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For Small Farmers Future

Caritas
INDIA
The Joy of Service...

Sagar
District Assessment Report

For more information on SAF-BIN project contact:
Sunil Simon
South Asia Programme Manager – SAF-BIN, South Asia Coordination Unit (SACU)
Caritas India
Web: www.safbin.org
email: sacu@safbin.org, sunilsimon@caritasindia.org

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Foreword

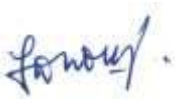
Caritas India has a history of working towards community empowerment and sustainability through our Natural Resource Management programs to address the food security and climate change issues, SAF-BIN, the action research program under European Union is a multi-dimensional research focuses on agricultural development challenges of developing and emerging countries especially Bangladesh, India and Nepal. The program aims to promote local food and nutritional security through adaptive small scale farming in four rainfed Agro Ecosystems (AES) in South Asia.

The program is implemented in three districts of Sagar, Satna & Mandla of Madhya Pradesh with its district agro ecological climatic conditions. This On-Farm Adaptive Research covers 1445 smallholder farmers with 1112 hectares of farm holdings in India. The interventions of SAF-BIN program is intended to facilitate a proactive process among smallholder farming community to address the issues and climate change and food security.

The uniqueness of this program lies in the inter-collaborative learning of farmers, agriculture scientist, research scholars and extension workers to give edge over the unprecedented climatic variations.

The district report is the compilation of district and village level assessments carried out in 10 project villages in Sagar district.

The content of report is based on the data source collected from the primary and the secondary sources of the research area through direct interaction with the villages and the stakeholder, Participatory Rural (PRA) tools, data collected through households survey (HHS), Focus group discussion (FGD) with the different groups of the project implementation area, in-depth interview (IDI) of the government officials and stakeholder and secondary information through government records and other sources.



Fr. Frederick D'Souza
Executive Director
Caritas India

Introduction:

The district of Sagar lies in the north central region of Madhya Pradesh. It was spelled as Saugor during the British period. It is situated between 23°10' and 24°27' north latitude and between 78°4' and 79°21' east longitude; the district has a truly central location in the country. The tropic of cancer passes through the southern part of the district. The origin of the name comes from the Hindi word SAGAR meaning lake or sea, apparently because of the large and once beautiful lake around which the town of Sagar has been built. Sagar was founded by Udan Singh in 1660 and was constituted a municipality in 1867, a major road and agricultural trade centre, it has industries such as oil and flour milling, saw-milling, ghee processing, handloom cotton weaving, bidi manufacture and railway and engineering works. It is known in all over India due to its University named as Dr. Harisingh Gaur University and Army Cantonment and recently it has come into lime light due to "Bhagyodyay Tirth" a charitable hospital named after a Jain Sant Shri Vidya Sagarji Maharaj. It is known for Police Training College which are only two in Madhya Pradesh other one is in Indore. Head quarter of Forensic Science Lab is also in SAGAR. Sagar lies in an extensive plain broken by low, forested hills and watered by Sonar River. Wheat, chickpeas, soghum, and oilseeds are chief crops of the region, there is extensive cattle raising. Sandstone, Limestone, iron ore and asbestos deposits are worked. The archaeological site nearby Eran has revealed several Gupta inscriptions. District Sagar is predominantly a Scheduled Caste/Backward class district. These together form about 75% of the district. The district has sizable population of tribals who are named as Rajgonds after their kingdom.The district is bounded on the north by Jhansi district of Uttar Pradesh , on the south by the district of Narsinghpur and Raisen, on the west by the district of Vidisha , and on the east by the district of Damoh, which was previously formed the part of Sagar District. On the north-east and north-west, the district adjoins Chhattarpur and Asok Nagar districts, respectively. The district is accessible by rail as the town of Sagar lies on the Bina-Katni branch line of Central railway. Sagar is 76 Km from Bina which is on the Bombay Delhi main line. The district is traversed by first class roads which connect it with important towns like Damoh and Jabalpur on the east and south east, respectively, Lalitpur and Jhansi on the north, Chhattarpur on the north east and Bhopal on the south-west. Bhopal the capital of Madhya Pradesh is about 208 Km from Sagar by road. Sagar district is the sixteenth largest district in size in the State, and the third largest in the Jabalpur revenue division. The district is divided into nine tehsils viz- Sagar, Banda, Khurai, Rehli, Garhakota, Bina, Deori, Rahatgarh and Kesli each in the charge of a Tahsildar or a Sub-Divisional Officer.

Geographical Condition:

Sagar district is situated in the famous Bundelkhand reagion. Betwa, Bebus, Bina, Dhasan and Sunar are main rivers of Sagar district. The Government's new venture 'Rajghat Pariyojna' on the dam of the river Bebus is very helpful for drinking water facility in the Sagar city. The climate of the district is very good and moderate. It has 11 blocks, 760 panchayats, 1927 habited villages and 2329 habitations. Sagar mainly depends on agriculture, economically. Bidi and Agarbatti making is the main source of livelihood for them. Wheat and Soyabeen are main agricultural products of the district.

Socio- Economic Condition:

Sagar is predominantly a Scheduled Caste/Backward Class district. Ahiwar, Kori are main SC population and Sourn, Gound and Rawat are main ST population of the district. 201906 are

marginal workers in the district. Out of 376379 households 148997 families are under Below Poverty Line (BPL). BPL families migrate for wages in building works and other unorganized sectors of the neighboring district. Sagar district faces seasonal emigrants from adjoining states like Chhatisgarh, UP, Bihar and Orisa.

