Cluster Agricultural Competitiveness Plan (CACP)

Watershed Cluster Bansur, Alwar
Rajasthan Agricultural Competitiveness Project (RACP)

Theme: Watershed, Block- Bansur, District – Alwar

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Preface

The World Bank has approved credit amounting to Rs. 832.50 crores for development of 17 clusters, each having area ranging from about 10,000 ha to 31,500 ha in eight agro-climatic zones across Rajasthan to address end to end solutions to farmer's problems in three main water regimes. These include watershed/rain-fed, surface/canal water and ground water regimes with certain specified desired selection criteria's.

The Cluster Agricultural Competitiveness Plan (CACP) is the outcome of a planning process that aims to (a) identify opportunities as well as constraints towards developing one or two or more value chains in which the community deem themselves to have a potential competitive advantage and to (b) select from a list of eligible project investments and within the funding constraints of those public investments that will enable the community to address constraints and enhance opportunities towards establishing and strengthening identified value chains. The value chains proposed would envisage addressing broad sub-sectorial issues as well as help establish specific partnership arrangements between farmer groups or Producer Companies with agribusiness companies.

The Cluster Agricultural Competitiveness Plan (CACP) comprises investments to be made on improving water use efficiency, technology transfer and provision market led advisory services for agriculture & horticulture development, livestock strengthening and management especially for small ruminants, market and value chains in the cluster.

The CACP of Bansur Watershed Cluster in Alwar district has been prepared and an amount of Rs.5232.73 lacs will be invested during the project period to make the cluster and farmers competitive so that economic level of farmers in the cluster can be uplifted. Simultaneously, as well as agricultural productivity of the cluster can be optimized.

I personally appreciate the commendable efforts by ARAVALI, Jaipur, Mr. V. S. Singh, Consultant, ARAVALI and especially Dr. V. P. Singh, Jt. Director Agriculture (Agronomy), Project Coordinators, Specialists, ABPF Consultant Grant Thornton India Pvt. Ltd. and line departments who contributed much towards making this comprehensive document. I also appreciate all other people who supported in many ways to prepare the CACP in a short period.

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Project Director
RACP, Jaipur

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ABPF	Agri Business Promotional Facility
AEZ	Agro-Ecological Zones
ARAVALI	Association for Rural Advancement through Voluntary Action and Local Involvement
ARS	Agriculture Research Station
ARSS	Agriculture Research Sub Station
ATC	Adaptive Trial Centre
BPL	Below Poverty Line
CACP	Cluster Agricultural Competitive Plan
CBO	Community Based Organizations
CFC	Common Facility Centers
CIG	Common Interest Group
DLIC	District-Level Implementation Committee
EMP	Environment Management Plan
e-NAM	e-National Agriculture Market
FAQ	Fair Average Quality
FCI	Food Corporation of India
FCSC	Farmer's Common Service Centre
FIG	Farmers Interest Group
FPO/FPC	Farmer Producer Organizations/ Farmer Producer Company
GIS	Geographical Information System
GoI	Government of India
GoR	Government of Rajasthan
GSS	Gram Seva Sahkari Samiti
ICM	Integrated Crop Management
ICT	Information, Communication and Technology
IMD	Indian Metrological Department
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
JV	Joint Venture
KSK	Kisan Sewa Kendra
KVSS	Kriay Vikrya Sahkari Samiti
LLW	Lady Link Worker
LSCD	Loose Stone Check Dam
MI	Micro-Irrigation
MMS	Minor Masonry Structure
MPT	Mini Percolation Tank
MSP	Minimum Support Price

MTA	Multi Task Association
MTG	Multi Task Group
NAM	National Agriculture Market
NCR	National Capital Region
NeML	NCDEX e-Markets Limited
NRSA	National Remote Sensing Agency
NSPOT	NCDEX Spot Exchange
OBC	Other Backward Cast
PC	Producers' Companies
PAD	Project Appraisal Document
PDO	Project Development Objectives
PG	Producer Group
PHM	Post-Harvest Management
PIU	Project Implementation Unit
PMU	Project Management Unit
PRA	Participatory Rural Appraisal
RACP	Rajasthan Agricultural Competitive Project
RAJHANS	Rajasthan Horticulture Nursery Society
RAJUVAS	Rajasthan University of Veterinary and Animal Sciences
RKVY	Rashtriya Krishi Vikas Yojana
RS	Remote Sensing
RSSC	Rajasthan State Seed Corporation
RTC	Rural Technology Centers
SC	Schedule Caste
SCPI	Sustainable Crop Production Intensification
SFAC	Small Farmers Agri Business Consortium
SHG	Self Help Group
SR	Small Ruminants
SRR	Seed Replacement Rate
ST	Schedule Tribe
TCS	Tata Consultancy Services
TGM	Technical Grade Material
TRA	Technical Resource Agency
UMP	Unified Market Platform
VCD	Vegetative Check Dam
WUE	Water Use Efficiency

Executive Summary

The World Bank is supporting and facilitating the Rajasthan Agriculture Competitiveness Project (RACP) by way of a credit of Rs 832.50 Cr. (166.5 USD) offered to Government of Rajasthan. This Project envisages to undertake structured interventions in 17 clusters, which are selected on the basis of water themes viz. watershed, surface water and ground water, and spread across 8 agro climatic zones of the State. The Project Development Objective (PDO) is to establish the feasibility of sustainably increasing agricultural productivity and farmers' incomes through a distinct agricultural development approach by integrating agriculture, water management, agricultural technology, farmer organizations and market innovations in selected locations across the ten agro-ecological zones of the state. The Project Development Objectives aim to help farmers realise more rupees per unit of water in compensation for using fewer units of water.

To achieve the PDO of the RACP, activities related to four components are to be implemented in the clusters viz. Component 1: Climate Resilient Agriculture; Component 2: Markets and Value Chains; Component 3: Farmer Organization and Capacity Building; and Component 4: Project Management, Monitoring and Learning. The Key Performance Indicators (KPIs) to assess the impact of the project are (a) reduction in water used in agriculture; (b) increase in water use efficiency in agriculture; (c) increase in agricultural productivity; (d) increase in gross margins from crops and livestock products; (e) increase in the share of producer's price in wholesale price; and (e) farmer satisfaction with project deliverables

The Bansur cluster (rainfed- watershed) in Alwar district has been selected under the project after several visits by the PMU coordinators; consultations with officials of the WD & SC Department Jaipur; Project Manager - WC DC, Zila Parishad (Alwar), interactions with the local community and various value-chain actors. The area is predominantly rich in agriculture and livestock rearing. Surplus production is generally available in the area as dominant crops in the cluster include Bajra, Guar, Mustard, Wheat and Barley. Bajra is largely used as cattle feed and complements livestock population of Alwar district. Also, the availability of fertile land and good quality water along with proximity to the NCR presents opportunities in horticulture. Local and cross-breed goat population also offers potential for both goat milk and meat

The Bansur (Alwar) cluster in Eastern Rajasthan has been selected as one of the watershed project clusters as most of the area is rainfed. The Bansur index catchment (watershed) cluster of RACP is located in Bansur Block of Alwar district, which is about 70 Kms from the district headquarter. The cluster comprises of 18 Gram Panchayats having 36 villages. About 88% farmers belong to small, marginal category and hence, require support for economic upliftment. The project area is characterized by comparatively low and inadequate rains, low availability of soil moisture, poor fertility and soil depth status in some areas. Poor infrastructure development, farmer's low economic status, low literacy and high incidence of migration during drought are the other major challenges in the cluster area. Total population of the cluster is 50168. Out of the total population, 47.43% are female, 14.75% are scheduled caste (SC) and 3.94% are from scheduled tribes (ST).

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The total cultivated area in the cluster is 9168.36 ha, out of which total area irrigated is 67.79% and 32.21% is rainfed. SC farmers are having 4.76%, ST 2.25% & OBC are having 86.79% of cultivated area.

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Soil in the cluster area is shallow to moderately deep, dominantly sandy loam imperfectly drained, moderate to severely eroded and almost flat. The average rainfall of the area is 635 mm which is moderate; still the ground water level is decreasing @1.40 m per year.

Major Kharif crops are Pearl millet (6558.77 ha) & Guar (709.35 ha). Whereas, Wheat (2988.66 ha), Mustard (2807.64 ha) and Barley (368.50 ha) are major crops in the Rabi season. The cluster contributes around 27.11% of Pearl Millet, 18.17% of Guar, 10.47% of Mustard, 15.01% of Wheat and 31.34% of Barley of the total production volume in the district. Bajra, Barley, Mustard and Vegetables crops i.e. Chilly, Tomato & Carrot have been identified for value chain development under the project based on various value chain selection parameters like: surplus production, scope of value addition, industrial value and higher returns with less water requirement to the farmers. Bansur cluster being mostly rain fed, naturally supports goat rearing especially for the small holder farmers. The cluster has substantial goat population (5683) and inclination for goat farming to generate income. The goat value chain is also identified to be supported under project investments. Accordingly, activities enhancing the above potentials are proposed to be implemented in the cluster. It is presumed that success of these technologies would be replicated in the similar areas.

There are four APMCs (Alwar, Khairthal, Khedli & Khed) and one CWC ware house in Alwar district which provides marketing support to farmers and whose services may be leveraged.

The crops in the cluster also face adverse climatic conditions, poor soil conditions, low and scanty rainfall, less adoption of package of practices and less seed replacement rate (SRR). The project would therefore also focus on adoption of package of practices, which would mitigate the adverse factors on crop production, seeing majority of the farmers are small and marginal and highly vulnerable to minor variations in climatic conditions.

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The cluster is classified as a watershed cluster and activities related to soil and water conservation is being implemented by the Watershed Development & Soil Conservation department, while activities related to production are considered by Department of Agriculture, Horticulture and Animal Husbandry (GOR). The activities related to market and value chains will be addressed and implemented by Farmer Producer Companies with the support from the Agri-Business Promotion Facility after their formation. Community mobilization, data collection and technical support to stakeholders will be provided by field level NGOs operating in the cluster.

A total of 300 MTGs for agriculture & horticulture activities, 80 MTGs of goat rearers have been formed in the cluster. The number of Users Groups (UGs) are 50 and 18 Multi Task Associations (MTAs) have been formed. 3-4 Farmer Producer Companies (FPCs) will be formed in the cluster to serve as the platform for undertaking various interventions.

The entire Project Area was categorised based on the nature and characteristics of the area. Based on the catchment area and annual average rainfall, the total yield of rainfall is about 82.14 MCM (simple formula used area x average rainfall). As per ground water study, about 6-18% of rains contribute to ground water, which depend on type of catchment, formation, intensity & quantity of rainfall etc. The Bansur cluster is an under average to bad catchment area , its formation is older alluvium and with about 18% of rainfall, which contribute to the ground water. The adoption of Micro Irrigation System (MIS) can save about 50% of crop water demand. The field and horticulture crops being grown in the Rabi season depend on conserved moisture and ground water. It means 50% ground water may be saved through cultivation on conserved moisture and about 50 of ground water can be saved through adoption of MIS. Total 22.64 MCM ground water is available annually in the cluster and the total draft has to be reduced to 21.45 MCM for maintaining water balance in the cluster.

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Based on the storage table, total expected yield of water would be 3,118,946.90 cum. Out of this, total 16,904.76 cum. water is already being harvested through Tankas and Masonry Nadies and local

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depressions in the cluster. The balance 3,102,042.14 cum could be conserved in areable areas and other activities like construction of Tankas & Masonry Nadies in index catchment.

The Rabi crops can be grown with in-situ moisture conservation and hence crop water requirement of Rabi crops may be reduced to 50%. Keeping in view that 100% area is covered under micro irrigation system, the final crop water requirement would be about 8.813 MCM which would be drafted from ground water against 21.45 MCM available as per the ground water study.

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A scoring intervention-matrix consisting of parameters along with weights has been deployed for prioritisation and selection of commodities/crops for value chain intervention in the cluster. The four important parameters considered include : (A) Existing size of the crop considering cropped area, production and productivity of each crop (B) Potential for value addition (implying scope for increased value addition for local producers and processors) considering price spread until mandi as well as retail level, net profit in production, scope for processing in the state, scope in terms of extent of processing (primary, secondary & tertiary), growth in market demand (C) Risk assessment considering price volatility in the commodity (D) Others considering water requirement. On this basis Bajra, Barley and Mustard have been selected for value chain study and intervention. Some basic interventions for Goat value chain planned under the project are; establishment of two goat milk chilling units, a milk processing and packaging unit, a rural haat and a Rural Technology Center. Horticulture development through various activities like introducing water saving techniques, promoting horticulture crops etc. has also been considered. There is a range of constraints apparently in the value chains leading to lower producers' incomes. These include multiple intermediaries, limited access to market information, limited value added processing units, inadequate capacity building initiatives for members, limited primary and secondary processing facilities, lower productivity and net yield in some crops like barley vis-à-vis wheat, poor awareness in good package of practices, limited storage and primary processing facilities etc.

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To address the issues of improvement of water use efficiency, production constraints, poor access to market management etc. following appropriate investments would be made in the project area:

1. Investment activities/heads in Climate Resilient Agriculture

A. Improvement of water use efficiency:

Since this is the index catchment (watershed), limiting activities of rain water management like construction of contour bunding, water harvesting structures, dugout pounds. Agro-forestry, pasture development including construction of V-ditches, over seeding of grasses etc. would be done to improve the water use efficiency and to increase the productivity of the community/ pasture / government land in the area. In addition to the above some expenditure on farmer's organizations and project management costs would also be done. The total investment on these activities would be around **Rs.956.84 lakh**. The works would be executed on the pattern of Mukhyamantri Jal Swamlamban Abhiyan (MJSA). The Watershed Development and Soil Conservation department is responsible to implement these activities with the support of field staff, community groups and field NGO.

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B. Technology transfer and market led advisory services in:

(I) Agriculture production activities will include (i) Promotion of efficient techniques of irrigation viz. drip and mini sprinklers to increase the irrigation efficiency, improve the productivity and reduce the cost of production (ii) Diversify a portion of the present wheat crop to barley with the aim to improve irrigation water use efficiency and to develop a new value chain crop through demonstration and capacity building (iii) Promotion of farm mechanization to reduce the cost of production (iv) Promotion of seed production to improve the SRR and farmer income (v) Promotion of fodder production to reduce the gap of demand and availability of fodder for animals (vi) Introduction of ICT based extension system for the quick reach of the solutions to the beneficiaries (vii) Establishment of FCSC to encourage the farmer organization of the cluster for their own input arrangement and facilitate value addition and marketing of agro-produce and (viii) Capacity building of beneficiaries to achieve the PDO. An investment of **Rs.1258.04 lakh** would be incurred on these activities.

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(II) Horticulture production activities will include (i) Demonstrations on production technologies for Fruit Cultivation (ii) Demonstrations on production technologies for vegetable cultivation including assistance on green house, assistance on shade net house (iii) Solar Pump Program (iv) Post-Harvest Management (v) Horticulture Mechanization and (vi) Farmers training, Seminars, Exhibition Kisan Mela etc. An investment of **Rs.1870.71 lakh** would be incurred on these activities.

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(III) Livestock Strengthening & Management activities will include:

(i) Improving productivity (milk and weight gain) through investment in breeding, feeding and animal health services (ii) improving market access and local level small value addition (iii) Supporting farmer advisory and training of the farmers, and training of existing Animal Husbandry Department's technical staff and (iv) Project management. An investment of **Rs.913.21 lakh** would be incurred.

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2. Market and value chains activities include:

Market Value Chain and marketing infrastructure will be developed in the cluster with the support from local community. Three crops i.e. Barley, Mustard, Bajra along with vegetable and Goat Value chains are selected for value chain development in the cluster. Accordingly, the Farmer Producer Companies and individual beneficiaries would be supported through (i) institutional cost for functional support, (ii) Value chain FPCs and capital expenditure for individual agri-preneurs. A tentative investment of **Rs.232 lakh** would be incurred during the project period on these activities. The investment is included in Market and value chain component of Agriculture and Horticulture department. The tentative cost of equipment for Goat Value chain development has been planned along with the cost of infrastructure along with that of Rural haat, RTC are included in the Livestock strengthening and management component. The Project Management Unit (PMU) and Agriculture & AH department are responsible to implement these activities with the support of field staff, community groups, ABPF Consultants and field NGOs.

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The intervention plan in the selected commodities in the light of critical constraints may be viewed as follows:

Barley:

#	Constraints	Action
1.	**Production**	
1.1	Productivity is less and variety is not suitable for processing (Malt)	Introduction of new Malt Variety
1.2	Farmers not following recommended package of practices	Farmers training on best package of practices
1.3	Limited identification efforts for farmer leaders (entrepreneurs) and BODS at field level in Barley Value Chain for capacity building.	Soufflet to identify farmers' leaders and these farmers' leaders will be trained by ABPF to be evolved. ABPF to prepare DPR and link these entrepreneurs with bank to get credit facilities. Incubation support to entrepreneurs.
1.4	Banks do not support individual farmers for crop loans etc.	Organise bankers meet with Soufflet; crop bans could also be used to measure input line seed
2.	**Post-Harvest**	
2.1	High dirt content in harvested barley.	Ensure availability of the Cleaning & Grading facility to farmers; ensure 10% higher income accruals to farmers after taking into account the cost of sorting and grading.
2.2	Mostly rain fed crop usually resulting in harvesting of immature grain without water/critical irrigation at time of pod filling. Resulting in small-sized grain	Farmer training, watershed management /sprinkler irrigation, pond + drip option etc. led to be considered.
2.3	During good harvest, prices collapse and hence storage option could help avoid distress sale.	Storage facility with electronic weigh bridge for farmers as part of FCSC/individual unit
3.	**Processing**	
3.1	Not aware of special license option to source directly from farmers /FPCs.	Awareness seminars for processors.

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#	Constraints	Action
3.2	No alternate marketing channel developed for Barley to facilitate crop diversification.	Soufflet to secure Single Purchase License. ABPF to link FPCs/farmers with Soufflet for Barley marketing.
3.3	Inadequate links with farmers for direct procurement.	ABPF to organise BS meet with players like Soufflet, Cargill etc.
3.4	High cost of procurement due to taxes like mandi tax and VAT	ABPF to work on policies for ease of procurement. Policy Support for value chain players like Soufflet
3.5	Inadequate capacity building programs on Market led extension services and weds	ABPF to organise capacity building program for farmers with market leaders like Soufflet

Bajra:

#	Constraints	Action
1.	**Production**	
1.1	High production cost due to cost of seed and Agri input requires like fertilizer pesticides etc.	Pooled procurement through FPCs to reduce cost of inputs and ensure quality inputs.
2.	**Post-Harvest**	
2.1	Moisture content of harvested Bajra is high, because of that farmers get less price.	To make Framers aware about market price of bajra proportionate to moisture content, making availability of moisture meters in FCSC
2.2	High dirt content /foreign material in harvested millet	Ensure availability of the Cleaning & Grading facility to farmers; usually in 10% higher income accural to farmers.
2.3	Lack of market information related to price	Price discovery through NCDEX, eNAM
2.4	5 / 11 quintals/acre in poor/good harvest. During good harvest prices Collapse and hence storage option could help and distress sale.	Storage facility for farmers as part of FCSC
3.	**Processing**	
3.1	Not aware of special license option to source directly from farmers /FPOs	Awareness seminars for farmers/Processors
3.2	Limited processing products are available in bajra	Promote handmade Namkeen bajra product
3.3	Lack of proper Product marketing	Awareness on Product Branding
3.4	Processor not aware of schemes of the GoI Including CLCSS, cluster Development scheme or “Sampada” for technology upgrading	Awareness seminars for processors

Mustard:

#	Constraints	Action
1.	**Production**	
1.1	High cost of inputs including seeds, fertilizers and pesticides	Pooled procurement through FPCs to reduce cost of inputs and ensure quality inputs.
1.2	Farmers not following recommended package of practices	PC to undertake custom hiring services & lead to farm mechanization
2.	**Post-Harvest**	
2.1	Inadequate storage facilities leading to post harvest losses and distress sale during bumper harvest	Establishment of storage facilities by PC as a part of FCSC
2.2	Large no. of intermediaries in the value chain leads to low producers income	FPC to undertake bulk supplies to large processors.
3.	**Processing**	
3.1	Limited processing units for mustard and its by products such as mustard oil unit, mustard paste and sauce unit, etc.	Facilitate start-ups in secondary processing from amongst PCs or individual entrepreneurs and start ups

Horticulture value chain:

S.no	Constraints	Action
1.	**Production**	
1.1	High cost of inputs including seeds, fertilizers and pesticides	Pooled procurement through FPCs to reduce cost of inputs and ensure quality inputs.
1.2	Farmers not following recommended package of practices	Provide sprinklers, green houses, poly house. Provide improved root stock, solar water pumps etc. PC to undertake custom hiring services & lead to farm mechanization
2.	**Post-Harvest**	
2.1	Inadequate storage facilities leading to post harvest losses and distress sale during bumper harvest	Establishment of mini cold storage
2.2	Large no. of intermediaries in the value chain leads to low producers income	FPC to undertake bulk supplies to large processors.
3.	**Processing**	
3.1	Non-existence of community processing units	Establish primary processing like sorting, grading by establishing pack house. Establish processing units for ketchup and solar dehydration unit for vegetables

Goat:

#	Constraints	Action
1.	**Production**	
1.1	Non availability of good variety of goats	Distribution of good variety goats
1.2	Health issues of animals	Animal health services through AH Department
1.3	Nutrition issues of goats	Farmers to be made aware of improved feed practices through traiing from AH department
1.4	Non availability of updated technology on animal rearing and management	Establishment of Rural technology Centre (RTC)
2.	**Post harvest**	
2.1	Entire supply channel of live animals to market captured by multiple level of middlemen	Establishment of Rural hat Promoting FPO operating from rural hat
2.2	Milk channel not well developed	Establishment of chilling units, milk processing and value addition facility. FPC to take up milk marketing units

Total Investments in Bansur Cluster

A total investment of Rs.5232.73 lakh is proposed to be incurred in the cluster during the project period to make the farmers and cluster competitive and realise improvement in water as well as agricultural productivity and better market access. A summary table of the total investment is shown below:

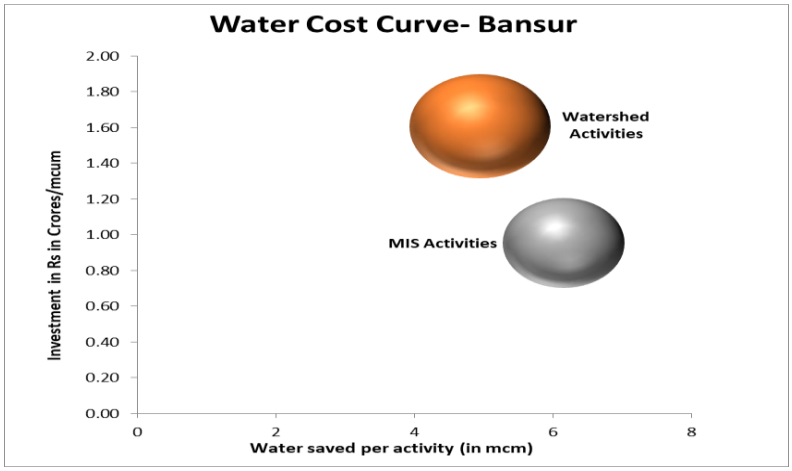
S. No.	Department	Components (Rs. Lakh)				
		Climate Resilient Agriculture	Market & Value Chains	Farmer's Organization and Capacity Building	Project Management and M&E	Total
1	Watershed Development & Soil Conservation	917.44	0	19.4	20	956.84
2	Agriculture	1102.48	232	148.13	9.36	1491.97
3	Horticulture	1,823.71	0	36	11	1870.71
4	Animal Husbandry	609.46	230	54.2	19.55	913.21
	Total	**4,453.09**	**462**	**257.73**	**59.91**	**5232.73**

The above table reveals that total investment amounting to **Rs.5232.73 lakh** would be incurred during the project period by March 2019 against activities related to improving water use efficiency, technology transfer and market led advisory services, livestock strengthening & management, market & value chains, farmers organization and capacity building, project management, along with monitoring & evaluation to make the cluster's farmers and production competitive to increase water and agricultural productivity.

Out of the total investments, 85.10% would be incurred on the first component, i.e. Climate Resilient Agriculture, 8.83% on Market and Value Chains, 4.93% on Farmers Organization & Capacity Building and 1.14% investments would be incurred on 4th Component i.e. Project Management & M&E.

The comparison of investment (in Rs crore per mcm) is a useful tool for assessing data to understand the relative effectiveness and cost of the full spectrum of approaches to improving water security. When coupled with realistic assessments of operational risk, such comparisons can also help policy makers and investors to improve water-sector productivity.

In the case of Bansur cluster, there are majorly two water saving activities taking place viz activities of Watershed department and the micro-irrigation system (MIS) activities of Agriculture and Horticulture department. Both these activities save water up to the extent of 3.76 mcm and 8.25 mcm. When the investment per unit of water saved is calculated, it is found that MIS activities are able to conserve more water at lower investment of Rs 1.09 crore per mcm of water saved. Thus, it could be said that MIS activities like installation of drips and sprinklers for the agricultural and horticultural crops has far reaching impact in the span of a year.



Activities undertaken to save water	Water saved- in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	3.76	2.44	9.174
MIS Activities	8.25	1.09	8.997

Out of above investments, about **8285 households** will be benefitted indirectly and about **3129 households** will be benefitted directly and will lead to at least 5% increase in productivity and considerable increase in gross margin of the target community. Additionally, the community institution building and infrastructure created will benefit the much larger population in a sustainable way even after the project period. It is also expected that the best learning will be replicated in a similar area to benefit the farming community on larger scale.

Summary of overall benefits:

1. Reduced cost of cultivation – 5%
2. Productivity improvement – 5%
3. Improved market access - 15%
4. Overall targeted benefit – 25%

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Chapter – 1: Context and Background

The World Bank has approved credit amounting to Rs.832.50 crore for development of 17 clusters, each having area ranging from about 10,000 ha to 31500 ha in eight agro-climatic zones across the Rajasthan to provide end to end solution to farmer's problems in three main water regimes namely Canal Water/rain-fed, surface/canal water and ground water, having some specified desired selection criterion.

The Project Development Objective (PDO) is to establish the feasibility of sustainably increasing agricultural productivity and farmer incomes through a distinct agricultural development approach by integrating agriculture water management and agricultural technology, farmer organizations and market innovations in selected locations across the ten agro-ecological zones of Rajasthan. The aim is for the state to help farmers get more rupees per unit of water in compensation for farmers using fewer units of water.

The guiding principles i.e. (a) sustainable and efficient use of water resources, including improved on-farm water use efficiency, reduced water-intensive cropping patterns, and using the resultant savings of water from agriculture sector for economic purposes outside of agriculture in support the state's water policy objectives; (b) increased private sector participation in the development of value chains in processing and marketing in support of the state's agro-processing and agri-business policy; and (c) improved public sector capacity in delivering agriculture support services are to be ensured through the investments.

The Key performance indicators (KPIs) (a) reduction in water used in agriculture; (b) increase in water use efficiency in agriculture; (c) increase in agricultural productivity; (d) increase in gross margins from crops and livestock products; (e) increase in the share of producer price in wholesale price; and (e) farmer satisfaction with project deliverables will also be measured under the project.

There are four components under the project: Component 1: Climate Resilient Agriculture; Component 2: Markets and Value Chains; Component 3: Farmer Organization and Capacity Building; and Component 4: Project Management, Monitoring and Learning. Implementation of the four components will take place over the project period and across selected clusters in the state. The project will be taken up in seventeen (17) clusters across the eight agro-ecological zones (AEZ) and would implement a location-specific menu of approaches and interventions would be discussed in the CACP. Each cluster will have a defined theme and demonstration objectives and accordingly cluster specific menu of investments are to be proposed for implementation in the cluster during the project period.

After restructuring the project, it was decided that planning and implementation of the project would be done by line departments in place of Service Providers (SP) as decided at the time of signing of the agreement and community mobilization at cluster level would be done with the support of Field NGOs. Dy. Director Agriculture, Jila Parishad, at district level has been designated as District Project Manager and his office has been designated as office of the District Project Management Unit (DPMU). All concerned offices of the line departments at district level would be Project Implementation Agencies for planning and implementation of project activities in the cluster. There is District Level Implementing Committee (DLIC) will be responsible for coordination and implementation at district as well as at cluster level. District Collector is

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chairperson of the committee, DPM, DPMU is member secretary and other district level officers / PIAs of the line departments are the members of the committee.

1.1. Brief Description of the CACP

The Cluster Agricultural Competitive Plan (CACP) is primary requirement of the cluster to be developed keeping in mind Project Development Objective (PDO). The CACP is divided in to eight chapters and whatever discussed in the chapter is being summarized as under:

First chapter includes context and the background, brief description of the CACP, objective of the RACP and rationale for selection of the cluster.

Second chapter consists of description of the cluster in terms of spatial characteristics, agro ecological characteristics, demography of the cluster, agriculture characteristics that includes agronomy, horticulture, Micro Irrigation Systems and Seed Replacement Rate. Further there is a description on livestock scenario in the cluster and market infrastructure that can have impact on the cluster.

Third chapter discusses the strategic contexts of choosing the Value chain crops for Bansur cluster. The scoring matrix designed to select the value chain crop has been detailed out along with the parameters for the same. Thereafter, the inference is drawn from the scoring model in order to finally select the major value chain crops. Then the current marketing channels of the selected VC crops have been described. Similarly goat value chain has been discussed in the present context of the Bansur cluster with respect to goat milk, meat, leather, illustration of organized market channel and fodder requirement for the same.

Forth chapter includes Opportunities and challenges in selected value chain/s along with summary of selected value chain crops that includes the constraints for the crops and the possible interventions.

Fifth chapter is related to the value chain investments to be done in the cluster under production and market and value chain sub component which includes rationale for these investments, non-water-use interventions in value chain, investments related to technology transfer and market led advisory services (agriculture & horticulture), livestock strengthening & management, interventions in market & value chains, value chain studies of identified commodities in the cluster of selected crops in the cluster, scouting of technologies and business ideas for such identified commodities, incubation services to agri-entrepreneurs, management and business training to FCSC and producer companies personnel, facilitating agri policies, linking producers groups to market, market infrastructure and reference business models of selected value chain crops, training and capacity building, market information services, cost estimate of investments, summary of proposed investments, brief description of implementing arrangements.

Sixth chapter is discussing about rain water management of the cluster to develop selected commodities as a pilot which consists description of watershed cluster, water budgeting including hydrological cycle, water budgeting exercise for the project area, water budgeting for the project area, calculations, objectives of the water management in watershed cluster, proposed activities in the watershed cluster including studies/Field Surveys, institutional activities, trainings, watershed development activities to be implemented, site specific plan & cost estimates of the activities, estimated cost of Investments under watershed management, implementation arrangement for all the planned activities in the watershed Area.

Seventh chapter includes social and environmental assessment of the proposed activities: social assessment of the proposed activities, the social assessment exercise has highlighted the following key social safeguard and social development issues, social inclusion strategies, social management plan under RACP and environment assessment of the proposed activities - environment management plan for crop intensification, environment management plan for water harvesting and water management, environment management plan for livestock management activities, environment management plan for value chain activities, training plan for implementation of

environment management plan (EMP), objective of training plan, training type, target groups & frequency.

Eighth chapter is consisting department and component wise consolidated investments plan to be incurred in the cluster.

The Cluster Agricultural Competitive Plan (CACP) is consisting of investments to be made on improving water use efficiency, technology transfer and market led advisory services in agriculture & horticulture development, livestock strengthening and management specially for small ruminants, market and value chains in the cluster.

1.2. Objectives of the CACP

The Cluster Agricultural Competitive Plan (CACP) is the outcome of a planning process that aims to (a) identify opportunities as well as constraints towards developing one or two or more value chains in which the community deem themselves to have a potential competitive advantage and to (b) select from a list of eligible project investments and within the funding constraints of those public investments that will enable the community to address constraints and enhance opportunities towards establishing identified value chains. The value chain proposed would envisage addressing broad sub-sectorial issues as well as help establish specific partnership arrangements between farmer groups or producer organizations with agribusiness companies.

1.3. Rationale of selection of the cluster

Keeping in view the principles of cluster selection, the Bansur cluster has been selected to achieve the Project Development Objective. The Bansur cluster is a watershed cluster which is a hydrological unit. The Bansur watershed cluster is selected in the IIIrd B Agro-climatic Zone (Flood Prone Eastern Plain). Bansur is a small tehsil headquarter of Alwar district located about 15 Km from Kotputli town on Jaipur-Delhi National Highway. The Bansur Cluster (Rainfed - Watershed) in Alwar district has been selected under the Project after undertaking various field visits by the PMU coordinators and having consultations with officials of the WD & SC Department, Jaipur & Project Manager, and WCDC cum Ex. En. (Land Resources), Zila Parishad, Alwar and interactions with the local community, following un-treated area as per details provided by the WD&SC Department have been identified. Nodal Department i.e. Watershed Development & Soil Conservation, Government of Rajasthan has agreed for taking up this area under RACP cluster. This was approved from the competent level.

The area is predominantly rich in agriculture and livestock rearing. The average rainfall of this cluster area is approximately 635 mm in this district. Total cropped area is about 14243 ha, out of which 8115 ha is cultivated in Kharif, 5878 ha in Rabi and 250 in Zaid seasons. Bajra crop is sown in 7235 ha & Guar crop is sown in 880 ha. In Rabi season Mustard is sown in 3540 ha, wheat in 1785 & Barley in 553 ha. Only 250 ha area is sown in Zaid crop. This makes a total cropping intensity of 156.09%. The above crops are sown in the cluster are dominant crops in the district. So, surplus production is generally available in the area.

The yield of pearl millet is being sold through unorganized local market and mandi of Kotputli and Alwar. Most of the produce of pearl millet is being used as cattle feed, hence looking to the considerable livestock population of Alwar district, there is a significant scope of value addition in this crop. Apart from this, the area being sown under this crop would be diversified into cultivation of high pay off crops i.e. horticultural crops.

In view of the major area under Mustard crop in Rabi season and scope of Barley as alternate crop looking to the possibility for malting, it would be selected as value chain crop.

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Although, there is no significant plantation of Horticulture/fruit at present, the availability of fertile land and good quality water along with the proximity to the National Capital Region (NCR) provides immense opportunity for cultivation of vegetables, herbs, flowers and also fruits. The project area has substantial production of carrot, tomato and Chilli. The area is fairly suitable for fruits like Guava, Beal, Lemon, Pomegranate etc.

As dairy is quite successful business in the cluster, cultivation of fodder crops has an important place in the cropping pattern of the local farmers. Similarly, Goat rearing is quite popular in this area. About 9246 goats are available in the villages of the cluster so there is a significant scope of value chain of goat meet. There is about 66298 goat population in Bansur tehsil. Basically, there is a breed locally called "Battisi" along with another breed which is a cross of Sirohi and Jamunapari breeds

Looking to value chain crops the availability of fertile land and good quality water along with the proximity to the National Capital Region (NCR) provides enough opportunity for cultivation of vegetables, herbs, flowers and fruits, as well as scope of value chain in goat meat production therefore Bansur is the appropriate cluster to be developed under RACP.

Chapter – 2: Description of the Cluster

2.1. Spatial characteristics

Bansur watershed cluster is located in Bansur Block of Alwar district. The project area is located between the latitudes 27.55^0 N to 27.78^0 N and longitudes 76.28^0 E 76.33^0 E.

2.1.1. Current Status of connectivity:

The maximum distance of the cluster is 15 km from Bansur block headquarters and 70 Km from the Alwar district headquarters. The area of the cluster is spread over 18 Gram Panchayats and 36 villages

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It is located in the National Capital Region about 155 km from Jaipur and around 150 km from Gurgaon.

2.2. Agro-ecological characteristics

Agriculture is the chief contributor towards the economy of the district. Alwar occupies an important place in the agricultural production of Rajasthan state. It falls in Agro-climatic zone IIIA i.e. Flood Prone Eastern Plan. The total geographical area of the district is 7,83,281 hectares which is about 2.29 per cent of the state.

2.2.1. Soil Types

The soil of the Project Area is shallow to moderately deep, dominantly sandy loam, dark yellowish brown in colour, imperfectly drained, and moderately to severely eroded. Topography of the Project Area is almost plain and majority of the area falls in the slope up to three per cent. The soil profile of the project area is summarized as under:

Table 11: Soil Profile of Bansur Cluster

S. No.	Major Soil Classes	Area in hectares
1	Sandy loam	12935.00
	Total	**12935.00**
Soil Depth		
	Depth (cm)	**Area in hectares**
1	0.00 to 7.50	1163.14
2	7.50 to 45.00	7184.76
3	> 45.00	4587.10
	Total	**12935.00**

(Source: Watershed DPR, Bansur**)**

The Soil fertility level of the Project Area is presented as under:

Table 22: The Soil fertility level of the Project Area

Soil fertility Status	Kg/ha	Recommended
N	0.32	0.62 – 0.91
P	29.50	23.00 – 55.00
K	350.00	141.00 - 334.00

Soil fertility Status	Kg/ha	Recommended
Micronutrients	PPM	Recommended
Zn	2.4 ppm	0.5 ppm
Fe	3.44 ppm	4.5 ppm
Cu	1.64 ppm	0.20 ppm

(Source: Watershed DPR, Bansur**)**

The above table reveals that the soil of the project area is good and status of fertility of the area is also good Even then, soil testing based application of nutrients need to be promoted in the area to maintain soil fertility fairly for achieving desired crop productivity.

2.2.2. Ground Water

Hydrogeology

Ground Water department is monitoring three wells in the Cluster Area. The Pre-Monsoon depth to water varies from 27.85 mts to 34.80 mts below ground level and Post-monsoon depth to from 24.20 mts to 34.40 mts.

During Pre-monsoon period in the long term, declining trend of ground water levels of 1.48 m/year has been observed in Pre-Monsoon period where as declining trend of 1.40 m/year in ground water levels of Post-Monsoon period has been noticed in the Cluster Area. Increased ground water draft to meet the increased demand of agriculture sector is the main cause for declining trend of ground water levels.

Existing Gross Ground Water Draft of 35.27 MCM for Irrigation are withdrawn through 2351 wells/Tube wells for irrigation purposes in the Bansur Cluster area.

Existing Gross Ground Water Draft of 1.46 MCM for Domestic purposes are withdrawn from Wells/Tube wells/Hand pumps.

Ground water potential of Bansur cluster area block Bansur, Alwar district has been estimated as on 31.03.2013 on the basis of GEC-97 Guidelines. Net Annual Ground water availability as on 31.03.2013 was 22.64 MCM.

Stage of ground water development in the Bansur Cluster area as on 31.3.2013 is 162.22%, which indicates that the scope of ground water development for Irrigation purposes is already exhausted. The Bansur Cluster area is coming under Over-Exploited.

In Critical areas and Over-Exploited areas there should be intensive monitoring by an accurate measurement of ground water extraction in the aquifer. Evaluation and future ground water development are linked with water conservation measures as well as efficient on farm water usage so that the present Draft for irrigation to be reduced to 21.45 MCM bringing a balance between water recharge and extraction over time for Sustainable Ground Water availability**.**

Based on the above data, the ground water level is decreasing @1.40 m per year and currently 35.27 MCM is being drafted for agriculture use and 1.46 MCM for domestic use. Total ground water is available 22.64 MCM annually in the cluster and the total draft has to be reduced to 21.45 MCM for maintaining water balance in the cluster.

2.2.3. Rainfall Pattern

This region falls under semi-arid climate. Winter season is observed between November to February months followed by summer season extending till June. July to September is the period in which rainfall occurs.

The climate of Bansur cluster is semi-arid, winters are chilly with fog enveloping the whole area. Summers are characterized by high temperatures (between 40^0 - 47^0) and rainfall is scanty with an average annual rainfall of 635 mm.

The identified project area falls under the Indian Metrological Department (IMD) Station named Bansur (Alwar) which is also the Tehsil headquarters at Bansur.

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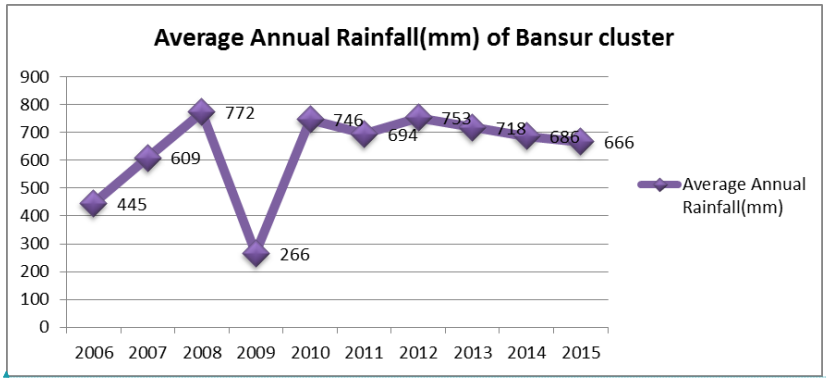
Figure 11: Average annual rainfall for in last 10 year decade – Bansur Cluster



Field Code Changed

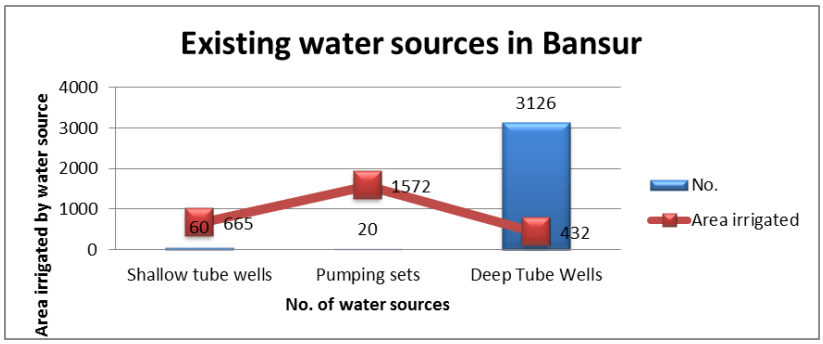
The average rainfall of the cluster area is 635 mm which is to be used for calculation of water budgeting and other similar aspects. (refer: Annexure 2.2)

2.2.4. Source of Irrigation

Rainwater is the main source of water which requires for crop production in Kharif season. Rainwater is also the main source of ground water recharge in the cluster. In Bansur cluster the main source of irrigation is ground water which is mainly used in Rabi season. The source (method) of ground water/extraction and related details as well as area irrigated is being summarized.

An area of around 2668 hectares of Bansur Cluster is being irrigated by 60 tube wells, 20 pump sets and 3126 deep tube wells. (Refer Annexure 2.3.):

Figure 22: Existing water sources of Bansur and Area covered

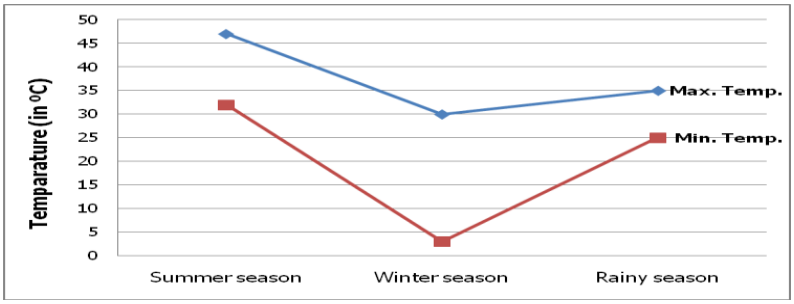


Source: Watershed DPR, Bansur

2.2.5. Temperature

The temperature during the summer (from April to July) reaches to as high as 46ºC. Hot wind commonly known as "*Loo*" blows in the months of May-June. On the other hand, winters have sunny and pleasant days and bitterly cold nights. Temperature can touch a low level of around 4º C, mostly during the nights.

Figure 33: Maximum and Minimum Temperature – Bansur



(Source: Watershed DPR, Bansur**)**

In summer the temperature goes upto 48ºC. the lowest temperature measured in winter season in 4ºC.

2.3. Demographic Characteristics

The villages falling in the Project Area are characterized by low and undependable rain. Ground water is the only source of irrigation, poor infrastructure development, low literacy and high incidence of migration during times of drought.

2.3.1 Population

The total population of the cluster is 50168. Out of the total population female population is 47% and Schedule Caste (SC) population is 15 % and 4% is of Schedule Tribe (ST) category. Similarly, 88% are small, marginal, landless, and BPL category farmers as indicated in the following table. During implementation of project activities, the involvement of household who are from lower backward and other weaker classes have to be ensured.

Table 33: Population Details

Male	Female	Total	SC	ST
26372	23796	50168	7401	1979
53%	47%	100%	15%	4%

(Source: Watershed Deptt & consultation with support agencies)

Table 44: Household Details

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
359	1711	3570	2004	1000	8285	857	214
4%	21%	43%	24%	12%	100%	10%	3%

(Source: Watershed Dept. & consultation with support agencies)

The above table reveals that most farmers are either small, BPL or marginal farmers. Large farmers account for 12.07% of the population. It means nearly 88% farmers require extensive support for upliftment.

Commented [EWB11]: This also means that RACP should avoid benefits transfer to the large farmers (12% of the households). This is targeting!

2.3.2. Socio-economic condition of the cluster

The poor source of irrigation, poor for infrastructure development, low literacy levels and high level of migration are predominantly observed during times of drought. In the cluster development indicators of the project area may be summarized as under:

Table 55: The development indicators of the project area

S. No.	Development Indicators	Rajasthan State	Project Area
1	Per capita income (Rs.)	3500	3050
2	Poverty ratio	70%	81%
3	Literacy (%)	56%	53%
4	Sex Ratio	1000:926	1000:902
5	Infant mortality rate	6.50%	6.50%
6	Maternal mortality ratio	4.50%	4.50%

(Source: Watershed DPR of Bansur Cluster)

The above table indicates average socio economic conditions of the cluster. However, per capita income of the project area is less than the state average of Rs. 3500. Although the poverty ratio and sex ratio are more than the state average, literacy levels are less than the state average. The infant mortality rate and maternal mortality ration is at par with the state average in the Bansur cluster. Basically, all these parameter needs to be favourably elevated in the project area through development.

2.4. Agriculture-related characteristics

2.4.1 Cropping Pattern of Agricultural Crops

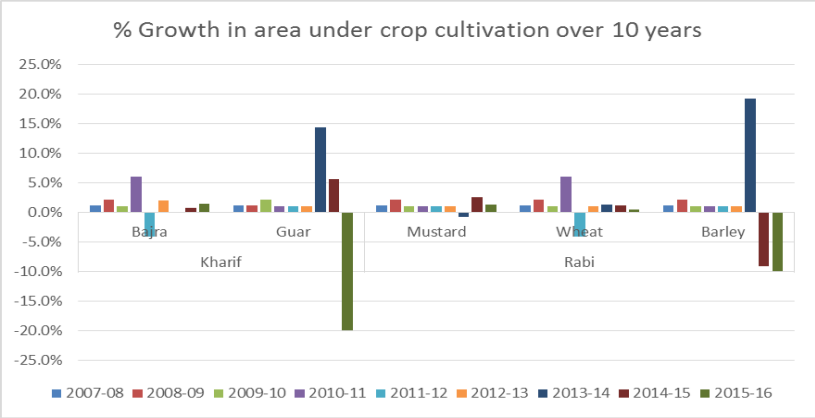
A number of crops are grown in Alwar district. In the Kharif season, Pearl Millet (Bajra), Maize, Sorghum (Jowar), Kharif pulses, Pigeon Pea (Arhar), Sesamum (Til), Cotton, Cluster Bean (Guar) etc. are sown in about 3,29,088 hectares (42 per cent). In the Rabi season Wheat, Barley, Gram, Mustard, Rabi pulses etc. are cultivated in about 4,52,527 hectares (58 per cent).

There is slight deviation in cropping pattern in Kharif crops over 10 years in the state as well in Alwar district, only about 5.36% area has increased in Pearl Millet crop the district. This increase is due to good rains and diversification of farmers from Sorghum & other crops. In Rabi crops the cropping pattern is almost constant and deviation (increase & decrease) is ranges from (-) 3.95% in Mustard to 5.84% in Wheat crops. This deviation depends on conditions of the rains, demand & supply, market rates. However, it can be said that there is no significant change in the cropping pattern.

From the cluster data of past 10 years, an analysis has been represented below through graphs on Area in Ha and Productivity in Kg/Ha.

Figure 44: Percentage Growth in area under crop cultivation over 10 years

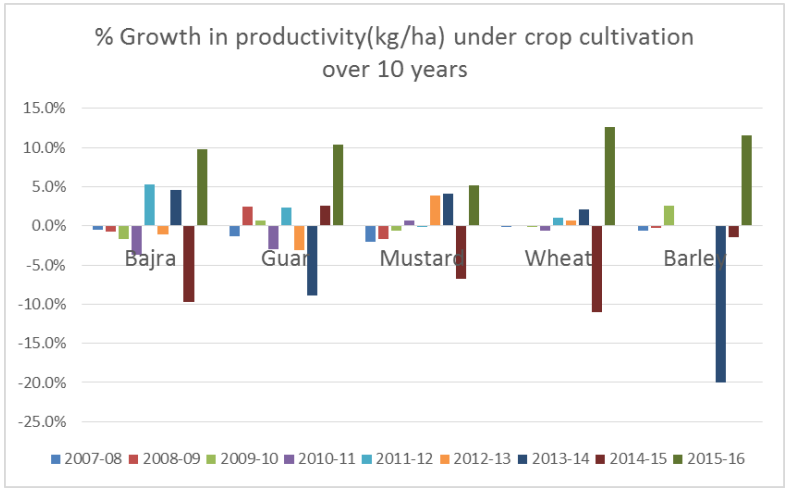
Commented [EWB12]: These data are also useful for developing a targeting strategy.



Source: GT Analysis

In the cluster, it is highly evident that Bajra is predominant crop in Kharif season. Guar is also cultivated in the cluster but the area under cultivation has drastically declined last year. Wheat and Mustard are the major crops of Rabi season with a trend of growth in area. Barley is also an emerging crop which has shown a surge in 2013-14 but has declined in last 2 years. This is primarily due to emergence of a high number of large processors of Barley in the district Alwar.

Figure 55: Percentage Growth in area under crop cultivation over 10 years



Source: GT Analysis

It can be seen from the above graph that productivity has not changed for past 10 years. Bajra, Mustard and Wheat have seen a major dip in productivity in 2014-15. 2015-16 has been a good year as all the commodities.

The cropping pattern is almost constant over the last 10 years in state as well as in district is because these crops are well accepted by farmers of the area. If there is any increase/decrease or any deviation in cropping pattern it is due to delayed rains or excess rains or good rains. Sometimes crops dry up due to scanty rainfall or monsoon closing before time. In such circumstances crops could not ripen and harvested properly affecting productivity. In 14-15, there was a dry spell & productivity was affected in all the crops.

Overview of the crops identified in Bansur Cluster

Since the Bansur cluster lies in the Panchayat Samiti, nomenclature of the cluster is based on the name of the Panchayat Samiti Bansur of Alwar district. The cluster has been selected based on the watershed approach. Therefore, improvement in water use efficiency would be achieved through watershed management. Agriculture and Horticulture productivity would be increased by the way water is saved through conservation measures to be adopted/constructed in the cluster. As far as cluster area is concerned, total area is 12935 ha and a total 36 villages falling in 18 Gram Panchayats are situated in the cluster. The cluster consists of 3 macro watersheds and 19 micro watersheds.

Category wise Cultivated Area in Bansur Cluster

Using remote sensing and Geographical Information System (GIS) and Participatory Rural Appraisal (PRA), the irrigated and rainfed area has been assessed. The category wise cultivated area in Bansur cluster is summarized in Annexure 2.1

About 87.93% farmers are marginal, small, landless or BPL farmers. Only about 12.07% farmers are large in Bansur cluster. Out of the total cultivated irrigated area, more than 60.50% area is with other than large farmers. Similarly, out of the total cultivated area, 32.21% is rainfed & 67.79% irrigated area is either with marginal, small farmers. Out of the total cultivated area, 86.79% cultivated area is with farmers from OBC category followed by General 6.20%, Schedule Caste 4.76% and Schedule Tribe farmers 2.25%.

The total irrigated area is only 67.79% of the total cultivated area and out of it 40.96% irrigated area is with small farmers followed by large, BPL & marginal farmers. The rainfed area is 32.21% and out of it 18.22% area belongs to small farmers followed by marginal, large and BPL farmers.

Commented [EWB13]: Actually, 68.11% is quite good for current irrigated area.

Status of Cropped area of Agricultural Crops in Bansur cluster

As discussed earlier, the major field crops of Kharif are Pearl-millet (Bajra) and Guar whereas Wheat, Barley and Mustard are important crops in the Rabi season in the cluster. Irrigation is provided in kharif during the dry spells wherever irrigation facilities are available.

The data given in Annexure 2.4 clearly show that there is not much deviation in cropping pattern in Kharif as well as in Rabi crops. The increasing trend is clearly evident in all crops in both the seasons from 0.79% to 7.50% in Kharif crops and 0.41% to 3.42% in Rabi crops over the year 2006-07 in the Bansur cluster. Kharif crops are sown in 56.18% area whereas Rabi crops are sown in 47.65%. The data reveals that the above crops being grown in the cluster are very much established in the cluster, and based on the field study, industrial value and crop water requirement, Pearl Millet in Kharif, Barley and Mustard in Rabi crops have been selected for value chain development.

