3
Procurement of seed	31	10	20	20

4.13 Procurement of Seed

During the survey it has been revealed that in Pandariya West Forest Range none of the farmers procure any types of seeds from government agencies like Krishi Vigyan Kendras (KVKs), Agriculture Department etc. There is a need to address this gap as these institutions can serve as good catalysts to inculcate improved agricultural practices amongst farmers especially on crop diversification to increase crop productivity. In case of Marwahi, Pali and Raghunathnagar Forest Ranges nearly 30% of the farmers procure seeds from KVK. Seed procurement for crops like paddy (*Oryza sativa*), arhar (*Cajanus cajan*) and tilli (*Sesamum indicum*) was preferred from block level market, whereas most of the farmers procured seeds of maize (*Zea mays*), kodo (*Paspalum scrobiculatum*) and kutki (*Panicum sumatrense*) from their relatives or neighbours as they mostly use seeds of traditional varieties. Few farmers (27%) also reported that seeds of maize (*Zea mays*), kodo (*Paspalum scrobiculatum*), kutki (*Panicum sumatrense*) and bhatta (a local rice variety) of previous crops were used for sowing in the next season.



A. In village Banshtal



B. In village Babhani



C. In village Madai



D. In village Ameratikra



E. In village Amlitola



Storage of maize and beans seeds in the villages of project area

4.14 Horticulture and Agroforestry

In Pandariya West Forest Range, 77.6% of the households grow multipurpose trees. Tree species grown were munga (*Moringa oleifera*), mahua (*Madhuca indica*), saja (*Terminalia tomentosa*), amla (*Phyllanthus emblica*), harra (*Terminalia chebula*), behra (*Terminalia bellirica*), tendu (*Diospyros melanoxylon*), sal (*Shorea robusta*), kusum (*Schleichera oleosa*), char (*Buchanania lanzan*), palash (*Butea monosperma*) and kalam (*Mitragyna parviflora*). These multipurpose trees were grown in the boundary of agriculture fields and around their houses.

Similarly, in Pali Forest Range almost 50% of the households have grown trees in their own fields. The number of trees under horticulture varies from 2 to 8 trees per household. Main trees grown were palash (*Butea monosperma*) and mahua (*Madhuca longifolia*) under agroforestry. Out of the total household population, 50% are involved in lac cultivation. Trees grown under horticulture were mainly mango, guava and citrus fruits for their self-consumption.

In Marwahi Forest Range trees under agroforestry have shown good vigour and almost all the villagers



have 1 to 15 trees grown in their agriculture land. About 75% of the households have grown custard apple (*Annona reticulata*) in their homestead. Palash (*Butea monosperma*) trees were in abundance in the villages under Marwahi Forest Range. This tree species is one of the host plants for lac insects, thus the cultivation of lac has good potential as an alternative income generation activity for the villages under Marwahi Forest Range.

In Raghunathnagar Forest Range horticulture was not a common practise in the villages. Trees under agroforestry were also of poor quality. Few tree species grown were palash (*Butea monosperma*), amla (*Phyllanthus emblica*), mahua (*Madhuca longifolia*) and neem (*Azadirachta indica*). Agroforestry and horticulture practices need to be encouraged in this area with crop diversification.



Trees under agroforestry in Kodar, Karanawadhi and Amalitola villages of Pali and Pandariya West Forest Ranges of ESIP area

4.15 Major Energy Sources Used and Collected

All households were using cow dung and fuel wood for cooking and heating purposes. In all the forest ranges, on an average only 16.3% of the households were using LPG as primary source of energy for cooking. Villagers preferred to use more than one source of energy for cooking purposes. In Marwahi Forest Range, villagers are registered under *Sahaj Bijli Bill Yojana*. Under this programme free/subsidized domestic electricity is provided to the consumers in the state. The objective of the scheme is to provide electricity to the households across the state. Table 18 shows that in Pandariya West Forest Range 4% of villagers and Pali Forest Range 5% of villagers were using LPG which shows their high dependency on fuelwood and other sources like cow dung or both for cooking purpose. Majority of the fuelwood were collected from forest (98%), which shows high dependency of the local community on the forest for fuelwood. On an average 15-20 kg fuelwood per day per household was collected from nearby forest areas by the villagers of ESIP area. Maximum distance travelled by the local communities for collection of fuelwood varies from 1-2 km. Commonly used fuel wood species in all four Forest Ranges were saja (*Terminalia tomentosa*), sena (*Lagerstroemia parviflora*), saliha (*Boswellia serrata*), dharwa (*Anogeissus latifolia*), char (*Buchnanania lanzan*), salhe (*Boswellia serrata*), mahua (*Madhuca indica*), kusum (*Schleichera oleosa*), beeja (*Pterocarpus marsupium*) and bhilwa (*Semecarpus anacardium*) etc.