Source- http://www.dietsagar.nic.in/districtprofile.html

Demographic (Work force) Break up:

Total Workers	Cultivators	Agriculture Labourers	Workers in House Hold	Other Workers	Marginal Workers
839763	223202	216748	204434	195379	201906

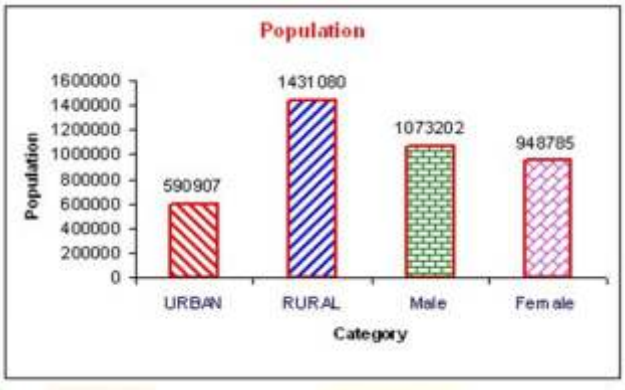
Source Census : 2001

Administrative Units:

S.No	Administrative Units	No.
1	Collectorate	1
2	Tehsils	9
3	Blocks	11
4	Tribal Blocks	0
5	Towns	3
6	Revenue Villages	1967
7	Habitations	2432

Demographic (Work force) Break up:

70% population of Sagar District live in rural areas and it includes SC, ST, OBC and General Categories. Table on population shows that 29.5% of total ST population which is largest in district, belongs to Kesli block 17.83% of ST population belongs to Deori block which is second highest in the district. As for as SC population is concerned 26% of total SC population belongs of Khurai block, which is highest in the district. Sex ratio of the district is 1000:884 and population density is 197.



Graph:- Population breakup of district Sagar with respect to Urban and Rural as well as male and female.

Literacy Rate:

The district literacy is presently 68.08 %, which is above the state literacy rate of 64.11%. The district has recorded a good growth in the literacy level. The district has also achieved a commendable growth in the literacy level of both male and female population. A summary of the literacy status of the district is given in the table below.

	Literacy Rate 2001			Literacy Rate 2011			Decadal Growth 1-11		
	National	M.P.	Sagar	National	M.P.	Sagar	National	M.P.	Sagar
Male	75.85	76.8	79.96	82.14	80.5	86.3	6.29	3.7	6.34
Female	54.16	50.28	54.5	65.46	60.00	67.7	11.3	9.72	13.5
Total	65.38	64.11	68.08	74.04	70.6	75.5	8.66	6.49	9.42

Source 1991 & 2001 Census

Literacy Rate Category Wise:

	All Communities			SC			ST		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Sagar	86.3	67.7	75.5	73.80	44.80	60.40	50.90	25.70	38.70

Population breakup of our working villages (Gram Panchayats) as per 2001 census:

NAME OF VILLAGE	Amarmau
Total Population	4620
Male Population	2453
Female Population	2167
SC Male Population	606
SC Female Population	515
ST Male Population	419
ST Female Population	376

This gram panchayat have two of our project villages namely- Khargatorra and Amarmau.

NAME OF VILLAGE	Palkator
Total Population	1366
Male Population	721
Female Population	645
SC Male Population	269
SC Female Population	229
ST Male Population	2
ST Female Population	4

This gram panchayat have one of our project villages namely- Hanumantorra.

NAME OF VILLAGE	Shasan
Total Population	729
Male Population	415
Female Population	314
SC Male Population	47
SC Female Population	31
ST Male Population	153
ST Female Population	121

NAME OF VILLAGE	Narwan
Total Population	6068
Male Population	3184
Female Population	2884
SC Male Population	898
SC Female Population	770
ST Male Population	2
ST Female Population	1

This gram panchayat have one of our project villages namely- Khushipura.

NAME OF VILLAGE	Batwaha
Total Population	651
Male Population	332
Female Population	319
SC Male Population	123
SC Female Population	107
ST Male Population	72
ST Female Population	75

This gram panchayat have one of our project villages namely- Vanpura.

NAME OF VILLAGE	Bilagram
Total Population	2212
Male Population	1188
Female Population	1024
SC Male Population	346
SC Female Population	292
ST Male Population	288
ST Female Population	252

This gram panchayat have one of our project villages namely- Chandola Tapariyan.

NAME OF VILLAGE	Simariya Kalan
Total Population	764
Male Population	400
Female Population	364
SC Male Population	9
SC Female Population	11
ST Male Population	1
ST Female Population	3

This gram panchayat have one of our project villages namely- Rathanpur.

NAME OF VILLAGE	Kanikhedi
Total Population	1335
Male Population	715
Female Population	620
SC Male Population	195
SC Female Population	153
ST Male Population	65
ST Female Population	64

NAME OF VILLAGE	Bagrohi
Total Population	2809
Male Population	1463
Female Population	1346
SC Male Population	451
SC Female Population	405
ST Male Population	2
ST Female Population	2

Agricultural Statistics of Sagar:

Irrigated area as percentage of total sown area:

	Total area sown*(ha)	Total area irrigated(ha)**	% total area sown that is irrigated
Sagar	710690	236635	33.3

Source: District-wise Land Use Statistics, Ministry of Agriculture, Government of India, May 2008. Percentages rounded off.
**Total sown land includes area sown more than once; the area is counted as many times as there are sowings in a year.*
***Total irrigated area is the total area under crops, irrigated once and/or more than once in a year. Area covered by any source of irrigation is considered irrigated area.*

Cropping Intensity:

	Net area sown in year(ha)	Area sown more than once in year (ha)	Cropping intensity (%)
Sagar	539003	171687	132

Source: District-wise Land Use Statistics, Ministry of Agriculture, Government of India, May 2008

Main crop categories as percentage of total cropped area (20 Years comparison):

	Cereals and Millets		Pulses		Oilseeds		Fodder crops	
	1984-85	2005-06	1984-85	2005-06	1984-85	2005-06	1980-81	2005-06
Sagar	56.7	25.7	21.8	43.5	12.1	25.3	11.3	3.8

Source: 2003-04 figures are from District-wise Land Use Statistics, Ministry of Agriculture, Government of India, May 2008. 1984-85 figures are from district statistical handbook figures quoted in Grassland & Fodder Atlas of Bundelkhand.

From the above table one thing is clear that, during these 20 years the percentage cropped area of cereals and millets has been decreased while that of for other categories like- pulse, oil seed and fodder crops, it has been enhanced.

Major crops as percentage of total cropped area of Sagar:

S.No.	Crop	Percentage of total cropped area (%)
1	Gram	28.36
2	Soybean	23.75
3	Wheat	23.04
4	Other Pulses	14.75

Source: District-wise Land Use Statistics, Ministry of Agriculture, Government of India, May 2008.