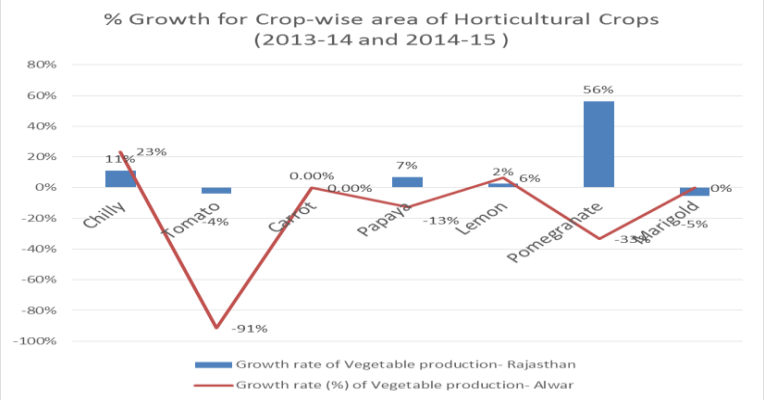
2.4.2 Cropping Pattern of Horticultural Crops

Under horticultural crops the area is very low in comparison to agricultural crops. Nevertheless, because of its proximity to NCR the area under horticultural crops i.e. fruits, vegetable and flower crops is increasing also due to the efforts made by the concerned department.

Year and Crop wise area of horticultural crops in Rajasthan and Alwar district

The area under horticultural crops has also been summarised. The state level data is available only for the years 2012-2013 to 2014-2015 and district level data is available only for two years i.e. the year 2013-2014 & 2014-15 from Agriculture department. The available data is summarized as under (refer Annexure 2.4)

Figure ~~66~~: Percentage Growth in area under Horticultural crops cultivation over 10 years



The above graph reveals that the available information for the district is not very encouraging. However, looking to the scope of marketing and potential and facility of the cluster as it lies in the vicinity of National High Way and National Capital Region (NCR) there is apparent scope. The data also reveal that looking to the potentiality of the area sufficient effort has not been made in the district as well as in the cluster to promote horticulture development.

Crop wise area of Horticultural crops in Bansur Cluster

The area under horticultural crops in Bansur cluster is not significant however, some area has been reported during past year's which is being summarized as under:

Figure 77: Crop wise area of Horticultural Crops in Bansur Cluster (2016-17)

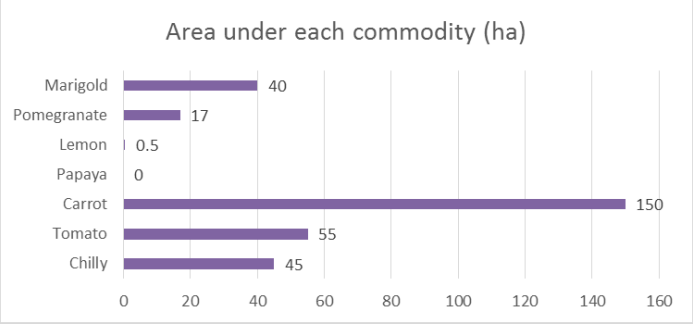


Table 66: Area under horticultural crops in Bansur cluster

Crops	Area (ha)	%age of Area
Chilly	45	0.49
Tomato	55	0.60
Carrot	150	1.64
Papaya	0	0
Lemon	0.50	0.01
Pomegranate	17	0.19
Marigold	40	0.44
Total	**307.50**	**3.37**

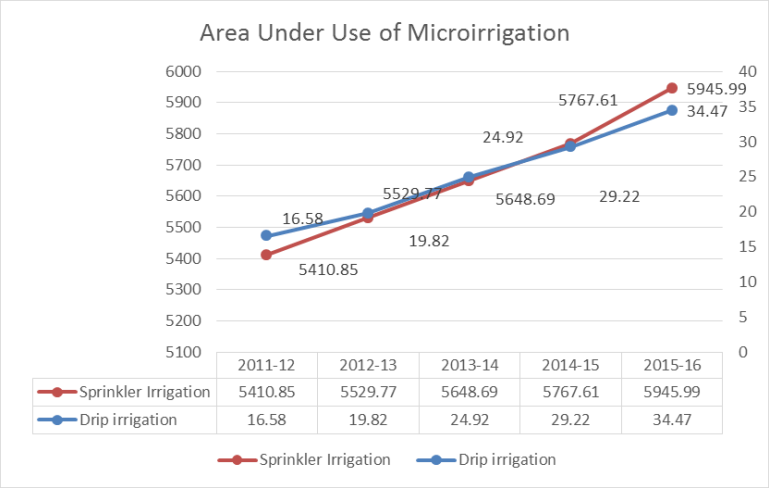
(Source: Horticulture department, Bansur)

The above table clearly shows that the areas under vegetables, fruits & floriculture crops are very low at about 3.37% of total agriculture land. However, there is considerable scope to increase area under these crops i.e. (vegetables: Chilly, Tomato, and Carrot and fruits: Pomegranate, lemon and Papaya as well as flower crop: Marigold) and diversification from food grain crops to horticultural crops as well as if it is done, the economic level of farmers could be upgraded during the project period.

2.4.3 Adoption Trend of Use of Micro Irrigation Methods in Bansur Cluster

Data has been compiled on adoption trend of use of micro irrigation methods in the Bansur Cluster during the Participatory Rural Appraisal (PRA). The area covered under drip and irrigation method for 5 years from 2011-12 to 2015-16 is summarized hereunder (Annexure 2.5)

Figure 88: Area under use of micro-irrigation (Sprinkler and Drip for last 5 years)



The graph above reveals that adoption support of micro irrigation methods is very slow in the cluster which ranges from 1.34% increase in 2012-13 over 2011-12 and 2.01% during 2015-16 over 2014-15. Total area under drip irrigation is very less which ranges from 0.18% in 2011-12 to 0.38% in 2015-16, whereas significant area under sprinkler irrigation is covered, which ranges from 59.48% in 2011-12 to 65.54 in 2015-16. It shows that more than 50% of agriculture area is covered under micro irrigation system but the increasing trend is very low which need to be enhanced during the project period. Micro irrigation systems play a very important role in increasing on farm irrigation efficiencies and up to 75% irrigation water can be saved in the cluster. Based on the data, there is apparently scope to invest significant amounts on these methods as crop demonstration and hence 100% farmers can adopt these methods and can play a significant role in increasing on farm irrigation efficiency in the cluster.

Commented [EWB14]: This indicates that achieving the expected reduction in groundwater draft for irrigation will require a shift from sprinkler to drip irrigation.

Commented [EWB15]: Does the CACP budget permit 100% MIS coverage?

Crop Water Requirement and Source

The Crop Water Requirement of crops being grown in the Bansur cluster is being summarized in Annexure 2.6

The data shows that the total cropped area is proposed to be increased to 15748.93 ha. Out of this an area of 1311.75 ha is proposed to be increased in Kharif and an area of 446.75 ha is proposed to be increased under Rabi, Zaid and horticultural crops. This area is proposed to be increased due to creation of additional water sources in watershed area and use of micro irrigation system.

As discussed elsewhere that Based on the above data, the ground water level is decreasing @1.40 m per year and currently 35.27 MCM is being drafted for agriculture use and 1.46 MCM for domestic use. Total ground water is available 22.64 MCM annually in the cluster and the total draft has to be reduced to 21.45 MCM for maintaining water balance in the cluster.

Here one thing is very significant to see here that estimated proposed crop water requirement is 34.38 MCM as per table no. 33 and 0.30 MCM is need to be required for domestic and drinking purposes so total 34.68 MCM is to be required in the cluster in normal conditions.

The contour bunds and peripheral bunds which are proposed to be constructed / established in the cluster are likely to provide in-situ moisture of 1991842.67 cum for additional area to be sown.

Water Budgeting and Water Balance

Based on the above data, the ground water level is decreasing @1.45 m per year and currently 35.27 MCM is being drafted for agriculture use from 2351 wells/tube wells and 1.46 MCM for domestic use. Total ground water is available 22.64 MCM annually in the cluster and the total draft has to be reduced to 21.45 MCM for maintaining water balance in the cluster

The entire Project Area was categorised based on the nature and characteristics of the area. Total catchment area is 12935 ha and annual average rainfall is 635 mm of the area. Based on the catchment area and annual average rainfall, the total yield of the rainfall will be about 82.14 MCM (simple formula used area x average rainfall). As per ground water study, about 6-18% of rains contribute ground water, which depend type of catchment, formation, intensity & quantity of rainfall etc. Bansur cluster is under Average to bad catchment and its formation is older alluvium and rainfall is also good in the area so about 18% of rainfall, which contribute to the ground water. It means 14.78 MCM rainwater will contribute ground water. In addition, soil moisture would also be available repeatedly and fulfil the crop water requirement of Kharif crops. As discussed, the adoption of Micro Irrigation System (MIS) can save about 50% of crop water demand. The field and horticulture crops being grown in Rabi season are depend on conserved moisture and ground water. It means 50% ground water may be saved through cultivation on conserved moisture and about 50 of ground water can be saved through adoption of MIS. It is also discussed elsewhere that total 22.64 MCM ground water is available annually in the cluster and the total draft has to be reduced to 21.45 MCM for maintaining water balance in the cluster. The crop water requirement and need of the ground water may be summarized as hereunder to maintain the water balance in the cluster:

Table 77: The crop water requirement and need of the ground water

S. No.	Items	Crop Water Requirement (MCM)	Total Ground Water Save due to Various Measures (MCM)/ cultivation on conserved moisture	Net crop water requirement to fulfilled from ground water (MCM)
1.	Crop water requirement of Kharif crops	8.58	7.722	0.858
2.	Crop water requirement of Rabi crops	20.98	15.735	5.245
3.	Crop water requirement of Horticultural crops	4.82	2.41	2.41
5.	Domestic & drinking water requirement	0.3	0	0.3
	Total	**34.68**	**25.867**	**8.813**

Commented [EWB16]: This table does not show how the CACP will reduce the irrigation draft to 21.45 MCM.

2.4.4 Seed Replacement Rate (SRR) in State, District and in Bansur cluster

The table and the data given in Annexure 2.10 reveal that the SRR in district as well as in the cluster is better than the state as a whole. **(Source:** Agriculture Department, Bansur**).**

The table reveals that the Seed Replacement Rate (SRR) is almost increasing in all the crops. In Pearl Millet crop the SRR is reached to 98% in the year 2015-16 from 90% in 2011-12. Similarly, in Guar reached to 32% from 29%, in Wheat 36% from 33%, in Mustard to 98% from 89% and in Barley the SRR reached to 37% from 31%. Increasing trend in all the crops is encouraging but except Pearl Millet and Mustard crops, the SRR is very low which needs to be improved through seed production programme and crop demonstration to be laid out in the cluster. If the SRR in cluster is compared with district, the SRR of crops in cluster is lower than the district.

After cropping pattern, productivity and seed replacement, the Fertilizer Consumption in Terms of Nutrients has to be discussed to see the current status in the area. The current status of fertilizer consumption in state and district is available at the movement. It is also pertinent here that almost same pattern may be considered for Bansur cluster. The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons) is being summarized under:

Table 88: The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons)

State/District	Nitrogenous (N)			Phosphatic (P)			Potashic (K)			Total Fertilizer in terms of NPK			Per ha Fertilizer Consumed (Kg/ha)		
	K	R	T	K	R	T	K	R	T	K	R	T	K	R	T
Rajasthan	3.47	6.05	9.52	1.75	1.56	3.31	0.06	0.09	0.15	5.29	7.70	12.99	34.40	82.76	52.64
Alwar	0.21	0.29	0.50	0.11	0.08	0.19	0.002	0.002	0.005	0.32	0.38	0.70	86.90	75.92	80.64

(K – Kharif, R – Rabi & T – Total)

(Source: Agriculture Department, Bansur**)**

2.4.5. Current structure of growers

Based on the data of the cluster, total production has been calculated crop wise which will help in assessment of need and viability of interventions.

Table 99: Current structure of growers (share of production by farm size) and prevalence of farmer groups / cooperatives

		Area (acre)			Productivity Qtl/acre	Production (Qtl)			
	Proportion*	Large	Small	Marginal		Large	Small	Marginal	Total production
		>5 acre	2-5 acre	<2 acre					
Average land		7	4	2					
Farmer's having area		**6,960**	**13,358**	**2,327**					
Bajra	89%	6,195	11,888	2,071	4	24,779	47,554	8,283	80,616
Guar	9%	626	1,202	209	3	1,879	3,607	628	6,114
Vegetables	2%	139	267	47					
Total	**100%**	**6,960**	**13,358**	**2,327**					
Mustard	40%	2,784	5,343	931	5.5	15,313	29,387	5,119	49,819
Wheat	20%	1,392	2,672	465	8	11,137	21,372	3,723	36,232

		Area (acre)			Productivity Qtl/acre	Production (Qtl)			
	Proportion*	Large	Small	Marginal		Large	Small	Marginal	Total production
		>5 acre	2-5 acre	<2 acre					
Barley	6%	418	801	140	6	2,506	4,809	838	8,152
Vegetables	10%	696	1,336	233					
Seasonal fallow land	24%	1,671	3,206	558					
Total	**100%**	**6,960**	**13,358**	**2,327**					

*Based on the field visit findings

2.5 Livestock profile of Bansur Cluster

Out of the total goat population, Rajasthan accounts for 16.03% (highest in India) followed by Uttar Pradesh 15.53% (2nd highest).

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Livestock profile of Bansur Cluster:

The Bansur cluster has a large no. of households (refer Annexure 2.8) possessing dairy animals (cattle & buffalo). The dairy cooperative network is well established in the cluster. Apart from the large ruminants, goats are also reared by many small and marginal farmers as it serves as a secondary source of livelihood for the rearing farmers. As per the Livestock Census 2012 the livestock profile of the cluster is as in Annexure 2.8.

On an average, the small and marginal farming households rear around 3-4 goats. (refer Annexure 2.8).
The village wise data for Goat population segregated further into male, female, calved etc. is in Annexure 2.9
The cluster has 80 Goat MTGs, with 1472 members rearing goats. Out of these 19.60% are male and balance 80.40% are female. The male population is lesser because there is a constant sale of male goats to local khatkis. Out of the female goats, 42.35% are milking. Some NGOs like IBTADA in support from Rajasthan State Rural Livelihood Mission and American philanthropic NGO Hiefer are working in nearby Thanagazi block focusing breed improvement in the goat population in the area. Generally, much of work is not being done on marketing of Goat milk due to various challenges described in Chapter 4. IBTADA NGO has also formed a Goat producer Company namely " Sirohi Bakri Palak Mahila Producer Company Ltd" with five hundred producers in nearby Thanagazi block of Alwar district.
In Bansur cluster large numbers of households have dairy animals (cattle & buffalo), the dairy cooperative network is well developed. District Milk Union Alwar has 120 milk cooperatives in Bansur, procuring 12000 litres milk per day. In addition to the milk cooperative network many private players like Mother Dairy, Nova, PAAYAS and AMUL are also procuring approximate 15000 litres milk per day from the area and supplying milk to Delhi market.

2.6 Structural characteristics

The Bansur cluster is located in Alwar district. The district has a number of industrial areas including processing units at MIA (Alwar), Kherli, Rajgarh, Behror etc. Apparently, there are over 3800 processing units in the district. Alwar is a processing hub with large players like United Spirits, Carlsberg, Soufflet, Dabur India, JVL Agro and Raj Solex etc. There are a range of financial institutes supporting agriculture and agri-business including the Alwar Central Co-operative Bank Ltd., which offers KCC, Tractor loans and crop insurance support. Another, important banking institution is Baroda Rajasthan Kshetrya Grameen Bank.

Presently, the structural infrastructure in the Bansur cluster influencing Agri business activities is as under:

2.6.1 Government departments

There is the presence of Agriculture, Horticulture, Animal husbandry and Watershed Development & Soil Conservation departments in the region. These departments have head offices in Jaipur but they have offices at district level too.

2.6.2 Farmer Producer Companies

Basically, 300 MTGs for agriculture & horticulture activities, 80 MTGs of goat-rearers have been formed in the cluster, Users' Groups (UGs) have to be formed in this cluster taking members from MTGs are 50 and 18 Multi Task Associations (MTAs) have been formed. Farmer Producer Companies (FPC) is being formed in the cluster to serve as the platform for undertaking various interventions. There are two producer companies in Alwar district which are in the vicinity of the cluster Bansur. These include:

Behror Bansur Agro Veg Producer Company Ltd:

Behrod Bansur Agro Veg Producer Company Limited is a Private Producer company incorporated on 27 December 2013. It is classified as Non-Government Company and is registered at Registrar of Companies, Jaipur. Its authorized share capital is Rs. 100,000 and its paid up capital is Rs. 100,000. It was supported by a local institutional partner under the NVIC scheme of SFAC for 3 years. Its registration number is U0112RJ2013PTC044700.

Although SFAC withdrew support under the scheme after 3 years, the company continued to operate. Though in want of the infrastructural support and expert technical handholding, the company could not initiate any processing and value addition. The board of directors in BBPCL are enterprising and took business activities in terms of opening an agri-input retail shop even after discontinuation of the project of the SFAC. The company is making a turnover of Rs 35 Lakh currently. There are 700 members presently in the company.

Rath Agro Producer Company Ltd (U01122RJ2013PTC044584)

Rath Agro Producer Company Limited is a Private Company limited by Shares. It is registered with Registrar of Companies, Jaipur on Dec 14, 2013. The current status of Rath Agro Producer Company Limited is Active. It is a Producer company with an Authorized Capital of ₹1, 00, 000 (One Lakh Indian Rupees) and Paid Up Capital of ₹ 1, 00, 000 (One Lakh Indian Rupees). There are 6 Directors associated with Rath Agro Producer Company Limited. They are: Data Ram, Ashok, Manoj Kumar, Sita Ram, Prithvi Singh and Taiyab Khan. There are 1000 producers in the company.

Corporate Identification Number (CIN) of Rath Agro Producer Company Limited is U01122RJ2013PTC044584 and its Registration Number is 044584. The FPC was not able to do any business because their Board members were having difference of opinion & this had a toll on the functioning of the FPC.

Apparently, there is need to ensure self-governance capabilities through a strong, BOD base for an FPO or PC to be sustainably evolved.

2.6.3 APMCs and Private market

Bansur cluster has an APMC Mandi sub yard only in its vicinity where the cereals, pulses and oilseeds are traded. The Alwar APMC is around 60 km away from the cluster. There is another APMC mandi in the proximity of 40 km from the cluster. The small and marginal farmers, presently, sell their produce in the sub yard. The large farmers with their private/ rented pick up vehicle carry their farm produce to the main mandis where they generally get higher margin up to 5% than that sold at their farm place.

In case of horticulture crops, the scenario is even dimmer as the horticulture produce has smaller shelf life and the mandis are at a distance. In want of appropriate cold storage facility in their vicinity, the farmers of the Bansur cluster have no other option than to sell it to local traders at any price quoted by them. Also there is lack of refer van among the farmers to transport the horticultural produce to the mandis of Alwar and Delhi like Azadganj, etc. Only the large farmers,

traders and processors are doing so as they are able to bear the logistic costs. Lack of such structures at the cluster levels are resulting in high post-harvest losses in the horticulture produce of the farmers of Bansur cluster. In order to ensure optimum utilization of agricultural crops as also fruits and vegetables and reduce waste to the minimum so as to ensure enhancement of income of the farmers, it is highly essential to strengthen cold chain and other relevant infrastructure.

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Currently, many un-organized players/ middle men operate from the cluster supplying agri inputs and procuring agri produce directly from the farm level. The production of pearl millet and other crops is sold through the unorganized local market as well as mandis of Kotputli, Khairtal and Alwar. The produce of the pearl millet crop is also being used as cattle feed. Hence, looking to the considerable livestock population of Alwar district, there is a significant scope for value addition in Pearl millet.

Apart from that, there are 3 other APMCs in the district which can have an impact on Bansur. The APMCs are located as follows:

a. Alwar, 55 kms from the cluster
b. Khairtal, 40 kms from the cluster
c. Khedli (LKaxmangarh), 100 kms from the cluster
d. Khed (Barodameo), 80 kms from the cluster

The Bansur mandi deals in Bajra, Barley, Mustard, Wheat and Guar. Few commission agents operate the mandi. Apparently, Guar had experienced considerable price fluctuations. Price fluctuations within a year has also been significant in the case of wheat and Barley.

The Kothpuli mandi located on Highway no.78, that is, the Jaipur-Delhi highway which is only 20-30 km from the cluster and producers sell their produce in local markets as well as through mandis.

The production of pearl millet and other crops is sold through the unorganized local market as well as mandis of Kotputli, Khairtal and Alwar. The produce of the pearl millet crop is also being used as cattle feed. Hence, looking to the considerable livestock population of Alwar district, there is a significant scope for value addition in Pearl millet.

2.6.4 Warehouses

During the discussion with the farmers of the Bansur cluster, it was found that they seem to be unaware of any public or private warehousing structure being available in the cluster. Due to inefficient grain storage structures and space, the farmers are compelled to sell their produce immediately after harvest at any unwarranted prices to the middlemen cum traders. Farmers are, thus, unable to garner high returns from their produce.

#	Name of the Warehouse	Capacity
1	State warehouse corporation (SWC)	30,050 MT
2	Central warehouse corporation (CWC)	3,500 MT

The present infrastructure of the cluster clearly shows that there is a lot of scope for interventions which will be beneficial for producers and largely beneficial to all stakeholders of the value chain. Such interventions are discussed in subsequent chapters.

The district and most specifically the cluster lack infrastructure capacities like adequate warehouse, availability of cold storage, primary sorting as well as grading facilities.

2.6.5 Predominant practices for cultivation practices

#	Particulars	Present Practice

1	Seeds/Fertilizers	Local Input Shops
2	Fungicide & Pesticide	Local Input Shops
3	Land Preparation and other cultivation practices	Local labours and own/hired tractors/implements
2	Harvesting and farm level grading	Combine Harvesters
3	Transport	Pick up vans/Tractor Trolleys/Bullock carts
4	Credit	Traders provide facilities, credit facilities with interest.
5	Marketing	Local Traders
6	Packaging	Processors- Cleaned and grade and packages it in 30 Kg Bags for Retailing

Chapter – 3: Strategic context and rationale for selecting value chains in Bansur cluster

3.1. Parameters for selection of Value Chain crops

A scoring matrix consisting of the parameters along with their weightage has been designed for prioritisation and selection of commodities for value chain intervention in the cluster (Annexure 3.1). Broadly, there are four different types of parameter categories with different weights based upon which the crops have been scored. Bajra, Barley, Guar, Mustard and Wheat are the major crops from the Bansur cluster that have been considered and compared using this scoring parameter. (Annexure 3.2)

3.1.1. Existing size of the crops

Commented [EWB17]: The analysis only considers existing crops. It does not appear to consider new crops.

The first category of parameters may be broadly categorised under with respect to existing size of crops in the Bansur cluster with regard to their area under cultivation, production and average cluster level productivity relative to national average productivity. Bajra scores highest in this category as it has maximum cropped area among all existing crops in the cluster. It also accounts for the maximum production in the cluster. Wheat accounts for the second largest area and production in the cluster. When it comes to relative productivity of the crops in the cluster, all the 5 crops have higher productivity when compared to their respective national average productivity. Apparently, Bajra could provide maximum marketable surplus for processing purposes. Nevertheless, owing to their above average yield the remaining 4 crops also apparently have the potential to offer higher production in case of market demand. (Annexure 3.2)

3.1.2. Potential for Value addition

The second category of parameters may be broadly categorised under the potential for Value addition the crops of the cluster, implying scope for increased value addition for local producers and processors and higher margin realization for producers. The typically processed value added products of each crop have been considered for estimating the retail level price spread. In order to maintain parity among these crops for their different value added products, the yield loss at processing level has been considered in cases where significant to get the actual required raw material to prepare the end product. For instance, the yield loss in case of roasted bajra and wheat it has been considered as 10% while that for malt from Barley it is taken as 20%. Yield loss has been taken as 30% and 40% respectively in case of Guar gum and Mustard kachhi ghani oil. Thus, Bajra scores highest in the price spread at retail level as roasted bajra has retail price spread of Rs 48, 667 per quintal which is based upon its market value of Rs 500 per kg and gross realization of farmer as Rs 12 per kg. Barley malt also reflects higher margin between the farmer's gross realizations at farm (Rs. 1200 per quintal) against that at the retail level which comes to be Rs. 48, 250 per quintal.

In the parameter related to price spread between farmer's gross realization at the farm and price paid by the primary processor at mandi, a margin of 4% has been considered as measure of price spread, over and above the prevalent mandi prices of the crops after consultation with traders and processors. Guar scores highest with a price spread of Rs 116 per Q followed by Mustard (Rs 96 per Q) and Barley (Rs 64 per Q). This parameter signifies the small scope to get this margin transferred

to farmers through relevant value chain interventions in the crops such as through establishment of primary processing FCSCs and reduction in mandi fees.

Net profit in production per acre is the measure of direct returns to farmers by selling the crop in the mandi and it's by product locally without any value addition. For according parity, the selling price has been taken as Rs 3 per Kg for all types of fodder crops. The fodder yield for Bajra, Barley, Guar and wheat has been taken as 25q, 15q, 5q and 16q based upon field level consultation. Especially, wheat, followed by Barley, offers the maximum net profit in production per acre to the farmer.

In the next parameter of scope for processing in the state of Rajasthan, there are comparatively more number of secondary and tertiary processing mustard oil and cake processing units of Adani Wilmar, Dhara and other private players in the state followed by that of barley viz. malt processing units and breweries which are established by the MNCs like SabMiller, Carlsburg and Soufflet. Although wheat has multiple private flour mills and cleaning and grading units, it lacks nevertheless in high end technologically advance processing units which could yield refined and high quality end products. Same is the case of Bajra. In the case of guar, there are multiple primary and secondary processing units but their produce acts as the raw material in other derivatives industry.

The parameter regarding the number of value added products of the crop considers the scope for locally feasible value addition at the primary level, secondary level, tertiary level and above such that higher the degree of value addition, higher are the returns. Among these crops, Wheat and Barley have the highest number of value added products viz. cleaned wheat grain, flour, bakery products and soozi for wheat while cleaned barley grains, flour, malt and oats for Barley. Next come Bajra and mustard with 3 value added products viz. cleaned bajra grains, bajra malt and bajra flour of bajra and mustard oil & cake, mustard seeds (Rai) and Sause of mustard. Guar has only 2 value added products i.e. Guar gum and guar korma used in making feed.

In order to quantify the parameters of growth in market demand, the National growth rate of consumption has been calculated (as CAGR) for each commodity and equated against its market demand. It is highest for Guar (8%) followed by Mustard (5 %) and Barley (4.5%). The market growth in demand has been negative for Bajra. (Annexure 3.5)

3.1.3. Risk assessment of Potential Value Chain crops

The third category of parameter is regarding identifying the risk in the respective value chain of the crops of the cluster. Price volatility in the historical mandi prices of the respective commodity over the period of 3 years has been taken as the benchmark for capturing and measuring the risk in the commodities due to any adverse agronomic circumstances like drought, pest epidemic, bumper production and/ or international market prices crash/ upsurge. The price volatility is highest in case of Barley (40.37%) followed by bajra (34.29%) and mustard (29.45%) while guar and wheat have the lowest price volatility at 28.78%. Barley is scored highest in this category as it has highest scope for value chain intervention in order to curb the price volatility and thus, ensure sustained regular income to the farmers. (Annexure 3.2)

3.1.4. Environmental Parameter

In the next category for environmental parameter with respect to water intensiveness of the crop, the water requirement of every crop has been compared with each other. The crop with lowest water requirement is scored highest as it proposes highest scope for crop diversification in order to conserve water in the cluster. Importantly, Bajra and guar with lowest water requirement of 1000 cum have the highest scope for crop diversification followed by Barley and Mustard with that of 2500 cum. Wheat has the most water requirement of 4000 cum, making it least preferred for crop diversification. (Annexure 3.2)

3.2. Inference from the Scoring Matrix

It could be straight away concluded from the total scores of the matrix that Bajra is the most important value chain crop in the matrix. Bajra has maximum cropped area and production in the cluster along with par national average productivity. Though it has limited scope for margins at

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mandi level yet it could generate high end margins if processed to value added items like roasted bajra. Bajra offers reasonable net profit per acre to the farmer. Yet there are few processing units of bajra in the state. Although its demand seems to have reduced in the past 5 years, there is scope for (as many as 3) value added products in the local environment of the cluster. Its fodder can be used in the cattle feed unit. Also, its water requirement is the lowest which makes it highly favourable for crop diversification. Similarly, Barley stands as the second preferred crop for value chain intervention in the Bansur cluster. (Annexure 3.2)

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Horticulture is also a significant activity in the economy of the any area. Although, currently not much area is covered under horticulture crops, but looking to the fertile soil, suitability of the area for horticulture and potentiality of marketing, the area being sown under grain crops has to be diversified in to fruit and vegetable cultivation. Looking to the suitability of the area, vegetable crops like Tomato, Green Chilli and Carrots can be cultivated by the farmers in the Bansur cluster as described in Chapter 2.

It is a proven fact, that fruit, vegetable & floriculture are more economical farming than field crops in the any of the area. Therefore, horticultural plantations (fruits, vegetables and flowers) would definitely enhance the economic condition of the farmers in the Bansur cluster. They occupy comparatively smaller cultivated area yet have the potential and scope for value addition with higher returns to the producers because of cluster's proximity to the national capital region. In such case, there could be a provision of pack house (as part of FCSCs) for these vegetables consisting of cleaning, washing and packaging facility which has been discussed in detail in Chapter 6.

3.3. Current marketing chain of selected value chain crops

Present condition of overall value chain of selected commodities has been ascertained and formulated with the help of site visits and interaction with producers and related stakeholders. The questionnaire schedules can be referred in Annexures 3, 4, and 5. With support of the production analysis made in the earlier chapter, an attempt is made to arrive at the value added activities and value added products that could substantially add values. (Annexure 3.3)

Barley

There are 3 important production-distribution/marketing channels. In all these channels, farmers/producers supply commodities to the APMC through village level traders. APMC commission agents in turn supply them to malt processors and thereafter malt barley is supplied to domestic brewers and distillers (channel 1) and larger international brewers and distillers (channel 2). In channel 3 feed and barley is supplied through APMC commission agents to processors and then onward to domestic and global retailers. The critical constraints in many locations is that the price yield from barley cultivation is lower than that of wheat in some seasons affecting crop diversification into this less water intensive crop. There is apparently scope for diversification into higher value yielding food than feed barley in many clusters to cater to the many local processors in the region. (Annexure 3.3)

Typically, the gross yield enjoyed by producers is 10 quintals per acre. Gross value realisation on sale at Rs. 1,400 per quintal is Rs. 14,000 per acre. The cost of cultivation is about Rs. 6,100 per acre and the net value realisation is about Rs. 7,900 per acre. (Annexure 3.6)

Pearl Millet (Bajra)

The pre-intervention value chain for bajra involves basically two production-distribution or activity-marketing channels, namely one related to food processors and the other related to feed processors. Presently, village traders and the mandi largely facilitate aggregation of produce. Producers suffer from want of storage and grading and sorting facilities and value accruals are limited. (Annexure 3.3)

Typically, the gross yield enjoyed by producers is barely 11.2 quintals per acre. Gross value realisation on sale at Rs.1400 per quintal is Rs.15, 680 per acre. The cost of cultivation is about Rs.7,840 per acre and the net value realisation is about Rs.7, 840 per acre. (Annexure 3.6)

Mustard

The present pre-intervention or value chain for Mustard may be viewed as one with two critical production-distribution or activity-marketing channels. The product is largely marketed by farmers through the APMC. Channel 1 may be viewed in terms of one for table variety and other for edible oil and DOC. The producers market their produce in both value chains through APMC Commission agents largely. (Annexure 3.3)

Typically, the gross yield enjoyed by producers in mustard is 5.5 quintals per acre. Gross value realisation on sale at Rs.3100 per quintal is Rs.17, 050 per acre. The cost of cultivation is about Rs.11, 600 per acre and the net value realisation is about Rs.6, 000 per acre. (Annexure 3.6)

Vegetables

Consultations with the stakeholders of the value chain along with the producers ascertained that the current basic value chain is similar in all types of vegetables in the cluster. (Annexure 3.3)

3.4. Strategic context of Goat Value chain in Bansur cluster

3.4.1. Goat for milk production

The goat farmers also consume the milk from these goats domestically, apart from selling live animals. Many families also sell excess milk in the village at the rate of Rs 20-24/L in the dairy Cooperative mixing with Cow/Buffalo milk as there is currently no separate channel available for goat milk collection. This provides handy daily income during the milking cycle of these goats. Goats however produce far lesser quantity of milk compared to large ruminants. Among the breeds of goats in the cluster, some of important milk production traits noted in field areas have been as follows.

Table 1010: Productivity trend of goat milk in the cluster

Average daily milk production (Wet average)	500 ml to 1 liter (Range 250 ml to 3 Liter)
Lactation length	150 to 170 days (5 to 6 months)
Estimated lactation yield - Dry period 3 to 4 months	100 to 180 liters

Source: Department of AH

The cluster has a total of around 5683 goats out of which 34% are milking animals. The estimated milk yield would be around 4837 L/day at an average estimated yield of around 2.5 L per day in two milking. Out of this, if 1 L of milk per day per farmer is taken as marketable surplus, it can be estimated that around 1935 L per day is the potential for collection as on date and this can grow up to 4837 L/day if maximum potential is achieved by developing a separate remunerative value chain for Goat milk.

While milk cooperatives have been successful with value additions and leveraging local communities' expertise, meat, as a product, in general suffers from multiple constraints. For a start, it is equally perishable as milk is, in its basic form. Processed meat consumption, while not preferred in rural and semi-urban areas big on "freshness", is rising in Indian cities, where a number of organized players are positioned well to cater to them today. The second mitigating factor, which is closely linked with the first, is the fact that the majority of populations in Rajasthan are vegetarians. The consumption centres are far from the production centres. As per a survey conducted in 2014, Rajasthan is India's largest producer of goat meat in India, while also being the lowest consumer. (Annexure 3.3)

3.4.2. Goat for meat production

As opposed to other agri /allied products which operate through organized marketing, the market for goat meat is highly un-organized. However the share of processed meat rising in cities, where the license for Abattoirs is given by the Municipal Health authority and in many big cities like NCR, Mumbai, Jaipur, Ahmedabad, Bhopal, Indore, Hyderabad etc. the slaughter is done in authorised

abattoirs only. The second mitigating factor, which is closely linked with the first, is the fact that the majority of populations in Rajasthan are vegetarians. The consumption centres are far from the production centres. As per a survey conducted in 2014 by CMF, Rajasthan is India's largest producer of goat meat in India, while also being the lowest consumer. Therefore, the number of butchers in the local economy is minimal, and the only way to sell goats is as live animals which are then sold in far off cities, both within and outside Rajasthan. The final factor to keep in mind is the goat's rearing cycle being longer than, say, poultry chicken, making commercialization harder.

These village economies, therefore, depend largely on the local traders or *Khatiks*, as the community in these parts is called, who visit these households at regular intervals for potential saleable animals. However, these cycles are currently irregular, and are dictated largely by liquidity and need for capital every once in a while. One of the trends observed across the cluster/district and the state, involves the demand varying starkly across seasons and across days. In a general week, the peak days for meat demand are Wednesday and Saturday. The Mandi and Goat butchers association does not operate on Tuesday and hence Wednesday registers higher demand. Similarly, Saturday registers a higher demand possibly due to last working day of the week. Friday and Sunday registers moderate demand and Monday and Thursday are the weakest. Even, as a thumb rule, sales during winters tend to be far higher than those during summers. The local market, therefore, runs on a fine balance, with supply decided by the vagaries of the farmer's household than the life stage of the goat. (Annexure 3.3)

3.4.3. Existing market practices:

A goat rearer typically spends 8-10 months of the year rearing and tending to the animal, and taking care of its health, growth and quality of its meat. However, in a market dominated by traders, and the poverty of a large proportion of these farmers, it is difficult for them to have any sort of bargaining power. Present trading of goats in project area is largely monopolized by single clans or close kinship families. Informal communication is high between traders of the same family. Unfortunately, this communication is used more towards reducing price paid to goat farmers than to enhance collective sale outside. As competition with outside trader is very low, a monopolized market is created by default. For example, in the Pratapgarh block, traders purchase animals through estimates, according to which they buy at **Rs 280-300** for every kilogram of meat that they estimate. Now, this is an approximate 50% value that they estimate to be the meat to overall ratio in the animal. At this rate, the animal is sold for an equivalent of **Rs 400-430** per kilogram in a market like Jaipur. Not only is this a discrepancy in rates, the butcher who purchases also benefits through the sale of other products, including **skins @ Rs 80-100 per unit, offals @ Rs 100/unit** and other such by-products. The profits for the traders and butchers, and the very basis for running the market, is from weight differences, apart from the other parts sold – offals, skin, kidneys and other parts which are retailed separately. The goat value chain, is also dominated by multiple nodes of middlemen. The number of nodes in the value chain, therefore, is dictated solely by the geographical location of the producer, and therefore, the distance from the terminal market. Each in a large state like Rajasthan, the number of nodes can go up to 4 levels of middlemen, each of whom takes a share of the total final value.

3.4.4. Goat Leather

The leather from goat is handled by local butchers and slaughterhouses and sent for further processing to the various tanneries across India, most notably the ones located in Uttar Pradesh, Madhya Pradesh and Tamil Nadu. While adequate research has been done on this, it is important to emphasize that the producer today does not get any compensation for the skin and the leather, due to the approximation mechanism in place for buying goats. During the research period, it was reported that the demand for goat hides was extremely low across the country, and each goat's skin yielded Rs 120-150 to the butcher.

It is also observed that, the Goat skin does not fetch good price (Hardly Rs 50-80) per skin. This is because of damage to the skin during open grazing in forest and tick infestation. Further damage is done to the skin during flaying process because as the butchers use traditional tools and techniques.

3.4.5. Illustration of an organized market for goats in nearby district

The Balaheri market is among the main primary trading markets for goat rearers in Eastern Rajasthan, in the districts of Dausa. It is organized by a co-operative body for Khatiks - Rajasthan Khatik Samaj Seva Samiti. The main catchment areas for this market are Jaipur, Dausa and Alwar districts. As with other markets, the price of each goat is decided by negotiation and approximation of weight by clutching their necks. These goats are then sold mostly in local markets by these buyers; a number of them are reared by farmers in places like Rasgan to be sold during Eid in the larger markets.

The market operates once a week, every Monday, and transport is arranged for by sellers and buyers. Overall, about 2000 goats are sold a week, on average. On most weeks, about 10% are taken back by farmers, while during the Eid season; about 250-300 more goats are sold. These are typically animals that are less than or about a year old and prices range from 3000-4000 for a 6 month old kid, upto Rs 15,000 for an adult older than 18 months. The dominant breeds are Totapari and Marwari, while some of them are Barbari.

The market levies INR 2 per goat from both buyers and sellers for its services, and thus makes close to 8000 every week. A number of goats sell for very low prices, since they are not too well-fed, and for their age, they could sell for far more.

3.4.6. Fodder requirement

While promotion of Goatry for both milk and meat is being discussed here, the availability of fodder has also to be taken care of without which there might be an adverse impact on the local environment due to excessive grazing. Table illustrates the availability of excess fodder in the cluster for supporting the goat value chain.

Estimated total requirement of dry matter (Fodder) is 41804 M.T whereas the fodder availability from the Bansur cluster is summarized as under. The cluster has sufficient availability of fodder.

Table 1~~1~~4: Fodder availability in Bansur Cluster (Qty in MT)

Season/Crop	Area (ha)	Productivity (Kg/ha)	Production (in Tons)
Kharif			
Bajra	6841.5	4000	27366
Guar	1785	2600	4641
Total	8115	-	
Rabi			0
Mustard	3894	0	0
Wheat	895.8	4500	4031.1
Barley	1106	4000	4424
Total	5878	-	
Zaid	275	70000	2887.5
Grand Total	**14243**	**-**	**43349.6**
Pasture Development	192	250	48.00
Grand Total			**43397.60**

(Source: Agriculture Department, Bansur**)**

Above table reveals that the fodder availability from the cluster is in excess after development of the cluster, even some area is proposed to be diversified to production of horticultural crops

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Chapter – 4: Key opportunities and challenges in selected value chain/s

4.1. Opportunities and challenges

(A) Looking at the cropping pattern, production, etc., the following crops have been selected for value chains study/diagnostics.

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#	Season/Type	Crop
1	Kharif	Bajra
2	Rabi	Barley, Mustard
3	Horticulture	Vegetables (Green Chilly, Tomato & Carrot)

(B) The SWOT of key commodities reflects gaps in terms of storage and primary processing facilities, large number of intermediaries in the chain, limited market information on processing activities, limited support from financial institutions for producers and/or their networks etc.

The SWOT of the key commodities/crops as per value chain study is as follows:

4.1.1. Bajra

Bajra is a major Kharif crop grown in Bansur cluster. Bajra is mainly grown for cereal and fodder purpose.

Strength	Weakness
• Bajra is one of the most extensively cultivated cereals in the world, after rice, wheat, and sorghum • In India alone, 90% of the world's and in Rajasthan 45 % of country's total bajra is grown. • Its tolerance to drought, heat and soil salinity along with its higher water use efficiency makes it a climate-smart crop. • It performs better than cereals in semi-arid regions. • It gives sufficient energy to the field workers at a very low cost. Thus it is called Poorman's food'. It is rich in nutrients like iron and zinc apart from carbohydrate and protein. • It provides feed to large number of animals and grown for silage and hay purpose also.	• Bajra flour (prepared by pounding or milling) quickly goes rancid, and can be stored only for short periods. • It tastes bitter due to the presence of phenolic compounds • Limited processing units for bajra and its by-products such as flour units, roasted Bajra units, etc. • Inadequate grading & sorting facilities. • The production of the crop is seasonal, but its demand remains for a longer period. Thus, adequate storage facilities required. • Large number of intermediaries in the chain leads to low producer's income. • Lack of market information regarding prevailing prices, arrivals etc. force farmers to sell in

	village itself.
Opportunity	**Threat**
• Scope for tie up of FPOs through CFC with firms like VSR, Patanjali, Moraraka Organic, etc. • Scope for facilitation of start-ups from amongst FPOs or individual entrepreneurs, in secondary processing of value added products of Bajra like flour, snacks, animal feed, roasted bajra, etc. • Scope for establishment of quality sorting and grading facilities by FPOs as part of Farmers Common Service Centre (FCSC), along with facilities for packaging and vehicle to facilitate transportation. • Promote good agricultural practices with regard to planting, harvesting, use of inputs, disease management, pest control, etc. through FCSC • FPOs to undertake joint input sourcing activities for seeds, fertilizers, pesticides, etc. under the umbrella of CFC • Increasing use as roasted bajra and in malt shows better marketing opportunities	• Adverse climatic condition can impact the crop production and productivity • Bird damage at the time of grain filling and maturity also lower the production considerably • Lack of higher remuneration in bajra may reduce farmer's interest from cultivating it.

4.1.2. Barley

Strength	**Weakness**
• Barley ranks as a major crop world wide • Barley is largely produced for animal feed and its use as food crop has growing demand • USA is the leading producer country followed by Argentina, Brazil, and Ukraine • A.P, Karnataka, Bihar, Maharashtra, and Rajasthan are important producers • Good demand by poultry industry in India which constitutes 47% of demand for India's production • Rajasthan is one of the leading producers of Barley in India. • Less water intensive crop	• Barley productivity is less and variety is not suitable for processing (Malt) • Traditional packages of practices in cultivation of Barley • Limited identification efforts for farmer leaders (entrepreneurs)and BODS at field level in Barley Value Chain for capacity building • Banks do not support individual farmers for crop loans etc. • High dirt content in harvested barley • Mostly Rainfed crop usually resulting in harvesting of immature grain without water/critical irrigation at time of pod filling. Resulting in small-sized grain • During good harvest prices Collapse and hence storage option could help avoid distress sale • Not aware of special license option to source directly from farmers /FPCs. • No alternate marketing channel developed for Barley to facilitate crop diversification. • Inadequate links with farmers for direct

	procurement. • Inadequate capacity building programs on Market led extension services.
Opportunities	**Threat**
• Option for crop diversification in rainfed areas. • Growing demand for malt barley and presence of processing players in the state itself. • Good processing opportunities for Barley-Barley Feed, Barley Biscuits, Barley Flour (feed, food and malt barley) • Development of alternate marketing channel for barley procurement is possible through tying up with large processors like Soufflet.	• Less productivity may change farmers' interest to produce Barley unless demonstrated in large scale. • Natural calamity may impact production and hence productivity and profitability. • Some scope for excessive dependence on large players (like processors supplying seeds)

4.1.3. Mustard

Strength	**Weakness**
• Mustard ranks second in terms of production in India. • However, due to more oil content (35%-40%) mustard ranks first in term of oil yield among all oil seed crops. • Rajasthan, UP, MP, Haryana, Gujarat and West Bengal states accounted for nearly 86.5% area and 91.4% production of mustard in India during 2012-13. • Rajasthan ranks third in term of mustard productivity in the country after Haryana and Gujarat.	• Mustard production trends represent fluctuating scenario. • The yield level also have been variable ranging from 1001(2007-08) to 1250(kg/ha) (2013-14) during last five years. • There was reduction in area and production of mustard in Rajasthan, Gujarat and U.P. • Adoption of scientifically recommended technology in mustard production, harvesting and processing is lower among both farmer and processors respectively.
Opportunity	**Threat**
• There is scope to grow the HYV of Mustard which are genetically enhanced. • Scope to develop thermo and photo insensitive mustard varieties. • Scope for FPOs undertake joint input sourcing activities for seeds, fertilizer, pesticides such that the farmer get good quality of inputs with lower cost of production. • Scope for secondary processing of mustard seeds and prepare value added products like mustard oil, mustard paste, sauce, etc. • Scope to tie up farmer of CFC to oil mill associations bulks buyer like ADM Agro, Amora exporters, etc.	• High temperature during crop establishment and terminal stages cause shorting of growing seasons • Fog and intermittent rain during crop growth can reduce yield considerably. • Depleting availability and deteriorating quality of water.

4.2. Constraints in value chain crops of Bansur Cluster

The constraints observed under various value chain crops in the cluster are divided under from different categories, viz Production related constraints, Post-Harvest related constraints and Processing and market infrastructure related constraints.

4.2.1. Production related constraints

Bajra

Bajra has largest area under cultivation in the Bansur cluster. It is mostly grown under mix cropping with guar. The total production became less due to price fluctuation in both commodity Bajra and Guar.

Barley

Barley occupies comparatively less area under cultivation with respect to Wheat. It is constantly grown in the area and production as well as productivity also due to irrigation facility. It is generally cultivated as feed Barley in the cluster.

Mustard

Mustard is the major Rabi crop grown along with wheat. There is increase in cost of production of mustard day by day due to the effect of Aphids and Thrips in the cluster.

Training of producer: Farmers are not trained in the marketing system. Proper training will improve their skill for better marketing of their produce. They should be trained on AGMARK standards, how to get market information and factors on which prices are determined. For e.g. size, shape, colour, moisture in grains, weight loss in fruits and vegetables etc.

4.2.2. Post-Harvest related constraints

Bajra

There is lack of post-harvest facility except sun drying in Bajra produced. It is difficult to harvest due to mix cropping with "**Guar**". It is normally harvested using Threshing Machine.

Barley

Barley is mostly cultivated six rows as feed Barley whose seed size is small. .There is lack of Primary processing facility except sun drying in Barley at farm level.

Mustard

There is lack of cleaning and grading facility in Mustard. Mostly immature seed of mustard are harvested due to uncertain rain which occurs for less than harvesting period of mustard.

Inadequate storage facilities in rural areas: Storage facilities in villages are found to be inadequate which contributes leads to distress sale. Due to lack of storage facilities, substantial quantity of commodity is also lost.

Transportation facilities at producers' level: Due to inadequate facilities of transportation at the village level, producers are forced to sell Bajra in the village itself to itinerant merchants or traders directly at low prices. Aggregation and negotiation with buyers is only possible if farmers have volume to trade and transport up to procurement centre.

4.2.3. Processing and market infrastructure related constraints

Bajra

The processing facility of Bajra is available at market yard. Traders, after procuring and packaging Bajra send it to whole sellers and retailers while remaining material goes to animal feed unit.

Barley

Market infrastructure is available at Bansur block level for Barley processing. Major units of barley secondary processing are available at district Alwar which deal in malt processing.

Mustard

Mustard price calculation depends on the oil content. There is lack of oil content testing laboratory in the cluster, however cleaning and grading facility for Mustard is available at market yard

Traditional system of marketing: In the cluster, there is an absence of alternate channels of marketing. So farmers typically sell only through APMCs or village level traders. The only rare exceptions are some contract farming and direct marketing initiative of a few (about 3,500) producers/farmers) and processors like Soufflet. Apparently, even such large players in barley like SAB Miller and Carlsberg source significantly through APMCs in the cluster.

Lack of market intelligence services: Farmers do not receive information on market prices. Some farmers sell crops through village level traders, because due to which they are not realising fair price.

Lack of primary processing infrastructure:

i. There is a non-availability of facilities for primary processing: cleaning, grading & sorting at the farm level.

ii. There is no practice and provision of producer level storage.

iii. There is acute lack of awareness among farmers regarding FAQ (Fair Average Quality) standards.

iv. Farmers do not practice the usage of basic equipment like moisture meter and weighing machine.

Distant markets: The nearest market from the cluster is the Bansur APMC that is 55 kms away. This leads to farm gate selling where farmers receive non-competitive prices for their produce.

Fluctuations in prices: Generally, the price of Bajra goes down in the post-harvest period due to heavy arrivals in the market and later shoots up. Farmers in the catchment area do not have storage facility to store and they also don't use a warehouse receipt system. The table below illustrates case of Bajra prices for month of September and October 2016. It clearly shows that when prices in October 16 are less in almost all the APMCs than in September 16. This is mainly because of the heavy arrivals of Bajra in the month of October (refer graph).

Figure 9: Graphical presentation shows arrivals in October and September 16

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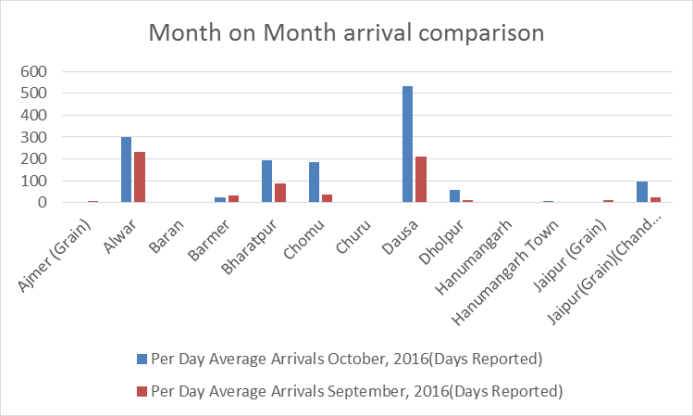

Lack of marketing information: Due to a lack of market information regarding prevailing prices, arrivals etc., most of the producers' market Bajra in the Bansur Mandi without studying the price trends.

Adoption of grading: Grading of Bajra at the producers' level ensures better prices to producers and better quality to consumers. At present there is no infrastructure available at the farmers' level for primary processing.

Malpractices in markets: Many malpractices prevail in the markets of Bajra i.e. excess weighment, delay in payment, high commission charges, delay in weighing and auction, different kinds of arbitrary deductions for religious and charitable purposes etc.

Infrastructure facilities: Due to inadequate infrastructural facilities available with the producers, traders, millers and at market level, the marketing efficiency is affected adversely

Long Supply Chain: The existence of a long chain of middlemen also reduces the producer's share in consumer's rupee.

4.2.4. Agri business policy related constraints

Contract farming: Rajasthan has adopted a model APMC Act, 2007. In Rajasthan Contract farming of desired variety and quantity as per buyer's/processor's need, has been allowed. Buyer/processors may supply inputs and technical know-how and farmers may produce the crop for sale to buyers at an agreed price. However, this price shall not be lower than minimum support price and title of land shall remain with farmer. Produce will be purchased at buyer/processor's business/factory place. But processors found less interested in registering under contract farming. Team ABPF discussed contract farming issues with some of the processors and related challenges are given below:

i. **Rule 5** – Each agreement shall be written on stamp paper of the value of Rs.100. This increases cost of procurement and procurement time.

Commented [EWB18]: What is the agreement value? It seems that Rs. 100 is quite small compared to the potential sales volume of the contract.

ii. **Rule 9** – Separate registration form shall be filled for each agreement. Large amount of paper work can be reduced by group registrations or procurement directly from FPCs.

iii. **Rule 17-**In case the contract farming buyer fails or refuses to purchase the agreed quantity of the agriculture produce from the contract farming producer, he is to pay the amount of the difference between the agreed price and the actual sale price of the contracted produce in the market committee concerned to the producer. Mutual termination of contract should be allowed.

iv. **Rule 19** – The contract farming buyer need furnish an undertaking equal to 20% of the value of the contracted amount. This amount can be reduced and this will motivate big players to participate in contract farming.