**Table 18:** Sources of energy utilization for cooking and heating purposes in the ESIP area (%)

Sources	Villages under Pandariya West Forest range	Villages under Pali Forest Range	Villages under Marwahi Forest Range	Villages under Raghunathnagar Forest Range
Only fuelwood	20	10	40	41.18
Only LPG	4	5	15	41.17
Both Cow dung and fuelwood	60	25	10	Nil
Cow dung, fuelwood and LPG	16	-	-	-
Both fuelwood and LGP	-	60	35	17.65

4.16 Involvement in Self Help Groups (SHGs)

SHGs were formed in each of the four forest ranges under various government scheme like *Deendayal Antayodaya Yojana – National Rural Livelihood Mission (DAY-NRLM)* etc. Following are the observations made during the survey:

- i. In Pandariya West Forest Range, the functioning of the SHGs was not very encouraging. The SHGs were formed earlier but have become defunct and maximum villagers are not the member of SHGs. The reasons for not joining SHGs was lack of awareness, and knowledge about the formation of SHGs and its importance in social and economic transformation. Therefore, it is imperative to sensitize the community on formation of SHGs, its objectives, management of funds and its role in promoting livelihood based activities. No information was received from the villagers on trainings received under any schemes and programme of the government.
- ii. In Pali Forest Range, 46% of the villagers were the members of SHGs. These SHGs were involved in mid-day meal in Anganwadi centre.
- iii. In Marwahi Forest Range, majority of the villagers interviewed (73%) were members of SHGs. Only 36% SHGs members undertook training on roles and responsibilities along with importance and functioning of groups under *Deendayal Antayodaya Yojana- National Rural Livelihood Mission (DAY-NRLM)*.
- iv. In Raghunathnagar Forest Range, nearly 70% of the villagers were members of SHGs. Most of these SHGs were formed under *Deendayal Antayodaya Yojana- National Rural Livelihood Mission (DAY-NRLM)*.

4.17 Gender Participation

Women are the backbone of the village economy, this is also applicable in the project areas. They were responsible for collection of fuelwood and fodder in almost all the four Forest Ranges. They equally contribute in family decision making process. The women contribute about 15% in total family income apart from looking after the household chores. Women folks in all the four forest ranges are also engaged in agriculture labour as secondary occupation. They earn Rs. 174/- as daily wage under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) of Government of India. They were engaged for certain period of time depending upon the availability of work. The percentage of women involved in fuelwood and fodder collection vary from season to season. Women also play a pivotal role in collection of fuelwood for domestic purposes which almost consumes 35% of their time. In most of the Forest Ranges males were the dominating partners and head the family and only 4% of females are heading the family as observed during the survey. Among all the respondents, 62% were the members of SHGs. Most of these SHGs were involved in mid-day meal in Anganwadi centres. About 72% of the women representatives (*as Gram Sarpanch*) of Gram Sabha were observed in all the four forest ranges.



Box 2: Bihan: Mobilizing Rural Poor Women into Self-Managed Community Institutions

State Rural Ajeevika Mission 'Bihan' is one of the flagship programmes of the Ministry of Rural Development, Government of India to alleviate rural poverty. In November 2015, the program was renamed *Deendayal Antayodaya Yojana- National Rural Livelihood Mission (DAY-NRLM)*. The programme aims at mobilizing all rural poor women into self-managed community institutions (Self Help Groups, Village Organisations, Cluster Level Federations, Producer Groups/Companies), in a phased manner. It also aims at promoting financial inclusion of the community institutions and provides support for strengthening and diversification of livelihood resources of households. In all four forest ranges 9 SHGs were formed under the scheme. Out of the nine SHGs, three SHG were observed in Banshital village, four in Girwani and two in Ameratikra village. These SHG comprise of 10-15 members and were functioning since last two years.