Yield of major and minor crops in Sagar:

Average yields of major crops (2003-04) in kg/hectare: (Comparison with the yield of M.P. and India.)

	Wheat (rabi)	Gram (rabi)	Jowar (kharif)	Rice (autumn)	Sesamom	Soyabean	Groundnut
Sagar	1140	820				990	
Highest in MP	3020 (Ratlam)	1460 (Tikamgarh)	2280 (Gwalior)	2460 (Gwalior)	710 (Guna)	2140 (Gwalior)	1590 (Ashok Nagar)
India yield	2713	811	716 (kharif+rabi)	2077 (kharif+ rabi)		1193	1357

Average yields of other pulses in (2003-04) in kg/ha: (Comparison with the yield of Madhya Pradesh, India)

	Peas/beans	Tur/arhar (kharif)	Urad	Moong	Masoor	Other pulses (rabi)
Sagar			320			450
Highest in MP			640 (Ratlam)			790 (Ratlam)
India yield		670			743	

Source: District wise crop production statistics (district figures) and Agriculture Statistics at a Glance 2006(India figures), Crop Production Statistics Information System, Ministry of Agriculture, GOI.

1 Primary Statistical Figures related to the Project Area:

Name of the District	Sagar				
Altitude	427 meters	Agro- Ecological zone	-		
Total Area (ha)	9361.84	Agriculture Area (ha)	4565.87	Irrigated Area (ha)	2228.48
Single Cropped area (ha)	1842.45	Double Cropped area (ha)	2498.12	Triple Cropped Irrigated Area (ha)	225.3
Area under Horticulture	6.5	Area under Pasture	1084.94	Forest Area	2797.37
Average Rainfall (mm)	1234.8 mm	Highest Temperature	40.7°C	Lowest Temperature	4.6°C
Main Soil Type	Black		Type of Land	Plain, Undulating	
Population	17872	Total Households	5586	Total HHs of SHF	5414
Hhs of ST	1120	Hhs of SC	1541	No. of other vulnerable HHs	-
Percentage of school going girls.	-	Reach to subsidized food	Yes	Average IMR (Less than 5 Yrs.) per 1000 births.	7
Accessibility to road	Throughout year	Electricity	Yes	Mobile Network	Yes
No. of SHG	35	Grain Bank	No	No. of Farmer's Institutions	0
No. of Nursery raisers	0	No. of large farmers	172	No. of farmers practicing organic farming	0

Rain fed Main food crop-1	Black Gram	Yield/ha	5	Total Area (ha)	3500
Rain fed Main food crop-2		Yield/ha		Total Area (ha)	
Rain fed Main food crop-3		Yield/ha		Total Area (ha)	
Irrigated Main food crop-1	Wheat	Yield/ha	20	Total Area (ha)	4500
Irrigated Main food crop-2		Yield/ha		Total Area (ha)	
Irrigated Main food crop-3		Yield/ha		Total Area (ha)	
Food Scape-1		Food Scape-2		Food Scape-3	
Main Cropping System- Rain fed	Black Gram			Area (ha)	3500
Main Cropping System- Irrigated	Wheat			Area (ha)	4500
Total village food availability (q)	371350	Own Production	88475	Procured from outside	282875
Loss of crop (Food crops) in last 5 years	Yes (Frost)	Situation of famine in last 5 Years			No
Percentage of food insecure HHs having insecurity of more than 2 months	-	SHF HHs percentage having food insecurity of more than 2 months.			-
Main Storage technology for food crops	Traditional	Main Processing technology for food crops			Traditional
Varities of main food crops	Lokman, WH-272	Indigenous/ HYV/ Hybrid			HYV
Seeds of main food crops	-	Local/ Exotic			Both
Area under Integrated Farming	0	Area Under IPM	0	Area Under INM	0
Cow, Bullock, Buffalo	6680	Goat, Ship, Pig	1310	Chicken	160
Milk Production	2830	Meat Production	NA	Egg Production	NA
Trend of Temperature	Increasing	Trend of Rainfall	Decreasing	Trend of Extreme events	Fluctuating

Source:- Village Survey Data, Shahgarh, Sagar

2. Climate Change Indicators and Perceptions:

S. No.	Climate Change Indicator	Trend	Effect on Food Production/ Agriculture	People's Perception
1	Temperature	Increasing	● Cost of cultivation enhanced. ● Shifting of farmers to less water needing verities/crops.	According to local mass, the major reason behind temperature increment is deforestation and scarcity of rainfall.
2	Rainfall	Decreasing	● Cost of cultivation enhanced. ● Shifting of farmers to less water needing verities/crops.	According to local mass, the major reason behind temperature increment is deforestation.
3	Disease Outbreak	Increasing	● Cost of cultivation enhanced. ● Soil and water pollution enhanced.	According to the local mass the main reason behind this is injudicious use of chemical pesticide.
4	Food Productivity	Decreasing	● Per hectare production has been diminished.	The major reason behind this is degradation of soil fertility due to excess use of fertilizers and chemical pesticides.
5	Food Production	Increasing	●Total production has been enhanced.	Its main cause is use of HYV seeds and fertilizer & pesticides.
6	Diet Diversity	Increasing	● Due to cultivation of crops other than cereals and millets, it has been enhanced.	It also has been enhanced due increase in the income of local mass due to migration and other source of livelihood.
7	Change in Food Source	From forest & agriculture to PDS.	● It has been shifted to agriculture and PDS from forest food.	Due to deforestation, people's dependence over the forest has become restricted to only few products and mostly they are dependent over agriculture and PDS for their food source.
8	Change in Cropping Pattern	Double cropping from Single cropping	● From single cropping of millets to wheat- Paddy and then wheat- Soybean cropping system.	Due to advancement in agricultural practices they shifted to Wheat- Paddy cropping system and later due to scarcity of irrigation water shifted to Wheat- Soybean cropping system.

Source: PRA and FGD Shahgarh, Sagar.