Commented [EWB19]: Big players will have no problem with 20%. It is the small players that are harmed by this level of guarantee.

4.3. Intervention plan of selected Value chain crop of Bansur Cluster

The intervention plan in the selected commodities in the light of critical constraints may be viewed as follows:

Barley:

S.no	Constraints	Action
1.	**Production**	
1.1	Productivity is less and variety is not suitable for processing (Malt)	Introduction of new Malt Variety
1.2	Farmers not following recommended package of practices	Farmers training on best package of practices
1.3	Limited identification efforts for farmer leaders (entrepreneurs) and BODS at field level in Barley Value Chain for capacity building.	Soufflet to identify farmers' leaders and these farmers' leaders will be trained by ABPF to be evolved. ABPF to prepare DPR and link these entrepreneurs with bank to get credit facilities. Incubation support to entrepreneurs.
1.4	Banks do not support individual farmers for crop loans etc.	Organise bankers meet with Soufflet; crop bans could also be used to measure input line seed
2.	**Post-Harvest**	
2.1	High dirt content in harvested barley.	Ensure availability of the Cleaning & Grading facility to farmers; ensure 10% higher income accruals to farmers after taking into account the cost of sorting and grading.
2.2	Mostly rain fed crop usually resulting in harvesting of immature grain without water/critical irrigation at time of pod filling. Resulting in small-sized grain	Farmer training, watershed management /sprinkler irrigation, pond + drip option etc. led to be considered.
2.3	During good harvest, prices collapse and hence storage option could help avoid distress sale.	Storage facility with electronic weigh bridge for farmers as part of FCSC/individual unit
3.	**Processing**	
3.1	Not aware of special license option to source directly from farmers /FPCs.	Awareness seminars for processors.
3.2	No alternate marketing channel developed for Barley to facilitate crop diversification.	Soufflet to secure Single Purchase License. ABPF to link FPCs/farmers with Soufflet for Barley marketing.
3.3	Inadequate links with farmers for direct procurement.	ABPF to organise BS meet with players like Soufflet, Cargill etc.
3.4	High cost of procurement due to taxes like mandi tax and VAT	ABPF to work on policies for ease of procurement. Policy Support for value chain players like Soufflet
3.5	Inadequate capacity building programs on Market led extension services and weds	ABPF to organise capacity building program for farmers with market leaders like Soufflet

Bajra:

S. No	Constraints	Action
1.	**Production**	
1.1	High production cost due to cost of seed and Agri input requires like fertilizer pesticides etc.	Pooled procurement through FPCs to reduce cost of inputs and ensure quality inputs.
2.	**Post-Harvest**	
2.1	Moisture content of harvested Bajra is high, because of that farmers get less price.	To make Framers aware about market price of bajra proportionate to moisture content, making availability of moisture meters in FCSC
2.2	High dirt content /foreign material in harvested millet.	Ensure availability of the Cleaning & Grading facility to farmers; usually in 10% higher income accrual to farmers.
2.3	Lack of market information related to price	Price discovery through NCDEX, eNAM
2.4	5 / 11 quintals/acre in poor/good harvest. During good harvest prices Collapse and hence storage option could help and distress sale.	Storage facility for farmers as part of FCSC
3.	**Processing**	
3.1	Not aware of special license option to source directly from farmers /FPOs.	Awareness seminars for farmers/Processors
3.2	Limited processing products are available in bajra	Promote handmade Namkeen bajra product
3.3	Lack of proper Product marketing	Awareness on Product Branding
3.4	Processor not aware of schemes of the GoI Including CLCSS, cluster Development scheme or “Sampada” for technology upgrading.	Awareness seminars for processors

Mustard:

S.no	Constraints	Action
1.	**Production**	
1.1	High cost of inputs including seeds, fertilizers and pesticides.	Pooled procurement through FPCs to reduce cost of inputs and ensure quality inputs.
1.2	Farmers not following recommended package of practices	PC to undertake custom hiring services & lead to farm mechanization
2.	**Post-Harvest**	
2.1	Inadequate storage facilities leading to post-harvest losses and distress sale during bumper harvest	Establishment of storage facilities by PC as a part of FCSC
2.2	Large no. of intermediaries in the value chain leads to low producers income	FPC to undertake bulk supplies to large processors.
3.	**Processing**	
3.1	Limited processing units for mustard and its by products such as mustard oil unit, mustard paste and sauce unit, etc.	Facilitate start-ups in secondary processing from amongst PCs or individual entrepreneurs and start ups

4.4. Interventions in the value chain crops of Bansur cluster

4.4.1. FPC Development Approach

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The FPC development approach may be viewed as depicted below:

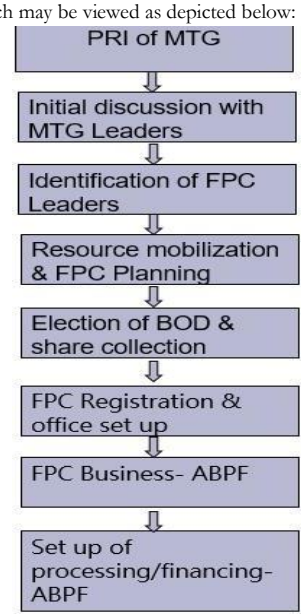

Figure 1040 FPC Development Approach

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Following are the steps to be followed for formation of the FPC:

i. **PRI of the MTG:** The MTGs will be made aware on the FPC model through PRI and individual farmers will be motivated to join the FPC as shareholder through respective MTGs.

ii. **Initial discussions with MTG leaders**: After PRI is done, initial discussion will be done with the MTG leaders for further orientation on FPC concept.

iii. **Identification of MTG leaders**: MTG leaders who show inclination to the concept will be selected in the executive committee for FPC formation.

iv. Resource mobilization and FPC planning: The executive committee will meet 2-3 times to plan further activities of FPC viz. crops, strategy for business etc.

v. Election of BoD and Share collection: 10-12 BoD will be identified along with 2-3 expert directors one each from Agri, Horti, AH and WS dept. The BoD will decide on share value and initiate collection of share through MTG leaders.

vi. **FPC registration:** Following identification of FPC BoD, registration will be done. This may take 1-2 months as DIN no of BoD has to be generated first. Care should be take that all elected BoD should have PAN no so that there is no delay in paper formalities for registrations.

vii. **FPC business:** Following registration of FPC, ABPF will prepare business plan for the FPC and facilitate market linkage for input and output.

viii. Setup of processing/ financing – ABPF will further facilitate establishment of processing unit setup along with feasibility studies and planning business linkage with market players.

4.4.2. Policy and Management

A PC will function within the overall policy and regulatory framework as per the Producer Company Act. The management of a PC or FPO will vest with the elected Board from amongst the members. The provision about constitution of managing committee will be made in the byelaws. The management of PCs will be by an elected Board of Directors. Therefore, the representatives of farmers will actually oversee and manage the affairs of a Producer Company or FPO.

The selection criteria for membership of FPC may be viewed as follows:

1. A member will express his willingness to become a member of PG / CIG / FIG.
2. A member will actively participate in all functions and activities of PG / CIG/ FIG and PC.
3. A member will contribute his equity to the Producer Company (PC)
4. A member will bring all or part of his produce to the PC for sale.
5. A member will purchase all or part of his farm inputs through the PC.
6. A member will produce and prepare his produce for marketing as per directions of PC.
7. A member will contribute his share to the Producer Association as upfront payment for the business development plan of a PC as needed.
8. A member will contribute his share to the Producer Company towards the reserves of PC as needed.

Illustrative list of components of a common facility of a Producer Company (Food Grain)

i. Godown for storage, drying platforms
ii. 2-3 MT per hour grain cleaning, grading, and packing machinery with shed
iii. Additional need based Agricultural Equipment
iv. Computer with internet connectivity for market information
v. Display Board with Accessories
vi. Auction Hall
vii. Input Suppliers Shops
viii. Toilets
ix. Drinking water & Electricity

Note: Though the illustrative infrastructure proposed is shown in the above tables, the actual infrastructure to be developed will be need based and on participative consultation process.

Typically, start-up may be involved in secondary and tertiary processing activities while FPO's may be involved in post-harvest and primary processing activity. In many cases, start-up may emerge firm within FPO members.

4.4.3. Introduction to FPC Model

Aggregation is the proposed solution of the constraints farmers are facing at present. It is proposed to form Farmers Producers' Company by bringing farmers together in the form of voluntary groups of about 15 to 20 active farmers and federating 20 to 25 such groups into a Producer Company. These Producer Companies will be functioning on behalf of member farmers and will strive to undertake a range of activities which will result in added value accruals to farmers and value to farmers produce. To form a producer company, producer groups will be mobilized (in some cases, this initiative may have already been completed by NGO's).

It is envisaged that an elected committee of members of Producers Groups will form a management committee and oversee the performance of an incentivized manager/CEO. The manager will be trained in technical issues of post-harvest management, marketing and in operating a transparent accounting system. The ABPF will support the operation of the Producer Company, and accelerate the cross learning of best practices.

The evaluation of success should be evaluated on the parameters as under:

i. PCs operating without financial support by the end of 36 months.
ii. The PC operates with a reserve fund to cover short term cash flow deficit and with potential for reinvestment in various activities
iii. The PC has an effective governing structure.
iv. The PC has a transparent accounting system.
v. The PC can function as a working example for other farmer organizations to observe and learn from.
vi. Contribution towards increasing farmers'/members incomes.

Chapter – 5: Value Chain Investments

5.1. Rationale for these investments

Post-Harvest infrastructure is of great relevance to small-holders, who tend to be geographically dispersed. The lack of primary processing infrastructure and efficient transport can therefore be a particular obstacle, making it difficult for them to obtain essential inputs and get their produce to markets. When smallholders do have access to transport services, the cost is often very high, limiting their competitiveness and ability to participate in agricultural value chains. Small-scale producers are at the greatest risk of significant post-harvest losses owing to the use of rudimentary storage facilities and limited access to reliable and efficient transportation systems. In the absence of primary processing infrastructure, transportation, farmers carry most of the produce (without any processing) themselves, often resulting in limited loads and produce spoilage. Small-scale farmers may also lack the resources to comply with increasingly strict food safety standards, particularly traceability requirements. It is therefore important to integrate and empower small-scale agricultural producers in the food supply chain by giving them access to information and communication technologies. Access to the right information at the right time gives smallholders the capacity to make informed decisions that enable them to optimize their price negotiations and the way in which they place their produce in the market.

Rajasthan shares many of the challenges facing India's low income states in achieving medium term growth and poverty reduction. It is an overwhelmingly rural and agricultural state, with very limited water resources availability. Increasing population, growing urbanization, and rapid industrialization combined with the need for raising agriculture productivity generates competing claims for water not only in Rajasthan but also across India. With limited water resources and increasing constraints on water availability for various usage, in particular for agriculture, improving productivity per unit of water use in irrigated agriculture (both surface and groundwater) and achieving productivity gains in rain-fed agriculture (watersheds) are one of the great untapped opportunities of the agriculture sector in the state. A more water-efficient agriculture holds the promise of smallholder farmers profitably shifting from low value, often water-guzzling crops to high value farming aiming for high returns on unit of water used, and driven by market demand.

Rajasthan is facing with acute water quantity and quality issues. Covering 10 per cent of India's land area and about 5 per cent of country's population, Rajasthan has less than 2 per cent of its water resources. Erratic rainfall and recurring droughts have exacerbated the situation. Over the last 100 years, on an average every district in the state has experienced drought in some form for 50 per cent of the time.

While challenges in making the semi-arid dessert bloom are many, there are also significant opportunities associated with agriculture in Rajasthan. These include: (1) a promising potential for diversification into higher value, less water consuming horticulture, floriculture, spice and medicinal plant production across a variety of agro-ecological zones; (2) scope for livestock development focusing on improved breeding, animal health, nutrition and access to markets; (3) the availability of a range of tested on-farm water management technologies and agronomic practices that can be rolled-out to the farming community; (4) a policy framework that, while not necessarily perfect, is increasingly conducive towards private sector-led, sustainable agriculture, including recently revised state policies on agriculture, livestock and agribusiness development as well as on water resources

management; and (5) experience in establishing and managing public private sector partnerships in agriculture.

The Bansur cluster is a watershed cluster and most of the cultivation is based on the rain water received during the monsoon. Second source of water is ground water and ground water is again dependent on the rain water management and ground water recharge. In addition to domestic and animals, the conserve moisture and ground water are used for agriculture and horticulture production. As goat or small ruminants are basic livelihood of the villagers / farmers, so the emphasis on these aspects is to be needed in the cluster. Finally, agriculture, horticulture and animal husbandry are the basic livelihood of the residents of the cluster. Keeping in view above in mind, the investments have to be made on rainwater management to increase water availability in the cluster, to improve field application efficiency, to increase productivity of value chain crops of the cluster and market accessibility in the area to get the more benefit. As stated earlier that small ruminant's i.e. goat management is also significant for rural livelihood therefore appropriate investment provision has to be made in the cluster. The support to small ruminants will focus on improving productivity through breeding, feeding and health activities at the cluster level. Improved feeding will not only aim to optimize the use of crop residues, but also make better use of common property lands.

This sub-component will finance demand-based sub-projects proposed by farmer groups, and producer organizations to build strategic linkages amongst the value chain participants with a view to increase competitiveness, productivity, and quality and market access. Market Infrastructure support will be provided to support farmer groups with matching grant investments in rural market infrastructure and for productive infrastructure such as storage facilities, grading and sorting equipment, collection centres, etc. Agribusiness support will provide producer organizations with matching grant directed towards improving marketing activities (such as product aggregation, cleaning, grading, packaging) and will co-finance investment proposals from producer organizations and producer groups established under the project which are actively seeking to expand their operations. Proposals that qualify for matching grants will have one or more of the following general characteristics: (i) provide clear linkage through formal contracts between farmer groups/ producer organizations and agribusiness/value chain participants; and (ii) have some public good character that benefits many participants in a value chain.

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5.2. Non water use interventions in value chain

The focus of this sub-component is on improving on-farm water use efficiency and productivity in the clusters by promoting micro irrigation techniques, demonstrations and crop husbandry practices which improve agricultural productivity, profitability and sustainability while reducing the water footprint of agriculture.

5.2.1. Agriculture

Pearl millet (Bajra), Cluster bean (Guar), Wheat, Barley and Mustard are the major crops of the cluster. Use of sprinklers is picking up to reduce the production cost and improve the irrigation/ field water use efficiency. However, introduction of more efficient techniques (viz. Drip and mini sprinklers) is imperative along with the increment in domain of sprinklers. Fertigation and Automation techniques need to be demonstrated to synergise the micro irrigation technology.

The hybrid varieties for Pearl Millet crop and improved seed of the Mustard crop is being used but the seed replacement rate (SRR) for Guar, Barley and Wheat needs to be further enhanced by more promising varieties. Seed production activity and adoption support for the same is required. More promising crops, varieties and technology also needs to be intervened to match the fodder demand of the cluster area. The Integrated Nutrient Management (INM), Integrated Pest Management (IPM) and other innovative techniques are still needs to be intervened for the environmental and techno friendly agriculture.

The soil preparation, sowing and threshing of the crops is performed through tractor drawn implements but still there is a great need to introduce the more efficient mechanization tools for

farm operations. Post-harvest techniques are also imperative to introduce in the cluster for the prevailing and ensuing crops.

The farmers' community is supported by the extension machinery of Agriculture department up to the grass root level but the extension system still needs to be compatible with the ICT (Information and Communication Technology) for more effective delivery of the services. Market information and market access is an important intervention to be looked into. The capacity building and regular technical back up to the farmers for the latest updates of the agriculture technologies would be a useful tool for the competitiveness, sustainability and profitability.

Thus looking to the present scenario, the main proposed activities of the Agriculture subcomponent with certain desired objectives are:

a. Promotion of efficient techniques of irrigation to increase the irrigation efficiency, improve productivity and reduce cost of production.
b. Diversify the present wheat crop to barley with the aim to improve the irrigation water use efficiency and to develop a new value chain crop through demonstrations and capacity building.
c. Promotion of farm mechanization to reduce the cost of production.
d. Promotion of seed production and adaption support to improve the SRR and the farmer income.
e. Promotion of fodder production to reduce the gap of demand and availability of fodder for the animals.
f. Introduction of ICT based extension system for the quick reach of the solutions to the beneficiaries.
g. Capacity building of the beneficiaries to achieve the PDO.

Detailed description on the activities is given in the Annexure 5.1.

The Investments and Cost Estimates under the Agriculture Subcomponent under RACP, Bansur:

Table 1212: Investments and Cost Estimates under the Agriculture Subcomponent under RACP

#	Name of sub-component	Unit	Unit Cost	Assistance (%)	Bansur (Alwar)			
					Phy	Assistance	Beneficiary Contribution	Total Project Cost
						Fin	Fin	Fin
1	**Component 1: Climate Resilient Agriculture**							
1A	Sub Component 1A: Improved water use efficiency (Micro Irrigation (MI) based technology)							
1	Integrated demonstration for Drip Irrigation System with Automation and fertigation based techniques for field crops	ha	2.20	75	5	8.25	2.75	11.00
2	Integrated demonstration for Mini Sprinkler based techniques for field crops	ha	1.45	75	33	35.64	11.88	47.51
3	Drip Irrigation System	ha	1.10	75	50	48.75	16.25	65.00
4	Mini/ Micro Sprinkler Irrigation System	ha	1.00	75	120	81.00	27.00	108.00
5	Sprinkler Irrigation System	ha	0.20	75	1600	240.00	80.00	320.00

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#	Name of sub-component	Unit	Unit cost	Assistance (%)	Bansur (Alwar)			
					Phy	Assistance	Beneficiary Contribution	Total Project Cost
						Fin	Fin	Fin
6	Pipeline for piped conveyance of irrigation water	100 mtr	0.10	75	1067	80.00	26.67	106.67
Subtotal 1A						**493.64**	**164.55**	**658.18**
1B	Sub Component 1B: Technology transfer and market led advisory services (Promoting Adoption and Documentation of Improved Technologies)							
1	Soil Testing	Nos	0.00	100	1701	1.41		1.41
2	Demonstrations on production technologies for value chain crops to bridge gap	ha	0.10	75	2100	126.66	42.22	168.88
3	Demonstrations on farm mechanization and PHM technologies	Nos	1.00	75	120	90.00	30.00	120.00
4	Demonstrations on forage/ fodder	ha	0.10	75	360	20.29	6.76	27.05
5a	1. Promotion to seed production	ha	0.05	100	399	18.96	0	18.96
5b	2. Promotion to Adaption support	ha	0.05	50	1300	32.50	32.50	65.00
6	Innovative activities/ INM/ IPM	No.	1.00	75	20	15.00	5.00	20.00
Subtotal 1 Ba						**304.82**	**116.48**	**421.30**
1B-b	Information and Communication Technologies (ICT) based demand driven participatory extension system (Modernization of extension/ research linkages)							
1	KSK strengthening as model in project area-to serve as level I platform for ICT	Nos	2.50	100	2	7.00	0	7.00
2	Agriculture Research Institute strengthening to serve as level II/ III platform for ICT	Nos	1.00	100	1	3.00	0	3.00
3	Honorarium to the experts for solution of the problems and facilitate field visits	LS	1.00	100	2	2.00	0	2.00
4	Digital instruments to field coordinator/ staff	Nos	0.50	100	20	10.00	0	10.00
5	Potential threats led/ Pro-P based literature on cluster specific crops	Nos	0.50	100	2	1.00	0	1.00
	Subtotal 1 Bb					**23.00**	**0**	**23.00**
	Subtotal 1 Ba +1 Bb					**327.82**	**116.48**	**444.30**
	Subtotal 1 (1A + 1 B)					**821.45**	**281.03**	**1102.48**

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#	Name of sub-component	Unit	Unit cost	Assistance (%)	Bansur (Alwar)			
					Phy	Assistance	Beneficiary Contribution	Total Project Cost
						Fin	Fin	Fin
3	**Component 3: Farmer Organization and Capacity Building**							
1	Field days, exposure visits, orientation, capacity building	LS		100	15	21.32	0	21.32
2	Hiring the Services of NGO for Community Participation, Social Screening and Social Mobilization required for implementation of Cluster Agricultural Competitiveness Plan (CACP)	As per deliverables		100		124.88	0	124.88
	Sub Total 3					**146.20**	**0**	**146.20**
4	**Component 4: Project Management, Monitoring and Learning**							
1	Operating costs PIA	LS	3.00	100	2	9.36	0	9.36
	Subtotal 4					**9.36**	**0**	**9.36**
Total Cost (Agriculture Department)						**977.01**	**281.03**	**1258.04**

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5.2.2. Horticulture

In agriculture water productivity is a major concern in the state, this implies promotion of high payoff and low water requiring crops is the main focus under the project. Horticultural crops are recognized as high payoff, nutritious value crops. Water management issue is also very important issue in the agriculture. Areas depend on rains and ground water is becoming very important in the field of water management. Whatever ground water is available in the cluster should be used judiciously. Horticulture is one of the sectors which has emerged as major drivers of growth in the agricultural and allied sector.

Notably, the problems in development of Horticulture are pressures emanating from climate change; post-harvest losses; bio-security concerns; absence of market linkages and resultant price fluctuations; changing quality consciousness; and global competition. These concerns need to be addressed in order to sustain the growth momentum in horticulture. The focus of the growth strategy, therefore, needs to be on raising productivity by supporting high density plantations, protected cultivation and efficient irrigation methods i.e. micro irrigation, quality planting material, rejuvenation of senile orchards and a thrust on post-harvest management to ensure that farmers do not lose their produce in transit from the farm gate to the consumer's plate.

Although there is not much horticultural fruit plantations at present, but the availability of fertile land and good quality water along with the proximity to the National Capital Region (NCR) provides immense opportunity for the cultivation of flowers and fruits as well as vegetables, herbs. The area is suitable for fruits like Guava, Beal, Lemon, Pomegranate, Papaya etc., hence, the area under pearl millet in Kharif crops, would be diversified in to the cultivation of vegetables, herbs, flowers and fruits crops. Considering the potential and acceptance of the area Chilly, Tomato, Carrot and Cucurbits in vegetable crops, Marigold under floriculture and Pomegranate & Lemon in fruit crops are to be promoted through demonstration with drip irrigation. Solar technology would also be promoted to assure irrigation. Farm mechanization would also be promoted to reduce the cost of cultivation. Post-harvest management would also be promoted.

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Based on the above facts and to promote horticulture in the area following activities would be attempted in the cluster:

a. Promoting Adoption and Documentation of Improved Technologies

Demonstrations on production technologies for Fruit Cultivation

Under this component assistance to farmers shall be provided for establishment of fruit orchards at normal / wide spacing as well as high density plantations. An attempt has been made to integrate various components of scientific fruit production viz. efficient water use devices like Drip irrigation system with Package of practices, IPM, INM, Fertigation, mulching, automation etc.

Wide spacing of crops with inter-cropping

Under this activity, assistance to farmers for scientific establishment of fruit orchards will be provided. It has been contemplated that various aspects of modern fruit production at wide spacing/normal spacing with intercrop are integrated. Farmers shall be provided planting material, drip system, mulch, fertilizers and plant protection chemicals.

An investment of Rs.295.05 lakh is to be made on demonstration and establishment of 105 ha orchards with Pomegranate, lemon and papaya orchard establishment. The assistance will be provide to farmers 75% of total unit cost Rs.2.81lakh in different inputs. After plantation of fruit crops in the first year, additional support during second year and third year would be provided.

High density plantations

"High Density planting technique is a modern method of fruit cultivation involving planting of fruit plants densely, allowing small or dwarf plants with modified canopy for better light interception and distribution and case of mechanized field operation". HDP and meadow orchards gives higher yield as well as returns/unit area due to increasing the no. of plants/unit area resulting in increasing productivity and return per unit area.

Under this component technological and input assistance shall be provided to the farmers for establishment of fruit orchard at high density. An investment of Rs.389.90 lakh is to be incurred for demonstration and establishment of 70 ha orchards with Pomegranate HDP (3x3m spacing). Assistance will be to provide to farmers 75% of total unit cost of Rs.5.57 lakh in different inputs. After plantation of fruit crops in first year, additional support during second year and third year would be given.

Demonstrations on production technologies for vegetable Cultivation

The cultivation of vegetables has been very remunerative but due to lack of investment capacity of farmers and involvement of high level of technical skills, the rate of adoption of vegetable as well as floriculture is not picking upto desired scales. It has been contemplated that various aspects of modern vegetable production technologies with drip and automation, hybrid and improved quality seeds, soil sterilization full POP, water soluble fertilizer, mulching, PP chemical and growth regulators and others cultural practices are integrated.

Under this component technological and input assistance shall be provided to the farmers for vegetable technology demonstration. An investment of Rs.292.00 lakh is to be incurred on demonstration and cultivation of 100 ha with Chilly, Tomato, Carrot and Cucurbits, which are the leading crops & selected for demonstration. The assistance will be provide to farmers 75% of total unit cost Rs.2.92 lakh in different inputs.

On farm Demonstration on Protected Horticulture

Protected cultivation has opened avenues for intensifying land use. This can provide an excellent avenue for small size of holdings owned by families having ample underemployed manpower. The weather proof (protected) cultivation results in high quality product and better income to farmers with optimum use of water. There are the two types of protected structure proposed in the cluster.

A. Green house (GH) -The benefits of Green House to improve productivity and quality are:

1. Equal distribution of light inside the green house.
2. To optimize the heat inside the green house.
3. To control the micro climate & establish optimal environment for cultivation & adjust temperature, humidity, lighting etc.
4. Protection against disease, pest etc.
5. Excellent ventilation.
6. Optimum sealing against rains & air.
7. To increase production
8. To ensure off season production, resulting good market rates.

Under this component, technological and input assistance shall be provided to the farmers for establishment of G.H. is 75% of total cost of Rs.0.0108 per sqm. A total investment of Rs.330.00 lakh is to be needed for establishment of green house in 30,000 sqm.

Assistance on shade net house

Shade net houses provide a cost effective avenue for protected cultivation in areas where the crop production is limited by intense heat and sunlight. The shade net house is a low cost structure which covered by the net for protecting the plants from high temperature & heat.

Under this component technological and input assistance shall be provided to the farmers for establishment of shade net house up to 75% of total cost of 0.009 per sqm. The total investment for shade net house is Rs.36.00 lakh for 4,000 sqm.

Commented [EWB23]: This must be a group activity, as per PIP and PAD. The subsidy is too high for an individual farmer.

Solar Pump Program

Energy as input in horticulture has great importance as with increase in intensity of production we need more and more energy. The solar pumps have paved new pathways for independent energy system for the farmers. It is proposed that solar pump of an estimated cost of Rs.5.5 lakh shall be provided to the farmers on 70% assistance. The SPV system should be operated with a PV array capacity in the range of 3,000 watts peak to 5,000-watt peak. The operation of solar powered pumps is more economical mainly due to the lower operation and maintenance costs and has less environmental impact than pumps powered by an internal combustion engine (ICE). Solar pumps are useful where grid electricity is unavailable.

Under this component technological and equipment assistance shall be provided to the farmers for establishment of SPV is 70% of total cost. The total investment for SPV establishment is Rs.247.50 lakh for 45 SPV.

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Post-Harvest Management

The post-harvest management of horticultural crops is of paramount importance as these products are of perishable nature and any attempt to service the gluts results in ensuring fair price realization to the farmers. It is contemplated that assistance to entrepreneurs is to be needed for establishing new post-harvest units. The contemplated assistance will be 50% of eligible project cost in the form of credit linked back ended subsidy or 50% of total cost of PHM equipment and Machinery.

Under this component assistance shall be provided to the farmers for establishment of pack house, grading, sorting, washing, packing, primary and secondary PHM Machinery and equipment. The total investment for this activity is Rs.28 lakh. The maximum assistance will be provided 50% of the unit cost of Rs.28 lakh.

Commented [EWB25]: Who owns it? Who will manage it?

Horticulture Mechanization

Mechanization is the effective tool to reduce production cost, increase the efficiency of farm and reduction in chemical weedicides. Power operated machines and mini tractors for field operations, planting, sowing, spraying, mulch laying machine, training and pruning, grading, harvesting etc.

Operations are proposed to be provided with the assistance level of 50 per cent to the selected beneficiary of the cluster. An estimated maximum cost of Rs.7.5 lakh has been kept for the implements/ mechanization technology per unit.

The total investment for this activity is Rs.22.50 lakh. The maximum assistance will be provided 50% of the unit cost of Rs.7.5 lakh or 50% of the total cost of machinery and equipment.

Commented [EWB26]: Why can't this be achieved through a Custom Hiring Center?

Micro irrigation in horticulture crops

With a view to produce more crops per drop of water and also to obtain higher and qualitative yield from horticulture crops, assistance would be provided to farmers who are willing to adopt drip irrigation system especially in fruit orchards and vegetable cultivation. Under this component, farmers will be promoted to adopt the drip irrigation system. A unit cost of Rs.0.80 lakh for establishment of drip irrigation in fruit orchards and Rs.1.30 lakh for vegetable cultivation has been decided. Farmers would be provided 75% assistance for adoption of a drip irrigation system. The total investment for this activity is Rs.52.00 lakh.

Farmers training, Seminars, Exhibition Kisan mela etc

To upgrade the technical knowledge of the farmers, training programmes, exposure visits, seminars, kisan mela etc would be organized.

The investments under the horticulture sub component are being summarized as under:

Table 13~~13~~: Investment proposal for the Bansur Cluster and Cost Estimate under RACP for FY 2016-17 to 2018-19

#	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Bansur (Alwar) Grand Total (Rs. In lakh)			
					Physical	Financial		
						Assistance	Beneficiary Contribution	Total Project Cost
I.	**Component 1: Climate Resilient Agriculture**							
I B	**Sub Component 1B: Technology transfer and market led advisory services**							
1	**Promoting Adoption and Documentation of Improved Technologies**							
i.	**Assistance on production technologies for Fruit Cultivation**							
1	Wide spacing crops with inter cropping	ha	2.81	75	105	73.71	221.34	295.05
i.	First year Maintenance support	ha	0.58	75	97	14.07	42.20	56.26
ii.	Second year Maintenance support	ha	0.75	75	40	7.56	22.44	30.00
2	High density plantations	ha	5.57	75	70	97.44	292.46	389.90
i.	First year Maintenance support	ha	1.09	75	50	13.60	40.90	54.50
ii.	Second year Maintenance support	ha	1.32	75	0	0.00	0.00	0.00
3	Assistance on production technologies for vegetable Cultivation	ha	2.92	75	100	73.0	219.0	292.0
4	Assistance on green house	Sq M	0.01	75	30000	85.20	244.80	330.00
5	Assistance on shade net house	Sq M	0.01	75	4000	10.12	25.88	36.00
6	Solar Pump Program	Nos	5.5	70	45	74.25	173.25	247.50
7	Post-Harvest Management	Nos	28	50	1	14.00	14.00	28.00
8	Horticulture Mechanization	Nos	7.5	50	3	11.25	11.25	22.50
9	Micro Irrigation in Horticulture Crops (Drip System)	Ha						
	Fruits		0.80	75	20	4.00	12.00	16.00
	Vegetable		1.30	75	20	6.50	19.50	26.00
	Sub Total IB				**34,551.00**	**484.70**	**1,339.02**	**1,823.71**
III	**Farmer's Organization and Capacity Building**							
1	2 days Farmer's training (50 farmers in each)	Nos	1	100	12	0.00	12.00	12.00
2	Exposure visit for 50 farmers for 5 days	Nos.	2	100	6	0.00	12.00	12.00

#	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Bansur (Alwar) Grand Total (Rs. In lakh)			
					Physical	Financial		
						Assistance	Beneficiary Contribution	Total Project Cost
3	Seminar for 100 participants for 2 days	Nos.	2	100	6	0.00	12.00	12.00
	Sub Total III				**24**	**0.00**	**36.00**	**36.00**
IV	**Project Management & M&E**							
1	Operating cost including (Photostat, computer, printer, fax, manpower, services outsourcing, mobility (hired taxi), TA for District unit)p	0	LS	100	11	0.00	0.00	11.00
	Sub Total IV				**11**	**0.00**	**0.00**	**11.00**
	Grand Total				**34,586**	**484.70**	**1,375.02**	**1,870.71**

5.2.3. Livestock

RACP envisages investing and working in a cohesive way with all the identified components for benefitting farmers, especially small holders in a sustainable manner, up-scaling the successes and documenting the learnings. For this purpose, it is planned to prepare the Cluster Agriculture Competitiveness Plan (CACP). The CACP has a defined objective and after analyzing primary and secondary data of the cluster proposes interventions including investments, Community level Institutional Development, Water Conservation and Resource Management, Climate Resilient Agriculture, and Value Chain Development. The CACP provides a detailed project report for the selected cluster. CACPs are prepared through a participative process involving a broad range of stakeholders, including private sector.

Based on the constraints identified with the community, project investments are planned to achieve the Project Development Objectives (PDOs). The details are as under the identified and eligible Investments under the project

Climate resilient agriculture –It is planned to improve productivity (milk and weight gain) through investment in breeding, feeding and animal health services.

Market and value Chain- It is planned to establish separate goat milk collection chain by establishing chilling nits in a phased manner and also installing a processing and packaging facility of goat milk. Improving market access for goat rearing farmers is to be done through rural haat.

Capacity building- supporting farmer advisory and training of farmers, and training of existing Animal Husbandry Department's technical staff

Project management & Monitoring

The impact of investment will arrive from increased profit to farmers by realising a higher price for their goats (through access to market information and value chain development not only through sale of animal/milk & meat, but also products like manure, hair, and hides); increased sale of goats due to reduced mortality and higher fecundity; and increased productivity (as a result of better breeding, feeding and healthcare). Women in particular will benefit; they provide the majority of labour for goat production though they are often excluded from marketing the produce.

The following activities would be undertaken at the Bansur cluster under Livestock Strengthening and management component:

Climate Resilient Agriculture

Productivity enhancement

Breed improvement; and advisory services to ensure that the breeding cycle coincides with market demand, climatic conditions/ resources availability. This will include:

i. Improved Jamnapari Bucks distribution to MTG members

ii. Goat distribution to Widows and/or specially abled women for livelihood development

iii. Risk Coverage through Animal Insurance

Low milk yield and low weight gain in non-descript goat population of the cluster is the major constraint for improving farmers' income. The Department of Animal Husbandry breeding policy recommends Jamnapari breed for the cluster area, so it is planned to induct elite breeding bucks in the area. The Project will support distribution of breeding bucks to those MTG (Goat) members who have at least 10 breeding goats. It is found that in the cluster many women especially widows and disabled are in need of livelihood support and they are willing to adopt goat farming. It is planned to support these women to provide a unit of 4 Goats for adopting goat farming. Asset insurance is critical for the poor and small holder farmers; under the project distributed bucks and goats will be insured with project support.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Buck Distribution	320	100	150	70
Goat Distribution	240 MTG Members	30	110	100
Animal Insurance	1280	220	750	550

The primary objective of investment the under the livestock strengthening and management component of RACP (Rajasthan Agriculture Competitiveness project) is to improve Goat productivity and provide market access for the produce. This will improve competitiveness of the small holder and improve her income from the activity.

Goat productivity majorly depends upon the breed and also on nutrition & management. In context of the project cluster small goat rearer keeps non-descript (not true to breed) goats; this results in low milk production and weight gain. It is to improve the breed of the goat of the farmers in the project clusters; it is envisaged to induct quality bucks to those MTG members already keeping goats. The Project will support sourcing of elite bucks from open nucleus farm for multiplier herds and from the multiplier herd to the MTG members.

Improved feeding practices through advisory support and better utilisation of local resources; improving fodder availability silvi-pasture development on common lands and fodder demonstration on private lands, better integration of crops with livestock through simple storage, production and processing of crop residues to include, feed blocks, chaffing and fodder banks This will include

Azolla Demonstration to MTG members

The cost norm for demonstrations would cover the expenditure on provision of critical inputs i.e. know-how, seeds, fertilizers, insecticides, micronutrients etc. Fodder Demonstration will be organized/laid out on the field of members of MTGs. One demonstration only would be provided to one farmer. The area of each demonstration would be up to 0.4 ha per farmer and an estimated cost of the inputs would be around Rs.5000 (on actual basis)/0.4 ha. Project will support the full cost of seeds and inputs (Fertilizer, pesticides & micronutrients). This component may be linked up with the Department of Agriculture.

The demand for milk and meat is creating new potential in the profitability of animal husbandry as an occupation. Yet, at the same time, there is a substantial decline in fodder availability. The area under forest and grasslands is decreasing as is the amount of various crop residues available for feed, largely due to the introduction of high yielding dwarf varieties. The shortage of fodder is therefore compensated with commercial feed, resulting in increased costs in meat and milk production. Moreover, as commercial feed is mixed with urea and other artificial milk boosters, it has a negative effect on the quality of milk and the health of the livestock. The search for alternatives to concentrates led us to a wonderful plant azolla, which holds the promise of providing a sustainable feed for livestock.

Azolla is a floating fern and belongs to the family of Azollaceae. Azolla hosts symbiotic blue green algae, Anabaena azollae, which is responsible for the fixation and assimilation of atmospheric nitrogen. Azolla, in turn, provides the carbon source and favourable environment for the growth and development of the algae. It is this unique symbiotic relationship that makes azolla, a wonderful plant with high protein content.

Demonstration of Azolla with capacity of producing sufficient Azolla for feeding minimum 20 +1 unit of goats daily (Approximately 3 KG. Daily) will be organised at MTG's field. AS being new technology initial 1-2 days field training & hand holding support and all related inputs will be provided with project support. One demonstration would be given per farmer.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Azolla Demonstration	800	0	400	400

Chaff cutter Demonstration to MTG members

To save the wastage and improve digestibility project will demonstrate and motive chaff cutter use by small holder farmers. Good quality manually operated Chaff cutter as per BIS specification will be provided to goat rearer with project support**.** DAH through NGO will promote regular use of chaff cutter.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Chaff Cutter Distribution	800	330	300	170

Feed supplement to Goat & Buck of cluster:

Goats have an ability to thrive in the harshest environments. Their high digestive ability enables them to deal with high cellulose/high fibre diets of a very coarse nature; with its relatively large digestive system in relation to its body size, the work of digestion involves the use, and loss, of large quantities of minerals. Goats are also prolific breeders; achieve sexual maturity at the age of 10-12 months. Gestation period is short and at the age of 16-17 months and starts giving milk. Twining is common and triplets and quadruplets are also possible.

It is observed that growth rate (body weight gain) and timely fertility gain of female goat restricts goat farming economics in the cluster. One of the reason in the cluster is absence of essential minerals and vitamins in the goat feed. Small holder's lack resources to buy quality feed supplement and DAH resources usually exhaust with large dairy animals.

In this context, the project may support the goat population of the cluster for feed supplement (20 gm per day for 90 days in a year) to demonstrate benefits:

Activity	Total Requirement (KG)	Year Wise requirement		
		Ist year	II year	III Year
Feed Supplement	6000		3000 Buck & Goat	3000 Buck & Goat

Animal Health Services

It is observed that timely availability of animal health services, both prophylactic and curative are very important for ensuring productivity and this leads to better returns to the farmers. Common diseases like PPR, ET and kid mortality can easily be controlled by animal health management. For animal health management major identified constraints in the cluster are:

a. Availability of animal health services at village level
b. Regular Deworming and Vaccination
c. Local Resource for motivation and support
d. Regular health check-up of the stock
e. Strengthening of Animal Husbandry institutions for providing quality animal health care

For overcoming above constraints in possible effective sense following investments are planned for livestock owners especially the small holders

Establishment of Rural Technology Centers (RTCs)

Suitable existing institutions of Department of Animal Husbandry will function as Rural Technology Centres (RTCs) in the project clusters at the strategic location for livestock development with aim to provide health, prophylactic services and centres for technology demonstration & extension.

There would be two types of RTC: A & B Grade, "A" grade shall ideally be centrally located. Vet. Doctor placed at RTC 'A'grade will be responsible for organising all the project activities under DD LSD / OIC RACP supervision, in the cluster and also manage Emergency animal health services.

DAH has 3 Veterinary hospitals (Bansur, Manchi and Khedashampur), 1 vet. dispensary (Gadi) and 5 sub centres (Basdayal, Rasnali, Neemuchana, Chatarpura and Babera). But available infrastructure is not sufficient to provide effective services to the livestock owners. Additionally, support is required for extension and capacity building services at technology centres.

The following Locations (in discussion with community and department of AH) have been identified for RTC's in the Bansur cluster

RTC "A" Grade:- Mahanpur with Rural Haat

RTC"B" Grade:- 1. Manchi, 2. Neemuchana

The Project will support building construction and procurement of basic furniture, equipment and recurring expenditure during project period for effective functioning of RTCs. The RTC will have an organic relation with DAH as after the project period assets and functions will be transferred to DAH. The RTC will also have facility for feed & fodder, vaccine, medicines & mineral mixture Storage. The meeting place for MTA/PO/Cluster federation, RTC can be a place for organising health camps, training, exhibition and seminars.

RACPPMU & DAH with the help of construction expert will finalise the design of the RTC. The RTC will also have required equipment and furniture etc. Facilities for organising trainings, meetings and farmer's workshop will also be created. The project will also support operating cost of the RTCs that will include office expenses, running and maintenance cost of the emergency mobile vehicle.

Health cum combat infertility and awareness camps

a. It is planned to organize need based health and sterility camps periodically through Rural Technology Centre (RTC)/ DAH institutions in order to cover all health related issues in the project area. The health camps will be organized for vaccination; deworming, etc. **at least once in a month in each gram Panchayat**. Bansur cluster covers 18 Gram Panchayats so 18 Animal Health Camps per month will be organised.

b. Organization of health care and awareness camps by RTC/ DAH institutions where activities like vaccination, de-worming, castration, Feed supplement distribution, treatment, extension, etc. will be undertaken.

c. Health check-up and treatment of infertile animals shall be covered in these camps. Department of Animal Husbandry in consultation with research institutions shall provide technical aid in addressing health related problems in the project area.

d. DAH will organise health camps under its free vet. Medicine and **"Pashu Chiktsayalya Pashu Palakke Dwar"** scheme and project will financially support Rs.5000 per camp for additional expenses. This will cover expenses towards registration/vaccination, cleaning, tent, sitting, water, publicity, small refreshment and miscellaneous/contingency..

e. Further the opportunity will be used for organising Farmer's meeting (Pashu Palak Goshti) of at least 50 farmers for disseminating the latest technical and other information and knowledge of animal husbandry.

Activity	Total	Year Wise requirement

	Requirement (No)	I year	II year	III Year
Animal health Camps (One per GP per month)	690	216	216	216

Mobile Emergency Animal Health Van cum Ambulatory clinic:

The mobile Emergency animal health van cum ambulatory clinic is an excellent support tool for implementation of the activities related to the animal husbandry. The Mobile van will provide animal health services

The Project will provide one Mobile animal health van cum ambulatory clinic in cluster and 100% cost will be borne by the project and it will be procured by the project as per the World Bank procurement guidelines. The project will also support its running and recurring expenditure during the project period. It will be handed over to the DAH and will be used for providing services in the cluster The Mobile vehicle shall be equipped with storage of medicine/ vaccines, primary testing and minor surgical interventions.

Installation of Travis in project cluster:

The Project will support the animal health services in the project cluster villages, and for inspecting the animal it is essential to restrain the animal. This is safe for the professionals and also comfortable for the animal. It is planned to install travis for restraining the animals in all the villages where already not available through department of animal husbandry. Actual requirement will be accessed and procurement will be done as per World Bank procurement guidelines.

Animal husbandry management and advisory support

Distribution of Feeding and water troughs to MTG members

It is observed that there is no standardisation in feeding and watering appliances. The animals tend to contaminate the feed in most of these devices by voiding faeces and urine and by standing inside or over these feeders or keeping the fore legs inside these devices. Farmer incurs about seventy percent running expenditure on feeding material. To minimise the cost, it is of utmost importance to reduce the wastage and contamination of feed and to increase efficiency of feeders. It will also help in the prevention of goat diseases, caused due to contamination of feed and water. Design developed by CIRG (central Institute for Research on Goats) Makhdoom U.P. will be utilised as these feeders are suitable for various types of feed and fodder.

Activity	Total Requirement	Year Wise requirement		
	(No)	Ist year	II year	III Year
Feeding & Water Trough	800	100	400	300

Goat Housing

Presently Goat rearing on zero input concepts is mainly sustained but this does not provide attractive returns to the farmers. Goat are exposed to harsh environmental conditions, does not provided balance ration and scientific health management; leads to underutilization of resources and lower returns.

The Project will support adoption of intensive or semi intensive goat management system by the farmers. Goat housing is important in intensive system of production; in fact one must ensure proper comfort of animals for production to gain maximum profits. The main aim of housing is to protect animals from harsh, uneven climate as well as environmental stress. The goats shall be provided enough floor space to avoid crowding and proper ventilation.

The Project will also support construction of goat house for one (40 goats+1Buck) Unit with 220 Sq Feet floor space. The design will be prepared by utilising local material to reduce cost. The Project may support 75 percent of goat house cost and remaining 25 percent cost will born by the beneficiary.

Activity	Total Requirement	Year Wise requirement		
	(No)	Ist year	II year	III Year
Goat House	100	0	50	50

Commented [EWB27]: How will the project decide who gets these goat houses and who does not? Is this one Goat House for each MTG?

Lady Link Worker cum Marketing Facilitator

Small Ruminant development especially for small holder is possible only through regular and timely help. This is only possible when a local resource person is available with information and professional linkage. Under the project it is envisaged that one progressive women farmer preferably MTG member per Gram Panchayat, will be trained as resource person i.e. Lady Link Worker cum marketing facilitator.

This worker will be the local common linkage both for the project and women farmer. She will maintain the inventory of MTG members', their goats, goat health status, project activities schedules etc. She will coordinate organisation of camps and Goat Haats for the project beneficiaries. LLWs will have support of ICT application for information dissemination and marketing access.

Roles and Responsibilities:

a. LLW will facilitate extension services; make farmers aware about vaccination, de-worming and health care, feed - fodder and housing and other management practices.

b. LLW would support in timely implementation of various activities planned under AHD component of RACP

c. LLW would also facilitate formation and mobilising the MTG (goat)

d. LLW shall play a role in creating awareness about animal health, safety in case of outbreak of contagious diseases, extreme climatic changes like heavy Rainfall, flooding, extreme cold and hot temperatures, food scarcity due to drought.

e. LLW shall creating awareness in neo-natal care of young kids and does, weaning and milking of goats.

f. Lady Link Worker shall play role of entitlement facilitator and enhancing outreach of schemes of Department of Animal Husbandry to marginalized farmers.

g. She will maintain an inventory of ready to market animals for organizing rural haats and also motivate farmers to sell animals on weight basis.

These LLWs will be supported for monthly worked related honorarium.

Market and Value Chains

To improve market and value addition, the project will support:

Formation of Farmer Producer groups

Multi Task Groups (MTG) for Goats that would enable the producer to access diversified markets, better access to inputs and services on a gender equitable basis and access to market information. The Goat farmers are to be organized into MTGs @10-15 farmers per MTG through NGO selected by PMU RACP. On the basis of the potential of goat farming and available resources a total of 100 MTG (Goat) will be organized in the project cluster. Selection criteria for Small Ruminants (SR) farmers to become member of MTG have been evolved:

Small ruminant market "Rural Haat" in the project cluster.

Marketing is most crucial activity for producers to realize proper price and income for their farm produce. One of the major constraints identified is raising the income of goat farmers in the cluster is the absence of any Small ruminant markets Further, no standards are laid down for small ruminants marketing. Alwar district's total goat population is about 4 lakh and present practice is of marketing live animals through middle man that also without weighing. There is need for developing local markets at potential location where sale and purchase deals are done locally & timely and farmers get good price of their produce. In this context it is envisaged to establish one Small Ruminants markets at a centralised location of the cluster with basic infrastructure supported from the project.

The selection criteria for Haat includes: (a) Preferably it should be in the project cluster or very nearby (b) at least one weekly or fortnightly market can be organized in the haat; and (c) village Panchyat will provide place for Rural Haat (it may be already existing in the area, if it is not available then land (5-10 Bigha) will be provided free of cost)

Initially, Technical Resource Agency (TRA)/ABPF hired by PMU RACP, with NGO and DAH support will initiate the goat marketing operation at Rural Haat and simultaneously build capacity of the community/ PC & PRIs so that the PC /PRI can operate Rural Haat sustainably. Technical / Market Resource Agency/ABPF in consultation with PMU/PIU/DAH will finalise the SOP (standard operating procedures) of Rural Haat functioning.

The issue was discussed with the community, PRIS, local department of animal husbandry officials and "Mahanpur" was identified as potential location of the SR Rural Haat. The Gram Panchayat is proactively supporting the market establishment and provided NOC for land allotment. The available land area is 10 Bigha. Basic infrastructure (civil and Equipment) will be supported by project as per World Bank procurement guidelines.

The illustrative facilities would be provided in the haat including among others Compound wall, few goat sheds, electricity/solar, drinking water, toilets Vet. Facility, loading-unloading platforms, waste disposal, feed storage office cum meeting room and essential equipment like weighing balance, milking machine, computer etc. Construction consultant hired by RACP will design the Rural Haat in consultation with PMU and DAH.

These SR markets will also be used for organizing health check-up camps, vaccination & deworming of SR, field visits & demonstrations, MTG /Producer Company meetings. Addition to the SR marketing activities the possibilities will also be explored for establishing FCSC (Farmer common service centre) at these locations for optimum utilisation of the facilities developed under the project.

Distribution of weighing scale to MTG members

Live goat sale is the largest adopted method by the small holder farmers. Sometime in case of urgent need it becomes ready cash for the farmer. Goat sale usually occurs through middle man, who taking the benefits of approximation cheats the farmer by paying less in comparison to animal's actual weight. Project may provide advisory to MTG members for weighing the animals before selling and will also provide weighing scale for ready use. Weighing scale will also help farmers to know the weight gain of animals for supporting the right quantity of feed intake.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Weighing Scale	1500	0	1500	0

Goat Milk Value chain and Clean milk production

Alwar and Bansur cluster within have substantial goat milk production and strengthening goat milk value chain will provide remunerative price to the small goat rearers. The value chain may include milk collection, chilling and value addition and packaging. Nearness to the Delhi market will provide opportunity to market value added products like Goat Cheese. Value addition demands high quality milk and project proposed to support this practice in a coherent manner for adoption at the large scale. Post intervention value chain maps for milk and meat are given in Annexure 5.2.

Capacity Building and Training

Goat Management training of MTG members

A training need analysis has to be done for various stakeholders like goat farmers, NGO, and AHD staff. Accordingly, the relevant training programs will be organized for all the stakeholders. It will be ensured that majority of the members of MTG receives basic training involving skill up gradation and orientation on the technical and organizational aspects.

The Project will support to organize exposure visits of successful Animal Husbandry projects for members of MTGs and professional staff with the aim to adopt best practices and improved technologies. Project will also support refresher training of professional staff engaged in project implementation at national level institute in relation to goat development.

In each village all the members of the MTG will be given 3 Days training on Goat Management at RTC/GP/Village level. This will cover General Management, Breeding, feeding esp. fodder development and Goat marketing esp. synchronization as per the market demand.

Activity	Total Requirement (No)	Year Wise requirement		
		Ist year	II year	III Year
MTG Goat Management Training	1500 MTG Members	100	700	700

Professional Training

It is observed that knowledge of veterinary professionals in the project cluster is also limited for goat management practices especially for latest development for feed and breeding.

Professionals training of the DAH and project staff will be organized at reputed National institutes.