A. In Kodar village



B. In Girwani village



C. In Madai village



D. In Danikundi village

4.18 Medicinal Plants

In Marwahi Forest Range, villagers of Danikundi, Madai, Banshital and Naka villages were collecting more medicinal plants from forest in comparison to villagers of Ameritikra, Rumga and Kolbira villages. This was because these villages are in the vicinity of the forest. Medicinal plants were collected by the villagers for their health care use only. Local traditional healers (*vaids*) were available in the four Forest Ranges. They were not involved in the trading of medicinal plants. Some of the common medicinal plants collected by the villagers of Pandariya West, Pali, Marwahi and Raghunathnagar Forest Ranges were *satavar* (*Asparagus racemosus*), *chirchitta* (*Adhyranthes aspera*), *harra* (*Terminalia chebula*), *bahera* (*Terminalia bellerica*), *amla* (*Embllica officinalis*), *amaltas* (*Cassia fistula*), *kubbi* (*Caeya arborea*), *kali musli* (*Curculigo orchioides*), *neem* (*Azadirachta indica*), *brahngraj* (*Eclipta alba*), *beeja* (*Pterocarpus marsupium*), *arjun* (*Terminalia arjuna*), *nagarkena* (*Costus speciose*), *koriya* (*Holarrhaena pubescens*), *rohina* (*Soymida*



febrifuga), *gudru* (*Stereospermum suaveolens*), *patkoriya* (*Cissampelos pareira*), *van chench* (*Chorchorus oliotorius*), *ratkbilar* (*Desmodium pulchella*), *karanj* (*Pongamia pinnata*), *dahiman* (*Cordia dihotoma*), *kolya* (*Hollarhena antidysentrica*), *pedar* (*Stereospermum xylocarpa*) etc.

4.19 Timber Collection

Attempt was also made to collect information on collection of timber, source of timber (government forest, community forest, own land, etc.), amount of timber extracted annually and use of timber. Most of the respondents were reluctant to respond to this question on fear of being challaned by State Forest Department. Therefore, approximate quantification of timber collection could not be made. However, in the villages most of the households have heaps of small timber collected in their backyard/courtyard for use in agriculture or other household purpose.



Small timber collection in the ESIP area of forest ranges

4.20 Household Waste Management

Cow dung utilization for organic manure and fuel were observed in all the four forest ranges of Chhattisgarh. Compost pits were seen for organic farming practices in Marwahi Forest Range. During the survey villages like Amilitola, Neur, in Pandariya West Forest Range and Kodar and Karanawadhi in Pali Forest Range heaps of dung were observed which was used as organic manure in agriculture. Agriculture residue was used as fodder and for fuelwood purpose. Almost all the houses have toilets under *Swatch Bharat Mission*.



Household waste management in Amalitola and Banshital villages of Pandariya West and Marwahi Forest Ranges

5. Conclusion and Way Forward

Based on the informations received from the villagers and compilation of data from the socio-economic survey, possible areas of interventions were also identified. The identified interventions are water conservation, natural resource management, agriculture development, community mobilization, women group formation and livelihood through sustainable land and ecosystem management practices. Detailed potential areas for interventions are given in Table 19.