From the above table of climate change indication and perception, one thing is very clear that most of the parameters regarding the climate change have been happened due to the

deforestation. Other thing that came during this study about the climate change perception was injudicious use fertilizer and chemical pesticides. One major adoption practice of the local mass that we got during our work was the people are shifting from more water needing variety to the water resistant variety. This adoption was predominantly seen into wheat and some of the pulses. Initially people were using mainly household seeds for the cultivation and it needed more water and later due to water scarcity they shifted to some water resistant variety namely- Lokman for the cultivation practice of wheat. This adoption practice was also visible in the shifting of people from Wheat- Paddy cropping system to the Wheat- Soybean cropping system. Also, due to various other livelihood activities and migration of people, income of the people has been enhanced and due to that their dietary diversity as well as expenditure related to their health and nutrition has been enhanced.

3. Situation of Food Production, Storage/Distribution, Consumption-food /Nutritional Security & Climate Change Impacts:

Food Production Scenario in the Project Villages:

Land Use Pattern (ha):

S. No.	Name of the Village	Geographical Area	Area Under Agriculture			Area under irrigation	Cultivable Waste Land	Uncultivable Waste land	Area of Private Land
			Single Crop	Double Crop	Triple Crop				
1	Khargatorrax	1575.97	300	400	0	400	0	0	700
2	Amarmau	1970.4	600	600	600	800	0	0	1400
3	Hanumantorra	92.8	13	62.8	5	65	0	2	80.8
4	Rathanpur	268	20	240	0	40	8	0	260
5	Khushipura	91.98	0	87.98	0	87.98	0	2	87.98
6	Vanpura	207.52	50.13	118.57	0	118.57	4.5	0.02	168.7
7	Bagrohi	1134.88	249.95	448.34	5	329.5	12.15	346.6	703.29
8	Kanikheri	752.5	10.5	282	0	292	0	10	292.5
9	Sashan	2849.03	476.15	152.53	15.3	78.5	15.4	133.66	736
10	Chandola Tapariyan	418.76	122.72	105.9	0	16.93	45.8	47.04	228.62
	Total	9361.84	1842.45	2498.12	225.3	2228.48	85.85	541.32	4657.89

Source:- Village Survey Data, Shahgarh, Sagar

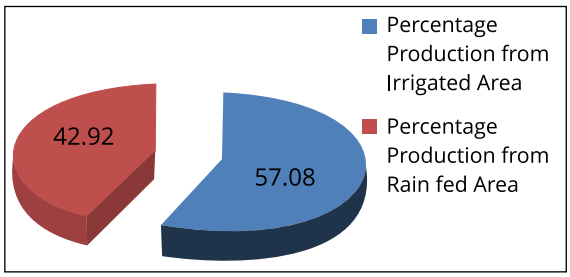
Some of the statistical figures drawn from the table:

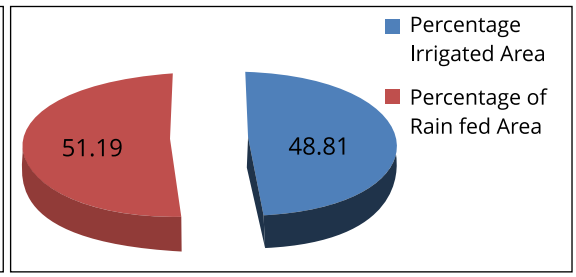
Particulars	Percentage Figure (%)
Total Cultivable land as compared to geographical area	48.77
Single cropping land as compared to total cultivable land	40.35
Double cropping land as compared to total cultivable land.	54.71
Triple cropping land as compared to total cultivable land	4.93
Irrigated area as compared to total cultivable land.	48.81
Rain fed area percentage	51.19
Waste land as compared to geographical area.	6.70
Private land as compared to geographical area	49.75

So, from the above conclusion table we can clearly see that only around 50% of the total geographical area is used for the agriculture purpose here in our villages, in which percentage of double cropped area highest amongst all is followed by the single cropping and triple cropping is least among all. Also, about more than half of cultivable land is rain fed.

Food Production (q) in the project area:

S. No.	Village	Crop Production (q)		Animal Production (l)
		Irrigated	Rain Fed	
1	Khargatorra	500	200	100
2	Amarmau	24000	24000	1400
3	Hanumantorra	500	200	180
4	Rathanpur	1000	1500	30
5	Khushipura	2200	1295	25
6	Vanpura	600	1000	85
7	Bagrohi	11200	8960	472
8	Kanikheri	10000	50	200
9	Sashan	350	520	1000
10	Chandola Tapariyan	150	250	15000
	Total	50500	37975	18492





From the table and graph, we can clearly see that perhaps our project villages has lesser percentage of irrigated area but the overall production of irrigated are is more than that of rain fed area.

Storage and Distribution practices in the project villages:

Storage:

The storage infrastructure and technology of our working area is highly traditional. Usually people do storage mainly for the seeds in some crop, like- Black gram, Sorghum, Soybean etc. For food grain storing purpose, people do little storage. It is because, people sell maximum of their produce at the time of harvest to pay different types of loans.

The infrastructure used for the storage purpose is mainly the plastic bags and gunny bags and little bit farmers store their produce into some traditional earthen structures. Preservative for the storage is also mainly the natural ones and people use very little source of chemical preservatives for their storage. Preservatives used for the storage includes- Neem leaves, Fenugreek straw, Onion, Ash, Kerosene oil, Match sticks etc.

Distribution Practice (Purchase behaviour) of Food Grains:

S. No.	Village	PDS Procurement (q)	Market Purchase (q)
1	Khargatorra	4680	20839
2	Amarmau	10065	41873
3	Hanumantorra	4260	1000
4	Rathanpur	10800	18180
5	Khushipura	114	300
6	Vanpura	36144	10246
7	Bagrohi	612	3740
8	Kanikheri	61488	10000
9	Sashan	3888	21120
10	Chandola Tapariyan	6492	17034
	Total	138543	144332

Source:- PRA and FGD Shahgarh, Sagar

So, from the table one thing is very clear that people do purchasing of food grains more than that of purchasing through PDS apart from their agricultural production. But this amount has very little difference and in near about terms, we can conclude that people do around same procurement from market as well as PDS apart from their own agricultural produces.