Goat Exhibition cum Seminars

Goat Exhibition cum Seminars will be organised to motivate farmers towards rearing quality animals and showcasing best practices. RTC will take the initiative with the help of NGO and under JD/DD LSD supervision. The goat exhibition cum seminars will be organised at the cluster level and as per the approved action plan and Project guidelines

Estimated Cost of Investments on Livestock activities

Tentative Livestock Activity Action Plan & Cost Estimates for the Bansur cluster is summarized as under:

Table 1414: Estimated Cost of Investments on Livestock activities

#	Items	Unit	Unit cost (Rs. In lac)	Assistance (Rs. In lac)	Physical	Total Financial (Rs. In Lakh)		
						Farmer Share	Project Cost	Total Cost
I.	**Climate Resilient Agriculture**							
1 C	**Livestock Strengthening and Management**							
1	Distribution of bucks (farmers)	No.	0.100	0.075	320	8	24	32
2	Distribution of goats (widows & disabled) (one unit of 4 goats)	No.	0.32	0.320	300	0	96	96
3	Goat insurance (8% per annum) of units receiving improved bucks and does	No.	0.008	0.006	1520	3.04	9.12	12.16
4	Veterinary Health Camp support (one camp Per GP Per month)	No.	0.05	0.050	690	0	34.5	34.5
5	Establishment of regional technology center (RTC)							
i.	A- grade	No.	60	60.000	1	0	60	60
ii.	B- grade	No.	30	30.000	2	0	60	60
6	Vehicle for emergency animal health services	No.	10	10.000	1	0	10	10

#	Items	Unit	Unit cost (Rs. In lac)	Assistance (Rs. In lac)	Physical	Total Financial (Rs. In Lakh)		
						Farmer Share	Project Cost	Total Cost
7	Operating cost of RTC including POL for Vehicle	No.	3.6	3.600	9	0	32.4	32.4
8	Link worker/MF honorarium (One per Gram Panchayat)	No.	0.36	0.360	54	0	19.44	19.44
9	Azolla demonstration	No.	0.065	0.065	800	0	52	52
10	Housing supports	No.	0.66	0.495	100	16.5	49.5	66
11	Feeding and water troughs distribution	No.	0.05	0.038	800	10	30	40
12	Travis installation in project villages (one per village)	No.	0.15	0.150	37	0	5.55	5.55
13	Distribution of chaff cutter	No.	0.08	0.060	800	16	48	64
14	Animal identification							
i.	Tags	Nos	0.00018	0.00018	5000	0	0.9	0.9
ii.	Needle	Nos		0.000	360	0	0	0
iii.	Tag applicator	Nos	0.015	0.015	10	0	0.15	0.15
15	Weighing balance	No.	0.01	0.010	1500	0	15	15
16	Feed supplement distribution	No.	0.00126	0.001	6000	0	7.56	7.56
17	ICT Support for LLW/MF		0.1	0.100	18	0	1.8	1.8
	Sub total					**53.54**	**555.92**	**609.46**
II.	**Market & value chain**							
1	Formation of MTG (goat)	No.	0	0	100	0	0	0
2	Establishment of rural haat	No.	200	200	1	0	200	200
3	Clean milk production	No.	0.01	0.01	3000		30	30
	Sub Total					**0**	**230**	**230**
III.	**Farmers Organization & capacity Building**							
1	MTG members Goat Management	No.	0.02763	0.02763	1500	0	41.445	41.445
2	MTG members Refresher Goat Management	No.	0.00545	0.00545	1500	0	8.175	8.175
3	LLW training	No.	0.075	0.075	21	0	1.575	1.575
4	Professional staff training	No.	0.075	0.075	20	0	1.5	1.5
5	Goat Exhibition/Seminar	No.	0.5	0.5	3	0	1.5	1.5
	Sub Total					**0**	**54.195**	**54.195**
IV.	**Project Management & M&E**							
1	Operating expenses of DD Office	No.	0.6	0.6	3	0	1.8	1.8
2	District Goat Development Plan Consultation (One at each District)	No.	2	2	1	0	2	2

#	Items	Unit	Unit cost (Rs. In lac)	Assistance (Rs. In lac)	Physical	Total Financial (Rs. In Lakh)		
						Farmer Share	Project Cost	Total Cost
3	Vehicle on Hire for Cluster /POL	No.	1.8	1.8	3	0	5.4	5.4
4	Incentive for different project activities (Rs 1500 per CAPM)	No.	0.015	0.015	690	0	10.35	10.35
	Sub Total					**0**	**19.55**	**19.55**
	Total					**53.54**	**859.67**	**913.21**

5.3. Market and value chains

The objective of this component is to enable farmers to engage in profitable market oriented production, that is sustainable, and to promote partnerships and market linkages with other value chain participants and agribusinesses. The component will help producer groups, agro enterprises, and commodity associations, to actively engage in the development of commodity value chains by partially financing demand-driven investment proposals to producer organization through a matching grant. This will be done by further organizing members of MTG and developing their capacity and skills for input and output marketing. It is expected that aggregation will bring economies of scale in procurement of inputs and marketing of agricultural produce, thus enabling wider access to markets. These producer organizations will be an important vehicle for promoting market-oriented production in their geographical jurisdiction and can act as centers for technology dissemination and input/output marketing. Project will develop (a) value chains aiming to establish longer term partnerships and market linkages between farmer groups and agribusiness enterprises, facilitated through an Agri-Business Promotion Facility (ABPF); and (b) alternate market channels. It is in this context that the FPCs that are developed may serve as input facilitators of seeds, pesticides etc. operators of common facilities by way of primary processing facilities, custom hiring (of farm equipment) facilitators, seed producers as well as platforms for B2B linkages directly with secondary processors/marketers.

5.3.1. Value chain studies of identified commodities in the cluster

As discussed in Chapter 3, following commodities are selected for the value chain intervention in the cluster: Bajra, Barley and Mustard along with vegetables primarily Carrot, Tomato and Chilli. This was done based on broadly four set of parameters: 1) Existing size of the crop, 2) Potential for value addition, 3) Risk assessment and 4) Environmental parameter.

A comprehensive value chain study has been conducted that includes following activities, but not limited to: (i) participatory meetings with value chain stakeholders of each cluster such as – producers, aggregators, transport facilitators, storage facilitators, commission agents, wholesalers, retailers, (ii) analysis of potential for new value chains, volume & value of the selected crop with respect to its production, postharvest management practices, processing, storage, transport and marketing), (iv) analysis of the data / information collected from various sources, (v) feedback from market participants & relevant agencies, (vi) understanding on the role of stakeholders (vii) cost contribution analysis per stakeholder wise (viii) Margins at each level of value addition (ix) study gaps and issues in value chains (x) suggested intervention (xi) SWOT analysis for each value chain for intervention. (xiii) Comparative study of stakeholders' role and cost contribution in each cluster separately.

5.3.2. Value chain analysis and key opportunities

As discussed in the chapter 4, there is scope in the selected crops for value chain interventions. As mentioned, intervention can be started with primary processing at common facilities (FCSC). Thus the income of farmers can be increased by 25% instantly.

1. **Bajra and Barley**

The concept of FPC as suggested in Chapter 4, will get complimented by an FCSC unit. A reference value chain map of Bajra and Barley, post intervention along with the incremental benefit by comparing the traditional marketing chain of farmer with a suggested marketing chain, is shown in Annexure 5.2.

Farmers are exploited by traders based on the quality of the produce brought. Processors are willing to pay a premium based on FAQ (Fair Average Quality) parameters. Hence a small cleaning and grading unit can increase the returns by 20% because apart from getting premium, farmers will also save on the expenses as a result of aggregation. Farmers can then sell their cleaned and graded produce directly to processors. A warehouse along with the cleaning and grading unit can ensure longer use of the unit and can also cater the price volatility so that farmers need not go for distress sale. A reference model is proposed in Annexure 5.3.

2. Mustard

Value chain map of Mustard, post intervention along with the incremental benefit comparison is show in Annexure 5.2.

In mustard, a mini oil unit can be a primary processing unit because as per the consultation, in mustard, only cleaning and grading will not increase the returns by such margin. Hence a mini oil mill unit can be proposed including oil testing machine so that member farmers can have option of selling their produce in open market just by checking the oil content. A reference model is proposed in Annexure 5.3.

3. Vegetable

Value chain map of vegetables, post intervention along with the incremental benefit comparison is show in Annexure 5.2. Currently, horticulture crops are being promoted in the cluster and a ready market available in terms of Azadpur mandi in Delhi.

Horticulture crops have high productivity hence they have high returns but due to high perishable nature, there is always a risk. At primary level, vegetable pack house with a small cold store can bring stability in price fluctuation to a large extent. A reference business model is proposed in Annexure 5.3.

4. Goat milk

As mentioned in the situational analysis of goat value chain section that the estimated milk production in the cluster is 4837 litres per day. The highest milk producing villages in the cluster are Bisalwa, Neemuchana, Buteri, Gyanpura, Khohri, Manchi and Bas karnawat and all these villages have more than 200 litres per day of milk production estimates.
The cluster has scope for establishing at least 2 small milk processing unit. As mentioned in the situational analysis section, the capacity of small milk processing unit can be 500 litres per day and following activities will be performed:

- Milk collection (weighing scale, milk testing equipment and other utensils)
- Chilling section/ chiller
- Solar panel for CIP (Cleaning in process)
- Sterilization and packaging

The unit is suitable for the following milk products

- Packaged sterilized milk (Tetra pack)
- Sterilized flavoured milk (few additional machine will be required with some small investment)

The unit will be under administration of FPC of goat rearer as mentioned in previous section.

Apart from the hard intervention, there is a need of soft interventions too. Based on the FPC model approach as discussed in Chapter 4, there is a requirement of other activities as listed below and a detailed description is in Annexure 5.4.

- Scouting of technologies and business ideas for identified commodities
- Incubation services to agri entrepreneurs
- Management and business training to FCSC and producer company personnel
- Facilitating reforms in agri policies

5.3.3. Value chain cost estimate

To promote Farmers' Producer Company along with the development of farmer common service center, it would require a support from the project as discussed below.

FPC registration and related licenses

Registration fees along with the fees of the facilitator can be budget under this amount. This component can also cover the fees to apply for other licenses as well like electricity, procurement etc. 100% assistance is required from the project as it is just the starting of the FPC hence there would be no other source of cash inflow for the unit.

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
i)	Registration expenses and other pre-operative expenses- FPC	FPC	1	100%	1	4	0	4	4

Human Resource

Dedicated resource person is required at each FPC to manage and control day to day activities along with other compliances and business as well. 100% assistance is required in manpower.

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
ii)	Manpower Expenses - FPC (Rs. 25,000 per month for 2 years)	FPC	6	100%	6	4	0	24	24

Office infrastructure

An office can be set up in a rented building with basic amenities like table, chair, computer, printer etc. Office is purely on the brand building basis to show the identity of the FPC hence a 50% support can be given by the project.

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
iii)	Office Establishment (only physical assets like chair, tables, computer, printer and other furniture)	FPC	1	50%	0.5	4	2	2	4

Common Facility

This is the component for the establishment of the common facility infrastructure. On an average and also as per the business models suggested in the previous section an FCSC along with an FPC has a capital expenditure of Rs. 30 lakh. It can be taken as a standard by the project to assist any unit by 75% or Rs. 22.5 lakh whichever is lesser.

S.	Name of sub-	Unit	Unit	Assistance	Amount of	Phy.	Financial

No.	component / Activity		cost	(%)	Assistance		Farmer share	Project	Total
1	**Value Added Unit (Common Facility) - FPC**	FPC	30	75%	22.5	4	30	90	120
2	**Value added unit-Goat**	FCSC	25	75%	18.75	1	6.25	18.75	25

For the suggested business models following table summarizes the capital expenditure required in the FCSC.

Table 1515 Capital expenditure for the common facilities

#	Suggested value chain interventions in the cluster	Amount (Rs.)
1	**Bajra and Barley cleaning and grading unit (2 TPH)**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Grains cleaning machine 2 TPH	1,200,000
	Weighing scales, bag sealing machines	20,000
	Warehouse (200 MT)	1,080,000
	Electricity/Generator	35,000
	Total	**3,035,000**
2	**Vegetable pack house (2 TPH)**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Vegetable Cleaning and Grading Machines (Grading Tables, Water Tank, Washing Tank)	500,000
	Pre cooling chamber (5 MT)	500,000
	Vehicle (2 MT capacity)	750,000
	Total	**2,450,000**
3	**Mustard oil unit (3 QPH)**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Oil Unit Machines	1,200,000
	Electricity/Generator	50,000
	Vehicle (2 MT capacity)	750,000
	Total	**2,700,000**

Capital investment required for the goat milk business model is as under.

#	Description	No. of unit	Per unit value	Total Value
1	Shed construction	300	1000	300,000
2	Chiller (500 litre capacity)	2	650,000	1,300,000
3	Milk Collection Equipment's (weighing scale, milk testing equipment and other utensils)	1	100,000	100,000
4	Solar Panel for CIP	2	250,000	500,000
5	Sterilization and packaging equipment	1	300,000	300,000
Total				**2,500,000**

A summary of the expenditure and the assistance required through project is as follows:

Table 1616 Estimated Cost of Investments on Value chain activities

S.	Name of sub-	Unit	Unit	Assistance	Amount of	Phy.	Financial

No.	component / Activity		cost	(%)	Assistance		Farmer share	Project	Total
I.	**Component 2: Market and Value Chain (Agri. and Horti.)**								
	Sub Component 2B: Market Infrastructure and Agribusiness Support								
1	**Nurturing farmers group**								
i)	Registration expenses and other pre-operative expenses- FPC	FPC	1	100%	1	4	0	4	4
ii)	Manpower Expenses - FPC (Rs. 25,000 per month for 2 years)	FPC	6	100%	6	4	0	24	24
iii)	Office Establishment (only physical assets like chair, tables, computer, printer and other furniture)	FPC	1	50%	0.5	4	2	2	4
2a	**Value Added Unit (Common Facility) - FPC**	FPC	30	75%	22.5	4	30	90	120
2b	**Value added unit- Goat**	FCSC	25	75%	18.75	1	6.25	18.75	25
	G. Total						**38.25**	**138.75**	**177**

An indicative profitability study for all the FCSC units proposed are as given below:

Table 1717 Profitability indicators on proposed value chain units

Particulars	Vegetable Pack house (Rs.)	Mustard oil mil (Rs.)	Bajra and Barley CnG (Rs.)	Goat milk chilling unit (Rs.)
Revenue	1,152,000	31,104,000	1,536,000	4,015,000
Total Revenue	**1,152,000**	**31,104,000**	**1,536,000**	**4,015,000**
Fixed Cost (HR, other fixed cost)	214,400	514,000	383,000	221,000
Variable Cost	180,000	25,408,480	360,000	3,016,798
Total Operational Expenses	**394,400**	**25,922,480**	**743,000**	**3,237,798**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**757,600**	**5,181,520**	**793,000**	**777,202**
Depreciation	210,000	235,000	268,500	142,388
Amortization	-	-	-	-

Particulars	Vegetable Pack house (Rs.)	Mustard oil mil (Rs.)	Bajra and Barley CnG (Rs.)	Goat milk chilling unit (Rs.)
Earnings Before Interest and Taxes (EBIT)	**547,600**	**4,946,520**	**524,500**	**634,815**
Interest Expense	-	-	-	177,734
Earnings Before Taxes (EBT)	**547,600**	**4,946,520**	**524,500**	**457,081**
Tax (@ 30%)	164,280	1,483,956	157,350	137,124
Earnings After Taxes (EAT)	**383,320**	**3,462,564**	**367,150**	**319,957**
Financial Indicators				
Net Present Value (@ discount rate 10%)	346,027	10,380,669	132,293	897,873
Internal Rate of Return	14.99%	75.43%	51.50%	25.50%
Payback period in years (Equity)	1.03	0.77	1.13	1
Payback period in years (Total)	3.48	1.40	3.91	3
Breakeven point	19.39%	9.02%	45.45%	17.54%

Commented [EWB28]: This is typically given in months, not percentage. What is meant here…% of what?

Detailed Profit and loss statement for all the models including goat milk unit are given in Annexure 5.5.

5.3.4. Brief description of Implementing Arrangements

Above mentioned technological gaps would be addressed through various interventions suggested and through farmers groups (MTGs) formed under RACP. Group leaders of MTGs/MTAs can be trained on market led extension to spread adaption of technologies speedily. Also for better implementation role of ATMA, KVK would be crucial and they can be involved for registration of groups, trainings to farmers.

Implementation process for agri business units is proposed as follows:

1. Preparation of potential business model of units proposed above with the help of AB consulting agency.
2. Submission of project proposals to the PMU by the beneficiary.
3. Evaluation of projects by an appointed technical committee of PMU.
4. Approval of project by PMU/ EC RACPMIS for the proposed support through RACP.
5. Commissioning of the unit and business activity initiation
6. Phasing of subsidy during implementation:
    a. 20% after mobilization of PC/entrepreneur fund
    b. 40% during the purchase of the plant and machinery
    c. 40% at the commencement of the unit

5.4. Investment per unit of water saved

The comparison of investment (in Rs crore per mcm) is a useful tool for assessing data to understand the relative effectiveness and cost of the full spectrum of approaches to improving water security. When coupled with realistic assessments of operational risk, such comparisons can also help policy makers and investors to improve water-sector productivity.

In the case of Bansur cluster, there are majorly two water saving activities taking place viz activities of Watershed department and the micro-irrigation system (MIS) activities of Agriculture and Horticulture department. Both these activities save water up to the extent of 3.76 mcm and 8.25 mcm. When the investment per unit of water saved is calculated, it is found that MIS activities are able to conserve more water at lower investment of Rs 1.09 crore per mcm of water saved. Thus, it could be said that MIS activities like installation of drips and sprinklers for the agricultural and horticultural crops has far reaching impact in the span of a year.

Figure 1144 Investment (Rs crore/mcm) verses Water saved (mcm)

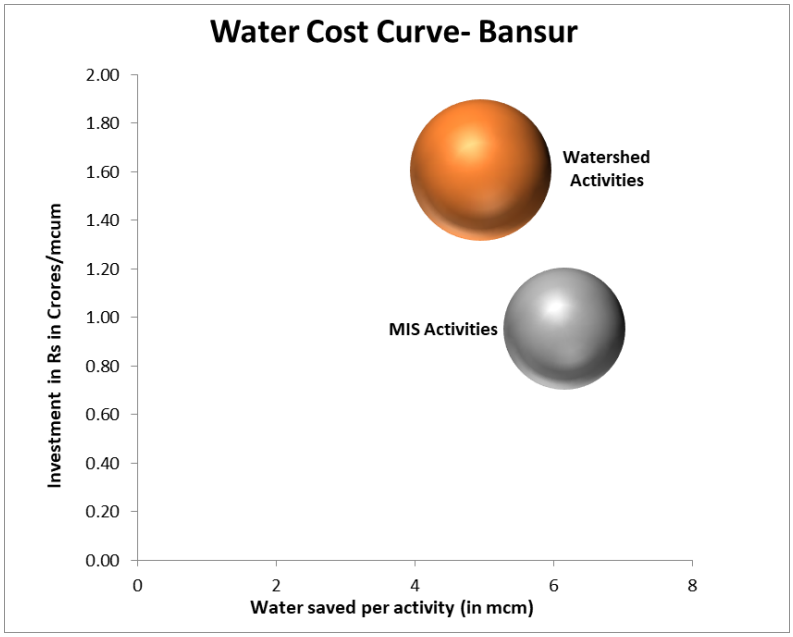

Table 1818 Investment (Rs. crore/mcm) verses Water saved (mcm)

Activities undertaken to save water	Water saved- in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	3.76	2.44	9.174
MIS Activities	8.25	1.09	8.997

Chapter – 6: Watershed Development & Rain Water Management for Ground Water Recharge and addressing water demand

6.1 Description of watershed cluster

The Bansur watershed cluster of RACP is located in Panchayat Samiti Bansur, Alwar district. There are 36 no. of villages situated in 18 Gram Panchayats in the Project area. The elevation is from 0-65 meters and slope range from 0-10%. The major water stream is the Sahibi River.

6.2 Objectives of the Water Management in Watershed Cluster

a. To promote the socio-economic development of the village community through optimum utilisation of natural resources of watershed,

b. To conserve soil, rainwater and vegetation effectively and harvest surplus water to create surface water sources and to recharge groundwater,

c. To promote sustainable farming and stabilise crop yields by adopting suitable crop management system. Thus increasing the production and yield per hectare,

d. To cover the non-arable areas effectively through afforestation, horticulture and pastures based on land capability classification,

e. To improve the economic and social conditions of the resource - poor and disadvantaged sections of the watershed community by employment generation and enhancing the income of individuals by adopting alternate enterprise.

f. Restoration of ecological balance,

Thus, watershed development activities in rain-fed areas aim at conservation and management of natural resources on arable and non-arable lands to harvest and conserve rainwater, improve the productivity of crops, horticulture plantation, fuel and fodder resulting in increased income of Below Poverty Line (BPL) families, SC/ST, landless and marginal farmers, poverty alleviation and drought proofing.

6.3 Water Budgeting Exercise for the Project Area

The Micro Watershed-wise Area for water budgeting purpose (Potential Runoff contributing areas including upper forest lands within the micro watersheds, if any) is given in Annexure 6.1. The water budget is a basic tool that may be utilised to evaluate occurrence and movement of water through the natural environment. Water budget for a given area can be looked at as water inputs, outputs and changes in harvesting, recharge & storage. The inputs into the area of investigation (precipitation, groundwater or surface water inflows etc.) must be equal to the outputs (evapo-transpiration, water harvesting, and recharge, supply, abstractions, surface or groundwater outflows) as well as any changes in storage within the area. Water budgeting of watershed is necessary to work out the total number and size of water harvesting structure, i.e. how much total runoff is available,

out of which how much is being already stored in existing structures and also how much is available for further storage.

a. Estimation of Rainwater

The process to estimate runoff may be summarized as under:

Classification of Project Area based on inputs received from Revenue Record, GIS layers, and PRA exercise. The basis of the criteria is presented below:

Good Catchment – where maximum runoff & minimum infiltration like hillocks, plateau etc.

Average Catchment – cultivated land, forest land with vegetation.

Bad Catchment - where runoff is minimum and infiltration is maximum e.g. Sandy soil.

The Project area was categorised on the basis of information available in the land records.

#	Catchment	Area (Ha)
1	Good Catchment	0.0
2	Average Catchment	655
3	Bad Catchment	12,935
	Total	**13,590**

(i) Average Annual Rainfall: 635 mm (Data provided by Water Resource Dept, Alwar)

(ii) Calculation of Runoff (Expected Yield) based on the "Strange-Table"

Rating of Catchment	Characteristics	Coefficient in strange table (Cum/Ha) [1]	Area (in Hac) [2]	Expected Yield (in Cum) [1x2]
Good	Runoff is maximum & infiltration is minimum like hillocks, plateau etc.	-	-	-
Average	Runoff is medium like cultivated land, forest land with vegetation	978.80	655	641,114
Bad	Runoff is minimum and infiltration is maximum e.g. Sandy soil	652.50	12935	8,440,088
Total			**13590**	**9,081,202**

(iii) Estimation of water-storage in existing water harvesting structures situated in Project Area:-

S. No.	Type of Structure	Nos.	Storage Capacity (In Cum)	Storage Capacity (% of Total Surface Runoff)
1	Farm Ponds	Nil	Nil	11.83 %
2	Nadis	Nil	Nil	
3	Anicuts	Nil	Nil	
4	Village ponds (Talab)	25	75,930	
5	Local Depression		998,930	
	TOTAL		**1,074,860**	

The table above reveals that a total of 1074860 cum water is already being harvested through Village ponds and local depressions in the cluster. Presently, the balance runoff is to be harvested to cater to the requirement of crops to be grown in the area.

(iv) Calculation of the Balance Runoff:

Balance Runoff = Expected Yield (iii) – Present Storage Capacity (iv)

Balanced Runoff = 9081202 cum – 1074860 cum = 8006342 Cum

(v) Proposed Project Activities/Structures:

The activities/interventions presented below have been selected and proposed based on the outcomes of (i) the PRA exercise carried out in each project village (ii) Water budgeting carried out for the watershed (iii) Information gathered through DGPRS survey and GIS based thematic layers.

b. Proposed Project Activities/Structures for Arable Land

S. No.	Activity	Unit	Quantity	Storage Capacity (Cum)	Total Storage Capacity (Cum)
A.	**Conservation measures for Arable land**				
1.	Contour Bund	Rmt	53,480	4.50	2,40,660
2.	**Peripheral Bund**	**Rmt**	**8,747**	**4.50**	**39,362**
3.	**Field Bund**	**Rmt**	**1,08,578**	**4.50**	**4,88,601**
	Sub Total A1				**7,68,623**
4.	**Earthen Check dam**	**Nos.**	**7**	**6000**	**42,000**
5.	**Farm Pond**	**Nos.**	**9**	**5000**	**45,000**
	Sub Total A2				**87,000**

Note:- As per the on field Study Report of Dr. P.K. Singh, Professor and Head, Soil & Water Conservation Department, MPUAT, Udaipur, recently carried out in 2015, as a general principle, the total ground water recharge during the entire season or per year is about 2-3 times of the total water storage capacity of the rain water harvesting structure. The Department of Watershed Development & Soil Conservation has adopted total ground water recharge (from Non Arable and Drainage lines treatment structures) as 2 times of the total storage capacity for all Water Harvesting Structures.

As per this 2 times of the total storage capacity = 87000 x 2 = 174000 cum

Total of Storage Capacity (Cum) = Table 1(Sub Total A1) + Table 1 (Sub Total A2)

= 768623 + 174000

= 942623 cum

In watershed clusters, during the course of implementation of field activities similar type of trials would be carried out with the support of the State Agricultural University.

S. No.	Activity	Unit	Quantity	Storage Capacity (Cum)	Total Storage Capacity (Cum)
A.	**Conservation measures for Arable land**				
1.	Contour Bund	Rmt	53,480	4.50	2,40,660
2.	**Peripheral Bund**	**Rmt**	**8,747**	**4.50**	**39,362**
3.	**Field Bund**	**Rmt**	**1,08,578**	**4.50**	**4,88,601**
	Sub Total A1				**7,68,623**
4.	**Earthen Check dam**	**Nos.**	**7**	**6000**	**42,000**
5.	**Farm Pond**	**Nos.**	**9**	**5000**	**45,000**
	Sub Total A2				**87,000**

c. Proposed Project Activities/Structures for Non-Arable Land & D.L.T.

d. S. e. No.	Activity	Unit	Quantity	Storage Capacity(Cum)	Total Storage Capacity (Cum)
A.	**Conservation measures for non-arable land**				
1	Nadi Ty I L 50 mt ht. 2.5 mt	Nos.	3	1,680	5,040
2	Nadi Ty II L 80 mt ht. 2.7 mt	Nos.	9	2,790	25,110
3	Nadi Ty III L 120 mt ht. 3.1 mt	Nos.	5	5,760	28,800
4.	**Embankment cum Dugout Pond**	**Nos.**	3	8500	25,500

	W.W. L80 mt				
5.	**Embankment cum Dugout Pond W.W. L120m**	**Nos.**	11	13000	1,43,000
	Total		**31**		**2,27,450**
B.	**Drainage Line Treatment**				
1	Mini percolation tank (MPT Ty I) L30 mtht 2.5mt	Nos.	33	1,070	35,310
2	Mini percolation tank (MPT Ty II) L6 mt 2.9mt ht	Nos.	22	2,920	64,240
3	Mini percolation tank (MPT Ty III) L30mt 3.9mt ht	Nos.	9	2,520	22,680
4	Mini percolation tank (MPT Ty V) L40 mt 3.4 mt ht	Nos.	18	2,430	43,740
5	Mini percolation tank (MPT Ty VI) L80 mt 3.7 mt ht	Nos.	11	5,740	63,140
6	Mini percolation tank (MPT Ty VII) L50 mt 4.1 mt ht	Nos.	21	4,750	99,750
7	Mini percolation tank (MPT Ty VIII) L80 mt 3.2 mt ht	Nos.	7	4,360	30,520
8	Mini percolation tank (MPT Ty X) L20 mt 3.2 mt ht	Nos.	59	1,100	64,900
9	**Embankment cum Dugout Pond L 20 mt**	**Nos.**	**14**	**3500**	**49,000**
10.	**Embankment cum Dugout Pond L 30 mt**	**Nos.**	**17**	**4500**	**76,500**
11.	**Embankment cum Dugout Pond L 40 mt**	**Nos.**	**43**	**5500**	**2,36,500**
12.	**Embankment cum Dugout Pond L 60 mt**	**Nos.**	**5**	**7000**	**35,000**
13.	**Embankment cum Dugout Pond L 80 mt**	**Nos.**	**23**	**8500**	**1,95,500**
14.	**MMS I (L 8 m H 1.6 m)**	**Nos.**	**12**	**7500**	**90,000**
15	**MMS II (L 12 m H 1.6 m)**	**Nos.**	**5**	**9000**	**45,000**
16	**MMS III (L 18 m H 1.6 m)**	**Nos.**	**2**	**15000**	**30,000**
	Total		**301**		**11,81,780**
	Grand Total (N.A. + D.L.T.)		**332**		**14,09,230**

Similarly, for above structures proposed structures, 2 times of the total storage capacity

= 1409230 x 2 = 2818460 Cum

Total of likely ground water recharge from Arable Land + Non Arable Lands activities

= 942623 + 2818460

= 3761083 cum

Remaining (still untapped) Runoff = i.e. 8006342- 3761083= 4245259 cum (46.75% of Total Surface Runoff)

Expected Yield of Water	Present storage capacity	Balance Runoff to be utilized	Estimated Collective Storage Capacity of the Proposed Structures	Remaining Runoff (Still Untapped)
1	**2**	**3 = (1 – 2)**	**4**	**5 = (3 – 4)**
9081202 Cum	1074860 Cum	8006342 Cum	3761083 Cum	4245259 Cum
100%	**11.84 %**	**88.16 %**	**41.41%**	**46.75 %**

Above table clearly shown that only 53.25% (11.84+41.41) rain water is proposed to be harvested and rest 46.75% rain water still to be untapped and allowed to flow to lower areas beyond the cluster.

S. No.	Activity	Unit	Quantity	Storage Capacity(Cum)	Total Storage Capacity (Cum)
A.	**Conservation measures for non-arable land**				
1	Nadi Ty I L 50 mt ht. 2.5 mt	Nos.	3	1,680	5,040
2	Nadi Ty II L 80 mt ht. 2.7 mt	Nos.	9	2,790	25,110
3	Nadi Ty III L 120 mt ht. 3.1 mt	Nos.	5	5,760	28,800
4.	**Embankment cum Dugout Pond W.W. L80 mt**	**Nos.**	3	8500	25,500
5.	**Embankment cum Dugout Pond W.W. L120m**	**Nos.**	11	13000	1,43,000
	Total		**31**		**2,27,450**
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1	Mini percolation tank (MPT Ty I) L30 mtht 2.5mt	Nos.	33	1,070	35,310

2	Mini percolation tank (MPT Ty II) L6 mt 2.9mt ht	Nos.	22	2,920	64,240
3	Mini percolation tank (MPT Ty III) L30mt 3.9mt ht	Nos.	9	2,520	22,680
4	Mini percolation tank (MPT Ty V) L40 mt 3.4 mt ht	Nos.	18	2,430	43,740
5	Mini percolation tank (MPT Ty VI) L80 mt 3.7 mt ht	Nos.	11	5,740	63,140
6	Mini percolation tank (MPT Ty VII) L50 mt 4.1 mt ht	Nos.	21	4,750	99,750
7	Mini percolation tank (MPT Ty VIII) L80 mt 3.2 mt ht	Nos.	7	4,360	30,520
8	Mini percolation tank (MPT Ty X) L20 mt 3.2 mt ht	Nos.	59	1,100	64,900
9	**Embankment cum Dugout Pond L 20 mt**	**Nos.**	**14**	**3500**	**49,000**
10.	**Embankment cum Dugout Pond L 30 mt**	**Nos.**	**17**	**4500**	**76,500**
11.	**Embankment cum Dugout Pond L 40 mt**	**Nos.**	**43**	**5500**	**2,36,500**
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13.	**Embankment cum Dugout Pond L 80 mt**	**Nos.**	**23**	**8500**	**1,95,500**
14.	**MMS I (L 8 m H 1.6 m)**	**Nos.**	**12**	**7500**	**90,000**
15	**MMS II (L 12 m H 1.6 m)**	**Nos.**	**5**	**9000**	**45,000**
16	**MMS III (L 18 m H 1.6 m)**	**Nos.**	**2**	**15000**	**30,000**
	Total		**301**		**11,81,780**
	Grand Total (N.A. + D.L.T.)		**332**		**14,09,230**

Similarly, for above structures proposed structures, 2 times of the total storage capacity

= 1409230 x 2 = 2818460 Cum

Total of likely ground water recharge from Arable Land + Non Arable Lands activities

= 942623 + 2818460

= 3761083 cum

Remaining (still untapped) Runoff = i.e. 8006342- 3761083= 4245259 cum (46.75% of Total Surface Runoff)

Expected Yield of Water	Present storage capacity	Balance Runoff to be utilized	Estimated Collective Storage Capacity of the Proposed Structures	Remaining Runoff (Still Untapped)
1	**2**	**3 = (1 – 2)**	**4**	**5 = (3 – 4)**
9081202 Cum	1074860 Cum	8006342 Cum	3761083 Cum	4245259 Cum
100%	**11.84%**	**88.16%**	**41.41%**	**46.75 %**

Above table clearly shown that only 53.25% (11.84+41.41) rain water is proposed to be harvested and rest 46.75% rain water still to be untapped and allowed to flow to lower areas beyond the cluster..

6.4 Proposed Activities in the watershed cluster

The activities to be proposed in the watershed cluster is dependent on extent of the soil erosion and crops to be grown in the cluster so that soil erosion can be controlled and requirement of the crops of the cluster could be met out. Although Kharif crops are grown in rainfed areas but for getting more production lifesaving irrigation has to be applied on the crops. Similarly, in Rabi crops, the crop requirement is to be catered either from ground water or from harvested water done through farm ponds and other water storage structures needed in the area. Keeping this in view, field survey has been undertaken in the cluster and is summarized herewith.

Efficient use of ground water on farm water usages through:

1. Demonstration of water efficient technologies for irrigation (Drip & Sprinklers etc.)
2. Promotion of high value agriculture as well as
3. Promotion of crops introduced and/or supported as part of improved crops rotation and management practices with lower water requirements.

Participatory Rural Appraisal (PRA)

A field level survey using Participatory Rural Appraisal (PRA) has been carried out by the project team and estimation of field level findings has been identified.

Participatory Rural Appraisal (PRA) is a systemic tool for intensive action with community members to facilitate collection, analysis and understanding needs/problems of their community. PRA emphasizes local knowledge and involves communities in inventing, monitoring, and planning of local resources. The PRA approach relies heavily on visualization, diagramming and people participation. It provides information to outsiders who wish to understand how the community uses and manages its own resources. PRA activity empowers marginalized communities, de-emphasizes hierarchies, and helps identify resource needs and its sustainable use.

PRA Outcome - SWOT Analysis

SWOT analysis was performed for the project area to identify the strengths, weaknesses, opportunities and threats in the context of the RACP project so that strategic planning can be pursued to improve the prevailing condition.

Strength	Weakness
• The project area is blessed in terms of fertility of land resources. • Most of the villages in the Project Area are located in the vicinity of 20-40 Kms of Jaipur Delhi NH-8 that enables better access to urban centres such as Jaipur, Kotputli, Delhi etc. • Good amount of milk is produced in these villages, generating regular income to villagers.	• The entire Project Area is rain-fed and does not have other bankable sources of irrigation which is resulting in high dependency on rains. • Groundwater in the Project Area is good and is the main source of irrigation. • Lack of diversity in livelihood sources, as agriculture and Animal Husbandry are the only major sources of livelihood. This situation compels the villagers to work as daily labourers in the urban areas and even migrate to urban areas during drought periods. • Weak organization of the Self Help Groups (SHGs) present in the project area. • Dismal level of literacy and awareness in the Project villages resulting in lack of transformation on agriculture and other livelihood practices, poor awareness about government schemes related to agriculture/horticulture etc.
Opportunity	**Threat**

• Very good access to adjoining urban areas through the adjoining NH offers tremendous opportunity for effective marketing of the agriculture and milk produce in nearby cities. • Effective implementation of watershed development activities can potentially enhance the productivity of land resources in the project area and thereby transform the economy of the entire area by increased production of crops, vegetables, fruits, milk etc. • Challenge with regard to protecting the surface-water sources from getting saline within 6 to 8 months can be addressed by constructing farm ponds.	• Excessive dependence on rains for agriculture makes the economy of the entire project area vulnerable, • Excessive usage of groundwater may further deplete ground water, • Proximity with urban centres may encourage of increased rate of migration causing socio-cultural problems.

6.5 Watershed Development Activities

Apart from need based training, workshops, capacity building, IEC and exposure visit activities, WD&SC Department will carry out Hydrological Monitoring Networks (HMN) at the cluster level and instruments like runoff recorder, sediment sampler, automatic rain gauge, drop spillway & instruments housing facility etc. shall be provided. A provision of Rs. 23.28 Lakh is being kept in CACP.

In addition to this, to enable the DPR/CACP Sub Plan preparation, Field Surveys, PRA was done, baseline data, secondary data, revenue record was collected and Thematic Layers i.e. Khasra map on watershed map, Present Land use and land cover, Contour and slope map, Drainage network map, digital elevation model (DEM) using Remote Sensing & Geographical Information System (RS&GIS) are procured, analysed & scientifically used.

Based on need of the area and runoff to be harvested, various watershed activities are taken up for in-situ moisture conservation, water harvesting, and water recharge. This will ensure growth of Kharif crops from in-situ moisture & harvested water to support lifesaving irrigation and most importantly contributing to ground water recharge and to the water balance.

Keeping these factors in mind, details of field level location specific and need based watershed activities to be carried out in Bansur and expected beneficiaries/outcome are presented under the following activities proposed for watershed development.

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	Likely Beneficiaries (Nos)
1.	Contour Bund	Constructed along contours. If land is less/farmers doesn't allow bunds on contours in field, compromise contour bunds called field bunds of 60-90 cm height adjusted on field boundary are constructed with table top. It checks soil erosion, conserve moisture in-situ to grow crops. 53480 mt. contour bund with financial cost Rs. 72.39 lacs.	2,40,660	300
2.	Field Bund	Field Bunds are constructed to check soil erosion, reduced velocity of rain fall then increase infiltration rate of water and conserve moisture to grow crops then save irrigation. By constructing 108578 m Field bund with proposed financial cost Rs.162.87 Lacs water will conserve by in-situ moisture conservation.	4,88,601	600
3.	Pacca waste weir	To stop further elongation of gullies, to stabilize gullies & to provide safe disposal of excess water on agricultural land. 18 Nos. Pacca Waste Weir with Rs. 6.48 lacs.	Along bunds at suitable designated places	

4.	Rump Cum Waste Weir	To stop further elongation of gullies, to stabilize gullies & to provide safe disposal of excess water on agricultural land. 360 Nos. Ramp cum Waste Weir with Rs.25.92 lacs.	Along bunds at suitable designated places	
5.	Peripheral Bund	Taken to stabilize the banks of drains/ nallah along Agricultural Land, so that land do not erode. 8747 m Peripheral bund with proposed financial cost Rs.16.05 lacs	39,362	60
6.	Chute Spillway	A Chute spillway is a common and basic design which transfer excess water from behind the dam down a smooth decline into the river below. These are usually designed following an ogee curve. Most often, they are lined on the bottom and sides with concrete to protect the dam and topography. Chute spillway can be ingrained with a baffle of concrete blocks but usually have a 'flip lip' and/or dissipater basin which creates a hydraulic jump, protecting the toe of the dam from erosion. By constructing 9 Chute spillway with proposed financial cost Rs.6.84.	Along bunds at suitable designated places	
7.	Earthen Check Dam	Earthen Check Dam activity is proposed to harvest & infiltration of runoff in drainage line of Ist and IInd order. By constructing 7 Earthen Check dam structures in arable and non-arable land with proposed financial cost Rs.4.06 Lacs runoff will harvested for irrigation use.	42000	20
8.	Farm Pond	Farm Ponds, at a lower elevation, are constructed to harvest the excess runoff after in-situ moisture conservation. Farm pond helps in providing supplemental irrigation as well as increasing cropping intensity. By constructing 9 Farm ponds with proposed financial cost Rs. 35.46 Lacs.	45,000	30
9.	Agro-Forestry	To increased productivity, economic benefits, and more diversity in the ecological goods. 17381 plants with proposed financial cost Rs. 5.31 lacs	-	1980
10.	Nadi	To harvest runoff constructed near the point of use where maximum water can be stored on non-arable land. 17 Nadi's with Rs. 24.09 lacs.	1,17,900	benefits will be ascertained
11.	Embank-ment Cum Dugout Pond W.W.	To harvest runoff constructed near the point of use where maximum water can be stored on non-arable land. 14 Nadi's with Rs. 31.82 lacs.	3,37,000	benefits will be as certained
12.	Vegetative Check Dam (V.C.D.)	To reduce the velocity of runoff & arrest soil and water necessary for the proper growth of vegetative cover. 8700 m Rs. 1.16 lacs	in-situ	-
13.	Staggered Trenches	Check the velocity of runoff as well as conserve in-situ moisture and check soil erosion. 140 hac with proposed financial cost of Rs. 14.79 lacs	in-situ	-
14.	Pasture development	1. Fencing of Pasture Lands:- fencing of the area either by ditch cum bund, vegetative, stone wall or other suitable fencing. 2. V-Ditches/staggered trenches. 3. Tree plantation on all un-cultivated Non arable/ Pasture lands to develop a three tier canopy. 4. Over-seeding of grass seeds in pasture land areas:- Broadcasting of locally suited palatable grass seed like Sevan, Dhaman, Stylosanthes Hamata etc Pasture Development activities will carried out in 20 hac with Rs. 16.60 lacs.	-	Users Groups
15.	Mini Percolation Tanks (MPTs)	Earthen activity mostly semi-circular bund is formed across the slope to harvest runoff in Drainage line of Ist & IInd order. 180 MPT's structures with Rs. 158.73 lacs.	5,48,560	Farmers & Users Groups

16.	Embankment Cum Dugout Pond (ECDP)	Earthen activity mostly semi-circular bund is formed across the slope to harvest runoff in Drainage line of Ist & IInd order. 102 ECDP structures with Rs. 105.09 lacs.	11,85,000	Farmers & Users Groups
17.	Minor Masonry Structure (M.M.S.)	Constructed at 3rd & 4th order drainage line because in 3rd & 4th order drainage the runoff & intensity of water flow is high & the earthen structure is not sustainable. 19 MMS structures with cost Rs. 149.00 lacs.	3,30,000	Users Groups
18.	Sub-surface Barrier	To check sub surface flow in drainage line resulting increase water table in local area. 140 SSB structures will constructed with Rs. 11.87 lacs.	Underground recharge	-

The Department of Watershed Development & Soil Conservation has Technical Manual for watershed activities into operation state-wide and all the details of activities, justification, technical parameters, location specific requirements etc. are available with the PIA-District/Clusters.During the planning process of CACP Bansur, the proposed locations of all the interventions have been finalised in consultation with the MTG members/beneficiaries, users groups and other concerned stake holders and activity locations are geo-tagged with longitude and latitudes. At the time of concurrent monitoring during implementation of activities, these geo-tags will be referred for random quality checks also.

6.6 Implementation Strategy for execution of Watershed Development Works

However, separate detailed **Operational Guidelines** for Watershed Development & Soil Conservation activities has been issued, still some important strategic aspects are enumerated as under:

a. Approach for implementation of Watershed Works under RACP as per MJSA

Under Mukhyamatri Jal Swablamban Abhiyan (MJSA), the works are carried out through contractors and machines both Arable, Non Arable and DLT on "Four Waters Concept" and ensuring higher technical requirements, quality skills and timely execution of activities. There are two types of scenario i.e. shopping & N.C.B. which are being done at the level of District level Officers of the WD&SC Department and accordingly procurement plan is being prepared by the Department and being submitted to the World Bank through STEP.

b. Beneficiary's Contribution and involvement:

Under the RACP, farmer's contribution is an integral part of project cost besides World Bank and State Government's contribution in order to ascertain the belongingness of the local community. There is a beneficiary contribution of **10% for S & M farmers and 20% for others farmers** in all individual watershed activities. These contributions would be acceptable in Cash/Labour/Material. There will be no beneficiary contribution for activities on common / Panchayat land.

One of the major strengths of the RACP is that one dedicated NGO having technical team and community organizers has been deployed to carry out data collection, community mobilization, training, IEC, social screening, need based technical support to the PIAs of all line departments. It is strengthening the linkage between the contractors and community, its participation, sustainability and ownership of assets created.

c. Broad Approach followed for selecting and design of proposed structures:

- GIS Based thematic layers (Maps) prepared on the basis of high resolution NRSA data.
- GIS based Flow Accumulation layer utilised to estimate water accumulation at various points/locations and the corresponding catchment areas for each such location.
- GIS based Slop Layer utilised to assess the land slope at various points of the project area so as to choose appropriate structures/interventions based on the land slope as well
- GIS based Drainage/Water-Bodies layer utilised to mark the location and required dimensions of drains and water bodies

- Reconnaissance survey carried out for location of *Nallah* marked on the drainage/water-bodies GIS layer and *Nallah* figure correctly marked on the map
- GIS based Land-Use-Land-Cover layer utilised to access usages of the land and accordingly selection of appropriate location for various structures
- GIS based *Khasra* layer utilised for identification of locations for construction of the proposed structures identified based on potential for water storage and size of the land parcels
- Inputs received from the community during the PRA exercise carried out in all 36 project villages were considered for deciding the nature and location of the structures
- Standard criteria and formats being followed by the Department of Watershed, Government of Rajasthan, adopted for the purpose of designing structures.
- Latest BSR of PR&RD, P.S. Bansur, District Alwar & Irrigation Department Alwar adopted for estimation of item-wise costs for the proposed interventions.

6.7 Estimated Cost of Investments under Watershed Management

The total project period details of activities / measures / works / structures proposed in Bansur cluster are as under:

Proposed Interventions under Watershed Development & Soil Conservation:

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
1	2	3	4	5	6
1	**Component 1: Climatic Resilient Agriculture**				
1A	**Sub Component 1A : Improving Water use efficiency**				
	Physical Activities :				
1.1	**Watershed Sub Plan of Cluster Agricultural Competitiveness Plan (CACP)**				**10.35**
1.2	**Hydrological Monitoring Network (HNM) & Crop Water Budgeting (CWB) Etc.**				**50.00**
1.3	**ACTIVITIES ON ARABLE LAND**				
1.3.1	**Arable Conservation Measure**				
1	Contour Bund Type A	0.00135	Rmt	53480	72.39
2	Pacca Waste Weir	0.36	Nos.	18	6.48
3	Peripheral Bund	0.00177	Nos.	4260	7.52
4	**Field Bund**	**0.00150**	**Rmt**	**108578**	**162.87**
5	**Rump Cum Waste weir**	**0.07**	**Nos.**	**360**	**25.92**
6	**Peripheral Bund**	**0.00190**	**Rmt**	**4487**	**8.53**
7	**Chute Spillway**	**0.76**	**Nos.**	**9**	**6.84**
8	**Earthen check dam**	**0.58**	**Nos.**	**7**	**4.06**
9	**Farm Pond**	**3.94**	**Nos.**	**9**	**35.46**
	Total 1.3.1				**330.06**
1.3.1	**Arable Production Measure**				
1	Agro Forestry	0.00031	Nos.	17381	5.31
	Total 1.3.2				**5.31**
	Total Arable 1.3.1 +1.3.2				**335.37**
1.4	**ACTIVITIES ON NON ARABLE LANDS**				
1.4.1	**Non-Arable Conservation Measure**				

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
1	Nadi Ty I L 50 mt ht. 2.5 mt	0.85	Nos.	3	2.54
2	Nadi Ty II L 80 mt ht. 2.7 mt	1.22	Nos.	9	10.96
3	Nadi Ty III L 120 mt ht. 3.1 mt	2.12	Nos.	5	10.59
4	**Embankment cum Dugout Pond W.W. L 80 mt**	1.44	Nos.	3	4.32
5	**Embankment cum Dugout Pond W.W. L 120 mt**	2.50	Nos.	11	27.50
	Total 1.4.1				**55.91**
1.4.2	**Non-Arable Production Measure**				
1	Vegetative Check Dam (VCD)	0.00013	Rmt	8700	1.16
2	Staggered Trenches	0.11	Ha.	140	14.79
3	Pasture Development	0.83	Ha.	20	16.60
	Total 1.4.2				**32.55**
	Total Non-Arable (1.4.1+1.4.2)				**88.46**
1.5	**Drainage Line Treatment**				
1	Mini percolation tank (MPT Ty I) L30 mt ht 2.5 mt	0.54	Nos.	33	17.66
2	Mini percolation tank (MPT Ty II) L60 mt 2.9 mt ht	1.16	Nos.	22	25.48
3	Mini percolation tank (MPT Ty III) L30 mt 3.9 mt ht	0.78	Nos.	9	7.02
4	Mini percolation tank (MPT Ty V) L40 mt 3.4 mt ht	0.89	Nos.	18	16.03
5	Mini percolation tank (MPT Ty VI) L80 mt 3.7 mt ht	1.86	Nos.	11	20.49
6	Mini percolation tank (MPT Ty VII) L50 mt 4.1 mt ht	1.63	Nos.	21	34.22
7	Mini percolation tank (MPT Ty VIII) L80 mt 3.2 mt ht	1.54	Nos.	7	10.78
8	Mini percolation tank (MPT Ty X) L20 mt 3.2 mt ht	0.46	Nos.	59	27.05
9	**Embankment cum Dugout Pond L 20 mt**	**0.50**	**Nos.**	**14**	**7.00**
10	**Embankment cum Dugout Pond L 30 mt**	**0.60**	**Nos.**	**17**	**10.20**
11	**Embankment cum Dugout Pond L 40 mt**	**1.00**	**Nos.**	**43**	**43.00**
12	**Embankment cum Dugout Pond L 60 mt**	**1.32**	**Nos.**	**5**	**6.60**
13	**Embankment cum Dugout Pond L 80 mt**	**1.70**	**Nos.**	**23**	**39.10**
14	**MMS I (L 8 m)**	**6.17**	**Nos.**	**12**	**74.02**
15	**MMS II (L 12 m)**	**9.64**	**Nos.**	**5**	**48.18**
16	**MMS III (L 18 m)**	**13.40**	**Nos.**	**2**	**26.80**
17	SSB	0.08	Nos.	140	11.87
	Total D.L.T. 1.5				**425.50**
	Grand Total NRM Measures (1.3+1.4+1.5)				**849.33**
1.6	**Consolidation of Works**				7.76
	Total 1 (1.1 to 1.6)				**917.44**
2	**Component 2 : Markets and value chain**				

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
3	**Component 3 : Farmer Organization & Capacity building**				
3.1	**Community Mobilization ,IEC, Group Formation, training, Capacity Building**				19.40
	Sub Total 3				**19.40**
4	**Component 4 : Project Management, Monitoring and Learning**				
4.1	**District + PIA Level Operating Costs including Photostats, computer typing & printing, fax, mobility (hired taxi/POL), TA/DA etc.**				20.00
	Sub Total 4				**20.00**
	Grand Total (1+2+3+4)				**956.84**

Site Specific Plan & Cost estimates

The measures / works / structures as discussed above are proposed to be executed / constructed / implemented to harvest the rain water during the monsoon to the benefit of farmers so that crops can be grown satisfactorily in the cluster and productivity of crops may be increased accordingly.

The farm level plans of all individual activities have been prepared by the PIA and his team. The list of farmers with all the details including longitude and latitude, where the work / structures are proposed are collected, geo tagged are available before start of implementation.

The site Specific designs, plan and cost estimates of activities are given in the excel sheet attached as Annexure –6.3.

6.8 Implementation Arrangement for all the planned activities in the watershed Area

Planning and implementation of the project activities is being undertaken by the line department i.e. that of Watershed Development and Soil Conservation with the support of dedicated Project Implementation Unit (PIU) of the department. The implementation structure at the state, district, cluster and community level for implementation and monitoring for all the planned activities in the watershed Area under the project is described below:

At the State level, in addition to the Steering Committee i.e. Apex Body & Executive Committee, a Project Management Unit (PMU) has been established under the society i.e. RACPMIS and dedicated Project Implementation Unit (PIU). The PMU & PIU will be having effective coordination and provide a robust governance and coordination mechanism for the project. To support livestock activities and supply of bucks, the Rajasthan University of Veterinary and Animal Sciences (RAJUVAS), Bikaner has been added in the project as Partner Agency and similarly a MOU has been signed with the ARAVALI for support in community mobilization and other training activities for the project.

At District Level: A district level Project Implementation Agency (PIA) has been assigned for planning and implementation of project activities in the cluster. Although one District Coordinator (Watershed Engineer) has been deputed with the PIA, the Project Manager and his office has been designated by the department for implementation of the watershed management activities in the cluster. This is with the support of PRIs and field level NGO under overall supervision of PIU and District-Level Implementation Committee (DLIC). DLIC is headed by the District Collector with District Project Manager (RACP) as member secretary already established under the RACPMIS. DLIC will also maintain convergence at the district, Zilla Parishad level to PRIs at block and GP level. The linkage between the PRIs and the project is critical so that no conflict situation arises between the PRIs and different community level organizations set up within the RACP.

At the Cluster Level: A field level NGO has been deployed in the cluster to support implementation of technical activities in the cluster. In addition to the Team Leader, Community Mobilization Specialist, Community Organizers, a Watershed Assistant is with the NGO to support field level activities in the cluster. As per the operational guidelines issued under the project, the Multi Task Groups, Multi Task Associations, User's Groups and Farmer Producer Company are being formed in the cluster. Participation of these Institutions would be ensured in implementation of the project activities to maintain quality and quantity. For support of other technical activities in the cluster the Agriculture, Horticulture and Livestock Assistant are also deployed with the NGO to support related activities in the cluster. A contractor would also be contracted to implement the activities for Natural Resources Management in the cluster.

Chapter – 7: Social & Environmental Management Plan

7.1. Social Management Plan (SMP)

The SMP is described to minimise or mitigate any adverse social and livelihood impacts emanating from various sub-projects supported by the RACP project. The SMP will be used for developing appropriate social mitigation strategies, and mechanisms for minimizing the risks and expected adverse impacts. In addition, the SMP also includes strategies for consultation and participation, social mobilisation and inclusion, gender and women's empowerment and social risk management.

The SMP therefore provides guidelines to assess the social impact of all the sub-projects and design cluster-specific plans, including the tribal development plan and the resettlement/ rehabilitation assistance plans. Overall, the SMP aims to avoid/minimize risks, avoid exacerbation of social and economic disparities between and among social groups, ensure equitable spread of project investments and benefits, and contribute to long-term social and institutional sustainability of the RACP.