Table 19: Potential area for ESIP intervention in the project villages

Agriculture	<ul style="list-style-type: none"> ➤ Crop diversification has been noticed in the villages but due to lack of irrigation facilities and undulating terrain most of the farmers were growing crops in small areas. Improved irrigation system and introducing small water harvesting structure under SLEM best practices viz. rain water harvesting and augmentation of water resources in the respective villages. ➤ Awareness of farmers needs to be generated on use of improved seeds which require less water consumption ➤ Coordination with KVK so, that farmers are provided with updated knowledge and awareness of various government schemes and programmes on agriculture improvement in the region. ➤ Possibilities of cultivating vegetables-cum-paddy-cum tree under Wadi model in ESIP villages needs to be explored. Vegetable kits of improved varieties can be supplied to the farmers. ➤ Farmers growing fruit trees and other multipurpose trees on their farm lands to be encouraged and involve them in the activities of sustainable land and ecosystem management practices. ➤ Exposure visit and hands-on training to the farmers for better understanding on land management, agriculture productivity and water conservation in the region should be explored.
Livestock	<ul style="list-style-type: none"> ➤ Integrate farm management practice with livestock rearing and growing fodder crops on the bunds needs to be encouraged
Capacity Building/Awareness	<ul style="list-style-type: none"> ➤ Training on mushroom and lac cultivation, organic farming practices and crop diversification ➤ Awareness building to strengthen Community Based Organizations (CBO) ➤ Capacity building of the CBO on sustainable land and ecosystem management practices. ➤ Awareness on water conservation measures, low cost water harvesting models, organic farming practices, natural resource management etc. ➤ Awareness on water use efficiency in agriculture practice.
Community based institutions	<ul style="list-style-type: none"> ➤ SHG formation and strengthening of the JFMC to be explored under the ESIP. ➤ Formation of farmer school/user group for implementation of SLEM best practices in the villages



5.1. Suggestions

Henry Garrett's Ranking Technique (Garrett and Woodworth, 1969) was used to rank the suggestions provided by the villagers related to upscaling of SLEM best practices during focus group discussions for prioritising the suggestions. Table 20 depicted the results of Garrett Ranking analysis of suggestions. Among eleven suggestions considered (given in table below), lac cultivation is the major suggestion given by the villagers with the mean score of 32.38 followed by irrigation facilities (II rank with a mean score of 30.03), yield improvement, availability of improved quality seed (III rank with a mean score of 28.08). The other suggestions provided were construction of pond (IV rank), fishery (VI rank), drinking water facilities (VII rank). Figure 4 shows the various suggestions provided by the villagers.

Table 20: Prioritizing suggestions using Garrett Ranking

S. No.	Suggestions	Factors	Score	Rank
1	Lac culture and procurement of seed	F1	32.38	I
2	Irrigation facilities	F2	30.03	II
3	Construction of pond	F3	21.45	IV
4	Fishery	F4	18.60	VI
5	Drinking water facilities	F5	14.85	VII
6	Both construction of pond and vegetables cultivation	F6	14.50	VIII
7	Levelling of land	F7	19.35	V
8	Yield improvement, availability of improved quality seed	F8	28.08	III
9	Computer training centre and shop	F9	10.08	X
10	Mango orchard	F10	11.16	IX
11	Installation of hand pump and well	F11	10.00	XI

Suggestions received from the villagers on SLEM best practices for upscaling in the selected villages of four forest ranges (Pali, Pandariya West, Marwahi and Raghunathnagar) are given in Table 21:

Table 21: SLEM best practices for upscaling in ESIP area

Range	Village	Recommendations
Raghunathnagar	Babhani	Awareness on strengthening of CBOs and their role in natural resource management; Training on SHGs -its function, composition and fund management; awareness on role of women in sustainable land and ecosystem management practices. Integrated farm management practices to increase the income of farmers by introducing horticulture and agroforestry along with livestock rearing and fishery
	Girwani (Manbasa)	
Marwahi	Banshital	Awareness on organic farming practices and crop diversification. Trainings on selection of crops that require less water; water harvesting structure; Training on lac cultivation.
	Ameratikra	
	Madai	Formation of Farmer school/user group formation enhancement of crop production; Awareness on pest management and organic farming practices. System of Rice Intensification (SRI) and Wadi model to be introduced on a pilot intervention in the region. Land leveling and yield improvement to be addressed as part of best practices; awareness on role of women in sustainable land and ecosystem management practices, organic farming and lac cultivation.
	Thiatola (Rumga)	
	Kolbira	