Climate change impacts (Threats):

S. No.	Climate change Parameters	Impacts/ Threats
1	Temperature	• Need of irrigation water has been enhanced. • Loss in nutrition elements into the crops.
2	Rainfall	• Need of irrigation water has been enhanced. • Reduction in crop diversity, because of omission of crops by farmers which needs more water.
3	Disease outbreak	• Production cost has been enhanced. • Due to more use of chemical pesticides, soil and water pollution has been enhanced.
4	Land Productivity	• Production cost has been enhanced. • Loss in nutrition elements into the crops.

Source:- PRA and FGD Shahgarh, Sagar

So, from the above table one thing is clear that, there are lots of impacts/ threats of climate change into our project area. The major threat/impact of climate change into our area is enhancement into the cost of crop production, which reduces the food security of the people as well as return got through the cultivation. Also, due to climate change soil and water pollution has been enhanced and there are lots of insect's infestation and disease outbreak into the villages. One major thing also came as climate change perception that due to climate change nutrition elements are being degraded from the food grains gradually.

4. Ongoing adaptation/innovation practices:

Components of FPDCS	Sub-components	Adaptation	Farmer's Own Practice(s)		Practices Received / Adopted by Farmers	
			Techno-logy	Institu-tion	Techno-logy	Institu-tion
Production	Crop Manage-ment	Cultivation of less water needing variety.	-	-	Selection of HYVs.	Govt. Organis-ations
		Shifting to Wheat-Soybean cropping system from Wheat- Paddy cropping System.	-	-	Shifting in cropping System	Govt. Organi-sation
	Seed	Use of Less water needing verities of seeds in case of major crops.	-	-	Selection of HYVs.	Govt. Organi-sations

Production	Pest Management	Use of traditional practices for disease & pest management.*	Traditional	Village	-	-
Storage	Infrastructure	Storage into plastic bags and traditional earthen structure.	Traditional	Village	-	-
	Preservatives	Use of traditional preservatives.*	Traditional	Village	-	-
Distribution	Selling	Selling through middle men as well as direct selling into the market.	-	Middle Men	-	Market
	PDS procurement	Subsidised food through government.	-	-	-	Govt. Organisation.
	Market purchase	Purchasing through market	-	-	-	Market
Consumption	Processing	Post Harvest Processing.	Traditional	Village	-	-
		Pre consumption processing.	Traditional	Village	-	-

Source:- PRA and FGD Shahgarh, Sagar

**See Annexure.*

From the above table one thing is clear that the technologies that farmers are using are mostly traditional and also we can see that the major innovations of FPDCS into our area are related with the minimisation of the stress of water scarcity.

5. Stakeholders' Perceptions:

Stakeholder's perception about the climate change was also one of the major activities of our project. We have taken the views of stakeholders other than our primary stakeholders, i.e. - small holder farmers regarding this. For this purpose we had indepthly interviewed government officials, scientists, medicine officials and local leaders having their activities into the agriculture and nutrition sector. The views of these stakeholders were also interesting and through this we came to know about some interesting facts about the climate change into that area.

For this purpose we have interviewed following officials:

- B.M.O.
- R.A.E.O.

- C.E.O. Janpad Panchayat.
- Nursery Superintendent.
- PDS Chariman.
- Sarpanch.
- Scientists. (Personnel of KVK).

Stakeholders' Perceptions on Vulnerability of SHF to Climate Change:

S. No.	Local Issues	Response Got	Stakeholder involved
1	Health & Nutrition level of local mass.	• Health & nutrition level of local mass is not up to the mark. • People of lower cast strata are majorly affected by serious diseases. • Malnutrition is also prevalent into lower cast. • Coarse cereal from the daily diet of people has been replaced through wheat and rice.	B.M.O
2	Expenditure habit of local mass and its affect over food security.	• 10-20% 0f income of the local people is being expensed over health. • Health expenditure does not affect the food security of the local mass, because it is very less.	B.M.O.
3	Nutritional diversity of local mass.	• People generally take calorie rich diets in their daily diets. • Vitamins and minerals supplements are relatively less into their daily diets.	B.M.O.
4	Perception to climate change	• Rainfall has been decreased considerably. • Production of the area is being increased, however it is fluctuating. • Gradually bio diversity in farming has been diminished considerably. • Cultivation of coarse cereals has been stopped by the villagers.	R.A.E.O. & C.E.O. Janpad Panchayat
5	Food Security of the area.	• Food security of the area is around 6 months to these villages. • Proper storage infrastructure and irrigation facility may enhance the food security of the area.	R.A.E.O. & C.E.O. Janpad Panchayat
6	Adoption to climate change of small holder farmers	• People have started dry farming. • People started growing soybean in place of paddy to counter irrigation water. • Also they started growing some less water needing verities in different crops.	R.A.E.O. & C.E.O. Janpad Panchayat

7	Horticultural status of the area	• It is very pathetic. • People do not prefer to plant fruit crops commercially, because of less awareness and also less acreage of the people.	Nursery Superintendent
8	Nutrition level and dietary diversity of the area	• It is medium, because people mainly use calorie rich diets and use less amount of fruits and vegetables in their diet.	Nursery Superintendent & B.M.O
9	Response of small holder farmers towards fruit tree plantation	• It is very less and they only do it in their backyard or onto the bund of their fields.	Nursery Superintendent.
10	Condition of food distribution system in projet area.	• In most of the villages, there is timely distribution is every month, in some of the villages, there are little bit corruption and untimed distribution. • For BPL & ARY families, there is provision of wheat, rice, sugar and kerosene oil and for APL families, there is the provision of only sugar and kerosene oil.	P.D.S. Chairman
11	Role of PDS in food security	• 15-20% population of this area is completely dependent over the PDS for their food requirement. • Around 30% population needs half support from the PDS, i.e. - 6 months in an year they are dependent over the PDS for their food requirement.	P.D.S. Chairman
12	Local issues of food production.	• Organic farming is not so practiced in this area, people only do chemical farming here. • People mainly produce cereals and production of cash crops or medicinal plants is not so practiced here. • Livestock production is very poor in this area.	Sarpanch
13	Local issues of food distribution.	• APMC mandies: - Around 30% of the produce is being sold and distributed through this channel. • Open Market: - Around 70% of the produce is being sold and distributed through this channel.	Sarpanch
14	Food Security of the local population.	• It varies from 6-10 months from person to person and also from village to village.	Sarpanch & B.M.O