SMP consists of the following strategies:

- Social baseline information
- Consultant held - Key social issue of cluster
- Social mobilisation strategy
- Targeting and beneficiary selection criteria for project goods/services
- Subproject require social impact screening and rehabilitation assistance

Social baseline information (Bansur Cluster):-

Project Area covers an area of 12935 hectare (ha) comprising eighteen (18) Gram Panchayats and thirty-six (36) villages. The Cluster village has a population of 50168 of which 26372 are males while 23796 are females as per field survey by NGOs. In the cluster scheduled caste 7401 and scheduled tribe category folk amount to 1979. Cluster had household of 8285 of which small farmers amount to 3570, marginal farmers 2004, large farmers 1000 and remaining farmers are landless.

Consultant held - Key social issue of the Cluster

Major issues in the Bansur cluster that emerged from the farmer and group consultations during field visit are summarized below.

a. Women folk believe that though they do most of the work in agriculture except for ploughing and selling, they have no role in decision making regarding purchase of inputs or selling of produce.
b. Women are not recognized as farmers in their own right.
c. Problem of access to credit by small and marginal farmers.
d. Lack of timely supply of agriculture inputs including seed and fertilizers.
e. Marginalization of small and marginal farmers in technologies and investments, training and capacity building.

f. Lack of breed improvement and livestock health care services.
g. Outreach of extension services very low in villages.
h. Community based organizations (multi task groups, multi task group - goat) should be integrated into the Farmer Producer Companies (FPC) that will be facilitated in the RACP.

The project does not envisage acquisition of any private land for purposes of storage, processing or any other activity. There will be no adverse impacts related to land acquisition. Therefore abbreviated resettlement plan does not require at cluster level. The detailed social management plan can be referred from Annexure 7.1.

7.2. Environment Management Plan (EMP)

The key interventions under RACP can be grouped as under:-

- Crop intensification
- Water Management & Pastureland Development
- Livestock Management
- Value chain development activities

Environment Management Plan for Crop Intensification/Water management & Pastureland Development/Livestock Management/ Value Chain development activities

The key objective of interventions in crop production is to increase crop productivity so that farmer income is also enhanced. The dominant and "business-as-usual" approach to achieving this is to intensify crop production by introducing hybrid seed varieties that respond well to chemical fertilizers and apply chemical pesticides to control pests and diseases that attack the crop. The RACP proposes to adopt "green" agricultural practices that would promote Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) and therefore, the possibility of excessive use of agri-chemicals is largely mitigated.

Water harvesting and water management activities are expected to be implemented in the RACP, namely, rain fed, groundwater based and surface water based. The main objectives are to harvest and store water in rain fed systems, harvest and recharge in groundwater systems and under all water regimes to sustainably use water for cropping and livestock, reduce use of water in agriculture sector and increase water-use efficiency in cropping.

The project proposes to provide health care through organizing Animal Health Camps and also by providing permanent services through a Rural Technology Centre-cum-Animal Health Centre. The likely impacts of these are issues related to safe disposal of syringes, needles and vaccines used in treating the animals.

Storage and processing of produce are activities expected to be taken up under value chain development component of the RACP. The operations include input supply to its members, output marketing and processing support to its members, providing warehousing facility, Food processing Unit, etc. These activities when carried out in a "business-as-usual" manner would affect the environment in one way or the other.

The Line Department /NGO/ Design consultants/engineers /FPC for designing and executing the structures will abide by the Environmental measures listed in the Environment Management Plan (EMP) given below. The Line Department shall include the EMP requirements in the Programme of RACP Works. The requirements stated in the EMP should therefore be studied properly and implemented accordingly.

Detailed description on each activity is given in Annexure 7.2.

Chapter – 8: Consolidated investment plan with budget and source of funds

8.1. Procurement and Financial Management

a) **The financial management and procurement aspects are at the core** and are stated in the Loan Agreement, Project Agreement, Disbursement Letter and detailed in the Project Financial Management Manual (PFMM) and Project Procurement Manual (PPM). Accordingly both the PFMM and PMM have already been shared with all agencies (The PMU, DPMU, Jaipur the six Line departments and partner agencies) to ensure consistency and compliance. While the Financial Management aspects include: Planning and Budgeting, Funds Flow, Accounting, Reporting, Internal Control, including internal Audit and External Audit the Procurement aspects include procurement planning, use of standard bid documents, contract management aspects and procurement prior and post review based on threshold in agreed procurement plan.

b) The procurement is done as per the procurement plan approved from the World Bank and Procurement Manual & World Bank Procurement Guidelines are followed. As far as fund flow management is concerned, fund management is done as per the Financial Management Manual.

c) Financial Management and Procurement Framework for fund releases to MTAs/FPCs/Individual Beneficiaries (IBs) under grants, mentioned above the procurement will be done as per the Procurement Management Manual (PMM) and fund flow will be done as per the Financial Management Manual (FMM). In this cluster, Multi Task Associations (MTAs) have been formed and Farmer Producer's Companies (FPCs) are to be formed. The related activities are to be performed by these MTAs/FPCs/Individual Beneficiaries (IBs). A Community Resource Person (CRP) is being deployed with each of the MTAs and Chief Executive Officer (CEO) is to be deployed with each of the FPC in the cluster. These CRPs/CEOs will be paid based on the performance. The certain works have been assigned to them to be performed by them. Following actions are needed:

d) A fiduciary capacity assessment of MTAs/FPCs/IBs shall be carried out by the Bank. (This shall be completed by assessing a representative sample of MTAs/FPCs/IBs, as determined by the Bank.)

e) Based on the completed assessment, appropriate mitigation measures, including issuing the fiduciary guidelines; availability of procurement and financial management point person at their level and capacity building shall be adopted. Some activities like institutional & infrastructure support to Farmer's Producer

Companies and Post-Harvest Management support to be given to individual farmers which are to be treated as grant in Agriculture and Horticulture departments. Upon verification that above actions have been completed, funds flow to MTAs/FPCs/IBs through Grants under approved sub projects as part of the CACPs can be initiated

8.2. Investment Plan

The **consolidated investment plan** has been explained in the concerned chapters to make the area and farmers of the cluster competitive so that they can get optimum water as well crop's productivity. An estimated consolidated investment amount of **Rs.5232.73 lakh** would be incurred on various activities. The source of funds is credit available in components of Rajasthan Agricultural Competitiveness Project (RACP). The department, major activity and component wise investment plan with budget are being summarized as under:

Table 1919: Consolidated Investment Plan

S. No.	Department	Components (Rs. Lakh)				
		Climate Resilient Agriculture	Market & Value Chains	Farmer's Organization and Capacity Building	Project Management and M&E	Total
1	Watershed Development & Soil Conservation	917.44	0	19.40	20.00	956.84
2	Agriculture	1102.48	232.00	148.13	9.36	1491.97
3	Horticulture	1,823.71	0	36.00	11.00	1870.71
4	Animal Husbandry	609.46	230.00	54.20	19.55	913.21
	Total	**4,453.09**	**462.00**	**257.73**	**59.91**	**5232.73**

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Above table reveals that investments related to improvement of water use efficiency, transfer of technology and market led advisory services, livestock strengthening, market infrastructure and value chain development an estimated total amount of **Rs.5232.73 lakh** likely to be incurred in Bansur cluster to make the farmer and cluster competitive and to maximize water as well as agricultural productivity in the cluster.

8.2.1. Consolidated Investment Plan – by nature of expenditure:

Investments related to improvement of water use efficiency, transfer of technology and market led advisory services, livestock strengthening, market infrastructure and value chain development an estimated total amount of **Rs.5232.73 lakh** likely to be incurred in the cluster to make the farmer and cluster competitive and to maximize water as well as agricultural productivity in the cluster.

Table 2020: Consolidated Investment Plan – by nature of expenditure

Type of Expenditure/ Line Dept.	Watershed Dev. & Soil Conservation	Agriculture	Horticulture	Animal Husbandry	Total
Goods	0.00	813.52	1339.01	386.09	**2538.62**
Works	816.85	2.22	0.00	350.00	**1169.07**
Consultant Services	60.35	126.88	0.00	0.00	**187.23**
Operating Costs	20.00	16.87	11.00	69.39	**117.26**
Training	19.40	23.45	36.00	54.19	**133.04**
Grants	0.00	116.00	0.00	0.00	**116.00**
Beneficiary Contribution	40.24	393.03	484.70	53.54	**971.51**

Type of Expenditure/ Line Dept.	Watershed Dev. & Soil Conservation	Agriculture	Horticulture	Animal Husbandry	Total
Total	956.84	1491.97	1870.71	913.21	5232.73

Note:

1. The column for "Grants" would state project's share for any goods/services provided to WUAs/MTAs/FPCs/IBs and column for "Beneficiary contribution" will include share of WUAs/MTAs/FPCs/IB.

2. The proposed activities in the CACP will be implemented as per the subject specific operational guidelines already approved. The revisions in the guidelines have been made as per the reply sent to the World Bank and committed during the Mid Term Review (MTR) and approved in the meetings of Executive Committee held till now. If any change in subject specific operational guidelines in future is to be made during the course of implementation, then it would be applicable accordingly

3. As the CACP is dynamic so any savings in other activities would be invested in activities related to the Micro Irrigation System (drip and sprinkler methods) or demand of the cluster, which would be based on the performance of the cluster during course of implementation.

Annexure 2.1: Area, Production and Productivity

Table 1: Total & average Area (in ha), Production (in MT) and Productivity (in kg/ha) from the year 2006-07 to 2015-16 at State level

Crops	Details	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	Average of 10 Years
Guar	Area	2,807,913	2,909,719	3,318,184	2,581,273	2,980,946	3,094,163	4,533,270	5,070,076	4,625,206	4,786,781	**3,670,753**
	Production	658,426	1,243,733	1,261,067	201,125	1,540,544	1,846,609	2,026,671	2,861,835	2,743,968	2,223,474	**1,660,745**
	Productivity	234	427	380	78	517	597	447	564	593	465	**430**
Pearl Millet	Area	4,910,409	5,077,396	5,206,162	5,168,502	5,519,448	4,986,783	3,988,912	4,412,998	4,076,909	4,044,591	**4,739,211**
	Production	3,440,400	4,223,266	4,294,938	2,034,875	6,117,800	6,434,880	3,870,673	4,117,910	4,456,123	3,211,656	**4,220,252**
	Productivity	701	832	825	394	1,108	1,290	970	933	1,093	794	**894**
Sorghum	Area	662,055	625,646	576,744	718,457	726,916	553,754	680,375	579,615	660,969	631,170	**641,570**
	Production	367,816	394,746	333,003	104,192	508,877	410,114	420,392	356,672	5,045,000	344,269	**828,508**
	Productivity	556	631	577	145	700	741	618	616	763	545	**589**
Mustard	Area	3,099,570	2,458,197	2,738,014	2,212,339	2,489,906	2,441,254	2,424,956	2,782,539	2,433,778	2,532,330	**2,561,288**
	Production	3,766,923	2,196,676	3,465,942	2,912,294	3,883,300	2,950,312	3,759,937	3,620,846	2,878,935	3,257,987	**3,269,315**
	Productivity	1,215	957	1,266	1,316	1,560	1,209	1,380	1,301	1,183	1,287	**1,267**
Taramira	Area	112,107	38,109	100,120	97,542	1,188,738	60,994	109,785	296,459	40,604	16,792	**206,125**
	Production	38,691	10,327	13,586	35,910	486,366	25,979	54,634	176,292	16,772	7,279	**86,584**
	Productivity	345	271	365	368	409	426	498	595	413	433	**412**
Wheat	Area	2,564,840	2,591,804	2,294,848	2,394,215	3,036,141	2,935,341	3,063,202	3,205,604	3,318,248	3,108,973	**2,851,322**
	Production	7,755,883	7,124,921	7,287,016	2,384,808	10,424,350	10,160,427	10,766,607	11,020,139	9,823,876	10,468,161	**8,721,619**
	Productivity	3,024	2,749	3,175	3,133	3,433	3,461	3,515	3,438	2,961	3,367	**3,226**
Barley	Area	232,271	249,189	286,950	223,406	327,991	278,016	307,911	309,281	343,302	256,029	**281,435**
	Production	591,582	539,049	878,382	619,766	934,651	789,153	957,824	942,032	962,391	766,379	**798,121**
	Productivity	2,547	2,163	3,061	2,774	2,850	2,839	3,111	3,046	2,803	2,993	**2,819**

(Source: Agriculture department, Alwar)

Table 2: Total & average Area (in ha), Production (in MT) and Productivity (in kg/ha) from the year 2006-07 to 2015-16, in the district

Crops	Details	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	Average of 10 Years
Guar	Area	27,900	34,662	37,818	28,868	23,399	19,084	44,214	65,047	43,407	47,342	**37,174**
	Production	28,842	39,916	43,515	3,466	23,806	21,939	51,822	80,239	49,688	47,732	**39,097**
	Productivity	1,034	1,152	1,151	120	1,017	1,150	1,172	1,234	1,145	1,008	**1,018**
Pearl Millet	Area	232,214	246,411	226,349	276,962	273,147	267,792	240,770	243,194	249,996	262,025	**251,886**
	Production	417,342	429,718	380,460	312,113	508,361	552,935	477,223	454,929	520,015	467,385	**452,048**
	Productivity	1,797	1,744	1,681	1,127	1,861	2,065	1,982	1,871	2,080	1,784	**1,799**
Sorghum	Area	28,505	31,535	24,459	43,288	31,990	29,895	28,476	24,703	27,752	28,320	**29,892**
	Production	20,138	21,874	15,315	14,734	20,975	28,279	20,742	20,846	25,011	24,418	**21,233**
	Productivity	706	694	626	340	656	946	728	844	901	862	**730**
Mustard	Area	256,404	234,517	269,865	251,375	252,730	264,822	245,516	238,293	230,660	234,421	**247,860**
	Production	356,485	285,842	448,122	392,953	426,074	339,114	383,065	350,841	318,464	340,282	**364,124**
	Productivity	1,390	1,219	1,661	1,563	1,686	1,281	1,560	1,472	1,381	1,452	**1,467**
Taramira	Area	679	371	514	1,146	2,376	856	473	538	231	280	**746**
	Production	234	100	188	422	972	364	235	320	95	121	**305**
	Productivity	345	270	366	368	409	425	497	595	411	432	**412**
Wheat	Area	180,515	191,439	170,172	192,800	193,992	185,167	204,967	208,206	219,063	213,011	**195,933**
	Production	641,964	669,051	688,076	722,874	816,059	727,380	837,412	825,344	757,957	776,427	**746,254**
	Productivity	3,556	3,495	4,043	3,749	4,207	3,928	4,086	3,964	3,460	3,645	**3,813**
Barley	Area	14,233	14,246	15,725	14,533	13,011	12,565	11,423	10,718	9,609	8,551	**12,461**
	Production	46311	41485	58074	53906	47301	44924	43310	35016	30514	30698	**43153.90**
	Productivity	3254	2912	3693	3709	3635	3575	3791	3267	3176	3590	**3460.20**

(Source: Agriculture department, Alwar)

Table 3. The cropped Area (ha), Production (MT) and Productivity (Kg/ha) of 10 years from 2006-07 to 2015-16 in Bansur Cluster

#	Crops	Items	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
A.	**Kharif**												
1	Pearl Millet	Area	6158.45	6226.88	6363.73	6432.16	6842.72	6569.01	6705.87	6699.17	6747.02	6842.72	6558.773
		Production	114057.06	115353.17	117945.37	119241.48	120537.58	121833.68	123129.78	129610	127606.64	136264	122557.9
		Productivity	1910	1901	1887	1856	1789	1890	1870	1960	1786	1981	1883
2	Guar	Area	645.99	653.17	660.35	674.7	681.88	689.06	696.23	813	861.32	717.77	709.347
		Production	5848.92	5915.38	6048.31	13433.31	6114.78	6181.24	6314.17	6646.5	7524.51	7018.51	7104.563
		Productivity	933	921	944	950	923	945	917	842	864	964	920.3
B.	**Rabi**												
1	Mustard	Area	2657.25	2686.78	2745.83	2775.35	2804.88	2834.4	2863.93	2840.38	2915.13	2952.5	2807.643
		Production	35476.94	35880.08	36686.38	37089.52	37492.67	37895.82	38298.97	40315	39682	42377	38119.44
		Productivity	1375	1347	1324	1316	1325	1324	1377	1436	1345	1418	1358.7
2	Wheat	Area	2805.25	2836.42	2898.76	2929.93	3116.95	2992.27	3023.44	3064.62	3102	3116.95	2988.659
		Production	105022.1	106215.53	108602.4	109795.83	110989.26	113376.13	114569.56	119343	108514	123726	112015.4
		Productivity	3757	3755	3757	3755	3731	3771	3796	3876	3492	3998	3768.8
3	Barley	Area	336.36	340.1	347.57	351.31	355.05	358.79	362.52	448.48	411.11	373.73	368.502
		Production	12849.25	12995.27	13287.3	13579.32	13725.34	13871.35	14017.37	14601	13006	13331	13526.32
		Productivity	3788	3764	3755	3853	3853	3853	3854	3213	3167	3583	3668.3

(Source: Agriculture Department, Bansur**)**

Annexure 2.2: Rainfall data

	Average Annual Rainfall(mm)	
Sr.No.	Year	Average Annual Rainfall(mm)
1	2006	445
2	2007	609
3	2008	772
4	2009	266
5	2010	746
6	2011	694
7	2012	753
8	2013	718
9	2014	686
10	2015	666
	Total	6355
	Average	**635.5**

Annexure 2.3 Farmers' category wise Cultivated Area in Bansur Cluster

Table2121. Farmers' Category-wise Cultivated Area in Bari Cluster

S. No.	Category of Farmer	Total Households	Cultivated Area (ha)			Category wise Cultivated Area (ha)			
			Irrigated	Un-irrigated	Total	General	SC	ST	OBC
1	Large farmer	1000.00	2455.00	363.28	2818.28	214.21	56.36	33.81	2513.90
2	Small farmer	3570.00	3737.18	1670.92	5408.10	297.68	218.30	127.34	4764.78
3	Marginal farmer	2004.00	22.82	919.16	941.98	56.57	161.77	45.49	678.15
4	Landless person	1711.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	No. of BPL households	837.00	4.00	132.24	136.24	0.00	68.00	68.24	0.00
	Total (1 to 4)	**8285.00**	**6215.00**	**2953.36**	**9168.36**	**568.46**	**436.43**	**206.64**	**7956.83**
	Category wise Cultivated Area in Alwar (Watershed) Cluster in %								
1	Large farmer	12.07%	26.78%	3.96%	30.74%	2.34%	0.61%	0.37%	27.42%
2	Small farmer	43.09%	40.76%	18.22%	58.99%	3.25%	2.38%	1.39%	51.97%
3	Marginal farmer	24.19%	0.25%	10.03%	10.27%	0.62%	1.76%	0.50%	7.40%
4	Landless person	20.65%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	No. of BPL households	10.10%	0.04%	1.44%	1.49%	0.00%	0.74%	0.74%	0.00%
	Total (1to 4)	**100.00%**	**67.79%**	**32.21%**	**100.00%**	**6.20%**	**4.76%**	**2.25%**	**86.79%**

Annexure 2.3: Ground water data

Table 4: Existing groundwater sources in the Bansur cluster

Sr. No.	Source	No.	Functional depth (mt)	Dry	Depth of water (mt)	Area irrigated	Water availability(days)
1	Shallow tube wells	60	70 – 100	08	80	664.50	365
2	Pumping sets	20	60 - 90	04	80	1571.95	365
3	Deep Tube Wells	3126	120 - 150	10	80	431.55	365
	Total/ Average	**3206**	**60-150**	**22**	**80**	**2668.00**	**365**

Annexure 2.4: Comparative cropping area study of Rajasthan vs. India

Table 5: Area Status of Rajasthan Compared to all India under Major Crops (Area in Million ha)

Crops	2012-13				2013-14			
	India	Rajasthan	% share	Rank	India	Rajasthan	% share	Rank
Kharif								
Bajra	7.30	3.99	54.66	1	7.89	4.43	56.23	1
Guar	5.15	4.53	87.96	1	NA	NA	NA	NA
Rabi								
Mustard	6.36	2.83	44.55	1	6.70	3.08	45.95	1
Wheat	30.00	3.06	10.21	5	31.19	2.81	9.01	4
Barley	NA	NA	NA	NA	NA	NA	NA	NA

(Source: Agriculture department, Bansur)

Table 6: Area Status of Rajasthan Compared to all India under Major Crops (Area in Million ha)

Crops	Rajasthan		Alwar District	
	2013-14	2014-15	2013-14	2014-15
Chilly	8715	9671	124	153
Tomato	17151	16519	646	55
Carrot	961	814	407	-
Papaya	434	464	8	7
Lemon	2929	3001	63	67
Pomegranate	1323	2065	3	2
Marigold	786	745	0	0

Annexure 2.5: Micro Irrigation Area

Table 7: Area (in ha & %) under use of Micro Irrigation Methods in Bansur Cluster

Micro Irrigation Methods	2011-12	2012-13	2013-14	2014-15	2015-16
Area Covered in ha					
Drip irrigation	16.58	19.82	24.92	29.22	34.47
Sprinkler Irrigation	5410.85	5529.77	5648.69	5767.61	5945.99
Total	**5427.43**	**5549.59**	**5673.61**	**5796.83**	**5980.46**
Area Covered in %					
Drip irrigation	0.18%	0.22%	0.27%	0.32%	0.38%
Sprinkler Irrigation	59.30%	60.60%	61.90%	63.21%	65.16%
Total	**59.48%**	**60.82%**	**62.18%**	**63.53%**	**65.54%**
Trend	**-**	**1.34%**	**1.36%**	**1.35%**	**2.01%**

Annexure 2.6: Crop water requirement

Table 8: Crop Water Requirement of Agricultural Crops in the project area

Name of crop	Present Cropped Area in ha	Crop water in Cum /ha	Present Crop Water requirement in cum	Proposed Cropped area (ha)	Proposed Crop Water requirement in cum	Additional Crop Water Requirement in Cum
Rain fed area (Kharif)						
Guar	709.35	1000	709350	709.35	709350	0
Bajra	6558.77	1000	6558770	7870.53	7870530	1311760
Sub total	**7268.12**		**7268120**	**8579.88**	**8579880**	**1311760**
Irrigated area (Rabi)						
Mustard	2807.64	2500	7019100	2807.64	7019100	0
Wheat	2988.66	4000	11954640	2988.66	11954640	0
Barley	368.5	2500	921250	552.75	1381875	460625
Sub total	**6164.8**		**19894990**	**6349.05**	**20355615**	**460625**
Irrigated area (Zaid)						
Chari	250	2500	625000	250	625000	0
Sub total	**250**		**625000**	**250**	**625000**	**0**
Chili	45	8000	360000	90	720000	360000
Tomato	55	8000	440000	110	880000	440000
Carrot	150	8000	1200000	200	1600000	400000
Pomegranate	17	11000	187000	50	550000	363000
Lemon	0.5	9000	4500	20	180000	175500
Papaya	0	11000	0	30	330000	330000
Marigold	40	8000	320000	70	560000	240000
Total	**307.5**		**2511500**	**570**	**4820000**	**2308500**
Grand Total	**13990.42**		**30299610**	**15748.93**	**34380495**	**4080885**

(Source: Agriculture Department**)**

Annexure 2.7: Approach to study ground water occurrence

To study about ground water occurrence & its movement, the various litho units have been classified on the basis of their degree of consolidation and related parameters. Older alluvium is the only Aquifer in Bansur Cluster, the most important unconsolidated formations due to their wide-spread occurrence. The sediments are composed of clay, silt, sand, gravel and mixture of concretions etc. Sand, gravel and a mixture of these form the potential aquifers. Ground water occurs under unconfined to semi-confined conditions.

In GEC'97, two approaches have been recommended. The water level fluctuation method is based on the concept of storage change due to difference between various input and output components. Input refers to recharge from rainfall and other sources and subsurface inflow into the assessment unit. Output refers to ground water draft, ground water evapo-transpiration and base flow to streams and subsurface outflow from the Aquifer. Since the data on subsurface inflow/ outflow is not readily available, therefore the inflow/ outflow across these boundaries may be taken as negligible. In each assessment unit, hilly areas having slope more than 20% are deleted from the total area to get the area suitable for recharge.

Annexure 2.8: Livestock information

Number of Household and Household Enterprises owing Animal/Poultry Birds in Bansur Cluster

S. No.	Village	Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
1	Alampur	13	254	0	0	0	0	0
2	Babera	34	258	46	9	0	1	0
3	Barh Dhoondhala	23	121	0	0	0	0	0
4	Bas Dayal	8	82	4	5	0	0	0
5	Bas Karnawat	17	87	5	1	0	0	0
6	Basna	74	160	37	0	0	0	0
7	Beelath	43	54	28	0	0	0	0
8	Bhoori Doongri	2	30	1	0	0	0	0
9	Bisalwa	15	200	30	1	0	1	0
10	Burja	27	191	37	17	0	0	0
11	Buteri	80	438	74	0	0	2	0
12	Chatarpura	156	707	67	3	0	0	0
13	Garhi	0	0	0	0	0	0	0
14	Gyanpura	73	0	122	0	0	0	0
15	Holawas	102	397	38	0	1	0	0
16	Indrada	175	770	175	0	0	27	0
17	Kankariya	19	124	12	3	0	0	0
18	Kauthal	4	162	11	2	0	0	0
19	Keharpura	18	90	22	0	0	13	0
20	Kharkhara	57	299	39	2	0	0	0
21	Kharkhari Kalan	0	0	0	0	0	0	0
22	Kheewaheri	17	153	3	4	0	0	0
23	Khohri	117	368	30	7	1	0	0
24	Loyati	14	192	11	0	0	0	0
25	Mahanpur	26	27	4	1	0	0	0
26	Manchi	126	927	258	6	0	0	0
27	Meerapur	48	912	119	60	0	0	0
28	Milakpur	3	113	10	2	0	0	0

S. No.	Village	Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
29	Nangal Bhaosingh	12	212	44	0	0	2	0
30	Nawalpura	65	157	46	1	0	0	0
31	Neemoochana	86	317	125	1	1	0	0
32	Pali	8	25	25	0	0	0	0
33	Prithvipura	25	145	4	0	0	0	0
34	Rasnali	17	225	4	5	0	0	0
35	Santhalpur	17	139	18	77	0	0	0
36	Shyampura	139	465	23	3	0	0	0
Total		**1660**	**8801**	**1472**	**210**	**3**	**46**	**0**

(Source: Animal Husbandry department, Bansur)

Table A: Summary of livestock population in the cluster

Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
1660	**8801**	**5638**	**210**	**3**	**46**	**0**

Source: Dept. of AH

Table No: B: Goat population breakup in the cluster with potential for milk production:

Village	Male			Female					Total	Average goat/farmer	Milk availability/L day	No of HH
					1 Year and Above							
	<1 Year	>=1 Year	Total	<1 Year	In Milk	Dry	Never Calved	Total				
36	778	336	1114	1133	1935	1122	379	4569	5683	4	4837	1472
% to total	13.69	5.91	19.60	19.94	34.05	19.74	6.67	80.4				

Source: Department of AH

Annexure 2.9: Goat population

Goat Population profile of Bansur cluster

S. No.	Village	Male			Female					Total Goat
		Under 1 Year	1 Year and Above	Total	Under 1Year	1 Year and Above			Total	
						In Milk	Dry	Not Calved Once		
1.	Alampur	0	0	0	0	0	0	0	0	0
2	Babera	26	7	33	48	72	26	21	167	200
3	BarhDhoondhala	0	0	0	0	0	0	0	0	0
4	Bas Dayal	45	13	58	65	48	67	9	189	247
5	Bas Karnawat	30	13	43	67	88	65	9	229	272
6	Basna	28	24	52	12	45	2	0	59	111
7	Beelath	27	16	43	22	48	9	5	84	127
8	BhooriDoongri	5	0	5	2	13	0	0	15	20
9	Bisalwa	68	35	103	85	188	171	87	531	634
10	Burja	2	4	6	48	77	18	0	143	149
11	Buteri	66	14	80	102	133	52	33	320	400
12	Chatarpura	31	0	31	41	74	44	0	159	190
13	Garhi	0	0	0	0	0	0	0	0	0
14	Gyanpura	65	5	70	113	103	64	1	281	351
15	Holawas	10	2	12	17	36	6	3	62	74
16	Indrada	23	27	50	35	70	13	7	125	175
17	Kankariya	29	7	36	49	41	26	18	134	170
18	Kauthal	8	5	13	14	23	24	4	65	78
19	Keharpura	15	8	23	35	45	18	9	107	130
20	Kharkhara	42	4	46	26	59	19	0	104	150
21	Kharkhari Kalan	0	0	0	0	0	0	0	0	0
22	Kheewaheri	30	15	45	57	68	85	7	217	262
23	Khohri	44	27	71	34	90	97	72	293	364
24	Loyati	0	4	4	0	0	0	0	0	4
25	Mahanpur	1	0	1	8	15	16	6	45	46
26	Manchi	36	34	70	53	90	45	0	188	258
27	Meerapur	11	15	26	27	46	20	0	93	119

S. No.	Village	Male			Female					Total Goat
		Under 1 Year	1 Year and Above	Total	Under 1Year	1 Year and Above			Total	
						In Milk	Dry	Not Calved Once		
28	Milakpur	18	8	26	41	79	28	0	148	174
29	NangalBhaosingh	7	1	8	6	30	23	4	63	71
30	Nawalpura	21	3	24	11	43	16	5	75	99
31	Neemoochana	33	14	47	37	178	28	10	253	300
32	Pali	4	0	4	10	21	6	0	37	41
33	Prithvipura	0	0	0	1	1	2	1	5	5
34	Rasnali	40	14	54	52	79	75	68	274	328
35	Santhalpur	0	0	0	0	3	32	0	35	35
36	Shyampura	13	17	30	15	29	25	0	69	99
Total		**778**	**336**	**1114**	**1133**	**1935**	**1122**	**379**	**4569**	**5683**

(Source: Animal Husbandry department, Bansur)

Annexure 2.10: Seed replacement rate data

Table 2222: Statement showing Seed Replacement Rate (SRR) for five years (from 2011-12 to 2015-16) in cluster

Crop	Name of Certified / Improved varieties being shown in the cluster	2011-12			2012-13			2013-14			2014-15			2015-16		
		Area		SRR (%)	Area		SRR (%)	Area		SRR (%)	Area		SRR (%)	Area sown under		SRR (%)
		Total	Certified Seed		Total	Certified Seed		Total	Certified Seed		Total	Certified Seed		Total	Certified Seed	
Pearl Millet	HHB-60, HHB-67, RAJ-171 & Hybrid-Pioneer 86M88, RHB173	6264.32	5637.88	90%	6142.46	5958.18	97%	6213	6012.74	96%	6543	6215	95%	6842.72	6705.87	98%
Guar	RGC-9, RGC-1002, RGC-1003, RGC-1017	677.21	196.39	29%	723.43	260.43	36%	728.3	242	35%	678	230	34%	717.77	229.69	32%
Wheat	RAJ-3765, PBW-343, RAJ-3077, RAJ-4037, RAJ-4120	2910.52	960.47	33%	3216.05	1125.61	35%	3123	1010.23	32%	3037	911	30%	3116.95	1122.10	36%
Mustard	LAXMI, VASHUNDHARA, PUSABOLD, BIO-902, NRCDR2	2216.3	1972.5	89%	2002.73	1942.64	97%	2418	2213.45	96%	3112	2925	94%	2952.5	2893.45	98%
Barley	RD2052, RD Kharchia, RD-2068	211.95	65.7	31%	344.66	120.63	35%	352.1	118.52	33%	380.1	117	31%	373.73	138.28	37%

Annexure 3.1 Parameters and their definition for selection of Value Chain crops

Parameters and Weightage for the selection of Value Chain reports

#	Parameters	Weightage
A.	**Existing size**	**30**
1	Cropped Area of the crop in the cluster (in acre)	10
2	Crop Production in the cluster (in quintals)	10
3	Crop Productivity (cluster level compared to national's average)	10
B.	**Potential for Value addition within Rajasthan (implying scope for increased value addition for local producers and processors)**	**45**
4	Price spread in Rs/Q (Price paid at APMC mandi- realization by farmer at farm level)	5
5	Price spread in Rs/Q (Price paid by customer at retail level realization by farmer at farm level)	5
6	Net profit in production (Rs per acre)	5
7	Scope for processing in the state	10
8	Scope for value addition (Primary/ secondary/ tertiary processing)	10
9	Growth in market demand 5 year	10
C.	**Risk assessment**	**10**
10	Price Volatility (last 5 years; due to monsoon, due to adverse agronomical conditions)	10
D.	**Others (Environmental & Social Parameter)**	**15**
11	Water requirement	15
	Total	**100**

Definition of Parameters

1. **Area**

It is the cropped area in acres under cultivation of the particular crop in the concerned cluster as per data available with RACP for the year 2016-17. The area parameter has been accorded weightage of 10%. Crops have been given scores from 1 to 10 based upon their area of cultivation. The crop with the largest area is accorded the highest score of 10 while the remaining crops are given proportionately lower marks.

2. **Production**

It is the total production of the crop in quintal in the cluster as per data available with RACP for the year 2016-17. The area parameter has been accorded weightage of 10%. Crops have been allotted

scores from 1 to 10 based on their production levels. The crop with maximum production gets highest score of 10 while the remaining crops get proportionately lower marks.

3. Productivity

The productivity value of the crop is the comparison of the productivity (Q/Acre) of the crop in the cluster (as per the data available from RACP for the year 2016-17) as against average national productivity (Q/Acre) of the same crop (as per the data by Directorate of Economics and Statistics). The area parameter has been given a weightage of 10%. Cluster level productivity of the crops has been scored from 1 to 10. The crop having average productivity of the cluster greater than or equal to that of national average will get 10 whereas the crop having average productivity of the cluster less than that of national average will get proportionately/ relatively less score. For eg. Crop having cluster average productivity of 5 Q/acre and national average of 10 Q/acre will get 5 marks. Similarly if crop has cluster productivity of 3 Q/acre then it will get 3 marks. If the crop is having either 12 Q/acre or 15 Q/acre then both will get 10 marks.

4. Price spread at Mandi level

The price spread at mandi level can be defined as the difference between the value realization by farmer at the farm level (as per field consultation) by selling the raw crop produce and the price of the same crop obtained at primary processor level (as per the data available on www.agmarknet.nic.in). It is measured in Rs per quintal. The price spread at mandi level (parameter) has been accorded weightage of 5%. The crops have been scored from 1 to 5 based upon their price spread at mandi level; with the crop with higher price spread at mandi level receiving a higher score.

5. Price spread at retail level

The price spread at retail level can be defined as the difference between the value realization of farmer at the farm level (as per field consultation) by selling the raw crop produce and the price of the same crop, with highest degree of value addition, paid by consumer at the retail level (as per field consultation). It is measured in Rs per quintal. The price spread at retail level parameter has been given a weightage of 5%. The crops have been scored from 1 to 5 based upon their production, with the crop with higher price spread at retail level receiving higher score.

6. Net profit in production

It is the net income accrued to the farmer by selling the raw produce (commodity) at the farm level after deduction of the total cost of production involved (as per field consultation). It is measured in Rs. per quintal. This parameter has been accorded a weightage of 5%. The crops have been given scores from 1 to 5 based upon their net profit. The crop with the maximum net profit from production is given the highest score of 5 while the remaining in the crops area are accorded proportionately lower marks.

7. Scope for processing in the state

It is the total number of functionally active processing units of a particular commodity in the state as per the data available from DICs. This parameter has been given a weightage of 10%. Commodities

have been given scores from 1 to 10 based on the total number of functional processing units. The commodity with higher number of processing units in the state gets higher score because it portrays higher availability of ready market in the vicinity of the farms which reduces the intermediary logistics costs for the producers as well ensures steady returns.

8. Scope for value addition

The number of feasible value added products of a particular commodity in the concerned cluster indicates the scope for value addition (primary, secondary and tertiary) in the respective crop. This parameter has been accorded weightage of 10%. Commodities have been given scores from 1 to 10. The commodity with higher number of value added products gets a higher score.

9. Growth in market demand

In order to capture the growth in market demand of a particular commodity, an assumption has been formulated that consumption of that commodity for the last 5 years can be equated with the current growth in consumer level consumption of the commodity (as per data available on authentic public domain) This parameter has been given a weightage of 10% and commodities have been scored from 1 to 10 based on the basis of growth in their consumption demand. The commodity with higher growth in demand will get a higher score.

10. Price Volatility

Price volatility is per cent difference between the highest attained mandi price of a crop compared to the lowest attained mandi price during last 3/5 years (as per data available on www.agmarknet.nic.in). This parameter has been given a weightage of 10% and commodities have been scored from 1 to 10 based on the price volatility. The commodity with the higher range gets a higher score as they have greater scope for intervention in their existing value chain such that the farmer's risk gets reduced and higher returns could be ensured.

11. Water requirement

This is the water required by the crop in cubic metres per hectare at the cultivation stage in one season (as per data available from RACP for the year 2016-17). This parameter has been given a weightage of 15% and commodities have been scored from 1 to 15 based on the water requirement. The commodity with the lower water requirement gets a higher score as it could be promoted for crop diversification and efficient water use at the farm level.

Appendix 3.2 Scoring Matrix for prioritization of Value chain crops in Bansur

The parameters as well as relative scores of commodities in the Bansur cluster presented below:

Table 2323: Parameters for prioritization of Value chain commodities in Bansur cluster

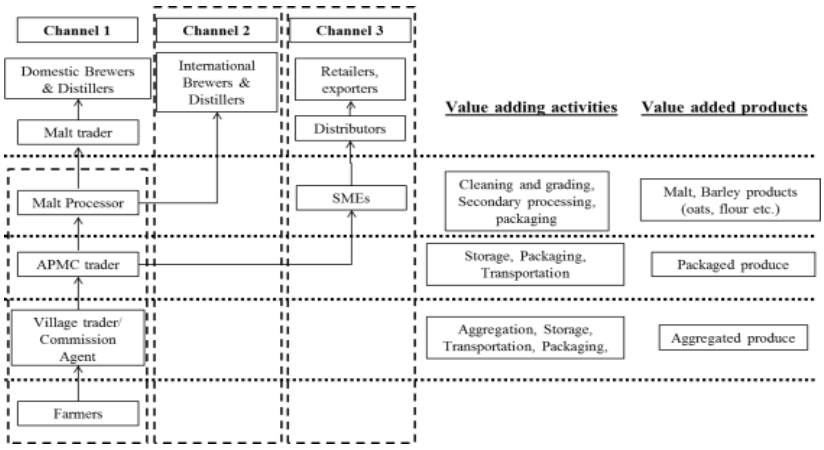
#	Parameters	Weightage	Bajra	Barley	Guar	Mustard	Wheat
A.	**Existing size of the crop**	**30**	**30.0**	**11.5**	**11.6**	**17.4**	**23.7**
1	Cropped Area of the crop in the cluster (in acre)	10	10.0	0.5	1.0	4.3	4.6
2	Crop Production in the cluster (in quintals)	10	10.0	1.0	0.5	3.1	9.2
3	Crop Productivity (cluster level compared to national's average)	10	10.0	10.0	10.0	10.0	10.0
B.	**Potential for Value addition (implying scope for increased value addition for local producers and processors)**	**45**	**22.7**	**36.4**	**28.8**	**30.9**	**29.0**
4	Price spread in Rs/Q (Price paid by primary processor at APMC mandi-realization by farmer at farm level)	5	2.5	2.9	5.0	4.3	2.9
5	Price spread in Rs/Q (Price paid by customer at retail level- realization by farmer at farm level)	5	5.0	5.0	4.7	0.8	1.7
6	Net profit in production (Rs per acre)	5	3.7	4.0	2.0	2.1	5.0
7	Scope for processing in the state	10	4.0	9.0	2.0	10.0	5.0
8	Scope for value addition (Primary/ secondary/ tertiary processing)	10	7.5	10.0	5.0	7.5	10.0
9	Growth in market demand	10	0.0	5.6	10.0	6.3	4.5
C.	**Risk assessment**	**10**	**8**	**10**	**7**	**7**	**7**
10	Price Volatility (last 5 years; due to monsoon, due to adverse agronomical conditions	10	8.5	10.0	7.1	7.3	7.0
D.	**Others (Environmental Parameter)**	**15.0**	**15.0**	**7.5**	**15.0**	**7.5**	**0.0**
11	Water requirement	15.0	15.0	7.5	15.0	7.5	0.0
Total		**100.0**	**76.2**	**65.5**	**62.5**	**63.1**	**59.8**

Source: Data analysis by ABPF- Grant Thornton

Appendix 3.3 Current marketing chain of Value chain crops in Bansur

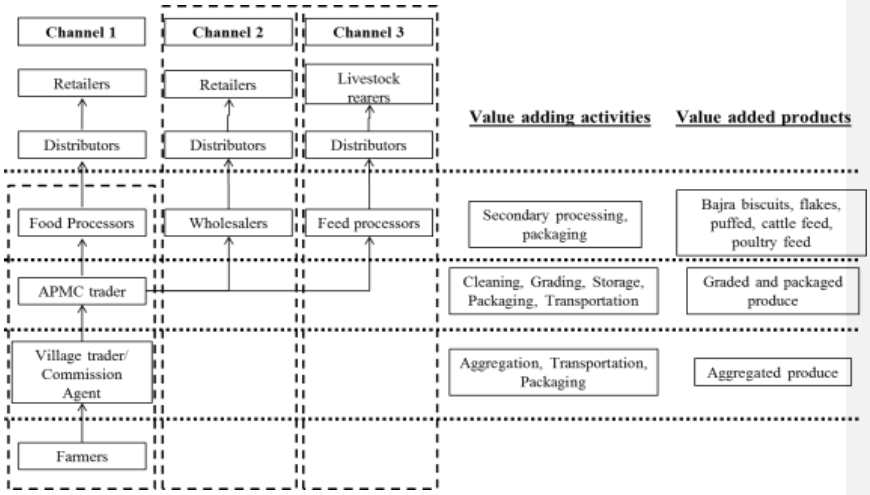
- **Barley**

Figure 1212: Current structure of marketing chains - Barley



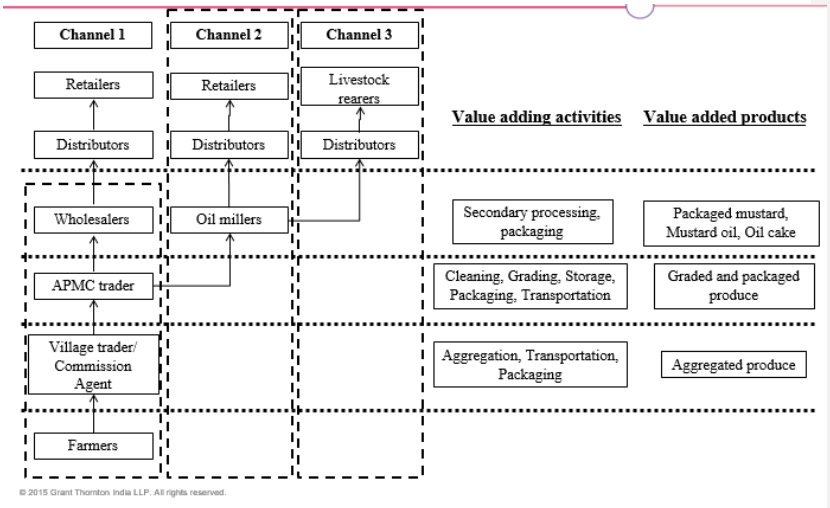
- **Bajra**

Figure 1313: Current structure of marketing chains - Bajra



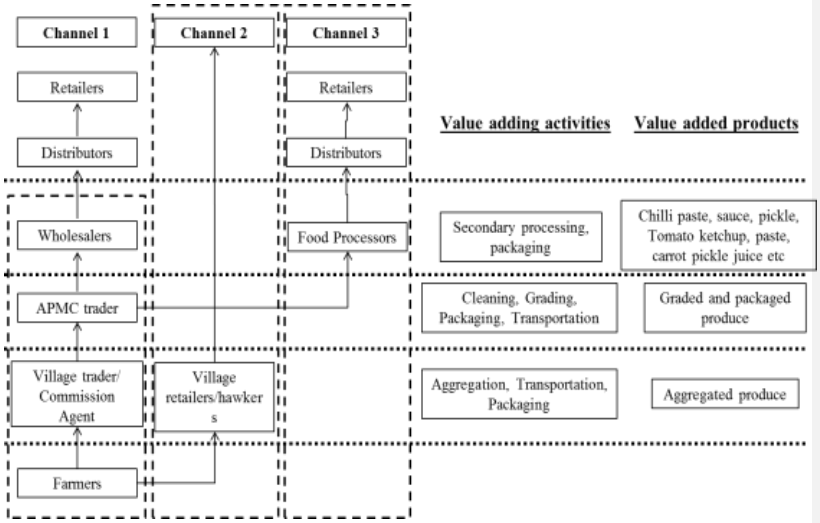
- **Mustard**

Figure 1414: Current structure of marketing chains of Mustard



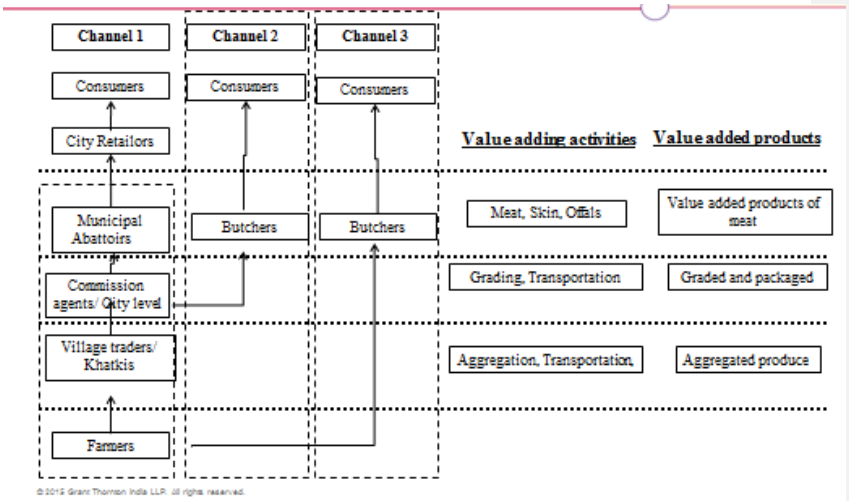
- **Vegetables**

Figure 1515: Current structure of marketing chains -of Vegetables



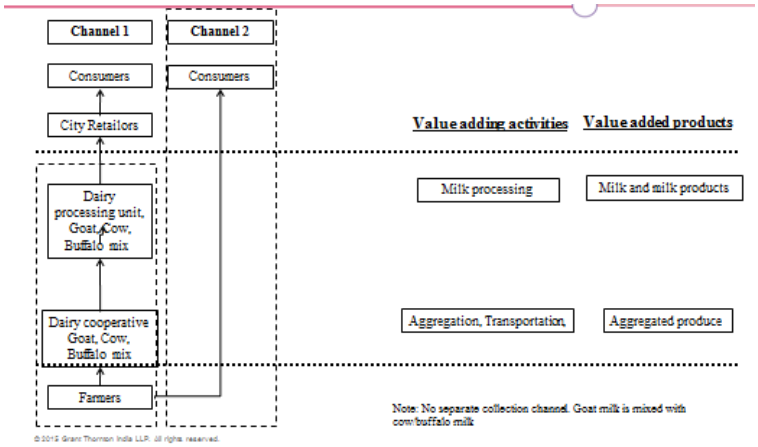
- **Goat Meat**

Figure 1616: Current structure of marketing chains of Goat Meat



- **Goat Milk**

Figure 1717: Current structure of marketing chains of Goat Milk


Channel 1
Channel 2
Consumers
Consumers
City Retailors
Value adding activities
Value added products
Milk processing
Milk and milk products
Dairy processing unit, Goat, Cow, Buffalo mix
Dairy cooperative Goat, Cow, Buffalo mix
Aggregation, Transportation,
Aggregated produce
Farmers
Note: No separate collection channel. Goat milk is mixed with cow/buffalo milk
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Appendix 3.4 Historical mandi/ farm gate prices (or farmer operating margins) trends of Value Chain crops

To identify the trend of the commodity, prices of 3 seasons have been gathered:

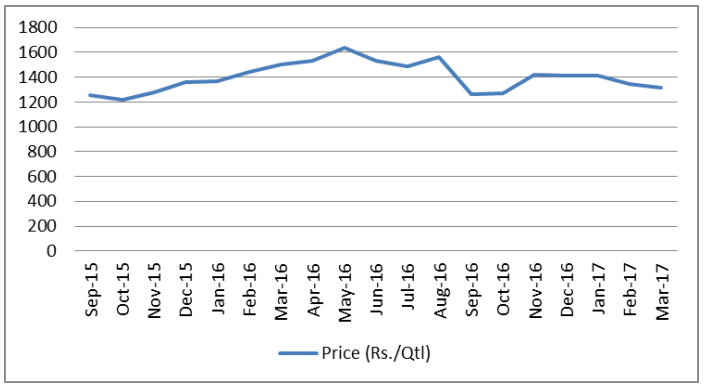
Bajra

Table 2424: Price trend of Bajra in Alwar mandi for 2 years

Month	Price (Rs./Qtl)	Month	Price (Rs./Qtl)
Sep-15	1255	Jul-16	1488
Oct-15	1216	Aug-16	1561
Nov-15	1281	Sep-16	1264
Dec-15	1362	Oct-16	1270
Jan-16	1369	Nov-16	1421
Feb-16	1439	Dec-16	1409
Mar-16	1504	Jan-17	1413
Apr-16	1528	Feb-17	1343
May-16	1633	Mar-17	1316
Jun-16	1528		

The trend shows that in Rajasthan, price of the commodity is largely in the same range over the period of 3 years. This is in respect to all the commodities that price dips to lowest at the harvesting time and rise to the highest during the cultivation time.

Figure 1818: Price trend of Bajra in Alwar mandi for 2 years



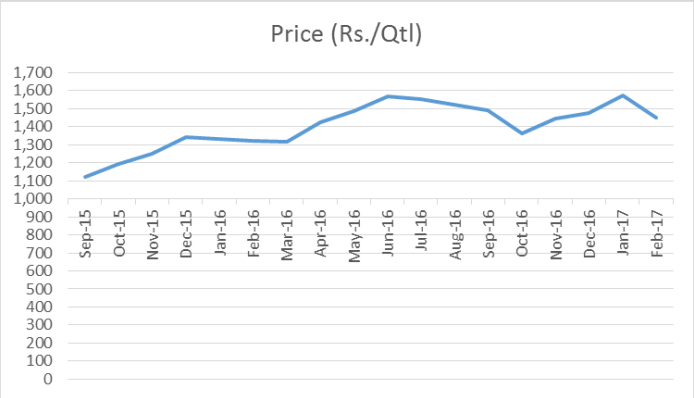
Barley

Table 2525: Price trend of Barley in Alwar mandi in last 3 years

Month	Price (Rs./Qtl)	Month	Price (Rs./Qtl)
Sep-15	1,122	Jun-16	1,570
Oct-15	1,193	Jul-16	1,553
Nov-15	1,250	Sep-16	1,489
Dec-15	1,342	Oct-16	1,363
Jan-16	1,333	Nov-16	1,443
Feb-16	1,322	Dec-16	1,475
Mar-16	1,315	Jan-17	1,575
Apr-16	1,426	Feb-17	1,450
May-16	1,488		

Barley crop is gaining price season over season considering the growth in demand of millet crops because of their nutritional value. Price range of Barley in past 3 seasons was from Rs. 1100 to Rs. 1600.

Figure 1919: Price range of Barley in past 3 seasons



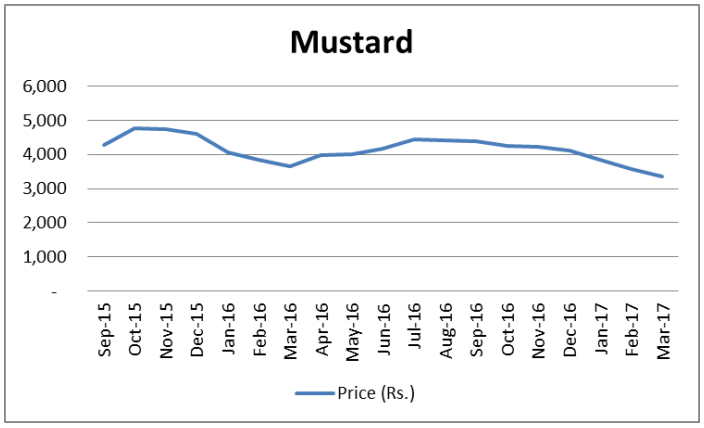
Mustard

Table 2626: Price trend of Mustard in Alwar mandi for past 3 season

Month	Price (Rs.)	Month	Price (Rs.)
Sep-15	4,268	Jul-16	4,448
Oct-15	4,771	Aug-16	4,419
Nov-15	4,736	Sep-16	4,378
Dec-15	4,603	Oct-16	4,250
Jan-16	4,063	Nov-16	4,231
Feb-16	3,849	Dec-16	4,105
Mar-16	3,648	Jan-17	3,835
Apr-16	3,978	Feb-17	3,583
May-16	4,005	Mar-17	3,366
Jun-16	4,171		

Mustard crop has large variation from Rs. 3,000 to Rs. 5,000. Currently it is selling at the lowest considering the fact that this is harvesting time of the crop.