Range	Village	Recommendations
Pali	Kodar	<p>Possibilities of growing vegetables-cum-paddy-cum tree under Wadi model to be encouraged.</p> <p>Farmers’ training programme to be conducted on enhancement of crop production & productivity; mainstreaming innovative agricultural best practices related to climate change adaptation in strategies/policies/projects like SRI and formation of farmers group.</p> <p>Training of the SHG members on lac cultivation and organic farming practices; integrated farm management practices and Wadi model to be introduced.</p>
	Karanawadhi	
Pandariya West	Amilitola	<p>The farmers are not fully aware of the soil nutrients status in their agriculture fields so, soil health card needs to be prepared in consultation with the relevant state government department;</p> <p>Training on lac cultivation to be given;</p> <p>Integrated farm management practices to be introduced to increase the income of the farmers by introducing horticulture and agroforestry along with livestock rearing and fishery; training on mushroom cultivation as alternative source of income in the village.</p> <p>As the agriculture is totally rainfed therefore water harvesting structures need to be introduced in the region. Wadi: A tree-based farming system model to be introduced in the village</p>
	Neur	<p>Up-scaling the traditional knowledge of the tribal on agriculture practices in other ESIP area; awareness on role of women in sustainable land and management practices. Training on Lac cultivation. Wadi: A tree-based farming system model to be introduced in the village.</p>

Based on the baseline informations from 4 Forest Ranges of Chhattisgarh, the details recommended best practices for up-scaling in state of Chhattisgarh are listed below:

SLEM BP	Villages										
	Amili tola	Neur	Girwani (Manbasa)	Babhani	Banshital	Ameratikra	Madai	Thiatola (Rumga)	Kolbirra	Kodar	Karana wadhi
System of Rice Intensification for Sustainable Land and Ecosystem Management											
Wadi - A tree-based farming system model for SLEM											
Lac Cultivation for Livelihood Generation and Biodiversity Conservation											



SLEM BP	Villages										
	Amili tola	Neur	Girwani (Manbasa)	Babhani	Banshital	Ameri tikra	Madai	Thiatola (Rumga)	Kolb irra	Kodar	Karana wadhi
Integrated Farm Development for Sustainable Land Productivity											
Climate-Proofing Fish Farming											
Rain Water Harvesting for Augmenting Ground Water											
Managing Groundwater for Adaptation to Climate Change											
Livelihood Diversification Through Integrated Production Systems											





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Annexure : A

Questionnaire for Socio-Economic Survey of the Villages under ESIP for Chhattisgarh

INFORMED CONSENT

Please read the following that explains this survey including the associated risks and benefits, if any. You are being asked to take part in the survey being conducted by ICFRE under Ecosystem Services Improvement project. This should help you decide whether or not you want to participate in the survey. Agreeing to this will confirm that you have been informed about the survey and you want to participate. Taking part in this survey is completely voluntary and anonymous.

Survey Description: This survey is about to know the socio-economic status of the local communities before the start of activities in the field. This survey will be helpful in identification of the actual beneficiaries of the project and people choices for up-scaling of SLEM best practices.

Risks and Benefits: There are no foreseeable risks or discomforts for participating in this survey. You may not receive any direct immediate benefit from taking part in this survey. However, by participating in this survey you may support the project implementing agency in implementation of component 3 of ESIP i.e. up-scaling of SLEM best practices in CPR. Data that we collect detailing household dependency on natural resources etc. can be used to implement the ESIP in the area.

Ending your Participation

You have the right to withdraw your consent or stop participating at any time. You have the right to refuse to answer any question(s) or refuse to participate in any procedure for any reason. Refusing to participate in this survey will not result in any penalty or loss of benefits to which you are otherwise entitled.

Description of Procedures

If you agree to take part in this survey, you will be asked to complete a survey that will last approximately 45 minutes.

Confidentiality

We will make every effort to maintain the confidentiality of your responses. Only the team of the project will have access to the data and information about participation and will not be shared with others, except for scientific publication and community necessities.

Authorization

I have read this information about the survey or it was read to me. I,
.....solemnly declare that the information provided by me are correct to best of my knowledge and belief, and is for research purpose only.