5) Traditional Practices for Insect Pest & Disease Management:

S.No.	Practices	Insect/	Crop	Short Description
1	Neem leaves application	Larvae	Wheat, Soybean, vegetable	Spraying of the following materials prior to their rotting for 10-15 days helps in eliminating larvae into these crops: (per acre)
2	Garlic & green chili application	Larvae	Wheat, Soybean, vegetable	Spraying of the following material's paste prior to their rotting for 10-15 days helps in eliminating larvae into these crops: (per acre) Garlic- 250g.
3	Bird Perching	Larvae	Gram	It is the physical control of the larvae into the field. In this practices Farers plant sticks at the various locations into the field and later bird sit there and eat larvae.
4	Whey Application	Larvae	Wheat, Soybean, vegetable	Whey put into an earthen pot and kept inside the ground for 40 days and then its spraying over crops helps into the pest repellent
5	Whey and cow urine application	Larvae	Wheat, Soybean, vegetable	Rotting of the mixture of whey and cow urine up to 40 days makes it good insecticide and its spraying over these crops helps into the elimination of larvae.
6	Fine ash application	Leaf curl and deflowering of chili	Vegetable (Chili- Capsicum anum)	Application of fine ash got through filtration of ash (through burning of fuel wood) over a perforated cotton cloth into the chili infected through the leaf curl and defloration disease, helps in controlling this.
7	Concentrated neem leaves syrup spraying	Larvae	Wheat, Soybean, vegetable	5 Kg. neem leaves boiled into the 5 liters of water up to the time when it becomes 1 liter solution. Spraying of this concentrated mother liquor @ 100 ml. into the 15 liters of water over these crops helps into the elimination of larvae.
8	Application of jaggery outside the field	Insects	Wheat, Soybean, vegetable	Application of jaggery over the bund of the field attracts insects over that and in place of destroying the crop, they remain over that jaggery.
9	Application of chili powder and garlic	Larvae	Wheat, Soybean, vegetable	Spraying of the following materials prior to their rotting for15 days helps in eliminating larvae into these crops: (per acre) Chili Powder- 500g. Garlic- 500 g.
10	Lime application	Larvae	Wheat, Soybean, vegetable	Hydrated lime spray over the crop works as pest repellent.

15	Predominant crops of this region.	• Kharif- Soybean, Sorghum, Urad, Sorghum. • Rabi- Wheat & Gram. • Zayad- Moong.	Scientists (KVK Personnel)
16	Suitable varieties in this region.	• Paddy: ❍ HYV- Pusa Suganda-4, Pusa Sugandha-5. ❍ Hybrid- JRH-1, JRH-2 • Moong- PU-35, PU-30, K-51, HUM-1, JU- 86, JU-3. • Soybean: JS-335, JS- 95-60, JS-93-05. • Coming Soybean varieties- JS-20-29, JS-20-34, JS-20-35.	Scientists (KVK Personnel)

Source- IDI of Stakeholders, Sagar.

6. Models/interventions and Proposed SHFC:

As per our project objective, we are doing action research over the agriculture to enhance the food security of the small holder farmers. So, models that are related to our work into our area are also over only the agriculture and we have selected the models of SHFC to enhance the production of only food crops. The main food crop of our area is wheat and pulses (Black gram) and also it has the potential to cultivate the paddy but due to water scarcity people have stopped its cultivation.

Also for working with the small holder farmers, we have formed the SHFC (Small Holder Farmers Consortium) and action research will be done through these SHFC.

Models that we have planned for our area is mainly over the following crops:

- Wheat
- Paddy
- Pulses
- Vegetable

For our project purpose, we have formed 33 SHFC with an aim to cover 50 SHF households for our project work into a particular village.

ANNEXURES

District Map of Sagar

Fig- District Map of Sagar

Traditional Practices of the area:

1) Traditional Practices for Land Preparation:

S.No.	Practices	Crop	Short Description
1	Plowing	Wheat, Soybean, Black Gram	• During crop sowing, they do 2-3 plowing through the cultivator prior to broadcasting the seed. Initially they did it through bullock but now a day, they do it through tractor. • During summer they do it through MB plow. It not only
2	Harrowing	Wheat, Soybean, Black Gram	They did it for the weed removal
3	Leveling	Wheat, Soybean, Black Gram	It was done after the broadcasting to incorporate the seed into the soil. It was done through the traditional structure made up of wood.

2) Traditional Practices for Seed selection:

S.No.	Practices	Crop	Short Description
1	Germination percentage checking	Wheat, Soybean, Black Gram.	In this practice, farmers first sow sample seed into their backyard and if the germination is good, they sow it to their field, otherwise they take other seed

3) Traditional Practices for Seed Treatment:

S.No.	Practices	Crop	Short Description
1	Soaking into Whey	Wheat & Paddy	24 hours prior to seed sowing, farmers soak the wheat seed into whey. It boosts germination as well as makes the seed resistant against termite.
2	Hot water treatment	Paddy & Wheat	Put the seed into the tolerable hot water (600c) for 5-10 minutes and then put it into teak leaves for 2-3 days prior to sowing. It promotes germination.

4) Traditional Crop Management Practices (CMP):

S.No.	CMP	Methods	Crop	Short description with formulation (where required)
1	Nutrient Management	Composting	Wheat, Soybean, Black Gram.	• Initially they put only the compost and FYM for the nutrient enrichment of the soil. Doses was approximately 1-2 tons/ Ha. • 2 liters of cow urine mixed with 5 liters of whey and then filter it and rot it for 8 days and then mix it into 300 liters of water and spray over one acre of crop acts as nitrogen supplement to the crop. • 2 liters of cow urine and 10 Kg. of cow dung mixed with140 liters of water and spray it over 1 acre of crop works as nitrogen supplement to the crop.
2	Moisture Conservation / Irrigation water management	Deep Summer plowing	Wheat, Soybean, Black Gram.	Deep plowing during the summer helps to retain the soil moisture throughout the year.
		Organic matter application	Wheat, Soybean, Black Gram.	Compost, FYM and other manures helps water retention.
3	Weed Management	Hand Weeding	Wheat, Soybean.	For shallow rooted weed, initially they practiced hand weeding with the help of spud in their standing crops.
		Deep rooted weed removal	Paddy	For removal of the deep rooted weeds (To clean the field), they apply goat litter and whey into the field. It went deeply and eliminates those weeds.
4	Other CMPs	Frost Control	Wheat, Soybean, Black Gram.	• Burning of crop straw onto the boundary of the field. • Irrigation into the field prior to the expectation of frost. • Shaking of crops through a rope during the morning hours after getting the frost attack into the crop.