Figure 2020: Price trend of Mustard in Alwar mandi for last 3 season



Appendix 3.5 Growth in demand of Value chain crops

Parameters as under are identified, which support in determination of future demand growth of a commodity. With the consultation of the various stakeholders of value chain, growth in upcoming 3 years for Bajra has been formulated which is shown in the table below.

With the consultation of the various stakeholders of value chain, growth in upcoming 3 years for Bajra has been formulated which is shown in the table below.

Bajra

Bajra has larger consumption in rural areas than urban. Although the demand for food Bajra has decreased by 14% CAGR in past 3 years but the demand in alternate segment (non-food) like cattle feed and malt is increasing and currently captures almost about 70% of the total consumption of Bajra.

National Demand Growth of Bajra (per capita consumption in kg)		
1999-2000	2004-2005	2009-2010
2.79	1.66	2.07

Barley

The estimated national consumption of Barley in the year 2017-18 is 1,900 MT which has grown at CAGR of 4.50 % in last 5 years.

National Demand of Barley ('000 MT)					
2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
1,525	1,200	1,400	1,520	1,800	1,900

Mustard

The national consumption of Mustard Seeds in the year 2017-18 is 7.2 MT which has grown at CAGR of 10% in last 3 years.

National Demand Growth of R&M (000 MT)		
2015/16	2016/17	2017/18
5,930	6,800	7,170

Guar[1]:

As per a report market size of Guar will increase with a CAGR of 8 % in next 5 years, while the CAGR of Asia pacific is the highest i.e. 25%.

Wheat

The national consumption of Wheat in the year 2017-18 is 100,000 MT which has grown at CAGR of 3.59 % in last 5 years.

National Demand Growth of Wheat(000 MT)					
2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
83,824	93,848	93,102	88,551	97,500	100,000

[1] http://www.marketsandmarkets.com/Market-Reports/guar-gum-market-177796677.html

Appendix 3.6 Economic Analysis of Selected Value Chain Crops

Cost of cultivation is the prerequisite aspect in the calculation of economics of a crop. Primary researches helped in getting the whole information related to economics of a crop.

Table 2727: Cost of economics of commodities

S. N.	Commodity	Cost of cultivation (Rs./acre)	Productivity (Qtl/acre)	Selling Price (Rs./Qtl)	Revenue from crop (Rs./acre)	Net surplus including fodder (Rs./acre)
1	Bajra	8,000	8	1,400	11,200	10,600
2	Barley	13,100	14	1,400	19,600	11,500
3	Mustard	11,600	5.5	3,100	17,050	6,000
4	Chilly	28,000	5	1,300	71,500	43,500
5	Tomato	23,000	80	900	72,000	49,000
6	Carrot	32,000	90	1,000	90,000	58,000

Annexure-5.1: Operational and Implementation Arrangements

The eligible activities for investment under Agriculture subcomponent would be implemented through Agriculture Department. The Deputy Director, Agriculture (Extension) ZP of the concerned district who is also DPM, RACP is responsible for implementation of the activities.

Component 1: Climate Resilient Agriculture

On-farm Integrated Crop Management (ICM) demonstrations will be the core project intervention under this sub-component, and the main vehicle for the dissemination of improved technologies to the farmers. Demonstrations serve as an effective instrument for rapid dissemination of technology. The effectiveness of demonstrations would increase with organization of field days around the demonstrations. The demonstrations to be organized under this project would be preferably composite demonstrations, demonstrating complete technology package of production.

Adoption rate of demonstration's technologies will be recorded in the years following the year in which demonstrations are organized. The adoption rates (number of farmers adopting demonstrated technologies, area on which, the technologies are adopted and farm level yield gains achieved by the farmers) will be monitored in the following years. This is essential for evaluating the productivity/quality gains achieved by the farmers as a result of demonstrations and trainings.

Improved Water Use Efficiency: Micro-Irrigation (MI) based technology

Micro-irrigation (MI) is proved to be an efficient method in saving water and increasing water use efficiency as compared to the conventional surface method of irrigation, where water use efficiency is only about 35-40 per cent or sometimes even less. The on-farm irrigation efficiency of properly designed and managed drip irrigation system is estimated to be about 90 per cent, while the same is only about 35 to 40 per cent for surface method of irrigation (INCID, 1994). In sprinkler irrigation method, water saving is relatively low (up to 70 per cent) as compared to drip irrigation since SIM supplies water over the entire field of the crop (INCID, 1998; Kulkarni, 2005, A. Narayanamoorthy, Dr. S. Raman). Thus, saving over the surface irrigation method through sprinkler irrigation and drip irrigation method would be 75% and 125%, simultaneously. In addition to above use of pipelines is also important for improving field efficiency. About 30-40% water can be saved by reducing the conveyance losses through using Pipelines.

Based on the above, the project would support various institutional, physical and modern water management practices with a view to promote sustainable water use available for agriculture, and improved water use efficiency. The project will also support promotion of on-farm water use efficiency measures, including drip and sprinkler irrigation & pipelines for irrigation water.

A. Integrated demonstration for Drip Irrigation System with Automation and fertigation based techniques for field crops

Micro irrigation along with automation and fertigation is getting popularity in horticultural crops but still the same needs to be percolated in wide spaced agricultural crops. It has been planned to lay this technology by promotional support at the selected beneficiaries to demonstrate the effect of the

technology and further replication. This will effectively improve the productivity and quality along with the water and labour saving. The package of technology along with the inputs required for first crop will be provided with an assistance of 75 per cent to the beneficiaries. Drip automation will be the optional/ need based item and it will be installed on the willingness of the beneficiary. The district unit will ensure the coordination of MI supplier and the Automation supplier (in case, they are separate entity) to make compatible commissioning and avoid duplication of the components. The estimated cost for the system with fertigation, automation along with crop demonstration is Rs.2.20 lac per ha. These technological demonstrations will be provided to the selected beneficiaries in the cluster by district unit of Agriculture department along with the other stakeholders.

B. Integrated demonstration for Mini/ Micro Sprinkler based techniques for field crops

Micro Irrigation based demonstrations for close space field crops like, Bajra, Sorghum, guar, pulses, Wheat, Mustard, Barley etc. has been proposed to improve the productivity per unit of water along with reduction in the production cost. The estimated cost for such demonstrations is Rs.1.45 lacs per ha including automation and crop demonstration. Implementation process will be similar as in the case of drip technology activity.

C. Micro Irrigation –Drip, Mini/ Micro Sprinklers and Sprinklers:

The micro irrigation systems viz. Drip, Mini/ Micro Sprinklers and portable Sprinklers would be promoted on large scale in the cluster with a view to cover most of the irrigated area under such techniques. The per ha model cost of Drip, Mini/ Micro Sprinklers and portable Sprinklers is estimated to be Rs. 1.10, Rs. 1.00 and Rs. 0.20 lacs respectively. The project assistance up to 75% is proposed to be provided to the beneficiaries.

D. Pipe line for piped conveyance of irrigation water:

Conveyance losses play a major role to increase/ decrease the irrigation efficiency. Traditionally, the farm water is conveyed through field channels which lead to leaching and evaporation losses. The conveyance of irrigation water at far ends of the farm through PVC/ HDPE pipelines leads to check such water losses. The estimated cost of 100 mts pipe line unit (generally sufficient to cover 1 ha) is Rs. 1.00 lacs and the project assistance of 75% has been proposed for this activity.

Technology Transfer and market led advisory services

Promoting adoption and documentation of improved technologies

This is the major activity where need based demonstrations to bridge the gap, improve productivity, to promote the efficient use of irrigation water, to enhance farm income, promote mechanisation and for the sustainability of agriculture have been proposed under the project. Field days, exposure visits, stakeholders' orientation and capacity building supportive activities have also been proposed for the effective adoption of the technologies. The detail of the activity is given as under:

a. Soil testing and distribution of Soil Health Cards

To know the fertility status of the farmer's field, soil testing will be done after taking soil samples from the farmer's field. After getting report of soil sample, the soil health card will be prepared and distributed to the farmers. The Dy. Director Agriculture would ensure soil testing and distribution of soil health cards to all the farmers of multi task groups of the cluster with convergence to the regular programme of the department. This activity needs to be completed within first year with the support of NGO. The district unit will train Multi Task Groups regarding process of taking soil samples from the fields.

b. Demonstrations on production technologies for value chain crops to bridge gap

The ICM demonstrations will preferably include the complete package of practices for a particular crop from land preparation to harvesting of the crop. Majority of the demonstrations will be on the value chain crops with a focus on popularizing high payoff interventions and reducing water foot print of the crop in the cluster. Demonstrations will also be conducted on other crops which are grown in a cropping sequence with the value chain crop with the objective of improving water use

efficiency, diversification to low water requiring, high value and other crops, reducing water foot print, etc. Another set of demonstrations will be on promoting resource conservation technologies and for popularizing climate smart agricultural practices. These demonstrations will need to be integrated with the on-farm water conservation structures developed under water sub-component of the project. The estimated cost for these demonstrations is Rs.10000 per ha including inputs and operations.

c. Demonstrations on Farm Mechanization and Post-Harvest Management (PHM) technologies

The objective of these demonstrations will be on promoting farm mechanization and Post-Harvest Management. Mechanization is the effective tool to reduce the production cost, increase the efficiency of farm and reduction in chemical weedicides. Medium category power operated/ self-propelled machines for field preparation, hoeing, weeding, planting, sowing, spraying, grading, harvesting etc. operations is included to encourage by assistance. PHM activities like farm level drying; cleaning, grading and post-harvest management of the harvested produce has also been included. It will also include provision of low cost plastic sheets to be used as movable threshing floor as well as for protection against damage by rain and water. The district unit will identify the potential implements for the cluster and will be made available to the farmers on 25% beneficiary's contribution.

d. Demonstrations on forage/ fodder

There is limited scope/ range of prevailing varieties of fodder in package of practices (POP). The programme planned to be implemented through outsourcing the agencies specified in fodder seed production. The range of fodder crops/ varieties which still could not be included in POP/ release may also be considered in the programme to foster the demand of fodder and new introduction. All inputs may be provided for these demonstrations and a part of the demonstration plot may be used for seed production of the same to ensure the seed availability of fodder crops/ varieties in the cluster. The estimated cost for such demonstrations is Rs.10000 per ha.

e. Promotion to seed production and adoption support

Seed Production: Special attention will be paid to technology empowerment of the farming community for production of quality seed of high yielding varieties of self-pollinated crops by organizing seed production demonstrations, including grading, packaging and certification and this program will be facilitated by NGO though Multi Task Groups. Seed production activity will be interlinked with FPO/ FCSC activity. Focus will be on improving the SRR of the cluster along with the improved income of the farmers. Tie-up will be made with certification and production agencies by the PIA.

Adoption Support: Quality seed of high yielding crop varieties is a critical input for increasing productivity. It also acts as a catalyst for the adoption of other improved crop husbandry practices. In view of the importance of seed in increasing crop productivity and the low seed replacement rates in the selected micro-clusters, adoption support in terms of 50% cost of seed will be provided to the farmers in the selected villages provided they give an undertaking to adopt the package of practices demonstrated for the value chain crop in the ICM demonstrations organized in that village in the preceding year. This will also help in tracking adoption rates of the demonstrated improved technologies by the farmers.

Integrated Crop Management is a system of crop production which conserves and enhances natural resources while producing food on an economically viable and sustainable foundation. It is based on a good understanding of the interactions between biology, environment and land management systems. ICM is particularly appropriate for small farmers because it aims to minimize dependence on purchased inputs and to make the fullest possible use of indigenous technical knowledge and land use practices. As discussed earlier regarding the topographical profile of the Bansur cluster, following are the key focus areas of ICM demonstration in the cluster-

a. The soil of the project area is moderately to deeply eroded. It needs to be addressed by field level and village level bunding.

b. Emphasis upon the application of Vermi-compost and other organic manures to rejuvenate the depleted soil nutrient condition of the cluster soil.
c. In order to maintain and conserve the ground water level of the Bansur cluster, the water harvesting techniques are imperative to be discussed in detail with the farmers
d. Village level Soil moisture conservation techniques also need to be demonstrated in order to get appropriate crop production in Rabi and Zaid season, which has lesser incidence compared to Kharif.

Adoption of Solar pumps for irrigations could be promoted among farmers as the local conditions are feasible like depth of ground water level is 100cm.

f. Innovative Activities/ INM/ IPM

The for foliar spray of micro nutrients, bio fertilizers, organic products, bio pesticides, IPM kits, pheromone traps, solar based light traps, wormy-compost units, tank based low pressure drip units, deionization units, nano-products for crop, other innovative techniques etc. are the activities which are proposed to be implemented as per need of particular crop/ technology with an assistance level of 75 percent.

Information and communication technologies (ICT) based demand driven participatory extension system (modernization of extension research linkages)

This activity pertains to creation of model information infrastructure at cluster level to support the beneficiaries for all the agricultural related problems along with the marketing support. The theme is to revitalize the existing extension system compatible with the modern techniques and farmers friendly software to support the farmers and grass root level staff on pilot basis. The KSK (Krishi Sewa Kendra) at cluster level will act as the problem solution/ technical back up and information centre, strengthened with IT and interlinked with the team of experts through software application. Efforts will be made for real time problem solution through IT enabled system. The KSK will also be strengthened with the literature, especially, related to potential threats led/ Pro-P based to support the grass root level staff for the precise identification and solution of major crop threats. The provision of technical back up from the experts at higher level has also been kept. Formation of a core team at project level to visualise and implementation monitoring of the ICT activities will be the axis of this activity.

a. KSK strengthening as model in project area-to serve as level I platform for ICT –

There is a provision of Kisan Sewa Kendra (KSK) among 2-3 Gram Panchayats in existing agriculture extension system of the state. It is felt that the KSK strengthening with modern information system is a must to fulfil the need of the beneficiary. Hence, 2 KSK in cluster have been proposed to be developed as modal KSK with modern infrastructure to serve as I level solution for the beneficiary. The model KSK will be strengthened by electronic devices, literature, furniture/ fixture, minor repairs and the operating costs.

b. Agriculture Research Institute strengthening to serve as level II/ III platform for ICT –

Each KSK needs to be backed up technically with the group of experts. It has been proposed that the existing Adaptive Trial Centre (ATC)/ Krishi Vigyan Kendra (KVK)/ Agriculture Research Station (ARS)/ Agriculture Research Sub Station (ARSS)/ ICAR Institute of the concerned district will be strengthened to support the model KSK.

c. Honorarium to the II/ III level experts for solution of the problems and facilitate field visits

ICT core team will assemble quarterly to review and monitor the progress of the activity. Expert at level I will be AS, AAO, AO, ARO and AD of concerned area. Expert panel for field problem solution at the level II and III will be finalised at PMU level. These will be provided excess to the software application where field problems in the form of text/ photo/ video will be uploaded by the farmer or KSK (which could not be solved at KSK level). The same may be got analysed by the panelled expert and online solution of the problem will be communicated. For each solution the

honorarium will be provided to concerned expert. There should not be any repetition of problem/ solution. In some complex cases field visit may also be made. The main discipline of the experts will be Agronomy, Horticulture, Plant Breeding, Entomology, Plant Pathology, Nematology, Soil Science, Prop-P, Fertigation, Irrigation, Agribusiness, Post-Harvest Management etc. The honorarium in the range of Rs.200- 1000 will be provided to the different level of experts for providing the solutions of the farmers' problem. However, the honorarium will be decided at competent level.

d. Digital instruments to field coordinator/ staff–

It has been proposed that some kit of digital instruments viz. smart phone/ tablet, EC/ pH meter, digital/infrared thermometer/ hygrometer, GPS, digital camera, soil sample kit etc. to the field coordinator, technical experts/ AS/ AAO/ STA/ AO/ AD may be provided for the quick diagnosis of the problem. A set of some of these instruments will be provided according to the need of the particular cluster.

e. Potential threats led/ Pro-P based literature for crop crisis management on cluster specific crops

It is proved fact that each crop has some specific/ potential problems/ threats which are generally able to reduce the yield substantially. The Production with Protection (Pro-P) technique evolved by the departmental experts Dr. Prakash Kumar and Mr.Rajendra Singh provided a methodology to transfer and utilize high level diagnosis and treatment expertise to grass root level by prescribing a written treatment to the farmers on the base of 'diagnosis and recommendation photo sheets' prepared with the help of key subject experts. These prescriptions will promote the use of scientifically recommended biological pest control methods with specific and safe pesticides/ bio-products to control the identified problem. This technique has initiated on pilot basis in Kota Division during 2014-15. The 'diagnosis and recommendation photo sheets' will support and synergize the level I experts for the quick solution of field problems. These photo sheets will develop a professional way of prescription in departmental officials and discourage the practice of misleading prescription by some dealers/ sales persons. This literature is proposed to be made available to in the cluster for major potential crops.

f. Platform/ Software development to facilitate the problem solution at the I/II/III level and user interface-

Comprehensive platform/ software application will be developed to facilitate the beneficiaries and the expert to put the problems and solutions in a very simplified manner. The software will connect KSK, level I, level II, level lII, selected beneficiaries, other stakeholders and PMU. The problem related to crops, production, plant protection, PHM, marketing etc. will be uploaded at the level of KSK/ cluster in the form of text or photo or video. The online solution will be provided by level I/ II/ III expert in most simplified way. The solution will be available/ accessible at KSK computer for the beneficiary. It will also be tried to communicate through some applications on the smartphone of grass root level officials and selected beneficiaries. The Project Management Unit (PMU) will be able to monitor the activity through the software itself. The software will be developed at PMU level. The software will also contain a set of technical information related to Agriculture sector. No provision has been kept at cluster level because this activity would be supported at PMU level.

Component 3: Farmer Organization and Capacity Building

Capacity Building

Capacity building component is to be implemented on the cost norms of the RACP training manual. The cluster specific activities and the action plan in the limit of provisions should be prepared by concerned district unit. These programmes will run on year round basis.

Field days, exposure visits, orientation, capacity building-

Field days-For dissemination of the improved technologies demonstrated in the ICM demonstrations to large number of farmers, field days will be organized in the villages in which these demonstrations are organized. The field days will be organized near the harvesting or critical stage of the crop so that the farmers are able to see the differences between the prevalent farmer practice and the improved package of practices for a particular crop. Selection of fields/ beneficiaries will be made by concerned AD/DD/ DPMU through field coordinators, field staff and NGOs (if functional). Organise field days by the field staff, NGO and district coordinator with experts. PMU will approve the plan for field days.

Exposure visits- Exposure visits for farmers will be organized within the state and outside the state so that the farmers are able to see the successful production, post-harvest handling and marketing innovations developed at different places. For selection of the proposed locations to be visited/ beneficiaries by AD/ DD/DPMU, a proposal has to be sent and get approved by PIU/ PMU.

Farmer's Training: These will cover training and capacity building programs for farmers and farm women for adoption of knowledge-based crop husbandry and natural resource management/conservation practices for increasing productivity, enhancing diversification to high value and low water requiring crops/practices for reducing water foot print of agriculture, enhancing farmer incomes and improving rural livelihoods.

Training of Service Provider Staff: These will cover training for program implementing staff about the project design, implementation arrangements, technical areas of crop production, post-harvest management and related aspects.

Orientation/ capacity building training- Orientation and capacity building training would be the on regular basis, as and when required.

Documentation of success stories: The success stories on specific issues may be documented in the form of text, photographs with text of small films/ movies. The proposals for the same may be sent to the PIU/ PMU.

To organize above several of trainings, Irrigation Management and Training Institute (IMTI) would be nodal agency. If specific trainings are needed during course of implementation, would be organized in state as well as national level Institute.

Procurement of inputs for technology demonstrations

The inputs viz. seeds, fertilizers, PP chemicals and bio-products need to be arranged for seed production program and adoption support, demonstrations on production technologies for value chain crops, fodder, integrated drip and mini sprinkler demonstrations. The agriculture inputs are to be procured from the Cooperative sector/ Govt Agri. Research Centre/ RSSC/ NSC/ SAUs/ RAJFED instead of competitive bidding because:

1. The cooperative/ public sector agencies have a strong network in the rural area through GSS, KVSS and their retail outlets which can cater the need of scattered beneficiary in the rural area.
2. These inputs have specific packing size but the project activities require different quantities which does not match the packing. The farmers/ beneficiaries and the field functionaries are in direct touch with these cooperative outlets. Thus, group of farmers may get the inputs collectively and distributed as per their requirement. It is practically not possible in the case of private suppliers.
3. Requirement of some inputs, especially, PP chemicals and bio-products depends on outbreak of particular insect/ pest/ disease/ weed which is practically not possible to predict precisely in advance. The procurement of such inputs within a very short notice is possible from these outlets to control the losses through infestation. The formalities of formal procurement will lose this beauty which may lead to worse consequences in the fields.
4. The inputs like seed, fertilizer and PP chemical are only sold by the licensed agencies/ firms. The licenses are governed as per respective Acts and regulations. Hence, supplies are restricted with the licensed firms only.

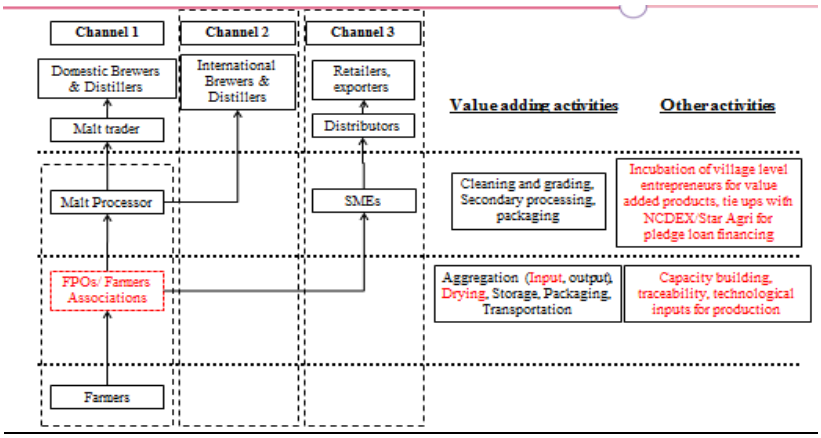
5. The major Fertilizers have the government control over rates. Hence, the rates for the same will be similar with each supplier. So procurement through tenders for such items does not make any logical sense.
6. The department of Agriculture has some set procedure to procure these inputs from the cooperative/ public sector agencies which prevails from long time. Moreover, field functionaries are not allowed to procure and store such inputs from private market. Hence, procurement through bidding process will be contradictory to the field functionaries.

Annexure 5.2: Post intervention value chain map

1. Barley

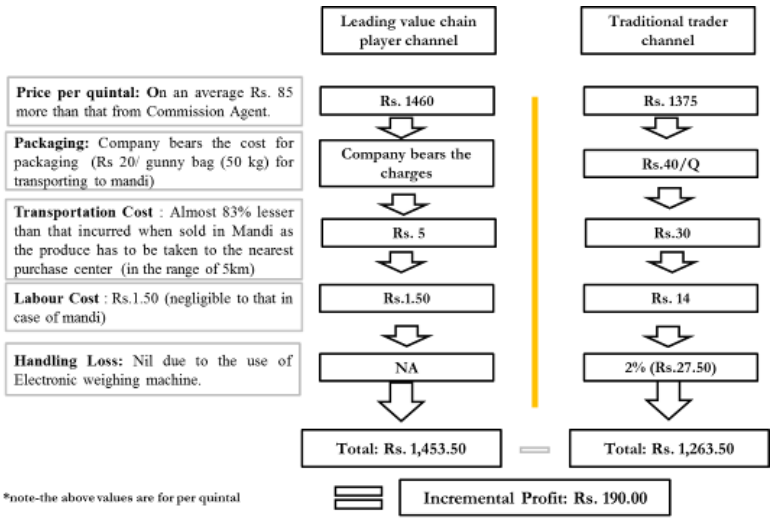
The intervention plan of Barley may be broadly considered in the context of activities and stakeholders in three stages- Production stage/ Cultivation by producers/farmers, post-harvest stage and the processing stage. In the context of shift towards barley production to greater extent, the production of apt food/malt barley production than feed barley is important. It should be strengthened by adaption of Best Package of Agricultural Practices, capacity building of producers so as to evolve governance structures like PCs etc. Undertaking contract farming practices are some of the interventions required to redress related constraints at the production stage. At the post-harvest stage, constraints in terms of high dirt content in harvested paddy, (largely) rain-fed irrigation and adequate storage facility are present. Well-designed FCSCs could help address these limitations at the farm/producer level. At the processing stage, gaps are most apparent, in terms of awareness amongst processors of contract farming options as well as limitations in contract farming policy. These may be reduced through information dissemination and B2B initiatives matched with policy reorientation and incentives (like mandi tax exemption) to facilitate the same.

Figure 2124: Scope of interventions in value chain of Barley



A comparative chart of Barley shows the value chain difference between the incremental profit realized by farmers by going along with the leading value chain players channel rather than the traditional trader channel.

Figure 2222: Value chain difference between the incremental profits realized by farmers

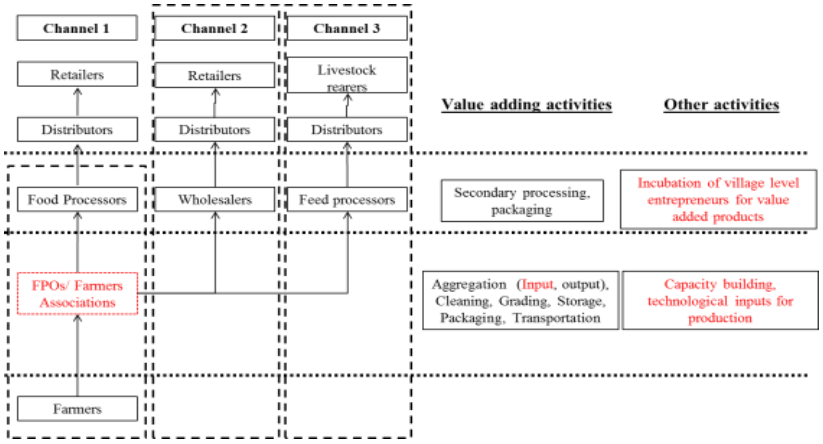


2. Bajra

In the post intervention value chain a third channel may be developed targeting value-added products like multi-grain flour (by large players like Ashirvad), breakfast cereals (Kellog), also large players like Cargill for animal feed. Also, the restructured value chain will have PCs and their FCSC replacing Mandi's and undertaking aggregation plus grinding and sorting and packaging services. The PCs may need input facilitation, custom hiring and marketing of produce.

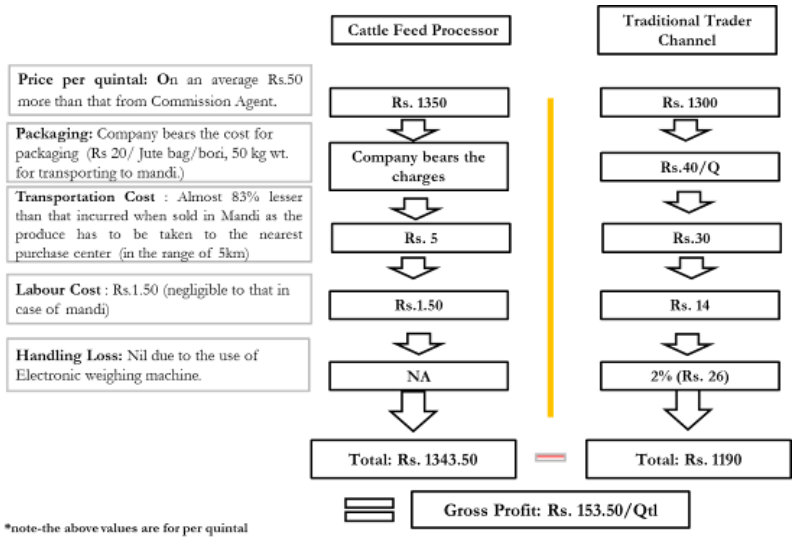
The unavailability of HYV of bajra for farmers is a critical constraint experienced by farmers. In this context, a seed production programme need to be launched availing the services of players Raj seeds. Also, limitation in terms of threshers and harvester combines are apparent. At the post-harvest stage there are constraints in terms of high moisture content, storage facility, high level of dirt and impurities in harvested which may be addressed through common facilities. There is also scope enterprises/links with large players like Cargill etc. Dissemination of benefits of direct Purchase license and apt contract farming modes are other related interventions.

Figure 2323: Scope of interventions in value chain of Bajra



A comparative chart of Bajra shows the value chain difference between the incremental profits realized by farmers by going with leading value chain players channel rather traditional trader channel.

Figure 2424: Value chain difference between the incremental profits realized by farmers

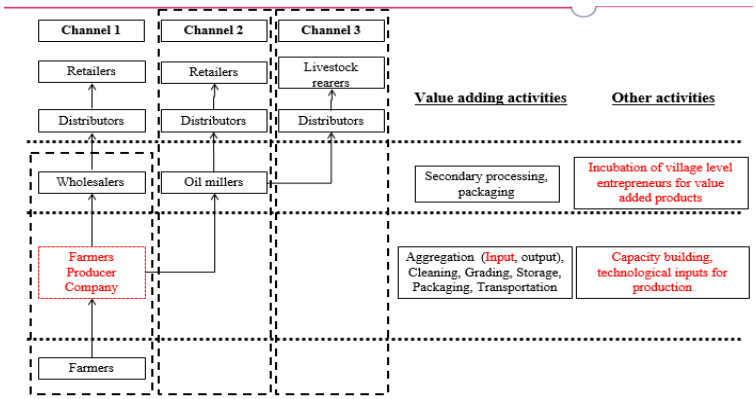


3. Mustard

The post intervention value chain map for Mustard may be visualised as one with three production-distribution or activity-marketing channels: edible oil and De-oiled cake, value added products like Mustard paste/Sause. It is also envisaged that PCs of producers with FCSCs is evolved. Such FCSCs undertakes storage, grading and sorting and packaging of produce activity. These FCSCs may offer other related services in terms of input facilitation, custom hiring, facilitating B2B connectivity etc.

Farmers' income from Mustard cultivation may be enhanced. Presently, the gross average yield per acre is 19 quintal per acre. The average market rate of sale is about Rs.1250 per quintal or Rs.23, 750 per acre. The average cost of cultivation is about Rs.11, 112 per acre. Other than good harvest practices, input facilitation (high seed prices during cropping season) needs to be provided/disseminated amongst farmers.

Figure 2525: Scope of interventions in value chain of Mustard



With the above given intervention plan, producers will get better returns with the help of aggregation and primary processing. Due to the traditional market channel there are certain constraints for processors as discussed below.

Two forms of mustard oil are traded in the Indian market namely Kacchi Ghani and Pakki Ghani (expeller oil). This industry constitutes the small-scale sector that markets the oil in loose form to about 80% and the rest contribution is made by the organized sector.

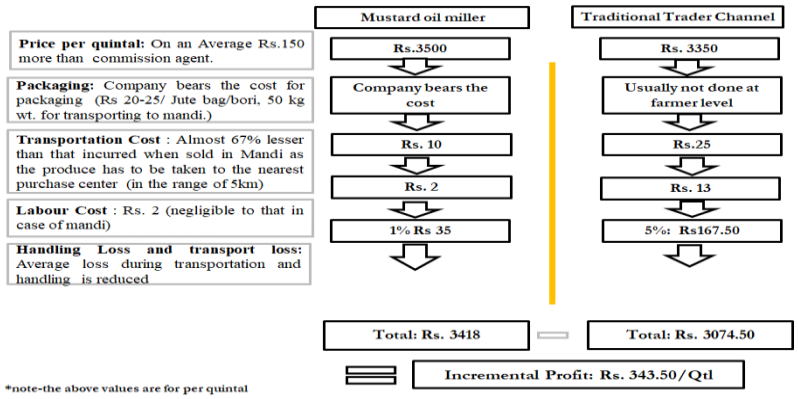
Constraints:

- Processors are dependent on "Arthiya's" traders in APMC for supply of inputs. However, Mustard Oil, arrivals in the market from Rajasthan is in Mar-April.
- Heavy competition among oil processors.
- Consumers - Price sensitive
- Pressure on processors to keep rate around Rs.80 per litre.
- Competition with soybean, palm, sunflower, groundnut oil.
- Consumption of Mustard oil: Highest in North and N.E. India. (Relatively poor states) impacts on retail pricing mustard.
- Also, Nepal supplies major chunk of mustard oil to India at relatively competitive price.
- Processing margins are barely 2-3 percent.

- Few units are upgraded into "Buhler" or quality equipment, and most are not aware of govt. scheme to encourage fuel upgrading and enhance processing margins.
- Most units are yet to have links with large retailers.

A comparative chart of Mustard shows the value chain difference between the incremental profit realized by farmers by going along with the leading value chain players channel rather than the traditional trader channel.

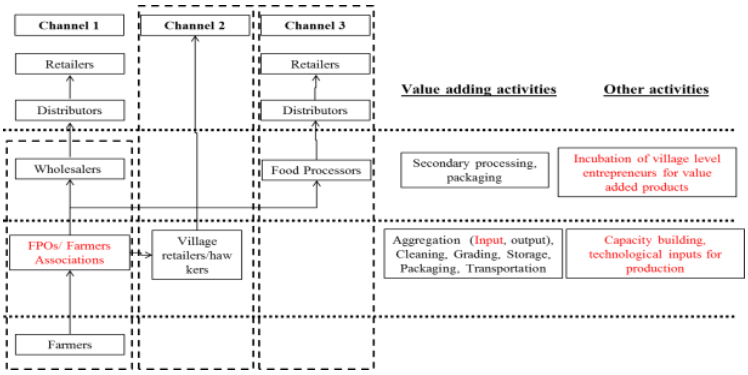
Figure 2626: Value chain difference between the incremental profits realized by farmers



4. Vegetables (Chilly, Tomato, Carrot)

Based on the consultation and potential in the cluster, there is a scope for intervention to enhance the prevalent value chain model. The below model present shows the possible interventions in vegetables, along with additional activities involved.

Figure 2727: Scope of interventions in value chain of vegetables



Farmer Producer Organizations and more specifically (FPCs) are a tool for facilitating the collectivization concept as to increase the bargaining power of farmers who are the most important player of the value chain but who realise the non-equitable returns for their effort.

5. Goat

An indicative post intervention value chain map for goat milk is shown below:

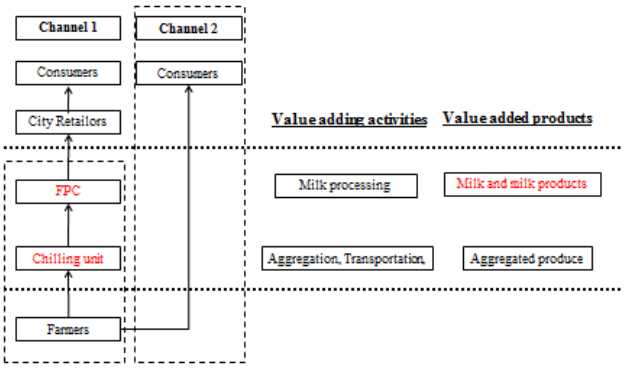


Figure 2828 Indicative Post intervention value chain map of Goat milk

A value chain study on goat meat has been done and the value chain map for goat meat is shown below:

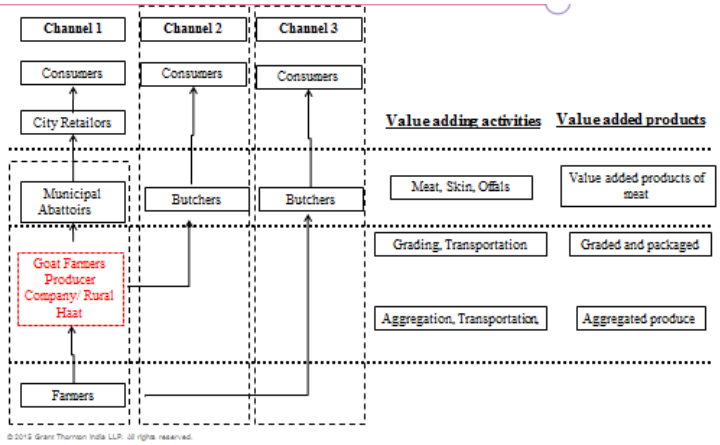


Figure 2929 Indicative Post intervention value chain map for goat meat

Field Code Changed

Annexure 5.3: Reference Business Models

Reference Business Model I – Barley and Bajra primary cleaning and grading cum feed unit

Opportunity assessment

Suitability and sustainability of the crop(s)

Barley is a short season crop and requires less water. In India, Barley is grown in winter season while Bajra is in Kharif. Rajasthan ranks first in production followed by Uttar Pradesh, Madhya Pradesh and Haryana. Barley is cultivated on 3.43 lakh Ha area, with an annual production of 0.96 million tonnes and productivity of 2803 Kg/Ha. Area under Bajra cultivation in Rajasthan state is of 40.45 lakh ha (in 2015-16) with production of 32.12 lakh MT and productivity of 794 kg/ha. The crop is predominantly cultivated in Kharif Season.

Key Districts (in the ABPF project area) by production are: S Ganganagar, Jaipur and Ajmer.

Area and Productivity: As per 2014-15 data, Area under Barley in Rajasthan is 343,302 Ha. As per 2015-16 data, area under Bajra in Rajasthan was 40,44,591 Ha. Average productivity of Bajra in India is 1090 Kg/Ha whereas for Rajasthan it is 794 Kg/Ha and is slightly lower than the national average.

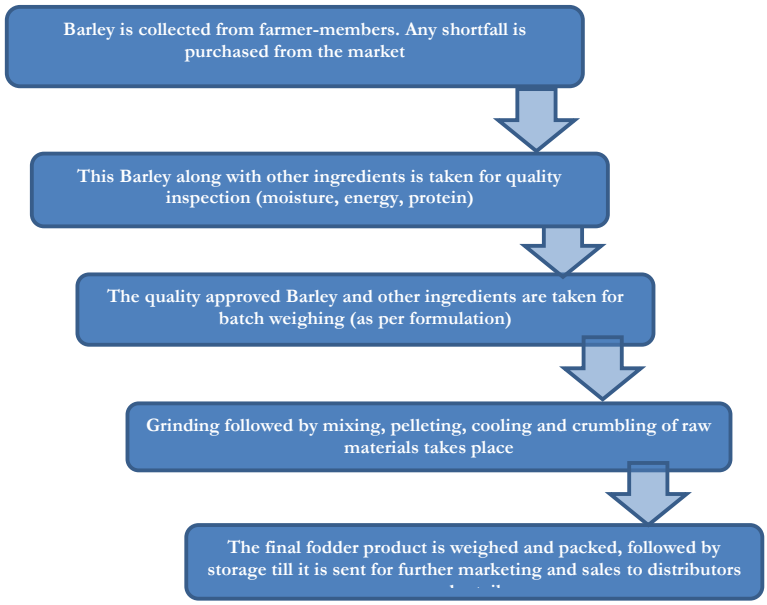
Current market scenario and marketing channels

- Based on government statistics and primary interviews with farmers, currently most of the sale of barley is done through APMCs.
- There are no Barley feed processing facilities in the district. Given the proximity of Alwar to major urban centers such as Jaipur, Delhi there is enough demand for Barley fodder products from the cattle farm owners in these urban centres.
- There are limited Bajra processing facilities in Alwar district. So, a primary processing cleaning and grading unit will be of large demand in the district itself. Apparently, processors can give 10%-20% more price if the produce they are getting is cleaned and graded. Given the proximity of Alwar to major urban centers such as Jaipur and Delhi there is enough demand in these urban centers from where it can be then marketed to the other states after proper packaging and branding or processing if required.

Proposed Business Initiative/Idea

Description of the business operations

There is significant potential for additional value capture by the barley farmers in Alwar. The business idea outlined in this document is for a "farmer owned and operated Barley cattle feed unit". The following diagram depicts suggested operating model of the processing unit:



Seasonality

Barley requires cool weather during early growth and warm and dry weather at maturity. It grows reasonably well in temperate as in sub-tropical regions of the state. Being drought resistant, barley suits areas with scanty rainfall. Sowing of barley in Rajasthan takes place during October to December. Harvesting of barley in Rajasthan takes place from the third week of March to the middle of April.

Bajra is a Kharif crop which is sown in the beginning of monsoon i.e. July and is harvested in the beginning of winter i.e. November. Bajra grows well in dry and warm climatic conditions and it is drought tolerant crop which requires low annual rainfall ranging between 400 to 600 mm. Ideal temperatures for Bajra cultivation is between 20 C to 30 C. Moist weather is advantageous during its vegetative growth.

Backward linkages

- The barley can be purchased directly from farmer members
- Would need to establish relationships with infrastructure suppliers to procure key equipment. This would be available in Mumbai.
- Barley is grown majorly in the Bansur cluster of Alwar so the unit can be located therein.

Key Target Market and Market Linkages

Cattle feed made of Barley has its significant demand by the cattle farmer owners and cattle caretakers. Being made from Barley, it is also highly nutritious and adds to the milk production and quality of the milch animal.

Market linkages would need to be either is built with large retail chains or large wholesalers who supply to small neighbourhood shops (*kirana* stores)

Suggested organization structure

The key responsibilities involved in the operations are classified below. Organization structure would have to cover these roles

Function	Roles and responsibilities
CEO	Overall responsibility; reporting to the Board about performance
Marketing	To reach out to the market, to build relationships and to get a sense of the type and the size of demand.
Finance	To monitor finances and payments & collections
Operations-Logistics	Oversee transport of raw material and finished goods
Purchase	Manage relationships with farmer-members directly. Relay market feedback. Negotiate pre-agreed price and quantity with the farmer-member. Reach out to farmers not in the FPC in case of a shortfall.
Shop floor supervisor	Oversees the production and ensures that the operation is running smoothly.

Note: The above structure is recommended for farmer groups; agri-entrepreneurs might use different structures depending on their need.

Infrastructure and investment required

Initial investment includes expenditure on key components such as plant and machinery, working capital and initial marketing costs. The proposed facility has been designed with an installed capacity of 25 kg/hour (assuming that the facility will be operational for at least 300 days a year, the total annual output is expected to be 75 MT/annum). The facility will require 50 sq m of land. The following table provides the key components of the proposed facility and the approximate cost associated with each of the components:

Sr. No	Particulars	Amount (Rs.)
	Bajra and Barley Cleaning and grading unit (2 TPH)	
i)	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
ii)	Grains cleaning machine 2 TPH	1,200,000
iii)	Weighing scales, bag sealing machines	20,000
iv)	Warehouse (200 MT)	1,080,000
v)	Electricity/Generator	35,000
	Total	**3,035,000**

Sources of capital can include equity from farmer members, soft loans/grants from government and loans from development institutions like NABARD. Financial assistance in the form of grant is available for under the "Scheme for Technology Up gradation/Modernization/Establishment of Food Processing Industries". This amounts to 25% of the plant & machinery and technical civil work cost subject to a maximum of Rs.50 lakh.

Potential for Public-Private Partnerships

Joint Venture (JV) between a Producer Company and a Private entity is the most obvious PPP model; some of the private parties to be targeted for such a JV could be large retail players. Furthermore, in terms of operations, while the Producer Company could bring in expertise in producing the product, the retail player could ensure its marketing by providing a steady channel for the Barley feed to be sold.

Potential for Impact

- The business model does not require high start-up capital. Thus it can be easily adopted by a group of farmers.
- Collectively marketing the produce will ensure better negotiating power
- Currently, farmers sell Barley at APMCs at ~Rs13-15/kg while Barley feed can be sold at prices which are 300% higher than this.
- Large impact footprint: a lot of the farmers in Alwar are involved with Barley farming

Key Success Factors and Typical Risks

Success factors

- The business needs to tie-up with retailer/wholesalers in urban/rural centres to ensure forward linkages
- Need to plan the capacity installation and expansion according to demand.
- Regular maintenance of machinery and equipment to reduce downtime and ensure steady supply for buyers which might be part of critical procurement contract terms

Typical risks

- **Inefficient working capital management** –It is imperative for the processing unit to devise an appropriate inventory strategy for raw materials to reduce inventory costs and loss to decomposition of other raw ingredients apart from Barley for the cattle feed.
- **Underutilization of installed capacity** –Farmer organizations need to start on a smaller scale till there is ample raw material supplier base to justify investment in higher capacity processing facility. Usually, there would be high debt which will increase the strain on cash flows in the initial period when there are not many suppliers and the processing capacity utilization is low.

Reference Business Model II– Mustard oil mill

Opportunity assessment

Suitability and sustainability of the crop(s)

Mustard is one of important oilseed in the state as a matter of fact. Rajasthan is the top Mustard producing state in India with area of 2.83 million ha (in 2015-16) with production of 3.5 million tonnes and productivity of 1237 kg/ha. The crop is predominantly cultivated in Rabi Season.

Key Districts (in the ABPF project area) by production are: S Ganganagar, Alwar, Tonk, Bharatpur, Hanumangarh

Area and Productivity: As per 2015-16 data, area under Mustard in Rajasthan was 2,838,000 Ha.

Average productivity of Mustard in India is 1253 Kg/Ha whereas for Rajasthan it is 1237 Kg/Ha and is equal to the national average.

Current market scenario and marketing channels

- Based on government statistics and primary interviews with the farmers, we understand that currently most of the sale of Mustard is done through local traders, middlemen and APMCs.
- There are no *Mustard oil extraction unit* facilities in the district. Given the proximity of Alwar to major urban centers such as Jaipur, Delhi there is enough demand for *Mustard oil* from the consumers of rural and urban origin.

Proposed Business Initiative/Idea

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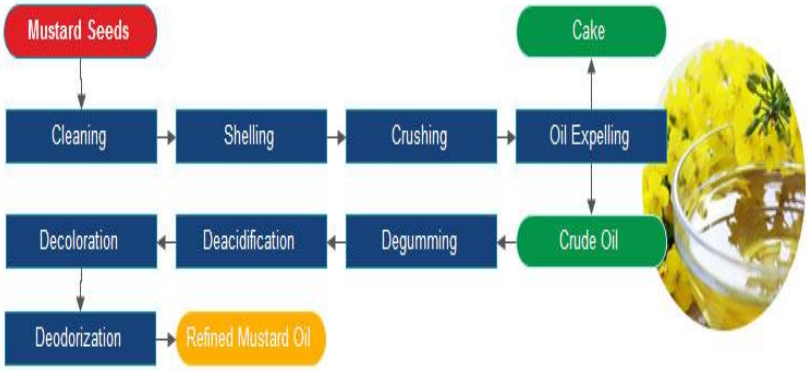
Description of the business operations

There is significant potential for additional value capture by the Mustard farmers in Alwar. The business idea outlined in this document is for a "farmer owned and operated Mustard cattle feed unit". The following diagram depicts suggested operating model of the processing unit:



Seasonality

Mustard requires cool weather during early growth and warm and dry weather at maturity. It grows reasonably well in temperate as in sub-tropical regions of the state. Being drought resistant, Mustard suits areas with scanty rainfall. Sowing of Mustard in Rajasthan takes place during October to December. Harvesting of Mustard in Rajasthan takes place from the third week of March to the middle of April.

Backward linkages

- The Mustard can be purchased directly from the farmer members
- Would need to establish relationships with infrastructure suppliers to procure key equipment. This would be available in Mumbai.
- Mustard is grown majorly in the Bansur cluster of Alwar so the unit can be located in there.

Key Target Market and Market Linkages

It has enormous demand as one of the edible oils and used as cooking medium especially in northern, eastern and north eastern of India. The demand of Mustard Oil is increasing with the time. Refined Ghani, filtered, double filtered mustard oil have given new thrust to its market. Due to consumption in household and in pickle industries it appears to be good scope for establishing mustard oil industry. Market linkages would need to be either is built with large retail chains or large wholesalers who supply to small neighbourhood shops (*kirana* stores).

Suggested organization structure

The key responsibilities involved in the operations are classified below. Organization structure would have to cover these roles

Function	Roles and responsibilities
CEO	Overall responsibility; reporting to the Board about performance
Marketing	To reach out to the market, to build relationships and to get a sense of the type and the size of demand.
Finance	To monitor finances and payments & collections
Operations-Logistics	Oversee transport of raw material and finished goods
Purchase	Manage relationships with farmer-members directly. Relay market feedback. Negotiate pre-agreed price and quantity with the farmer-member. Reach out to farmers not in the FPC in case of a shortfall.

Shop floor supervisor	Oversees the production and ensures that the operation is running smoothly.

Note: The above structure is recommended for farmer groups; agri-entrepreneurs might use different structures depending on their need.

Infrastructure and investment required

Initial investment includes expenditure on key components such as plant and machinery, working capital and initial marketing costs. The proposed facility has been designed with an installed capacity of 160 kg/hour (assuming that the facility will be operational for at least 300 days a year, the total annual output is expected to be 134 MT/annum of mustard oil and 230 MT/annum of mustard cake). The facility will require 2000 sq m of land. The following table provides the key components of the proposed facility and the approximate cost associated with each of the components:

#	Particulars	Amount (Rs.)
I	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
Ii	Oil Unit Machines	1,200,000
Iii	Electricity/Generator	50,000
Iv	Vehicle (2 MT capacity)	750,000
	Total	**2,700,000**

Sources of capital can include equity from farmer members, soft loans/grants from government and loans from development institutions like NABARD.

Potential for Public-Private Partnership

Joint Venture (JV) between a Producer Association and a Private entity is the most obvious PPP model; some of the private parties to be targeted for such a JV could be large retail players. Furthermore, in terms of operations, while the Producer Association could bring in expertise in producing the product, the retail player could ensure its marketing by providing a steady channel for the Mustard feed to be sold.

Potential for Impact

- The business model does not require high start-up capital. Thus it can be easily adopted by a group of farmers.
- Collectively marketing the produce will ensure better negotiating power
- Currently, farmers sell Mustard at APMCs at ~Rs34/kg while *Mustard oil* can be sold at prices which are 150% higher than this.
- Large impact footprint: a large number of the farmers in Alwar are involved with Mustard farming

Key Success Factors and Typical Risks

Success factors

- The business needs to tie-up with retailer/wholesalers in urban/rural centers to ensure forward linkages
- Need to plan the capacity installation and expansion according to demand.
- Regular maintenance of machinery and equipment to reduce downtime and ensure steady supply for buyers which might be part of critical procurement contract terms

Typical risks

- **Inefficient working capital management** –It is imperative for the processing unit to devise an appropriate inventory strategy for raw materials to reduce inventory costs and loss to decomposition of raw ingredients.

Underutilization of installed capacity –Farmer organizations need to start on a smaller scale till there is ample raw material supplier base to justify investment in higher capacity processing facility. Usually, there would be high debt which will increase the strain on cash flows in the initial period when there are not many suppliers and the processing capacity utilization is low.

Reference Business Model III - Vegetable Pack house (Chilly, Tomato, Carrot)

India Scenario

A pack house is a physical structure where harvested produce is consolidated and prepared for transport and distribution to markets. Packing is the main activity from which the name 'pack house' is derived. But there are activities before and after packing— together they are called pack house operations. Pack house operations include cleaning, sorting/grading, pre -treatments, packing, cooling, storage and dispatch to market. A pack house is also called a consolidation centre or collection centre. Many consolidation or collection centres in developing countries have no pack house operations.

Field preparation and packaging of produce is possible for only a limited number of crops, and for particular markets. After harvest most horticultural crops must be cleaned, sorted, sized and usually packaged if they are to be sold in the fresh produce market. Usually these procedures take place in packing houses of different types, be it a small thatched shelter on the edge of the field, or a large packing with automated equipment.

After harvest, fruits and vegetables need to be prepared for sale. This can be undertaken on the farm or at the level of retail, wholesale or supermarket chain. Regardless of the destination, preparation for the fresh market comprises four basic key operations:

Any working arrangement that reduces handling will lead to lower costs and will assist in reducing quality losses. Market preparation is therefore preferably carried out in the field. However, this is only really possible with tender or perishable products or small volumes for nearby markets. Products need to be transported to a packinghouse or packing shed in the following cases: for large operations, distant or demanding markets or products requiring special operations like washing, brushing, waxing, controlled ripening, refrigeration, storage or any specific type of treatment or packaging.

These two systems (field vs. packinghouse preparation) are not mutually exclusive. In many cases part field preparation is completed later in the packing shed. Because it is a waste of time and money to handle unmarketable units, primary selection of fruits and vegetables is always carried out in the field. In this way, products with severe defects, injuries or diseases are removed.

Packing houses serve as a sheltered working site for the produce and the packers, and should create an orderly assembly and flow of produce which can be well managed and centrally supervised. They may also provide a storage point for packing equipment and materials and, if large enough, can house office and communications facilities. Packing houses tend to become focal points for the local horticultural industry and centres of information, and if properly designed, can be utilized for packing of different commodities in different seasons. For export of fresh produce, packing houses are an essential part of the operation where selection, grading and quality control must be disciplined

The total production of pomegranate is concentrated mainly in Western Maharashtra, Karnataka, Gujarat, Andhra Pradesh, Tamil Nadu and Rajasthan in India. Maharashtra is the leading State with 82-thousand-hectare area under pomegranate cultivation, followed by Karnataka and Gujarat with 13.6 thousand ha and 5.8 thousand ha respectively, Andhra Pradesh and Tamil Nadu stood at fourth and fifth position with 2.8 and 0.5 thousand ha of pomegranate cultivation in India.