Signature of respondent



Questionnaire No. _____

Date: _____

Geographical Information of Village

- Q1.** Name of Village:..... Name of District
- Name of Forest Division:..... Name of State
- Q2.** GPS Location- Latitude:°.....'....." N Longitude:°.....'....." E
(Consultant/team should carry the GPS for taking reading of geo-coordinate of village)
- Q3.** Altitude :.....(m) amsl

Socio-Demographic Profile of Household

- Q5.** Name of Respondent:..... Mobile No.
- Q6.** Age: years..... **Q7.** Sex..... M F
- Q8.** Education: Illiterate , Primary , High School , Intermediate , Bachelor and above
- Q9.** Religion: **Q10.** Caste: General / OBC / SC /ST
- Q11.** What type of house do you have?
a) *Katcha* House b) *Semi-pucca* House c) *Pucca* House
- Q12.** Age wise distribution of household members:

Gender	below 7 years	between 8 to 18 years	above 18 years
Male			
Female			

Q13. Family Education Status:

Educational Level	Illiterate	Primary	High School	Intermediate	Bachelor	Above Bachelor
Male						
Female						

Q14. Profession:

Primary Profession:

Agriculture , Service , Self Employed , Labour , Any Other.....

Secondary Profession:

Agriculture , Service , Self Employed , Labour , Any Other.....

Approximate Annual Income (Rs.)

Q15. Involvement in project(s), if any Yes , No , If yes, please specify

Q16. Training received, if any



d. Livestock Resources

Livestock	Number		Product		Expenditure	Income
	Desi Breed	Cross Breed	For Self Consumption	For Selling		
Cow						
Buffalo						
Goat						
Sheep						
Chicken						
Bullock						

e. General information about farming practices.

- Type of fertilizers used: Chemical , Organic , Both
- Annual quantity of chemical fertilizer for cultivation:Expenditure: Rs.....
- Annual quantity of organic manure used for farming practices:.....Expenditure: Rs.....
- Use of chemical insecticide: Yes , No Expenditure: Rs.....

Dependence on Forest Resources

Q23. Fuelwood collection:

Season of Collection	Winter		Summer	
Quantity of Collection (kg/day)				
Own field (kg/day)				
Forest (kg/day)				
Community Forest (kg/day)				
Any Other (kg/day)				
Major fuelwood species				
Time spent (hr/day)				
Distance Travelled (km/day)				
Collector of fuelwood	No. of Male		No. of Female	
				No. of Children

Q24. Fodder collection:

Season of Collection	Winter		Summer	
Quantity of Collection (kg/day)				
Own field (kg/day)				
Forest (kg/day)				
Community Forest (kg/day)				
Any Other (kg/day)				
Major fodder species				
Time spent (hr/day)				
Distance Travelled (km/day)				
Collector of fodder	No. of Male		No. of Female	
				No. of Children
Fodder Cultivation at farm	Yes/No			
Do you grow grasses on bunds?	Yes <input type="checkbox"/> , No <input type="checkbox"/> , If yes, please specify			

**Q 25 Grazing**

- a. Livestock feeding practiced: Stall fed: Yes / No Grazing: Yes / No
- b. Time of grazing (Hour/day):
- c. Quantity of grazed stock, if possible:
- d. Place of grazing: Own field , Forest , Community Forests , Others

Q26 Leaf Litter/Understory collection for manuring and bedding:

- Own field , Forest , Community Forests , Others

Q27 Timber Logging

- a. Source of timber: Forest , Community Forest , Own Land , Forest Right
- b. Amount of timber logged annually:
- c. Use of Timber Extracted, if any

Q28. Plants from forest used for food or food stuff

Common Name	Useful Plant Part	Source	Remark

Q29. Plants from forest used for medicinal purposes

Common Name	Useful Plant Part	Source	Remark

Q30. Bamboo consumption and craft industry:

- a) Are you involved in bamboo cultivation
- b) If yes, what is the main specie of bamboo used in cultivation
- c) What is the approximate annual income from the bamboo
- d) What is the major use of the bamboo (i.e. craft industry/ own consumption)
- e) Personal Recommendation for bamboo cultivation and craft industry

Q31. Fish Farming/Apiculture/Lacultivation/Sericulture**Q32 Gender Perspective**

- a) What is the contribution of females towards income generation at house hold level
- b) Involvement/Contribution of females in decisions making at community level..... If yes, define their roles and responsibilities

Q 33. Please elaborate your opinion on up-scaling of SLEM best practices:

.....

Investigator



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