11	Neem leaves into cow urine and dung.	Larvae	Wheat, Soybean, vegetable	Spraying of the following materials prior to their rotting for 10-15 days helps in eliminating larvae into these crops: (per acre) Cow urine- 10 Ltrs. Cow Dung- 10 Kg. Whey- 10 Ltrs. Neem Leaves- 10 Kg. Besharam (Ipomoea carnea) leaves- 10 Kg.
12	Larvae Application	Larvae	Wheat, Soybean, Black Gram, Gram.	It is actually the biological control of the larvae into the all crops. In this method, farmers collect 50-60 larvae from the field and then they crush it and make its solution and spray it over the crop. Through this larvae gets some kind of disease and ultimately they die.
13	Early sowing	Larvae	Gram	Early sowing (Sowing into September) matures the plants earlier and escapes the plants from the time of larvae infestation.
14	Kerosene oil application	Uksa Disease (Black Spikelts)	Wheat	Application of kerosene oil through the irrigation water helps to control the Uksa disease of the wheat. In this disease, Spikelet of wheat become black and does not have grains.
15	Tamaritnd (Tamarindus indica) application	Uksa & Myau Disease and Larvae	Wheat	Rotting of tamarind (Tamarindus indica) up to 1 month and then its spraying helps to control these diseases and also works as insecticide.
16	Jamun (Syzygium cumini) application	Myau disease and Larvae.	Wheat	Rotting of Jamun (Syzygium cumini) up to 20 days and then its spraying helps to control these diseases and also works as insecticide.
17	Plant removal from field	Yellowing disease of Black gram	Black gram	During this situation, plants that got infected through this disease is uprooted and burnt outside the field and also ash is applied to the crop.
18	Application of Ash.	Larvae	Paddy & Black Gram	After getting the larvae infestation into these crops, application of ash helps in controlling the larvae.
19	Soaking of gram into the solution of Dhatura and Besharam leaves.	Rodents		Under this practices, Seeds of Dhatura (Datura wrightii) and Besharam (Ipomoea carnea) leaves is being boiled into the water and a dark mother liquor is being made and then gram or wheat is being soaked into that and after complete soaking, it is put over the burrows of rats and when they eat it they die.

20	Broadcasting of Mahua (Madhuka indica) fruit into the field	Rodents		After eating Mahua (Madhuka indica) fruit rodents stop eating the crops due to the bitterness of their teeth.
21	Physical Control	Rodents		• Tendu (Diospyros melanoxylon) sticks are planted at various locations near the burrows of rat and wheat or water soaked gram is put outside the burrows of rat and when they come outside to eat those, birds perches over the sticks prey them. • Khajur (Phoenix dactylifera) leaves are planted near the burrow of rat and it imitates like snake and rat get feared by seeing it.
22	Used engine oil application	Termites		To control the termite farmers add used engine oil and they apply it through the irrigation water.
23	Corn stick	Termite	Wheat	Under this practice farmers put several corn sticks into a 2-3 pitchers and put these over the several locations into the field. Due to its palatable smell termites attract towards this and get into the pitcher and also their mother ant come into it. After 2-3 days they take it out from the field and destroy it.

6) Traditional Practices for Storage:

S.No.	Seed Storage			Food Grain Storage		
	Preservatives Used	Crop	Storage Structure	Preservatives Used	Crop	Storage Structure
1	Kerosine oil	Black Gram	Plastic Bag	Neem Leaves	Wheat & Black Gram	Plastic Bag
2	Neem Leaves	Wheat	Wheat Straw & Plastic Bags	Onion	Wheat & Black Gram	Plastic Bag
3	Onion	Wheat	Wheat Straw & Plastic Bags	Fenugreek Straw	Wheat & Black Gram	Plastic Bag
4	Fenugreek Straw	Wheat	Wheat Straw & Plastic Bags	Match Stick	Wheat & Black Gram	Plastic Bag

7) Traditional Animal Husbandry Practices:

S.No.	Livestock	Feeding	Breeding	Pest Management	Farm waste recycling
1	Cow	Open Grazing	Natural Insemination	Neem Leaves paste application over body to kill bugs.	Pit formation to store waste.
2	Buffalo	Stall Feeding	Natural Insemination	Neem Leaves paste application over body to kill bugs.	Pit formation to store waste.
3	Goat	Open grazing	Natural Insemination	Neem Leaves paste application over body to kill bugs.	-
4	Bullock	Stall Feeding	-	Neem Leaves paste application over body to kill bugs.	Pit formation to store waste.
5	Pig	NA	NA	NA	NA
6	Chicken	Open Feeding	Natural Insemination	NA	NA
7	Others	NA	NA	NA	NA

8) Traditional Practices related with Natural Management Practices:

S.No	NRM Practices related with Agriculture	Method Employed
1	Soil Health	3-4 times plowing prior to seed sowing to pulverize the soil for its better aeration.
2	Organic Matter composition	● Addition of compost, FYM, dry leaves, crops residues and ashes into the field to enhance the organic matter composition of the soil. ● Green manuring. (Practiced by only few farmers)
3	Soil erosion checking	Bund making for checking the soil erosion through rain water.
4	Soil Nutrient Management	Addition of FYM and lime or gypsum to enhance the soil organic and inorganic matter.
5	Crop Biodiversity	● Mixed cropping of wheat with mustard. ● Plantation of maize and some other crops, that are not being into the regular cultivation into the backyard of their houses.
6	Biological balance into soil	NA

9) Other Innovative Practices:

- Intercropping of Soybean with Black gram leads to more production to both crops than their mono cropping. It is due to the synergetic effect of these crops over each other.
- For controlling the stray animals farmers prepare the juice of Besharam (Ipomia carnea) leaves and spray it over the crop deter stray animals to eat the crops.
- Formulation of traditional fertilizer made up from both traditional things as well as chemical fertilizers.