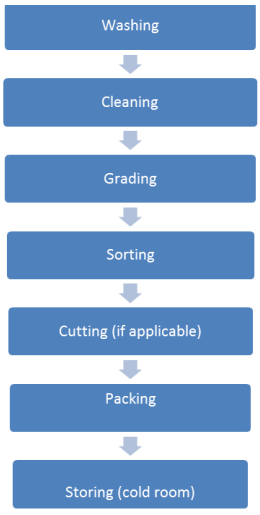
Through a pack house consumers get fresh fruits and vegetable and it prevents the commodity from getting spoiled. A pack house enables quality assurance activities that ensure product quality and quantity meet market requirements and losses are minimized during transport and distribution to markets. Developing countries incur serious postharvest losses of vegetables and fruits. The components of a related pack house facility may be viewed as follows:

Machinery and Equipment

#	Description	Amount (Rs.)
	Vegetable pack house (2 TPH)	
I	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
Ii	Vegetable Cleaning and Grading Machines (Grading Tables, Water Tank, Washing Tank)	500,000
Iii	Pre cooling chamber (5 MT)	500,000
iv	Vehicle (2 MT capacity)	750,000
	Total	**2,450,000**

Process in pack house

Figure 3030: Process in pack house



Annexure 5.4: Activities for soft intervention

Scouting of technologies and business ideas for such identified commodities

The ABPF shall scout for new and innovative models in agriculture and allied sector for developing local entrepreneurship for providing productive services to value chain stakeholders.

It shall include the following activities, but not limited to: (i) review of literature, (ii) participatory meetings with market participants and representatives of relevant business models such as – producers, aggregators, transport facilitators, storage facilitators, commission agents, wholesalers, retailers and ultimate consumers, (iii) field work (surveys on existing cold stores, pack houses, ripening rooms etc., surveys to assess the potential for establishing new marketing venture for FCSC, E-Trading and the role of local aggregators), (iv) analysis of the data / information, (v) feedback from market participants & relevant agencies, (vi) sharing the business models on a web platform.

Incubation services to Agri-entrepreneurs

ABPF shall provide agri-business incubation services, with the objective to identify, mobilize and groom emerging agro entrepreneurs and CBOs.

Training on market research methodologies, business proposals, business skills, business plan preparation, grants access, financial linkages and market linkage, legal framework, etc. to establish own business through competent trainers subject to approval from PMU-RACP.

ABPF shall also empower the youth and women to start their agri-business resulting in their social and economic development. At least 10% women candidates are desirable among the candidates trained under incubation program. The ABPF will be responsible for networking with other entrepreneurs, customers and other support agencies; provide mentorship support through development of a resource base of mentors, and subsequently ensure their deployment.

Management and Business Training to FCSC and Producer Companies personnel

The ABPF shall undertake training for management & business skill building for personnel of the Producers' Companies (PCs) and Farmer Common Service Centres (FCSCs) under the project. The ABPF shall develop comprehensive training plan.

Training is provided to personnel with an objective of enhancing the knowledge & skills of PC personnel (related to management of FCSC) for efficiently facilitating management & business of the FCSC.

#	Name of Component	Name of sub-component
1	Capacity building	Field days, exposure visits, orientation, capacity building
		Field days
		Exposure visits (Within state)
		Exposure visits (Out of state)
		Orientation
		Capacity Building

Facilitating Agri Policies

Agro-Processing and Agri-Marketing has been included as a Thrust sector in RIPS 2014. All Agro-Processing and Agri-Marketing Units shall be eligible for benefits under RIPS 2014.

Following additional incentives would be admissible under this Policy after obtaining the entitlement certificate under RIPS 2014.

Incentive for market development and diversification:

- Transport subsidy on export of the spices
- Subsidy on the export insurance
- Vehicle Registration Concession (Reefer vans and chilled milk transportation vehicles
- Incentives for quality and certification
- Incentive for project development
- Transport subsidy on export of Fruits & vegetables
- Incentive for Research & Development
- Incentives in Land Related Issues

It shall also facilitate agriculture policy seminars thereby providing a forum for stakeholders (agri industry, NGOs, PCs, Govt. bodies, etc.) in Rajasthan to discuss improvements to the agribusiness investment climate.

Linking producers and producer groups to the market

The ABPF shall retain the important role to identify and develop linkages between producers and processors so that return realized should be greater and major part of the consumer money should go down to the producer.

Market Information services

After the analysis of the existing information services, there is a scope of development of online portal based on the inputs from mobile based application as well as conventional method. As a pilot intervention, such portal can be developed to cater to the cluster area and which can gradually be rolled over to the whole district and eventually the state.

Existing sources of information services are as follows:

a. Mobile based applications

- **Agmarknet**

AGMARKNET portal also providing market information by connecting more than three thousand regulated markets of country to the farmers but due to lack of awareness and computer system, farmers are unable to access it. AGMARKNET Portal provides following information to farmers:

  - Dissemination of market information for arrivals and prices of crops grown across the states without the limit of geographical boundaries
  - Provides information on weather forecast, crop advice, use of fertilizers & pesticides etc.
  - Up loads latest research reports related to marketing and analysis of information and trends in prices, demand on continual basis.

The sampled farmers were not using this facility as they are unaware about these facilities. However, they get market information from fellow farmers and traders.

IKSL –Iffco Kisan Samridhi ltd. is offering voice based message services in this area.

b. Conventional method

- **Kisan Call Center (1800-180-1551)**[2]

The country today has an impressive telecom network both in the private and Government sector. Over 5 lakh villages have a public telephone in the country. It has been felt for long that this impressive telecom network could be put to effective use for delivering knowledge and information to the farming community. A call centre based extension service will be delivering knowledge and information exactly as per the requirements of the farming community. This system would also help to keep a record of what is being delivered to the farmers in terms of knowledge and information. The Kisan Call Centre scheme is available throughout the country. The Kisan Call Centre scheme has been functioning from 21.1.04.**The Call Centres can be accessed by farmers all over the country on common Toll Free Number 1800-180-1551.** Since 10th June, 2004, the Call Centres service has been made available right from 6 A.M. to 10 P.M. except on Sundays and gazetted holidays, beyond these hours the calls are attended in the voice recording mode.

The calls are received at 13 Call Centres wherein 116 Agriculture Graduates attend to answer the queries of the farmer in the local language. 123 experts located in different parts of the country at State Agriculture Universities, ICAR institutes, State Department of Agriculture, Horticulture and other developments are answering the calls at Level –II.

The SMS service has been started by the National Bank for Agriculture and Rural Development (NABARD) in collaboration with the India Meteorological Department (IMD, agrimet division). The focus of the project includes meteorological advisory services to the farmers, bringing together experts and grass-root level communities with the objective of making knowledge accessible to farmers, dissemination of agriculture advisory and feedback from farmers through the involvement of farmers clubs, joint liability groups, village watershed committees in area where watershed projects are being implemented and research and development in operational agriculture meteorology.

- **India Meteorological Department**

The service is provided by the India Meteorological Department, under the Ministry of Earth Sciences of Government of India. The IMD has set up nine agromet field units (AMFU) in the state. After these units get the forecast, they prepare agro advisory with the help of experts. This advisory is sent to IMD where the bulletin is composed and then disseminated to farmers through SMS, radio, newspapers and other means.

- **Tata Consultancy Services (TCS)**

The Tata Group's information and technology firm created a customizable Mobile Agro Advisory System called mKrishi that would address farmers' specific queries in real time. The name mKrishi combines "m" for mobile and "krishi," which refers to agriculture in many Indian languages.

[2] http://liferajasthan.blogspot.in/2011/04/know-kissan-call-center-1800-180-1551.html

Annexure 5.5: Profit and loss statement for FCSC units

Vegetable pack house

Vegetable Pack house	Y1	Y2	Y3	Y4	Y5
Service (@ Rs. 300/MT)	1,152,000	1,285,200	1,428,840	1,583,631	1,662,813
Total Revenue	**1,152,000**	**1,285,200**	**1,428,840**	**1,583,631**	**1,662,813**
Fixed Cost (HR, other fixed cost)	214,400	225,120	236,376	248,195	260,605
Variable Cost	180,000	191,250	202,500	213,750	213,750
Total Operational Expenses	**394,400**	**416,370**	**438,876**	**461,945**	**474,355**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**757,600**	**868,830**	**989,964**	**1,121,686**	**1,188,458**
Depreciation	210,000	210,000	210,000	210,000	210,000
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**547,600**	**658,830**	**779,964**	**911,686**	**978,458**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**547,600**	**658,830**	**779,964**	**911,686**	**978,458**
Tax	131,356	180,056	229,775	281,020	310,701
Earnings After Taxes (EAT)	**416,244**	**478,774**	**550,189**	**630,667**	**667,757**

Mustard oil mill

Particulars	Y1	Y2	Y3	Y4	Y5
Oil	20,736,000	21,772,800	22,861,440	24,004,512	25,204,738
Cake	10,368,000	10,886,400	11,430,720	12,002,256	12,602,369
Total Revenue	**31,104,000**	**32,659,200**	**34,292,160**	**36,006,768**	**37,807,106**
Fixed Cost	514,000	539,700	566,685	595,019	624,770
Variable Cost	25,408,480	26,678,904	28,012,849	29,413,492	30,884,166
Total Operational Expenses	**25,922,480**	**27,218,604**	**28,579,534**	**30,008,511**	**31,508,936**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**5,181,520**	**5,440,596**	**5,712,626**	**5,998,257**	**6,298,170**
Depreciation	235,000	235,000	235,000	235,000	235,000
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**4,946,520**	**5,205,596**	**5,477,626**	**5,763,257**	**6,063,170**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**4,946,520**	**5,205,596**	**5,477,626**	**5,763,257**	**6,063,170**
Tax	1,486,760	1,582,882	1,680,705	1,780,764	1,883,553
Earnings After Taxes (EAT)	**3,459,760**	**3,622,714**	**3,796,920**	**3,982,493**	**4,179,617**

Bajra and Barley cleaning and grading lab

Particulars	Y1	Y2	Y3	Y4	Y5
CnG Service	1,536,000	1,713,600	1,905,120	2,111,508	2,333,772
Total Revenue	**1,536,000**	**1,713,600**	**1,905,120**	**2,111,508**	**2,333,772**
Fixed Cost	383,000	402,150	422,258	443,370	465,539
Variable Cost	360,000	378,000	396,900	416,745	437,582
Total Operational Expenses	**743,000**	**780,150**	**819,158**	**860,115**	**903,121**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**793,000**	**933,450**	**1,085,963**	**1,251,393**	**1,430,651**
Depreciation	268,500	268,500	268,500	268,500	268,500
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**524,500**	**664,950**	**817,463**	**982,893**	**1,162,151**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**524,500**	**664,950**	**817,463**	**982,893**	**1,162,151**
Tax	115,180	176,976	239,848	304,447	371,384
Earnings After Taxes (EAT)	**409,320**	**487,974**	**577,615**	**678,446**	**790,766**

Goat milk chilling unit

Particulars	Y1	Y2	Y3	Y4	Y5
Milk Product	4,015,000	4,742,719	5,533,172	6,390,814	7,320,386
Total Revenue	**4,015,000**	**4,742,719**	**5,533,172**	**6,390,814**	**7,320,386**
Fixed Cost	221,000	232,050	243,653	255,835	268,627
Variable Cost	3,016,798	3,563,593	4,157,525	4,801,941	5,500,405
Total Operational Expenses	**3,237,798**	**3,795,643**	**4,401,177**	**5,057,776**	**5,769,032**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**777,202**	**947,076**	**1,131,995**	**1,333,037**	**1,551,354**
Depreciation	142,388	142,388	142,388	142,388	142,388
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**634,815**	**804,689**	**989,607**	**1,190,650**	**1,408,967**
Interest Expense	177,734	184,707	163,556	139,598	112,462
Earnings Before Taxes (EBT)	**457,081**	**619,982**	**826,051**	**1,051,052**	**1,296,505**
Tax	137,124	185,995	247,815	315,316	388,952
Earnings After Taxes (EAT)	**339,406**	**442,149**	**576,164**	**724,489**	**887,993**

Annexure 6.1: Watershed area distribution

Table 2828: Micro Watershed-wise Area for water budgeting purpose

S. No.	Macro No.	Micro No.	Name of Village	Micro W/S area (in ha)
1	6	4	Mahanpur, Machi	537
2	6	5	Mahanpur, Machi, Meerapur	365
3	6	6	Mahanpur	505
4	6	7	Mahanpur, Loyati	210
5	6	8	Loyati, Mahanpur, NangalBhaw Singh, Keherpura, Babera,BhuriDungri, Kothal,Buteri,Kankaria,	992
6	6	9	Loyati, Mahanpur, Shyampura, Uchpur, BadDhundla, Kothal, Sathalpur	885
7	6	10	Mahanpur	92
8	7	1	Alampur, Kharkhra, Shyampura, Rasnali Main	912
9	7	2	Bas Dayal, Kharkhra, Khoheri, Rasnali Main, Khiwaheri, Bas Karnawat Main, Milakpur	1325
10	7	3	Bas Dayal, Khoheri, Bas Karnawat Main, Neemuchana Main	980
11	7	4	Burja, Khoheri, Chaterpura, Neemuchana Main,	1250
12	7	5	Burja, Pali main, Neemuchana	490
13	7	6	Burja Main, Gyanpura, Chaterpura	470
14	8	1	Alampur, Nawalpura, Shyampura, Rasnali, Milakpur	872
15	8	2	Nawalpura, Shyampura	155
16	8	3	Khoheri, Nawalpura, Indrada, Milakpur	345
17	8	4	Khoheri, Prathvipura, Indrada, Holawas, Chterpura, Gadi	1750
18	8	6	Basna, Bisalu	115
19	8	7	Basna, Bilat, Bisalu	685

(Source: Watershed DPR, Bansur)

Annexure 6.2: Assessment of Groundwater Recharge from Rainwater Harvesting Structures

The project is important for semi-arid regions of Rajasthan especially for hard-rock areas, which makes it difficult to apply basic hydrologic principles derived for alluvial and unconsolidated geologic formations. The study area, is situated in hard-rock region of Udaipur district. Therefore, the results of the study will be mainly applicable to other hard-rock regions of India. The results will definitely be useful for the planners, researchers and decision makers in the study area to formulate suitable strategies for implementing artificial recharge projects on large scale.

Groundwater recharge is one of the vital components of the water cycle and is highly uncertain to be predicted accurately. In hard-rock areas of Rajasthan, cost-effective and feasible methods for artificial groundwater recharging have not been identified. Also, studies on evaluating impact of artificial groundwater recharge on improving groundwater quality are rare.

Water scarcity and depletion of groundwater levels are among the major problems in southern Rajasthan. During May-June every year, most of the wells become dry due to decline in groundwater levels. Artificial recharge of groundwater seems to be an appropriate solution under the present situation. It has been observed that rainwater harvesting-cum-groundwater recharging structures play an effective role in augmenting groundwater tables in the region. The small water harvesting ponds/Anicuts get submerged atleast two times during the entire monsoon season depending on rainfall and other watershed characteristics. In this study the recharge rate and recharge volume through a small masonry check dam/ anicut is determined by monitoring the inflow of runoff and percolation from the reservoir through staff gauge.

Preparation of Depth Capacity Curve for Shishvi Water Harvesting Structure

During the monsoon period of 2012 to 2015 daily surface water levels of water harvesting structure as well as the water table of identified open dug well were monitored to find out the impact of constructed structure for groundwater recharging. During the monsoon months, the constructed structure gets completely filled up two to three times because of occurrence of normal rainfall and its proper distribution. Depth-capacity curve of the structure was prepared by preparing contour map of the submergence area. The capacity of the pond at different depth is given in Table 1. The prepared depth-capacity curve is shown in Fig. 1

Table 2929 Storage capacity of groundwater recharges structures constructed at Shishvi

Contour Value	Depth (m)	Capacity (m^3)
98.50	0.5	250.00
99.00	1.0	992.50
99.50	1.5	2285.00
100.00	2.0	4235.00

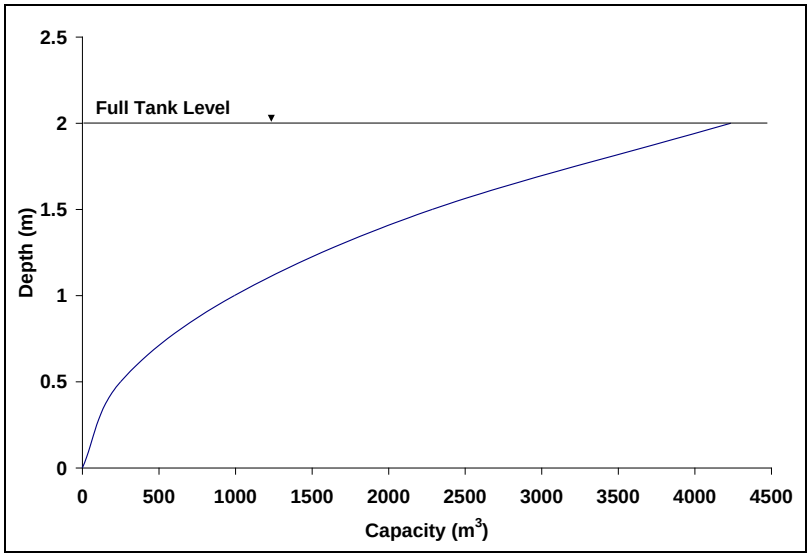


Figure 3134 Depth-Capacity Curve of Shishvi Water Harvesting Structure

Assessment of Groundwater Recharge through Rainwater Harvesting Structure Constructed at Shishvi

For assessment of groundwater recharge through rainwater harvesting structures, daily monitoring of surface water level were carried out through the installation of gauge in the Anicut. The water table of the identified open dug well situated in the downstream side of the structure were also measured on daily basis. The pan-evaporation data were collected from the CTAE Meteorological Observatory. The collected data were analyzed for computation of groundwater recharge and recharge rate through the construction of water harvesting structure. The average recharge rate was found to be 3.95 cm/day whereas net recharge volume was 7902.28 m^3 for the year 2015. The net recharge as well as recharge rate is shown in Table 2 and Table 3.

Table 3030 Estimation of Recharge Rate through Water Harvesting Structure Constructed at Shishvi

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
16-06-2015	27.00	0.30	0.00	7.20	5.04	0.00
17-06-2015	10.60	0.38	0.04	2.60	1.82	3.82
18-06-2015	6.80	0.40	0.04	5.80	4.06	3.59
19-06-2015	0.00	0.32	0.08	8.30	5.81	7.42
20-06-2015	0.00	0.25	0.07	8.60	6.02	6.40
21-06-2015	0.00	0.17	0.08	7.50	5.25	7.48
22-06-2015	0.00	0.10	0.07	6.40	4.48	6.55
23-06-2015	12.20	0.15	0.04	4.00	2.80	3.72
24-06-2015	0.00	0.06	0.09	4.00	2.80	8.72
25-06-2015	0.00	0.00	0.00	5.50	3.85	0.00
26-06-2015	0.00	0.00	0.00	6.10	4.27	0.00
27-06-2015	0.00	0.00	0.00	6.30	4.41	0.00
28-06-2015	0.00	0.00	0.00	5.50	3.85	0.00
29-06-2015	0.00	0.00	0.00	5.70	3.99	0.00
30-06-2015	0.00	0.00	0.00	6.00	4.20	0.00
01-07-2015	0.00	0.00	0.00	5.90	4.13	0.00
02-07-2015	0.00	0.00	0.00	4.80	3.36	0.00

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
03-07-2015	0.00	0.00	0.00	5.70	3.99	0.00
04-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
05-07-2015	0.00	0.00	0.00	5.90	4.13	0.00
06-07-2015	0.00	0.00	0.00	6.20	4.34	0.00
07-07-2015	0.00	0.00	0.00	6.40	4.48	0.00
08-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
09-07-2015	0.00	0.00	0.00	5.30	3.71	0.00
10-07-2015	0.00	0.00	0.00	5.30	3.71	0.00
11-07-2015	0.00	0.00	0.00	5.50	3.85	0.00
12-07-2015	0.00	0.00	0.00	5.10	3.57	0.00
13-07-2015	0.00	0.00	0.00	4.90	3.43	0.00
14-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
15-07-2015	0.00	0.00	0.00	6.10	4.27	0.00
16-07-2015	0.00	0.00	0.00	4.80	3.36	0.00
17-07-2015	0.00	0.00	0.00	4.30	3.01	0.00
18-07-2015	0.00	0.00	0.00	3.30	2.31	0.00
19-07-2015	12.20	0.00	0.00	1.80	1.26	0.00
20-07-2015	0.00	0.00	0.00	0.80	0.56	0.00
21-07-2015	25.00	0.65	0.04	1.10	0.77	3.92
22-07-2015	0.00	0.60	0.05	2.00	1.40	4.86
23-07-2015	25.70	1.35	0.04	2.20	1.54	3.85
24-07-2015	19.00	1.65	0.04	2.20	1.54	3.85
25-07-2015	0.00	1.58	0.07	1.60	1.12	6.89
26-07-2015	12.20	1.70	0.04	1.60	1.12	3.89
27-07-2015	32.00	2.00	0.04	0.80	0.56	3.94
28-07-2015	0.00	1.94	0.06	0.70	0.49	5.95
29-07-2015	67.40	2.00	0.04	0.60	0.42	3.96
30-07-2015	0.00	1.94	0.06	1.20	0.84	5.92
31-07-2015	0.00	1.89	0.05	1.80	1.26	4.87
01-08-2015	0.00	1.84	0.05	3.00	2.10	4.79
02-08-2015	0.00	1.78	0.06	4.30	3.01	5.70
03-08-2015	0.00	1.73	0.05	5.40	3.78	4.62
04-08-2015	0.00	1.68	0.05	5.50	3.85	4.62
05-08-2015	0.00	1.61	0.07	6.00	4.20	6.58
06-08-2015	0.00	1.54	0.07	6.00	4.20	6.58
07-08-2015	0.00	1.49	0.05	5.60	3.92	4.61
08-08-2015	0.00	1.42	0.07	5.20	3.64	6.64
09-08-2015	0.00	1.36	0.06	5.40	3.78	5.62
10-08-2015	0.00	1.31	0.05	4.30	3.01	4.70
11-08-2015	0.00	1.24	0.07	1.30	0.91	6.91
12-08-2015	43.20	2.00	0.04	0.20	0.14	3.99
13-08-2015	0.00	1.96	0.04	1.30	0.91	3.91
14-08-2015	0.00	1.91	0.05	2.00	1.40	4.86
15-08-2015	43.20	2.00	0.04	1.90	1.33	3.87
16-08-2015	0.00	1.95	0.05	3.10	2.17	4.78
17-08-2015	10.40	2.00	0.04	1.40	0.98	3.90
18-08-2015	7.40	1.96	0.04	1.50	1.05	3.90
19-08-2015	0.00	1.90	0.06	2.20	1.54	5.85
20-08-2015	0.00	1.83	0.07	4.20	2.94	6.71
21-08-2015	0.00	1.76	0.07	2.90	2.03	6.80
22-08-2015	0.00	1.70	0.06	3.20	2.24	5.78
23-08-2015	0.00	1.66	0.04	4.40	3.08	3.69
24-08-2015	0.00	1.60	0.06	4.70	3.29	5.67
25-08-2015	0.00	1.55	0.05	4.50	3.15	4.69
26-08-2015	0.00	1.49	0.06	5.10	3.57	5.64
27-08-2015	0.00	1.45	0.04	4.80	3.36	3.66
28-08-2015	0.00	1.40	0.05	5.30	3.71	4.63
29-08-2015	0.00	1.34	0.06	4.70	3.29	5.67
30-08-2015	0.00	1.29	0.05	4.80	3.36	4.66

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
31-08-2015	0.00	1.21	0.08	4.40	3.08	7.69
01-09-2015	0.00	1.16	0.05	3.40	2.38	4.76
02-09-2015	55.00	2.00	0.04	3.30	2.31	3.77
03-09-2015	0.00	1.95	0.05	3.80	2.66	4.73
04-09-2015	0.00	1.90	0.05	3.90	2.73	4.73
05-09-2015	0.00	1.84	0.06	4.10	2.87	5.71
06-09-2015	0.00	1.78	0.06	4.10	2.87	5.71
07-09-2015	0.00	1.72	0.06	4.00	2.80	5.72
08-09-2015	0.00	1.67	0.05	4.30	3.01	4.70
09-09-2015	0.00	1.62	0.05	4.30	3.01	4.70
10-09-2015	0.00	1.56	0.06	3.80	2.66	5.73
11-09-2015	0.00	1.51	0.05	3.80	2.66	4.73
12-09-2015	0.00	1.47	0.04	4.20	2.94	3.71
13-09-2015	0.00	1.42	0.05	5.50	3.85	4.62
14-09-2015	0.00	1.38	0.04	5.30	3.71	3.63
15-09-2015	0.00	1.32	0.06	4.80	3.36	5.66
16-09-2015	0.00	1.27	0.05	5.90	4.13	4.59
17-09-2015	0.00	1.23	0.04	6.40	4.48	3.55
18-09-2015	8.00	1.20	0.03	4.30	3.01	2.70
19-09-2015	17.20	1.50	0.04	1.70	1.19	3.88
20-09-2015	0.00	1.46	0.04	1.00	0.70	3.93
21-09-2015	0.00	1.41	0.05	1.00	0.70	4.93
22-09-2015	3.60	1.37	0.04	2.10	1.47	3.85
23-09-2015	0.00	1.32	0.05	4.40	3.08	4.69
24-09-2015	0.00	1.28	0.04	4.00	2.80	3.72
25-09-2015	0.00	1.22	0.06	4.20	2.94	5.71
26-09-2015	0.00	1.18	0.04	4.10	2.87	3.71
27-09-2015	0.00	1.13	0.05	3.80	2.66	4.73
28-09-2015	0.00	1.08	0.05	4.60	3.22	4.68
29-09-2015	17.00	1.40	0.04	4.50	3.15	3.69
30-09-2015	0.00	1.36	0.04	4.50	3.15	3.68
01-10-2015	0.00	1.32	0.04	4.40	3.08	3.69
02-10-2015	0.00	1.28	0.04	5.10	3.57	3.64
03-10-2015	0.00	1.22	0.06	5.50	3.85	5.62
04-10-2015	0.00	1.18	0.04	6.00	4.20	3.58
05-10-2015	0.00	1.13	0.05	5.20	3.64	4.64
06-10-2015	0.00	1.08	0.05	5.90	4.13	4.59
07-10-2015	0.00	1.02	0.06	5.20	3.64	5.64
08-10-2015	0.00	0.97	0.05	5.50	3.85	4.62
09-10-2015	0.00	0.93	0.04	5.30	3.71	3.63
10-10-2015	0.00	0.87	0.06	4.50	3.15	5.69
11-10-2015	0.00	0.81	0.06	5.80	4.06	5.59
12-10-2015	0.00	0.77	0.04	4.90	3.43	3.66
13-10-2015	0.00	0.72	0.05	4.90	3.43	4.66
14-10-2015	0.00	0.65	0.07	4.30	3.01	6.70
15-10-2015	0.00	0.60	0.05	4.10	2.87	4.71
16-10-2015	0.00	0.54	0.06	5.10	3.57	5.64
17-10-2015	0.00	0.48	0.06	5.10	3.57	5.64
18-10-2015	0.00	0.41	0.07	5.30	3.71	6.63
19-10-2015	0.00	0.34	0.07	5.70	3.99	6.60
20-10-2015	0.00	0.27	0.07	5.60	3.92	6.61
21-10-2015	0.00	0.20	0.07	4.30	3.01	6.70
22-10-2015	0.00	0.13	0.07	3.90	2.73	6.73
23-10-2015	0.00	0.06	0.07	4.20	2.94	6.71
24-10-2015	0.00	0.00	0.00	4.60	3.22	0.00
					Recharge rate (cm/day)	**3.95**

Table 3.3: Estimation for Recharge Volume through Water Harvesting Structure at Shishvi

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
16-06-2015	27.00	0.30	0.00	150	180	0.00	0.00	0.00
17-06-2015	10.60	0.38	0.04	190	227	9.08	0.41	8.67
18-06-2015	6.80	0.40	0.04	200	240	9.60	0.97	8.63
19-06-2015	0.00	0.32	0.08	160	190	15.20	1.10	14.10
20-06-2015	0.00	0.25	0.07	125	149	10.43	0.90	9.53
21-06-2015	0.00	0.17	0.08	89	104	8.32	0.55	7.77
22-06-2015	0.00	0.10	0.07	76	64	4.48	0.29	4.19
23-06-2015	12.20	0.15	0.04	87	82	3.28	0.23	3.05
24-06-2015	0.00	0.06	0.09	48	40	3.60	0.11	3.49
25-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
26-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
27-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
28-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
29-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
30-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
01-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
02-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
03-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
04-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
05-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
06-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
07-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
08-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
09-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
10-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
11-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
12-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
13-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
14-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
15-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
16-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
17-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
18-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
19-07-2015	12.20	0.00	0.00	0	0	0.00	0.00	0.00
20-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
21-07-2015	25.00	0.65	0.04	539	469	18.76	0.36	18.40
22-07-2015	0.00	0.60	0.05	275	432	21.60	0.60	21.00
23-07-2015	25.70	1.35	0.04	2060	1770	70.80	2.73	68.07
24-07-2015	19.00	1.65	0.04	3078	2175	87.00	3.35	83.65
25-07-2015	0.00	1.58	0.07	2407	2013	140.91	2.25	138.66
26-07-2015	12.20	1.70	0.04	3166	2251	90.04	2.52	87.52
27-07-2015	32.00	2.00	0.04	4235	2722	108.88	1.52	107.36
28-07-2015	0.00	1.94	0.06	4108	2641	158.46	1.29	157.17
29-07-2015	67.40	2.00	0.04	4235	2722	108.88	1.14	107.74
30-07-2015	0.00	1.94	0.06	4108	2641	158.46	2.22	156.24
31-07-2015	0.00	1.89	0.05	4002	2573	128.65	3.24	125.41
01-08-2015	0.00	1.84	0.05	3896	2436	121.80	5.12	116.68
02-08-2015	0.00	1.78	0.06	3288	2336	140.16	7.03	133.13
03-08-2015	0.00	1.73	0.05	3222	2290	114.50	8.66	105.84
04-08-2015	0.00	1.68	0.05	3130	2224	111.20	8.56	102.64
05-08-2015	0.00	1.61	0.07	2999	2132	149.24	8.95	140.29
06-08-2015	0.00	1.54	0.07	2355	1967	137.69	8.26	129.43
07-08-2015	0.00	1.49	0.05	2270	1906	95.30	7.47	87.83
08-08-2015	0.00	1.42	0.07	2163	1880	131.60	6.84	124.76
09-08-2015	0.00	1.36	0.06	2072	1715	102.90	6.48	96.42
10-08-2015	0.00	1.31	0.05	1996	1540	77.00	4.64	72.36
11-08-2015	0.00	1.24	0.07	1626	1457	101.99	1.33	100.66
12-08-2015	43.20	2.00	0.04	4235	2722	108.88	0.38	108.50

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
13-08-2015	0.00	1.96	0.04	4150	2668	106.72	2.43	104.29
14-08-2015	0.00	1.91	0.05	4044	2600	130.00	3.64	126.36
15-08-2015	43.20	2.00	0.04	4235	2722	108.88	3.62	105.26
16-08-2015	0.00	1.95	0.05	4129	2654	132.70	5.76	126.94
17-08-2015	10.40	2.00	0.04	4235	2722	108.88	2.67	106.21
18-08-2015	7.40	1.96	0.04	4150	2668	106.72	2.80	103.92
19-08-2015	0.00	1.90	0.06	4023	2587	155.22	3.98	151.24
20-08-2015	0.00	1.83	0.07	3875	2423	169.61	7.12	162.49
21-08-2015	0.00	1.76	0.07	3278	2330	163.10	4.73	158.37
22-08-2015	0.00	1.70	0.06	3166	2251	135.06	5.04	130.02
23-08-2015	0.00	1.66	0.04	3095	2190	87.60	6.75	80.85
24-08-2015	0.00	1.60	0.06	2703	2080	124.80	6.84	117.96
25-08-2015	0.00	1.55	0.05	2360	1975	98.75	6.22	92.53
26-08-2015	0.00	1.49	0.06	2270	1906	114.36	6.80	107.56
27-08-2015	0.00	1.45	0.04	2239	1898	75.92	6.38	69.54
28-08-2015	0.00	1.40	0.05	2132	1818	90.90	6.74	84.16
29-08-2015	0.00	1.34	0.06	2041	1640	98.40	5.40	93.00
30-08-2015	0.00	1.29	0.05	1966	1516	75.80	5.09	70.71
31-08-2015	0.00	1.21	0.08	1587	1422	113.76	4.38	109.38
01-09-2015	0.00	1.16	0.05	1422	1363	68.15	3.24	64.91
02-09-2015	55.00	2.00	0.04	4235	2722	108.88	6.29	102.59
03-09-2015	0.00	1.95	0.05	4129	2654	132.70	7.06	125.64
04-09-2015	0.00	1.90	0.05	4023	2587	129.35	7.06	122.29
05-09-2015	0.00	1.84	0.06	3896	2436	146.16	6.99	139.17
06-09-2015	0.00	1.78	0.06	3288	2336	140.16	6.70	133.46
07-09-2015	0.00	1.72	0.06	3204	2277	136.62	6.38	130.24
08-09-2015	0.00	1.67	0.05	3111	2211	110.55	6.66	103.89
09-09-2015	0.00	1.62	0.05	3018	2145	107.25	6.46	100.79
10-09-2015	0.00	1.56	0.06	2379	1989	119.34	5.29	114.05
11-09-2015	0.00	1.51	0.05	2300	1926	96.30	5.12	91.18
12-09-2015	0.00	1.47	0.04	2248	1885	75.40	5.54	69.86
13-09-2015	0.00	1.42	0.05	2163	1880	94.00	7.24	86.76
14-09-2015	0.00	1.38	0.04	2102	1758	70.32	6.52	63.80
15-09-2015	0.00	1.32	0.06	2011	1650	99.00	5.54	93.46
16-09-2015	0.00	1.27	0.05	1935	1492	74.60	6.16	68.44
17-09-2015	0.00	1.23	0.04	1615	1442	57.68	6.46	51.22
18-09-2015	8.00	1.20	0.03	1575	1410	42.30	4.24	38.06
19-09-2015	17.20	1.50	0.04	2284	1911	76.44	2.27	74.17
20-09-2015	0.00	1.46	0.04	2222	1884	75.36	1.32	74.04
21-09-2015	0.00	1.41	0.05	2148	1850	92.50	1.30	91.21
22-09-2015	3.60	1.37	0.04	2087	1745	69.80	2.57	67.23
23-09-2015	0.00	1.32	0.05	2011	1650	82.50	5.08	77.42
24-09-2015	0.00	1.28	0.04	1951	1505	60.20	4.21	55.99
25-09-2015	0.00	1.22	0.06	1601	1433	85.98	4.21	81.77
26-09-2015	0.00	1.18	0.04	1550	1387	55.48	3.98	51.50
27-09-2015	0.00	1.13	0.05	1482	1328	66.40	3.53	62.87
28-09-2015	0.00	1.08	0.05	1416	1238	61.90	3.99	57.91
29-09-2015	17.00	1.40	0.04	2132	1818	72.72	5.73	66.99
30-09-2015	0.00	1.36	0.04	2072	1715	68.60	5.40	63.20
01-10-2015	0.00	1.32	0.04	2011	1650	66.00	5.08	60.92
02-10-2015	0.00	1.28	0.04	1951	1505	60.20	5.37	54.83
03-10-2015	0.00	1.22	0.06	1601	1433	85.98	5.52	80.46
04-10-2015	0.00	1.18	0.04	1550	1387	55.48	5.83	49.65
05-10-2015	0.00	1.13	0.05	1482	1328	66.40	4.83	61.57
06-10-2015	0.00	1.08	0.05	1416	1238	61.90	5.11	56.79
07-10-2015	0.00	1.02	0.06	1013	1168	70.08	4.25	65.83
08-10-2015	0.00	0.97	0.05	963	1112	55.60	4.28	51.32
09-10-2015	0.00	0.93	0.04	923	1066	42.64	3.95	38.69

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
10-10-2015	0.00	0.87	0.06	864	997	59.82	3.14	56.68
11-10-2015	0.00	0.81	0.06	804	917	55.02	3.72	51.30
12-10-2015	0.00	0.77	0.04	735	742	29.68	2.55	27.13
13-10-2015	0.00	0.72	0.05	560	610	30.50	2.09	28.41
14-10-2015	0.00	0.65	0.07	539	469	32.83	1.41	31.42
15-10-2015	0.00	0.60	0.05	275	432	21.60	1.24	20.36
16-10-2015	0.00	0.54	0.06	256	358	21.48	1.28	20.20
17-10-2015	0.00	0.48	0.06	240	288	17.28	1.03	16.25
18-10-2015	0.00	0.41	0.07	205	246	17.22	0.91	16.31
19-10-2015	0.00	0.34	0.07	170	204	14.28	0.81	13.47
20-10-2015	0.00	0.27	0.07	135	162	11.34	0.64	10.70
21-10-2015	0.00	0.20	0.07	100	120	8.40	0.36	8.04
22-10-2015	0.00	0.13	0.07	84	78	5.46	0.21	5.25
23-10-2015	0.00	0.06	0.07	48	40	2.80	0.12	2.68
24-10-2015	0.00	0.00	0.07	0	0	0.00	0.00	0.00
25-10-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
Total	**455.10**					**8314.50**	**412.22**	**7902.28**

Annexure 7.1: Social Management Plan under RACP (Implementation strategy of Bansur cluster)

1. Stakeholder Consultations

To avoid/minimize risks, avoid exacerbation of social and economic disparities between and among social groups, ensure equitable spread of project investments and benefits, and contribute to long-term social and institutional sustainability of the RACP, stakeholder consultations in form of Focused Group Discussion were carried out in entire villages of 18 gram panchayats of Bansur Watershed Cluster.

Equal distribution of technologies and investment should be ensured under RACP through reframing the beneficiary contribution especially in Horticulture based activities. As small & marginal farmers doesn't having such a big amount to contribute at a time and also they are not much willing to book their land for 3-4 years till the production start to get them benefitted economically.

i. The lack of awareness of high tech agriculture (Micro Irrigation, Solar pump, Protective agriculture and post harvesting management) is there andthe community is not financially able to contribute their beneficiary share and hence small and marginalized farmer will be excluded under the project.
j. Women folk believe that though they do most of the work in agriculture except for ploughing and selling, they have no role in decision making regarding purchase of inputs or selling of produce.
k. Goat rearing women, widow, divorce, disabled and schedule cast farmer not able to take benefit of Drip, Mini sprinkler and Green house, Solar pump etc due to lack of beneficiary / farmer contribution.
l. Farmers are not getting affected with land acquisition as there is no displacement through any watershed development works.
m. Women are not recognized as farmers in their own right.
n. Problem of access to credit by small and marginal farmers.
o. Lack of timely supply of agriculture inputs including seed and fertilizers.
p. Marginalization of small and marginal farmers in technologies and investments, training and capacity building.
q. Lack of breed improvement and livestock health care services.
r. Outreach of extension services very low in villages.

s. In Bansur cluster, Agriculture and animal husbandry are the main source of livelihood for majority of population residing in the Project Area. Most of the villages in Cluster Area are located nearby to Jaipur Delhi expressway and the connected market Bansur, Kotputli, Behror and Alwar.

1.1 Field Consultant held - Key social issue of cluster

Major issues in the cluster that identified after consultation from the Sarpanch, PRIs and other groups like Women group, SC groups, field NGOs, representative of PRIs etc. during field visit with, are summarized below

Date	Village	Gram Panchayat	Participants
06-02-2017	Alampur	Alampur	22
07-02-2017	Babera	Babera	18
08-02-2017	Barh Dhoondhala	Bansur	17
08-02-2017	Bas Dayal	Bas Dayal	21
09-02-2017	Bas Karnawat	Bad Dayal	24
10-02-2017	Basna	Holawas	19
13-02-2017	Beelath	Holawas	23
14-02-2017	Bhoori Doongri	Loyati	17
15-02-2017	Bisalwa	Lekhri	16
16-02-2017	Burja	Gyanpura	18
18-02-2017	Buteri	Buteri	15
20-02-2017	Chatarpura	Chatarpura	14
21-02-2017	Gyanpura	Gyanpura	19
22-02-2017	Holawas	Holawas	21
23-02-2017	Indrada	Guradi	17
25-02-2017	Kankariya	Alampur	16
27-02-2017	Kauthal	Butari	20
28-02-2017	Keharpura	Babera	14
01-03-2017	Kharkhara	Alampur	21
02-03-2017	Kheewaheri	Rasnali	18
03-03-2017	Khohri	Khohri	22
03-03-2017	Loyati	Loyati	16
04-03-2017	Mahanpur	Mahanpur	15
06-03-2017	Manchi	Gunta	13
06-03-2017	Meerapur	Gunta	11
07-03-2017	Milakpur	Rasnali	15
07-03-2017	Nangal Bhaosingh	Loyati	13
08-03-2017	Nawalpura	Shyampura	18
09-03-2017	Neemoochana	Neemuchana	21
10-03-2017	Pali	Gyanpura	17
14-03-2017	Prithvipura	Chatarpura	11
15-03-2017	Rasnali	Rasnali	18
15-03-2017	Santhalpur	Loyati	19
16-03-2017	Shyampura	Shyampura	21

Date	Village	Gram Panchayat	Participants
17-03-2017	Unchhpur	Mahanpur	13
18-03-2017	Kothya	Ghari	13

Agriculture:-

Though farmers are very progressive and ready to adopt innovations but some activities need to be reframed as

1. To get benefitted with Mini sprinkler, farmers also demanding about the pipeline for piped conveyance of irrigation water as farm lands as scattered.
2. For every farmer, those who get benefitted with mini sprinkler / sprinkler system in his field, installation of solar pumps should be must.
3. Sprinkler is very successful in cluster area as most of the area comes under sandy soil.
4. Regular farmer training and exposure tour activities should be conducted so that they can adopt new technology and innovation idea in Agriculture field.
5. Farm land fencing could be done to save crops from wild animals.
6. Those farmers who are very poor / BPL should be facilitated with more project share to get benefitted in their respective fields.
7. The Exposure visits for farming community, PRIs, community groups, project staff etc. within the state and outside the state should be organized in the project so that they could explore their knowledge as well as experiences about the technical innovations.

Horticulture

1. Equal distribution of technologies and investment should be ensured under RACP through reframing the beneficiary contribution especially in Horticulture based activities.
2. As small & marginal farmers doesn't having such a big amount to contribute at a time and also they are not much willing to book their land for 3-4 years till the production start to get them benefitted economically.
3. For Green House / shed net, the small / marginal farmers couldn't be get benefitted as the farmer contribution is very high and bank finance is also very difficult to get on time.
4. The orchard development required on time plantation so timely supply of plants for fruits should be ensured.
5. Chilli, Tomatoand brinjal are the main vegetable crops while lemon, and pomegranate are the major fruit crops in the cluster area.
6. Power operated machines and mini tractors for field operations, planting, sowing, spraying, Mulch laying machine, training and pruning, grading, harvesting etc. operations are required.
7. The modern irrigation system requires pressurized application of water and this requires electricity which is very irregular in cluster area so provision of solar pumps of 7.5 hp should be ensured.

Animals Husbandry:-

1. Though the Animals husbandry is also one of the major livelihood activity along with Agriculture, so pasture development activities on Government land has to be increased.
2. There is felt need of community based dairy farm, so project should also assist in such endeavors.

3. To encourage the milk production in the cluster area, breed improvement of cows should also be taken care.
4. There should be a provision of cattle shed to cattle rarer.

Watershed:-

1. Though the Animals husbandry is also one of the major livelihood activity along with Agriculture, so pasture development activities on Government land has to be increased.
2. There is felt need of community based dairy farm, so project should also assist in such endeavors.
3. To encourage the milk production in the cluster area, breed improvement of cows should also be taken care.
4. There should be a provision of cattle shed to cattle rarer.

Market Linkages:-

1. Though the cluster area is very well connected with the nearby markets but middle man / broker (locally known as Aadhatiya) existence is hindering the real benefits to the farmers, so there is a felt need of Market development / linkages.
2. Bansur, Kotputli, Behror and Alwar are the market nearer to cluster area.
3. Due to lack of investment money with farmers, they generally borrows cash from Mandi wholesalers / businessman during the sowing time and therefore they have to sell their crop production to them only. This results high rate of interest and suffering the farmers.
4. Though farmers are having Kisan Credit cards, but once they get defaulter, banks doesn't allow to give them loan and therefore the farmers has to rely to Mandi wholesalers / businessman

Value Chain :-

1. Mustard, Wheat, Gram, Barley, Bajra and Guar are the major crops in the cluster area.
2. Wheat and Bajra Crop is the large scale Production in the cluster area so under value chain activities, Barley and Bajra should be develop as value chain crop.

Farmer Discussion in Bansur Cluster Area Enclosed The farmer list
Field Consultation

Sr. No.	Name Of Farmer	Father Name	Village	G.P.	Mobile No.
1	Krishan Kumar	Shreeram	Indrada	Goridi	9982272581
2	Gajender singh	Ganpat	Chatapura	Chatapura	9799637300
3	Dinesh kumar	Manoharlal	Manchi	Gunta	9649953507
4	Narendra	Sarjeet	Neemuchana	Neemuchana	9001363364
5	Rajendra yadav	Chhitar mal	Mahanpur	Mahanpur	8432423195
6	Kailash	Prabhuram meena	Indrada	Girudi	8003464322
7	Ramratan	Shivlal jat	Chatapura	Chatapura	9649597286
8	Indraj	Manguram	Manchi	gunta	9929961872
9	Jitendra	Dashrathsingh	Bisalu	Lekadi	7742081081
10	Raghuvir singh	Bhawanisingh	Basna	Holawas	9694132262
11	Maharam	Gheesaram	Manchi	gunta	7891271784
12	Banwari	Prahlad	Khohari	Khohari	9587273272
13	Vikaram	Matadin	Manchi	Gunta	9537156576

Sr. No.	Name Of Farmer	Father Name	Village	G.P.	Mobile No.
14	Lalaram	Surajbhan	Khohari	Khohari	9929474112
15	Rajesh	Hariram	Shyampura	Shyampura	9983368897
16	Rahul	Dharampal	Khohari	Khohari	9950908337
17	Amit kumar	Satpal jat	Khohari	Khohari	9549494141
18	Inderjeet	Badriprashad	Neemuchana	Neemuchana	9929025663
19	Matadin	Mularam	Basna	Holawas	9057764498
21	Dataram	Hanuman	Bhuridungri	Loyati	9636307202
22	Krishan Kumar	Bansidhar	Shyampura	Shyampura	7062629587
23	Jatansingh	Jagmal singh	Bilath	Holawas	9460842136
24	Lalit	Vishambher	Neemuchana	Neemuchana	8502871802
25	Umaidsingh	Hanuman	Bhuridungri	Loyati	8769973105
26	Karmveer	Lachchu singh	Butari	Butari	9828743450
27	Pohap singh	Motusingh	Khohari	Khohari	8890893378
28	Rajesh	Jaidyal	Butari	Butari	8440977162
29	Sunil	vijaypal	sathalpur	Loyati	8003206551
30	Deenaram	Bhagaram	Mahanpur	Mahanpur	9667512190
31	Rajkumar	Vijaysingh	Meerapur	gunta	8104681090
321	Vikaram	Ramswaroop	Loyati	Loyati	7742902827
33	Subesingh	Hitlal	Bhaddundla	Bansur	7568926827
34	Mamraj	Baluram	Khohari	Khohari	9929391201
35	Lokesh	Naresh	sathalpur	Loyati	7691099153
36	Ramsawroop	Malaram	Kothal	Butari	8058179549
37	Mahaveer	Sawatsingh	Kothal	Butari	8290884244
38	Mahaveer	Ramavatar	Khivahedi	Rasnali	9166916785
39	Chetram	Bansi ram	Khivahedi	Rasnali	8107142170
40	Leelaram	Fattaram	Shyampura	Shyampura	9982404193
41	Dayaram	Hariram	Rasnali	Rasnali	9828731714
42	Bhagwansahay	Nanchu ram	Milakpur	Rasnali	8107712045
43	Ramratan	Shivlal	Chatapura	Chatapura	9649597286
44	Manmohan	Bakas singh	Navalpura	Shyampura	7691093831
45	Ramsingh	Papuram	Navalpura	Shyampura	8590507545
46	Malaram	Jhorilal	sathalpur	Loyati	9057138832
47	Tekchand	Manphul	Khohari	Khohari	9460600255
48	Dayaram	Ramglal	Shyampura	Shyampura	9950795470
49	Vikash	Mojiram	Kharkhara	Alampur	9694674873
51	Natram	Kaluram	Kharkhara	Alampur	9829615260
52	Ramavatar	Arjun ram	Burja	Gyanpura	9982192762
53	Hansraj	mamchand	Baskarnawat	Basdyal	9001816438

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1.2 Findings of PRA in cluster area

As of field consultation during field visits, Participatory Rural Appraisal (PRA) activities viz. Resource mapping, Transit walk etc. were also carried out in the cluster area. The main findings during PRA exercise in Bansur cluster are summarized as under:

Sr No.	Date	Village	Place	Participants
1	02-09-2016	Alampur	Village Choupal	22
2	05-09-2016	Babera	Village Choupal	18
3	03-09-2016	Barh Dhoondhala	Village Choupal	17
4	08-09-2016	Bas Dayal	Village Choupal	21
5	11-09-2016	Bas Karnawat	Village Choupal	24
6	17-0-2019	Basna	Village Choupal	19
7	30-08-2016	Beelath	Village Choupal	23
8	07-09-2016	Bhoori Doongri	Village Choupal	17
9	29-08-2016	Bisalwa	Village Choupal	16
10	28-09-2016	Burja	Village Choupal	18
11	10-09-2016	Buteri	Village Choupal	15
12	26-08-2016	Chatarpura	Village Choupal	14
13	27-08-2016	Gyanpura	Village Choupal	19
14	17-09-2019	Holawas	Village Choupal	21
15	29-08-2016	Indrada	Village Choupal	17
16	03-09-2016	Kankariya	Village Choupal	16
17	11-9-2016	Kauthal	Village Choupal	20
18	06-09-2016	Keharpura	Village Choupal	14
19	11-9-2016	Kharkhara	Village Choupal	21
21	15-09-2016	Kheewaheri	Village Choupal	18
22	15-09-2016	Khohri	Village Choupal	22
23	05-09-2016	Loyati	Village Choupal	16
24	04-09-2016	Mahanpur	Village Choupal	15
25	28-08-2016	Manchi	Village Choupal	13
26	29-08-2016	Meerapur	Village Choupal	11
27	29-09-2016	Milakpur	Village Choupal	15
28	11-09-2016	Nangal Bhaosingh	Village Choupal	13
29	28-08-2016	Nawalpura	Village Choupal	18
30	08-09-2016	Neemoochana	Village Choupal	21
31	29-09-2016	Pali	Village Choupal	17
32	29-08-2016	Prithvipura	Village Choupal	11
33	28-09-2016	Rasnali	Village Choupal	18
32	10-9-2016	Santhalpur	Village Choupal	19
34	27-08-2016	Shyampura	Village Choupal	21
35	05-09-2016	Unchhpur	Village Choupal	13
36	26-08-2016	Kothya	Village Choupal	13

Findings of PRA in cluster area

1. For demonstration, there is high need/requirement from farmers input provided to farmers from line departments shall also include proper training and follow up for

effective learning, adoption and impact on ground Farmers with average land holding have most land as wasteland which is not arable Poor/BPL farmers require more financial assistance from government for installation for irrigation. The cluster is under flood irrigation, the farmer gets irrigation water for 2-6 hours only during which his 1-2 beegha land is irrigated by flood irrigation and the rest land remains rainfed. This reduces the crop productivity. there is lack of transport facilities within the cluster due to its sandy and average size.

2. There is lack of health services in the area as compared to rest of the state average of PHC in many GP There is land of many farmers in the cluster who does not reside in the cluster. Many of these farmers are out of station who hire local farmers to do farming on their land.
3. The soil type is sandy to loamy in the project area, Wheat, Gram Barley and Mustard are major Rabi crops Bajra, Gwar, are major Kharif crops.
4. Dairy development activities for establishment of milk route and improved animal husbandry practices should be promoted in the project area Breed improvement is highly necessary in the project area Land levellilng as well as silvipasture land development is highly in demand in the project area.
5. There is requirement of solar water pump in the project area Crop insurance is in high demand in project area Farmers have demanded for more time for irrigation in the farmers of project area does not have enough fund left for solar water pump The farmers are also bound in the vicious credit circle of local middlemen or money lender The financial assistance on irrigation is requested to be increased.
6. This has been observed that water level reducing regular in water table hence use micro irrigation system.
7. Market must be restructured according to optimize price rates of products as per farmers need fulfilment.
8. Agronomic and horticulture crops should be protective from stray and wild animals by fencing.
9. Undulating land topography is accelerating soil erosion for check it must be adopt plantation and cover crops.
10. Major parts of marginal farmers are not able to pay the contribution amount in horticulture activities.