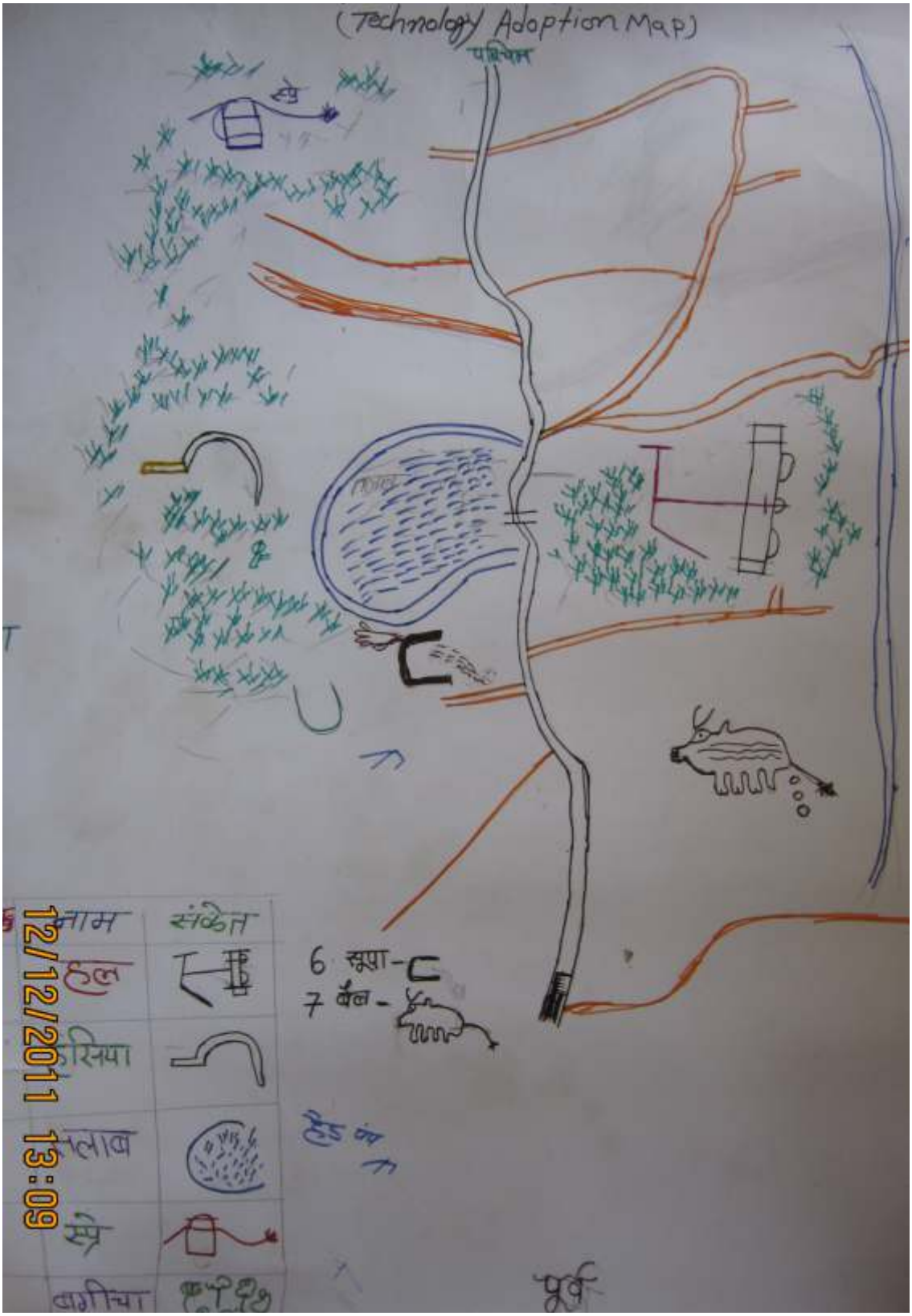
  Composition of this fertilizer is as follows: (dose of 1 acre)

  - Jaggery- 10 kg.
  - Fresh cow dung- 25 kg.
  - Cow Ghee (Concentrated food product made up from cow milk) - 500 g.
  - DAP (Di-Ammonium Phosphate) fertilizer- 15 kg

These materials are mixed thoroughly and kept into shade for one month becomes good fertilizer and very useful for all the crops.

- In a practice, if there is rain during the winter, then farmers plow their land and leave it for 4-5 months and then sow either pulse or oil seed crop or this crop gives about 2-3 times more yield than the normal sowing.
- Prior to storage of the seed or grain people store it for 10-15 days into the cold and then store it after mixing with proper preservatives.

Snaps of the District Project Activities



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Strengthening Adaptive Farming in Bangladesh, India and Nepal (SAF-BIN) is an action research programme under the European Union Global programme on Agriculture Research for Development (ARD). It is a multi-dimensional research that address the agricultural development challenges of developing and emerging countries. It is an initiative to promote local food and nutritional security through adaptive small scale farming in four rainfed Agro Ecosystems (AES) in South Asia. The programme is implemented by the Caritas Organisations in Bangladesh, India & Nepal in partnership with University of Natural Resources and Applied Life Sciences (BOKU), Austria and in association with Action for Food Production (AFPRO), India; Sam Higginbotom Institute of Agriculture, Technology & Sciences (SHIATS), India; Bangladesh Rice Research Institute (BRRI), Bangladesh and Local Initiatives for Biodiversity, Research and Development (LI-BIRD) to address the Food Security and Climate Change Challenges of the Smallholder Farmers living in rainfed areas in South Asia.

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CARITAS INDIA, CBCI Centre, 1 Ashok Place, New Delhi 110001
Tel: +91 11 23363390, +91 11 23715146, Fax: +91 11 23715146
www.caritasindia.org | www.safbin.org