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1. Social mobilization strategy

The consultations with participant are followed by / carried out through Information, Education and Communication (IEC) activities like display board, pamphlet distribution and awareness campaign with school children on activities and benefits for preparing of CACP under RACP. The detail of IEC activities are given as bellow in table.

S.N.	Name of Activities	Target	Achieve
1	Display Board at GP/Village Level	10	10
2	Kala Jattha and Puppet shows at the Chack Level	37	37
3	Pamphlet Distribution	11800	11800
4	RACP Awareness Rallies of	37	37

S.N.	Name of Activities	Target	Achieve
	School Children		
5	Flex Stand	4	4
6	Slogan Writing	206	206

2. Socioeconomic Profile (based on CACP baseline data)

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Project Area covers an area of 12935 hectare (ha) comprising four (18) Gram Panchayats and(36) villages. The Cluster village has a population of 50168 of which 26372 are males while 23796 are females as per field survey by NGOs.

The populations of cluster are counted through baseline survey conducted by field NGOs which are counted different to census data due to variation of village boundary. Some villages population are not counted of hole village population because of some area of village are not consider in cluster boundary hence the population of census data is variable to baseline survey.

Socioeconomically disaggregated baseline: The Baseline data are documented the existing status of farmers and estimate the resource dependency of the village common lands. CACP is included a summary of socioeconomic baseline, consultations held with various socioeconomic groups and their key concerns and a social strategy.

Population Details (according baseline data)

Male	Female	Total	SC	ST
26372	23796	50168	7401	1979
53%	47%	100%	15%	4%

Household Details (according baseline survey)

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
359	1711	3570	2004	1000	8285	857	214
4%	21%	43%	24%	12%	100%	10%	3%

Category wise Cultivated Area in Bansur Cluster

The cluster is recognized large, Small, Marginal and Landless farmers. These large, Small, Marginal and Landless farmers have more than 1and 0.52 hectare land which have low productivity through adverse climatic condition like drought, low fertility of soil. These large farmers are considered as small and marginal due to low income. Out of total land holding, 0% land holding have SC farmer including 00% BPL and 0% land holding have other back ward cast (OBC)

S.N	Type of Farmer	Total Households (Nos)	Area (in ha)			Area (in ha) Category wise			
			Irrigated	Un Irrigated	Total	General	SC	ST	OBC

S.N	Type of Farmer	Total Households (Nos)	Area (in ha)			Area (in ha) Category wise			
			Irrigated	Un Irrigated	Total	General	SC	ST	OBC
1	Large farmer	1000	2455.0	363.28	2818.28	214.21	56.36	33.81	2513.90
2	Small farmer	3570	3737.18	1627.56	5364.74	297.68	218.30	127.34	4721.42
3	Marginal farmer	2004	22.82	962.57	985.34	56.57	161.77	45.49	678.15
4	Landless person	1711	0	0	0	0	0	0	0
5	No. of BPL households	837	4.0	132.24	136.24	0	68	68.24	0
	Total (1to 4)	**8285**	**6215.0**	**2953.36**	**9168.36**	**568.46**	**436.43**	**206.64**	**7913.47**

Village wise household detail

Name of villages	No. of farmers (HH)	Farmers types and Numbers(HH)									
		Farmers types				Cotegories wise				BPL	Woman headed House Hold
		Landless	Small	Marginal	Large	General	SC	ST	OBC		
Prathvi Pura	51	9	22	18	2	33	3	1	14	2	0
Chaterpura	606	103	286	132	85	356	45	23	181	29	3
Indrda	302	65	126	71	40	188	23	12	79	13	5
Burja	219	52	82	61	24	146	13	5	55	8	2
Gyanpura	136	22	56	42	16	83	9	3	41	6	4
Pali Main	70	9	22	33	6	50	3	1	16	2	2
Basna	157	32	66	46	13	94	13	4	46	7	6
Bilat	19	3	7	6	3	14	1	0	4	1	2
Holawas	23	7	8	6	2	16	1	0	6	1	1
Khoheri	711	131	279	202	99	448	44	15	204	28	23
Neemuchana Main	684	101	355	169	59	359	56	20	245	36	18
Nawalpura	252	42	105	74	31	153	20	6	73	11	8
Shyampura	684	120	298	170	96	417	47	16	204	30	10
Kharkhara	346	69	151	82	44	205	24	8	109	15	11
Kakanria	3	0	3	0	0	1	0	0	2	0	0
Alampur	295	46	140	72	37	160	25	8	102	14	14
Rasnali	381	76	164	75	66	234	26	9	112	16	6
Milakpur	71	32	19	16	4	53	3	1	14	2	2
Khiwaheri	195	38	90	45	22	110	14	5	65	9	7
Bisalu	84	21	30	27	6	53	5	2	24	3	4
Buteri	89	29	30	21	9	60	10	2	17	3	2
Kothal	222	46	128	35	13	103	22	9	84	13	9
Nangal Bhaw Singh	337	82	93	115	47	253	15	8	61	9	4

Name of villages	No. of farmers (HH)	Farmers types and Numbers(HH)									
		Farmers types				Cotegories wise				BPL	Woman headed House Hold
		Landless	Small	Marginal	Large	General	SC	ST	OBC		
Bhuri Dungri	49	19	19	8	3	31	3	1	14	2	2
Sathalpur	344	79	120	92	53	227	24	7	86	12	13
Loyati	189	59	71	35	24	123	11	4	51	7	5
Basdayal	257	65	105	56	31	157	16	6	78	11	9
Baskarnawat	261	71	101	55	34	165	16	6	74	10	8
Machi	183	45	92	37	9	99	14	5	65	9	5
Meerapur	124	28	54	32	10	74	8	3	39	5	4
Kothiya	277	70	142	51	14	146	22	8	101	14	9
Mahanpur	532	98	260	90	84	300	45	14	183	26	8
Uchpur	67	18	26	16	7	43	4	1	19	3	2
Babera	9	3	2	3	1	8	0	0	1	0	0
Keherpura	15	8	3	3	1	13	0	0	2	0	0
Bad Dundla	41	13	15	8	5	27	2	1	11	2	1
Total	**8285**	**1711**	**3570**	**2004**	**1000**	**5002**	**587**	**214**	**2482**	**359**	**209**

3. Beneficiary Targeting and Social Inclusion

Ensuring Targeting, Inclusion, Participation and Access of small and marginal farmers, tribal farmers, SC and women farmers to agricultural inputs (seeds, fertilisers, credit, training, information, etc.), extension services and markets; are the basic need for the project to reach out and involve these groups at all stages. Through social mobilization including IEC activities and field consultation / PRA exercise, equitable access of small and marginal farmers, women farmers, tribal farmers and scheduled caste farmers in CACP preparation, farmer mobilization, and farmers' organisations is ensured.

4. Social Inclusion in Selection of Individual beneficiaries

RACP is offering a range of assets and resources to individual beneficiaries on a cost-sharing basis. Since most of these will not be on a saturation basis, the targeting and beneficiary selection criteria for all the categories of private assets will prioritise selection of small and marginal farmers, from scheduled caste, scheduled tribe, women headed and other vulnerable households highlighted in the social assessment of the CACP.

5. Gender and Women's Empowerment

During and before CACP planning, FGDs were conducted among different women groups where the anticipated benefits of the project were shared among them. It was also ensured that women from every group (caste/religion) should participate in such meetings with support of Female outreach workers viz. Anganwari Worker, Asha Sahyogini, ANM etc.

i) In CACP planning:-To promote goat raring among the women, information and eligibility criteria for distribution of goats and bucks among women (widow, physically challenged/divorced) is discussed so that they could adopt such livestock raring as a livelihood support. Under RACP, there is a provision of distribution of Goat and bucks, chaff cutter etc. and the same is being ensured by the TL & CMS with due support of livestock assistant and community organizers.

ii) As beneficiaries of individually targeted assets: -The selection of beneficiary is also being done in group meetings with women and tried to get benefitted to those women MTG members, who are needier. Women from SC/ST and BPL families are given priority.

iii) As members of MTGs, WUAs, and FPOs: - Apart from beneficiary selection, it is also taken care that women could participate as a member of MTGs, WUAs and FPOs. Though the small ruminant MTGs is having all the members are women mandatory but it is also ensured that at-least 30% members would be women in MTGs for agriculture and horticulture. It would also be taken care that in WUAs and FPO, there would be active participation of women members in meetings, capacity building and decision making. It is envisaged that for any decision regarding the WUAs / FPO, 60% women members' participation is mandatory.

iv) as participants in training program:-Though it is being ensured that women member's participation in group formation, meetings, planning and decision making but also it would be encouraged that women members could participate in capacity building programs / trainings. For every group / WUA, it would be mandatory that participants would be women members.

v) specially targeted women's activities:-Under RACP, recognition of women as farmers across the project structures are benefiting under project activities like goat rearing, chaff cutter, water troughs, cattle shed vegetable production etc. for generating her income. Women are aware through training, capacity building and consultation for preparation of CACP under activities and benefit in RACP. Apart from Goat Rearing, vegetable production etc. specially targeted women's activities, Lady Link workers were also being selected in the cluster under the Animal husbandry Department. Time to time their capacity building and trainings were also being carried out.

6. Tribal Development

The tribal population does not recognize in Bansur cluster.

7. Social Impact Mitigation (for activities involving land, structures, crops, livelihoods and access)

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
1	Watershed	Contour Bund Type A	Own land	• The risk of exclusion of women and marginal/small farmers from project investments and other benefits.	• Exposure visits of farmers to water scarce areas use of water to more managed and equitable resource-sharing arrangement. • Close monitoring of water use and distribution
		Pucca waste weir	GP Land		
		Peripheral Bund	Own land		
		Agro Forestry	GP Land		
		CCT	GP Land		
		VCD	GP Land		
		Staggered Trenches	GP Land		
		Pasture Development	GP Land		
		Nadi	GP Land		
		MPT	GP Land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		MMS	GP Land		arrangements by CBOs, CRPs and F-NGO. • Identification of women-owner farmers, and their prioritized inclusion in all project benefits. • %age of small and marginal farmers receiving the project benefits (in terms of numbers and investments) will be – to be monitored through PMIS
2	Agricultu re	Integrated demonstration for Drip Irrigation System with Automation and fustigation based techniques for field crops	• Own land	• Risk of marginal and small farmers; increased food insecurity • Risk of resource-poor smallholder farmers being further indebted to moneylenders • Increased perish ability, and challenges in marketability of produce (thus risking income) • Risk of livelihood	• Facilitate for market oriented agriculture comprising high-value and high-risk crops. • Promote establishmen t of grain banks with exclusive membership of marginal and small farmers. • Promote nutritional security through a kitchen
		Integrated demonstration for Mini Sprinkler based techniques for field crops	Own land		
		Drip Irrigation System	Own land		
		Mini/ Micro Sprinkler Irrigation System	Own land		
		Sprinkler	Own land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		Irrigation System		security	garden component. • Relaxation of contribution norms in the case of smallholder farmers (to be decided by the village institution on a case-by-case basis). • Established market linkages before start of production. • Strengthen farmers' organizations for taking up collective marketing
		Pipeline for piped conveyance of irrigation water	Own land		
		Soil Testing	Own land		
		PHM	Own land		
		Promotion to Adaption support	Own land		
		Wheat Seed Production	Own land		
		Green Fodder Seed Demonstration	Own land		
3	Horticulture	Wide spacing crops with inter cropping	Own land	• Risk of marginal and small farmers; increased food insecurity • Risk of resource-poor smallholder farmers being further indebted to moneylenders • Increased perishability, and challenges in marketability of produce (thus risking income) • Risk of livelihood security	• Promote local-level semi-processing and value-addition • Capacitate farmers in value-addition techniques • Integration of crop farming with horticulture, animal husbandry, back-yard poultry, and agro-forestry • Relaxation of contribution
		High density plantations	Own land		
		Assistance on production technologies for vegetable Cultivation	Own land		
		Assistance on green house	Own land		
		Solar Pump Program	Own land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
					norms in the case of smallholder farmers (to be decided by the village institution on a case-by-case basis).
4	Animal Husbandry	Buck Distribution	Not applicable	• The risk of migrant households, particularly shepherds, getting excluded from receiving the benefit • The risk of women being excluded from training and related activities • The risk of Pastureland development • Displacement – if there are any temporary houses on it • Affect access to the land for grazing/ stalling livestock	• Allow medical supplies (deworming and routine vaccination) for migrant herds to be given in bulk for the duration away from the village. • Develop a cadre of women CRPs in different thematic areas, including animal husbandry. • Development of pasturelands to be preceded by consultations with all resource users. • Follow the principles and procedures outlined in the RPF in case of impact on
		Goat Distribution	Not applicable		
		Azolla Demonstration	Own Land		
		Chaff Cutter Distribution	Not applicable		
		Feed Supplement	Not applicable		
		Rural Technology Centers (RTCs)	To be finalized		
		Feeding & Water Trough	Not applicable		
		Goat House	Own land		
		Weighing Balance	Not applicable		
		Travis Installation In Project Villages			
		Goat Insurance	Not applicable		
		Veterinary Health Camp	Not applicable		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
					house/ livelihood. • Formation of common land user associations/ resource institutions for development and management of the resource. • F-NGO will facilitate consensus building for arriving at and implementing equitable use and cost-benefit sharing norms.
5	Market & value chain	FPC	Proposed Gram panchayat land	• It is expected that sufficient land would be available with the Gram Panchayat for establishment and/or construction of common use facilities proposed under the project, • Loss of control of women over farm production with commercialization-on and formalization of markets – further	• Land-based interventions would be located only in those areas where such land is readily available and voluntarily offered by the Gram Panchayat. • The procedure for obtaining a "no objection certificate" from the Gram Panchayat is specified in the RAP. A
		FCSC	Proposed Gram panchayat land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
				disempowerment of women in the household economy	screening format for all land-based interventions is also appended. • Form and strengthen exclusive women farmers' groups for collective enterprise development. • Co-additional women farmers in producer companies if there are not enough women in the company.
6	Farmers' organization and capacity building	Formation of MTGs	Not applicable	• Develop a cadre of women CRPs, cascade training approach for capacity building of women farmers. • Equal participation of women in RACP processes and institutions. Equitable distribution of project benefits between women and men, as outlined in the	• Arrange rally, Arrange Nukkad Natak, group meeting, PRA (Participatory Rural Appraisal) exercise, and Information, Education and Communication (IEC) activities. • Poster, Pamphlets Literature related to RACP Project. • Wall
		Formation of UGAs	Not applicable		
		Formation of FPC	Not applicable		
		Socio economic Data collection	Not applicable		
		Identification of Beneficiary	Not applicable		
		Capacity building & Training	Not applicable		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
				gender and women empowerment strategy. • Equitable participation of smallholder farmers in RACP processes and institutions. • Customization of project interventions to meet the requirements of smallholders. • Relaxation and flexibility in cost-sharing norms and/or repayment terms for small holders, to be decided by the local member institutions. • Strengthening of farmer organizations for the use and management of water to precede other interventions.	painting of RACP slogan. • Data collection will enumerate all household within the clusters. • MTG will comprise of 15-20 nearest/vicinity field land holders. • MTA will comprise of 11 member from MTGs member in watershed cluster. • FPC will comprise all MTGs member through shareholding. • Consultation held including small and marginal farmer with vulnerable group. • Farmer selection process through MTG discussion

8. Grievance Redress

The Grievance Redress Mechanism (GRM)are developing at three tier level (first, second and third level). The first, second and third level recognized as followed village, district and

PMU level. The grievance redressal registers are maintained at all three tier level for received grievance under project activities.

First tier-Grievance mechanism operating and grievance register maintain by community organizer at village level with participation of MTGs leader.

Second tier-Grievance received through web application, hand on and toll free number and redress by Grievance Redressal Cell (GRC) which headed by cluster representative of PRIs/Zila Parisad with DPMU coordination.

Third tier– GRM monitor through web application, toll free number, forward by DPMU by state level GRC which headed by project director.

9. Key Social Indicators

The key social indicators are given below in table:-

Major activity	Sub activity	Social indicators
Watershed	The project will carry out rehabilitation and modernization of Nadi, Contour Bund Type A, Peripheral Bund works	The surface water sources will be created through anicuts, MPTs Ground Water Recharge will be facilitated by various soil moisture conservation practices Irrigation Potential will increase so as to enable the community to take more than one crops annually Pastureland development for increase in green cover and cover the fodder gap
Agriculture	MIS, Soil testing, Demonstrations ,PHM technologies, Seed Production, Demonstrations	Increase in farm production and productivity as a result of improved seed management and cultivation practices. Marginal and small and women farmers as beneficiaries of individually targeted assets/services and demo activities. On farm employment will reduce migration to nearby states Crop diversification will lead to food security and risk mitigation in rain fed agriculture
Horticulture	Wide spacing and High Density plants, vegetable Cultivation ,Greenhouse, shade net house cultivation, Solar pump set including fencing, Post-Harvest Management, Horticulture Mechanization	Greater access of farmers to markets and financial institutions and higher incomes. Maximum benefit is to be given to marginal and small farmers On farm employment will reduce migration to nearby states Vegetable and fruits (from

Major activity	Sub activity	Social indicators
		orchards) cultivation will provide cash income to farmers and also increase their consumption and selling basket Solar power will go long way because electrification is negligible in the cluster
Animal Husbandry	Buck Distribution ,Goat distribution to Widows and/or especially abled women, Health and Awareness camps, Azolla Demonstration, Lady Link Worker cum Marketing Facilitator and Chaff Cutter Distribution, Feeding & water troughs	All farmers with goats will stand to benefit from project interventions under the livestock component. The overall impact of these interventions will be a rise in income from goat rearing.
Markets and value chains	Agri-Business Promotion Facility (ABPF) Pre-Investment Advisory Support Market Infrastructure and Agribusiness Support	Higher income from market-oriented agriculture and market advisory services is the expected outcome of this component. Formation of producers' companies will lead to an increase in farmers' bargaining capacity and help in collective procurement of quality agriculture inputs.
Farmers' organization and capacity building	Capacity building Socio economic Data collection Identification of Targeting and Beneficiary MTGs (Multi Task Groups) MTA (Multi Task Association) FPC (Farmer Producer Company) Training on Social management Plan	Community will aware about RACP Project. Ensuring community participation. Project goal be achieved. Analyses the findings by different socio-economic groups. Cluster's all community will be benefited

The project does not envisage acquisition of any private land for purposes of storage, processing or any other activity. There will be no adverse impacts related to land acquisition. Therefore abbreviated resettlement plan does not require at cluster level.

Annexure 7.2 Environment Management Plan (EMP)

The key interventions under RACP can be grouped as under:-

- Crop intensification
- Water Management & Pastureland Development
- Livestock Management
- Value chain development activities

Environment Management Plan for Crop Intensification

The key objective of interventions in crop production is to increase crop productivity so that farmer income is also enhanced. The dominant and "business-as-usual" approach to achieving this is to intensify crop production by introducing hybrid seed varieties that respond well to chemical fertilizers and apply chemical pesticides to control pests and diseases that attack the crop. However, use of such intense chemical based crop production technologies results in the long-run in decreased yield. Increased use of chemical pesticides leads to destruction of pest predators and increase in pest and diseases. Most, hybrid seeds are designed to respond to higher doses of chemical fertilizers and do not perform well if they are not provided.

Thus, if a "business-as-usual" approach is taken to increasing crop productivity under RACP, there is a high likelihood of use of agri-chemicals increasing substantially leading to deterioration of soil quality which would reduce crop productivity and thereby agricultural competitiveness in the long run. Further, these agri-chemicals would pollute the village ecosystem and affect the health of the farming families in the village and their livestock as well.

The RACP proposes to adopt "green" agricultural practices that would promote Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) and therefore, the possibility of excessive use of agri-chemicals is largely mitigated.

It is defined as producing more from the same area of land while reducing negative environmental impacts and increasing contributions to natural capital and the flow of environmental services. Sustainable Crop Production Intensification (SCPI) views farming as an ecosystem which uses inputs, such as land, water, seed and fertilizer, to complement the natural processes that support plant growth, including pollination, natural predation for pest control, and the action of soil biota that allows plants to access nutrients.

The Line Department /NGO will abide by the Environmental measures listed in the Environment Management Plan (EMP) given below. The Line Department shall include the EMP requirements in the Programme of RACP Works. The requirements stated in the EMP should therefore be studied properly and implemented accordingly.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Impact on Environment**	**Possible Environmental Impacts**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
Demonstration packing of practices for higher production of selected crops	Crop Selection	Low	Selected crop may lead to consumption of more water	The sustainable availability of water and crop water requirement of each crop that is suited to the agro-climatic conditions of the cluster and choosing only those crops that can be grown within the available water. This assessment has to be conducted at the sub-watershed level for rained areas, at the aquifer level for groundwater conditions.	Design of package of practices	% of farmers got aware that crops have been selected based on water availability. % of crops that are water efficient (50%)	% of farmers following crops recommended based on water availability
			Selected cropping pattern may lead to nutrient depletion	Cropping pattern should be chosen such that the same crop is not being grown in the same patch of land season after season, year after year. Crops should be rotated to ensure that crops with different root zones, different demands on nutrients and different pests and diseases are grown. This would help in better soil, nutrient and pest management.		% of farmers got aware that identified cropping pattern based on crop rotation.	% of farmers following recommended cropping pattern
	Seed Selection		Variety may not be suited to the area or preferred by the farmers	Well adapted, high-yielding varieties with resistance to biotic and a -biotic stresses and improved nutritional quality should be chosen to mitigate risks of crop.	Design of Package of Practices & at the time of purchase of seeds for distribution.	% of farmers got aware that varieties have been based on recommended varieties.	% of varieties of seeds that are based recommended variety for the region
			Seed selected may be pest or disease infected leading to pest attack and crop loss or	Use of seeds of good quality that are pests & disease free determines crop performance to a large extent. Therefore, Seeds when purchased should be only from certified sources and should be used well within the expiry date.		% of farmers got aware that varieties of seeds that are based recommended variety for the	

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Impact on Environment**	**Possible Environmental Impacts**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
			increased use of chemical pesticides			region.	
			Genetically modified seeds may be used that are not approved for use in Rajasthan	In case of selection of Genetic Modified varieties guidance should be sought from the Department of Agriculture on whether it is an approved variety in the state or not.			
	Soil Health & Nutrient Management		Degradation of soil physical characteristics due to intensive cropping	Nutrient management is based on Integrated Nutrient Management Plan (INM).	Design of Package of Practices & at the time of purchase of fertilizers including biofertilizers for distribution.	% of farmers got aware on Integrated Nutrient Management practices. % of farmers who have been issued Soil Health Cards % of farmers who have received Soil Test results before taking up cropping	% of farmers who are applying fertilizers as per dosage recommended by the Soil Test result % reduction in use of chemical fertilizers over baseline in kg/Ha.
			Deterioration of nutrient content of soil due to intensive cropping				
			Increased and imbalanced use of chemical fertilizers				
	Pest & Disease Management		Increased chemical pesticide use	Measures should be implemented for chemical pesticide use to control pest followed by Integrated Pest management Plan (IPM).	Design of Package of Practices & at the time of purchase of pesticides including biopesticides / bio-control agents /pheromone traps for distribution.	% of farmers who have attended training on IPM	% of farmers who have adopted all components of IPM. % reduction in use of chemical pesticides over baseline in l/Ha.
			Increased incidence of pests if the same crop is promoted repeatedly				
			Safety issues in storing and using chemical pesticides				

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Impact on Environment**	**Possible Environmental Impacts**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
	Demand-side Water Management		Introduction of micro irrigation devices may lead to expansion of cropped area leading to no net reduction in water used in agriculture sector	The key practices to be adopted at the design stage itself are: ➢ Compulsory use of micro irrigation to irrigate crops in all water regimes so as to reduce absolute quantity of water applied and also increase water use efficiency ➢ Simple low pressure, gravity fed drip systems could be used in such situations to reduce the capital cost to the beneficiary. ➢ Mulching is an important operation to be carried out for weed control as well as improve water use efficiency.	At the time of design of cropping plan in CACP As a process during implementation of water management plan	% of farmer who have attended training on water conservation.	% of farmer who have adopted micro irrigation and drip system. % of farmer who have carried out mulching practices.
			Cropping pattern may be leading to unsustainable use of available water				
	Storage & Handling of Agri-inputs		Poor storage, handling can lead to spills and leaks of fertilizers and pesticides leading to contamination of soil and water	The following precautionary principles shall be followed an existing storage facility: ➢ Building foundation and secondary-containment floor shall be constructed of impermeable material & well drained and above the water table. Drainage should be provided around the building. ➢ If the storage facility is within 15 m of a water body, the same shall be relocated.	At the time of design, construction and operation of the storage facility.	% of workers who have attend training on precautions mentioned in measures to be taken/ Implemented for storage and Handling of agri-inputs.	% of storage facilities being used that follow precautions mentioned in measures to be taken/ Implemented.
			Poor storage may lead to pest and disease	Seeds should be stored in air tight containers and away from sunlight, heat and moisture. Seeds should be treated locally available material such as neem			

Multiple Sectors						Monitoring Indicators	
Intervention	Activity	Impact on Environment	Possible Environmental Impacts	Measures to be Taken/Implemented by the Line Department	Stage of Application	Process	Outcome
			infestation of seeds	leaves, pongamia leaves, etc.			

Environment Management Plan for Water Management and Pastureland Development

Water harvesting and water management activities are expected to be implemented in the RACP, namely, rain fed, groundwater based and surface water based. The main objectives are to harvest and store water in rain fed systems, harvest and recharge in groundwater systems and under all water regimes to sustainably use water for cropping and livestock, reduce use of water in agriculture sector and increase water-use efficiency in cropping.

Climate variability and emerging climate change in semi-arid areas in Rajasthan pose considerable threat to the natural resources that sustain fodder production for livestock. Pasture lands, in absence of appropriate management practices, are at risk of further degradation with precipitation expected to occur in future, in more concentrated rainfall events interrupted by longer dry spells. Loss of grazing lands may result in more intensive management practices, increasing competition between land for food grain cultivation and livestock activities, or decreasing livestock populations, under mining the security function that livestock rearing provides.

Overall, activities under this subcomponent are expected to reduce absolute quantity of water use in agriculture while increasing water-use efficiency. Therefore, environmental impacts are expected to be positive.

The Line Department /NGO will abide by the Environmental measures listed in the Environment Management Plan (EMP) given below. The Line Department shall include the EMP requirements in the Programme of RACP Works. The requirements stated in the EMP should therefore be studied properly and implemented accordingly.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
Water Supply Augmentation	Water Harvesting Recharge & Storage Structures:- Mini Percolation tank, Minor Masonry Structures (MMS), Nadi and Subsurface barriers (SSB).	Top soil removal	Medium	Soil removed during the process of digging water harvesting storage structures should be used to build bunds and top soil should be spread over the rest of the farm.	At the time of CACP. At the time of sanction of individual structure for implementation	% of trees actually planted as compared to number of trees to be taken up under compensatory planting.	% survival of trees planted under compensatory planting.
		Cutting of trees		As far as possible, these structures should be sited where there are no trees. If tree cutting is unavoidable, then compensatory planting in the ratio of 1:10 should be carried out and the beneficiary group made responsible for maintaining it with at least 90% survival till 3 years.			
		Siltation, seepage & erosion of Water harvest & storage structures		Following measures should be confirmed to standard design, safety and maintenance for water harvest & storage structure. • Standard design for these storage structures should be related to the size of the plot on which the storage structures are to be sited and quantity of runoff expected. Thus, size of storage structures can be expressed as a percentage of the plot area for a given range of runoff. • Water should be passed through a silt filter to prevent frequent silting up to these storage structures. • Reduction in the seepage rate may be achieved by mixing swelling clay material such as bentonite with soil. • Proper compaction should be		% Water harvest	% of water harvest

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				considered to check seepage through the embankment and to ensure the stability of the structures (SSB & MMS) • Bunds should be covered with vegetative cover to ensure longevity with lower maintenance costs. Plants such as *Vetiveria zizaniodes* (Khus/ vertiver grass), *Saccbarum munja* (Munj grass) *Cymbopogon martinii* (Rohida grass), *Cymbopogon flexuosus* (Lemongrass), *Lawsonia inermis* (Mehndi), *Agave sislana* (Sisal / Rambans), *Rbus mysurensis* (Dansra), *Vitex negundo* (Negad), *Jatropha curcus* (Ratanjot). *Leucaena leucocepbala* (Subabul) could be grown to help bind the soil together and thereby stabilize the bund.		structure with vegetative cover to prevent erosion and siltation. % Water harvest structures with safety provisions.	structure designed and constructed on the basis of catchment area, rainfall pattern, Physiographic condition and water demand and followed safety measures. % of water harvest & Storage structures properly designed and constructed to ensure that not

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
		Too many water harvesting structures may affect downstream flows • With ground water getting recharged more bore wells are dug and more water is extracted.		The focus of the project is to transfer knowledge and skills to organized groups of farmers on understanding, addressing the groundwater situation and its sustainable use. • Where a no. of Percolation Tanks, Subsurface barriers (SSB), Nadi and Minor Masonry Structure are being constructed, care shall be taken to ensure that not more than 70% of total runoff from the drained area is being stored. This is to ensure that there is adequate flow to meet downstream economic and ecological services. • Shifting to crops with lower water demand if available water is not sufficient. • Compulsory use of micro irrigation to irrigate crops in all water regimes so as to reduce absolute quantity of water applied and also increase water use efficiency.			more than 70 % of total runoff from drained area. % of groundwater got recharge through water harvesting & storages structures.
Water Supply Augmentation	Arable Water Conservation Measure:- Contour Bund , Pacca Waste Weir & Peripheral Bund	Top soil removal Cutting of trees	Low	Soil removed during the process of digging should be used to build bunds and top soil should be spread over the rest of the farm. As far as possible, these structures should be sited where there are no trees. If tree cutting is unavoidable, then compensatory planting in the ratio of 1:10 should be carried out	At the time of CACP. At the time of sanction of individual structure for implementation	% of trees	

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				and the beneficiary group made responsible for maintaining it with at least 90% survival till 3 years.		actually planted as compared to number of trees to be taken up under compensatory planting.	% survival of trees planted under compensatory planting.
		Soil erosion of bund structures		Following measures should be confirmed to standard design, and maintenance to control soil erosion:- • Side bunds be provided at both the ends of the contour bund and be extended upto the submergence level. Stone pitching at the end be provided for safe disposal of excess water. • Provision of side waste weir/pipe outlet is necessary to dispose the excess runoff received during erratic and unexpected rainfall conditions.			
Water Supply Augmentation	Non Arable Water Conservation Measure :- Continuous Contour Trenches	Top soil removal	Low	Top soil removed during the process of digging should spread over the rest of the farm.	At the time of CACP. At the time of sanction of individual structure for implementation		
Multiple	Pasture Land Development	Loss of Tree cover	Medium	As far as possible, these structures should be sited where there are no trees. If tree cutting is unavoidable, then compensatory planting in the ratio of 1:10 should be carried out and the beneficiary group made responsible for maintaining it with at least 90% survival till 3 years. Plant species should be grown for pastureland development as following:- Tree species : *Acacia albida, A.*	At the time of CACP. At the time of sanction of individual structure for implementation	% of trees actually planted as compared to number of trees to be taken up under compensatory planting.	% survival of trees planted under compensatory planting.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				senegal, A. catechu. Azadirachta indica, Zizyphus mauritiana, Butea monosperma, Prosopis cineraria, Ailanthus excelsa. Dalbergia sissoo, Pithecellobium dulce, Leucaena leucocephala, Sesbania grandiflora, Gliricidia maculeata, Melia azedirach, etc. Shrubs : *Rhus mysurensis, Zizyphus sp. Jatropha curcas, Vitex negundo and Adhoda vasica, etc.* Grasses and legumes : *Cenchrus ciliaris, C. setigerus, Panicum antidolale, Sehima nervosum, Dichanthium annulatum Stylosanthus hamata, Heteropogon contortus, Chrysopogon fulvus, Chloris gayana, Atylosia scaraboides, Macroptelium atroperpureum, etc.* • The basic requirement for pastureland management should be balanced the number of grazing animals (livestock) with grazing capacity (Carrying capacity). Not more than 80% of the range resource should be utilized. • Fencing should be conventionally used for closing the area and protecting it from biotic interference.			
		Alienation of pasture land for purpose other than grazing		The RACP shall adopt a simple resolution stating that it shall not use public pasture land for any purposes other than for pasture			

Multiple Sectors						Monitoring Indicators	
Intervention	Activity	Possible Environmental Impacts	Impact on Environment	Measures to be Taken/Implemented by the Line Department	Stage of Application	Process	Outcome
				development and/or constructing water harvesting, recharge and storage structures with a view to benefiting the development of the pasture. Further, it shall not accept any pasture land provided by any authority for any purpose other than those mentioned above.			

Environment Management Plan for Livestock Management activities

RACP has recognized the importance of livestock in ensuring nutrient recycling in cropping systems. Accordingly, it has included a component that focuses on improving livestock management, especially for goats. The key environmental impact of this activity would be shortage of fodder and increased grazing pressure on existing pastures.

Further, the project proposes to provide health care through organizing Animal Health Camps and also by providing permanent services through a Rural Technology Centre-cum-Animal Health Centre. The likely impacts of these are issues related to safe disposal of syringes, needles and vaccines used in treating the animals.

Therefore, there is a need to develop pasture (tree & grasses) lands on common and private land, bring in improved feed practices such as using chaff cutters to ensure that there is no rejection of fodder by the animals, use of mineral supplements to increase productivity, inclusion of fodder crops in the cropping pattern to ensure year-round feed and fodder availability etc. Of these, for small ruminants, development of pastures is the most important intervention since they need both tree leaves as well as grasses. Further, since small ruminants are almost entirely free grazed, availability of well-developed pastures is very essential.

The Line Department /NGO will abide by the Environmental measures listed in the Environment Management Plan (EMP) given below. The Line Department shall include the EMP requirements in the Programme of RACP Works. The requirements stated in the EMP should therefore be studied properly and implemented accordingly.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
Livestock Development & Management	Breed improvement of goats through introduction of bucks	Breed may not be suited to the area	Low	• Good quality bucks of the chosen breed (ensure that the breed being promoted complies with The Rajasthan Livestock Improvement Act No.45 of 1958) born in twins and triplets should be selected as breeding bucks. A buck is generally sufficient to serve about 30-40 females. • Bucks kept with a goat rearer group should be exchanged with other similar groups after 10-12 months to avoid inbreeding.	At the time of CACP. At the time of preparation of the Livestock Management Plan	Ratio of elite bucks of chosen breed to no. of females in a herd/goat rearers group. % of nondescript and mixed breed kids castrated to total kid population.	% of herd showing full characteristics of chosen breed.
		Fodder may not be sufficient to support the herd		• Development of community pasture land goes hand in hand with herd improvement. Planting tree species such as Gliricidia, Prosopis cineraria, Acacia, etc. on field bunds, backyards and on bunds of pasture lands would help in meeting the fodder requirements of goats.			

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				• Kids should also be given very succulent green fodder such as maize, Lucerne, etc. If adult goats are completely stall fed they should be given a daily feed of • Green fodder – 3to 4 kg • Dry fodder - 1 to 2 kg • Readymade concentrate – 200-250 g • If they are partly stall fed and partly free grazed they may be given half these rations.			
	Animal Health Inputs	Disposal of Used and expired vaccines and Biomedical waste		Biomedical wastes including needles, syringes, vaccines, medicines etc. generated from conducting animals health camps should be disposed of after treating 10% Sodium Hypochlorite solution then before burying them in deep pits which are at least 500	At the time of CACP. At the time of preparation of the Livestock Management Plan	% of staff who have attended training on Biomedical Waste Management for animal health camps	% of animal health camps that have adopted safe disposal of medical wastes % Animal Health Camp sites that have a safe disposal pit

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				m away from water bodies, grazing land and other human habitations. These pits should be covered with soil immediately after disposal of the wastes.			
		Use of banned veterinary medicines		Diclofenac and its formulations (for animal use) are prohibited for manufacture and sale through GSR NO. 499(E) Dated 04.07.2008 under section 26 A of Drugs & Cosmetics Act 1940 by The Ministry of Health and Family Welfare, India			
	Goat shade and Manure Management	If improperly managed, manure and shad can be a source of water pollution, odor, flies, parasites, and other nuisances. It can contaminate drinking water and harm goat.		Livestock owners must take responsibility for the manure generated by their animals in order to prevent water pollution. Composting is a controlled and managed aerobic ("with air") decomposition process for manure and other organic materials waste.	At the time of CACP. At the time of preparation of the Livestock Management Plan	% of goat herd owner has aware shade and manure management.	% of goat herd owner adopted shade and manure management

Environment Management Plan for value chain activities

Storage and processing of produce are activities expected to be taken up under value chain development component of the RACP.

The operations include input supply to its members, output marketing and processing support to its members, providing warehousing facility, etc. These activities when carried out in a "business-as-usual" manner would affect the environment in one way or the other. For example, if the Farmer Producer Organization **(**FPC) were to promote agri chemicals indiscriminately, as a pesticides dealer would, it would result in increased use of such chemicals in the project area. Therefore, there is a need for the FPC to operate as a responsible business entity.

All of food processing units consume huge amount of water for processing food. A considerable part of these waters are potential wastewaters to be treated for safe disposal to the environment. Wastewater and solid waste are the primary waste streams for the food processing units.

The Line Department /NGO/ Design consultants/engineers hired for designing and executing the structures will abide by the Environmental measures listed in the Environment Management Plan (EMP) given below. The Line Department shall include the EMP requirements in the Programme of RACP Works. The requirements stated in the EMP should therefore be studied properly and implemented accordingly.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
Value Chain Development	Farmer Producer Organization (FPO)	FPO activities may promote increased use of agri chemicals	Medium	Unlike a general agri-input merchant, the FPO shall not stock, sell and promote agri-chemicals indiscriminately. It shall make strong efforts to ensure that its members follow IPM and INM and accordingly shall stock and sell inputs relevant to implementing INM and IPM.	At the time of preparation of the business plan of the FPC.	% FPCs trained on Code of Practices for value chain	% FPCs with a CoP developed and adopted by the BoD.
	Establishing Food Processing Units	Water pollution and Solid waste may be generated through food processing Units		• Water used in conveying materials, facility cleanup, or other non-ingredient uses will be reduced, which in turn will reduce the wastewater volume from food-processing facilities. • Sanitizers or anti-microbials in wash water and other processing water may be useful in reducing pathogens on the surface of produce and/or reducing pathogen build-up in water. Chlorine is a commonly used anti-microbial. • Typically, pathogens, suspended solids, dissolved solids, nitrogen, and phosphorus are removed in advanced wastewater treatment. • The following is a listing of some technologies being used in advanced wastewater treatment. A .Membrane applications B. Charge separation etc.		% of workers of food processing Units are aware waste water and solid waste management practices.	% of food processing units are adopted waste water treatment and solid waste management practices.

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				• Food processing units will continue to look at ways to reduce solid waste generation, use less or reusable packaging, and use biodegradable packing products. • Solid waste pollution can be reduce through management alternatives as following: A. Using the food by-product as an animal feed. B. Composting or land spreading the food by-product.			
	Construction of Warehouse/ Food processing Unit	Cutting trees		As far possible, RACP would promote options wherein trees would not be cut to carry out an activity. However, where it is not feasible it would support compensatory planting in the ratio of 10 trees for every tree cut. The onus on planting will lie with the beneficiary who is cutting the trees.	At the time of CACP At the time of design and approval of building plans.	% of trees actually planted as compared to no. of trees to be taken up under compensatory planting. % of construction workers who have detailed mitigation measures for building construction.	% survival of trees planted under compensatory planting. % of construction workers adopted EMP for building construction.
		Top soil removal		Top soil removed during the process should be used to build bunds and excess soil should be spread over the rest of the farm.			
		Improper construction leading to damage of stored material		In addition to the above general guidance on building constructions, the RACP shall adhere to Code of Practice for Construction of Food grains Storage Structures as defined			

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				under the Warehouse Manual published by the Department of Food & Public Distribution, Ministry of Food & Consumer Affairs, GoI under operationalization of the Warehousing (Development & Regulation) Act, 2007.			
		Environment pollution may be generated During construction activities.		• The sewage system for the labour/ camp is designed, built and operated in such a manner that no health hazard occurs and no pollution to the air, ground water or adjacent water sources takes place. • Waste water generated from the sanitary facilities of labour camp is disposed in a septic tank/soak pits. • Solid waste generated at the construction site, plant/camp site, will be collected in covered wasted bins and segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag etc.). Polyethylene/plastic wastes will be stored in empty cement bags and should be sent for recycling. Biodegradable (food waste, paper etc.) solid waste will be disposed in a compost pit.			

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				• The contractor will take every precaution to reduce the level of dust and gaseous pollution from the work site/s. Measures to reduce the level of dust (PM 2.5 and PM 10) will be taken and the Contractor will make arrangements to minimize dust pollution through provision of wind screens/barriers, water sprinkling/mist fine spray arrangement and encapsulation of dust source (as required) shall be made. • Only acoustic enclosures fitted DG set will be allowed at the construction and plant/camp sites. • All measures required for ensuring safety and health of the workers shall be taken up by the Contractor. This includes provision and enforcement of appropriate personal protective equipment; first aid facilities at camp, plant site and work zones; emergency response arrangements; proper storage of hazardous/ toxic and/or polluting materials; measures for ensuring electrical, fire and mechanical safety arrangements. • Energy conservation measure should be followed in constructed building like installation of solar energy, LED			

Multiple Sectors						Monitoring Indicators	
Intervention	**Activity**	**Possible Environmental Impacts**	**Impact on Environment**	**Measures to be Taken/Implemented by the Line Department**	**Stage of Application**	**Process**	**Outcome**
				lighting etc as energy efficient building.			

Clearance requirement

Agriculture and allied activities per se have not been incorporated under the ambit of the Environment Impact Assessment (EIA) notification 1994 so the project per se will not require any clearance under this act. The clearance requirements for individual subprojects have been specified in the table below.

Sector	Relevant policy/acts	Clearance Requirement	Responsibility	Time Frame (Design stage/ implementation stage
Water--Supply Augmentation	National Environment Policy 2006 Rajasthan Soil and Water Conservation Acts, 1964 Rajasthan State Environment Policy, 2010 State Water Policy 2010 The Rajasthan Regulation and Control of The Development and Management of Ground Water Bill, 2006 (Draft) Rajasthan Panchayati Raj Rules, 1996 Rajasthan Soil and Water Conservation Acts, 1964 The Rajasthan Land Revenue Act. 1956 (Conversion of Agricultural Land for Non-Agricultural Purposes in Rural Areas) Rules, 1992	On public lands clearance from PRI Relevant PIU to approve technical designs	Community Institution with support from Line department and ES, PMU	Design stage
Water-Demand Management	State Water Policy 2010 The Rajasthan Regulation and Control of The Development and Management of Ground Water Bill, 2006 (Draft)	Specifications of components and vendor approval from PIU Layout design to be approved by PIU	PMU Community Institution with support from Line Department	Design stage
Climate-resilient agriculture and horticulture	National Agriculture Policy 2000 National Policy for Farmer 2007 The Seeds Act 1966, The Seeds Rules 1968 National Policy for Farmer 2007 The Insecticides Act. 1968 Amendment: Insecticides (Amendment) Act, 1977 (24 of 1977	The Competent Authority to clear use of bio-fertilizer/bio-pesticides, if any	PMU Community Institution with support from Line Department ES,PMU	To be included in Integrated Nutrient Management Plan (INM)/Integrated Pest Management Plan (IPM) at cluster.
Livestock development and management	Bio-Medical Waste (Management & Handling) Rules, 1998	Approval of Vaccines and medicines stocked by PIU Buck variety approved by relevant PIU	Community Institution with support from Line Department ES, PMU	Approval to be included in the detail cluster plan

Sector	Relevant policy/acts	Clearance Requirement	Responsibility	Time Frame (Design stage/ implementation stage
Value Chain	State Policy for promotion of agro-Processing and Agri-business, 2010 Rajasthan Industrial and Investment Promotion Policy 2010 The Rajasthan Land Revenue Act. 1956 (Conversion of Agricultural Land for Non-Agricultural Purposes in Rural Areas) Rules, 1992 The Warehousing (Development and Regulation) Act, 2007 Model APMC Act, 2003 National building Code, 1983 Water (prevention and control of pollution) Act 1974, amended in 1988 Air (Prevention and Control of Pollution) Act 1981 Solid Waste Management Rules 2016 Environment Protection Act 1986	Seeds/ Fertiliser/ Pesticide license from appropriate authority. Consent to Establish & Operate from Rajasthan State Pollution Control Board for Food processing Unit.	Producer Company	Before producer company starts procurement, Construction and Operation
Tree Cutting/Pastureland Development	Forest Conservation Act,1980 The Rajasthan Land Revenue Act. 1956 (Conversion of Agricultural Land for Non-Agricultural Purposes in Rural Areas) Rules, 1992	Clearance from Forest Dept for cutting trees On public lands clearance from PRI	Community Institution with support from Line Department	Design stage

Training Plan for Implementation of Environment Management Plan (EMP)

Apart from the training plan being presented here, every training provided under RACP should include where relevant a module on Environment Management Framework (EMF) and its application.

Objectives of training plan

The key objectives of the training plan are:

- To create awareness about RACP project activities and their environmental impacts.
- To create awareness about the Environmental Guidance that provides information on how to mitigate or avoid those impacts.
- To create awareness about the concept, approach and processes of EMF including selection of project activity, application of the specific Environment Guidelines (EGs), preparation of EMPs, monitoring performance of EMF and reporting.
- To teach how to apply the EMF and prepare EMPs for specific activities.

Training Type, Target Groups & Frequency

A 4-tier strategy for imparting training on the EMP is proposed and is presented in Error! Reference source not found.~~Error! Reference source not found.~~ :

Field Code Changed

Type of Training	Target Groups	Number of training	Frequency	Modes of training
Sensitization	• PMU • PIU • DPMU	One	Launch of the Project	Lectures, Presentation
State Level Training (Training workshops for trainers)	• Environment Specialist (ES, PMU) • Line Department (Team Leader) • Field NGO (Team Leader)	Two (Planned)	1st year at the beginning of the project 2nd Year a refresher course after preparation of Audit Report	On-field demonstrations, Case Studies, Group Exercises.
State Level Training of Trainers (Demand Driven)		Three (if Required)	3rd year onwards on assessment of requirement through the environment audit	
District Level training Workshops	• DPMU /DLIC • NGO (entire team) • Representatives of Cluster level /GP level / Village level Community Institutions • Representative of FPC including CEO	One in each of the districts every year in district where there are interventions	1st year before interventions are initiated and thereafter each year after completion of audit.	Field Demonstrations, lectures, group discussions, case studies
Community Level Training Workshops	• All Community Institutions Leaders • FPC Board Members	One in each of the districts every year in district where there are interventions	1st year before interventions are initiated and thereafter each year after completion of audit.	Field demonstration, group exercises, lectures

Tier-wise Suggested Training Content

Error! Reference source not found.~~Error! Reference source not found.~~ provides a brief outline of training content and duration for the 4 tiers of trainings envisaged. The actual content, pedagogy and duration should be developed as part of the general training being planned under RACP.

Field Code Changed

Type of Training	Content	Duration

Type of Training	Content	Duration
Sensitization	Sensitization on RACP activities, environmental impacts Brief concept of EMP, Institutional arrangement for implementing EMP	2 hrs as a part of larger induction training at the launch of RACP
State Level Training (Training workshops for trainers)	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. institutional arrangements for implementing EMP	3 days including 1 day of field visit to apply in EMP for sample project interventions
State Level ToT (Demand Driven)	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMP process, institutional arrangements for implementing EMP	As per need
District Level training workshops	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMP process, institutional arrangements for implementing EMP	5 days including 3 days for field visit to understand environmental issues and apply in EMP to understand IPM and INM in action. etc.
Community level training workshop	Project activities and environmental impacts EG to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMF process, institutional arrangements for implementing EMF	5 days including 3 days for field visit to understand environmental issues and apply in EMP to understand Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) in action etc.

Training required on activities wise for implantation of Environment Management Plan (EMP) as per Environment Management Safeguard (EMSF) guidelines under RACP as follows:-

Intervention	Activity	Reference of Environment guideline(EG) as per EMSF
Demonstration packing of practices for higher production of selected crops	Crop Selection	EG Agri 1
	Seed Selection	EG Agri 2
	Soil Health & Nutrient Management	EG Agri 3
	Pest & Disease Management	EG Agri 4
	Water use Management	EG Agri 6
	Storage & Handling of Agri-inputs	EG Agri 5
Water Supply Augmentation	Water harvesting structures	EG water 7.1
Value Chain	Farmer Producer Company (FPCs)	EG producer organisation 2.1
	Establishing Food Processing Units	-
	Construction of Warehouse/ Food processing Unit	EG common 10-1

Time Schedule on yearly basis for conducting training on Implementation of Environment management Plan:-

Type of Training	Jan.	Feb.	March	April	May	June	July	August	September	October	November	December
Sensitization												
State Level Training (Training workshops for trainers)												
District Level training Workshops												
Community Level Training Workshops												

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Tentative Budget for training (As per yearly basis) as follows:-

SN	Items	Nos.	No. of Days	Qty.	Rate (Rs.)	Unit	Amount (Rs.)
One Sensitization (One day Training)							
1	Training Kit - pen, note book, folder, Course material, inputs, other utility based required materials, reference literature, Registration etc.	50	1	50	300	Each	15000
2	Mobility support	1	1	1	2000	Day	2000
3	Miscellaneous						
	Total	One sensitization training will be carried out in a year					17,000
Two State, Three District and Three Cluster Level training (Two days training).							
1	Training Kit - pen, note book, folder, Course material, inputs, other utility based required materials, reference literature, Registration etc.	40	2	40	300	each	12000
2	Lodging and Boarding of participants	40	2	40	1000	each	40000
3	Mobility support	1	1	1	7000	day	7000
4	Rent for other training facilities (Class-room, LCD, etc.)	1	1	1	15000	day	15000
5	Travel for participants	40	1	40	300	Person	12000
6	Miscellaneous						
	Total	Eight numbers of two days training including one day field visit will be carried out in a year.					86,000*8=6,88,000/-
	Grand Total						7,05,000/-

Information, Education and Communication (IEC) & capacity building Strategy and it tentative budget for implementation of Environment Management Plan (EMP) at cluster

Introduction:-

Information, Education and Communication (IEC) is a process of working with individuals, communities, societies and policy & decision makers to develop communication strategies to promote positive behaviours which are appropriate to their Culture& Social/Community behaviours. IEC combine all suitable strategies, approaches and methods that enable individuals, families, groups, organizations and communities to play active role in achieving, protecting and sustaining the desired behavioural change.

IEC plays a pivotal role in creating awareness, mobilizing people, and making development process participatory through advocacy and by sharing knowledge, skills and techniques with the people. It is also critical for bringing about transparency in implementation of programmes at the field level and for promoting the concept of accountability and social audit. There are various techniques of

communication, which include mass communication as well as inter personal communication. There are no any fixed formulae and the techniques mobilize and ensuring participatory development .It varies from place to place, according to their specific problems, cultures and social setup.

Strategy for the IEC, Public awareness & Capacity Development.

Principles of strategy for IEC and Public awareness are based on the downward dissemination theory and Convergence theory for the message dissemination, Behaviour change and capacity development on environment management Plan (EMP) of activities under RACP.

Followings strategies shall be adopted at the Implementations level.

- IEC strategy has been prepared; to generate awareness amongst the stakeholders for achieving the objectives of the Rajasthan Agricultural Competitiveness Project (RACP). It is essential to use all type of communication mediums such as Inter Personnel Communication (IPC), Print media, electronic media, outdoor media and folk media. Extensive publicity and designing and printing of IEC material will be undertaken to disseminate the designated communication issues.

- IEC activities taken up in the action plan are telecast and broadcast of issues through electronic media, publication of public appeals in print and extensive use of social media, In addition to this orientation workshops, trainings, designing and printing of IEC material like posters, banners, flex, booklets, leaflets, flip chart and other material, etc will be undertaken.

- The major focus has been given to the grass root level interpersonal activities. The interpersonal communication will help in clearing the doubts of audience and take instant action. The advantage of this medium is that the messages can be communicated to the target audience who are not adequately educated.

- Greater emphasis has been given to grass root level activities whereas some activities have been taken for environment building and positioning the programme in proper perspective across all stakeholders.

The details are follows:-

i. New media
    - Bulk SMS
    - U –tube and face book
    - What's up messages

ii. Reminder Media
    - Wall Paintings
    - Slogans
    - Hoardings

iii. Inter Personal Communication (IPC)
    - Workshop
    - Exhibition
    - Community rally
    - Youth Rally
    - Women Rally
    - Rally by School Students
    - Door to door visits
    - Nukkad Natak
    - Essay and drawing competitions
    - Quiz competitions
    - PRA

- SHG, Water User Association, MTG, FPCs

iv. Print media

- Printing of IEC materials (Poster, banners, flex, Signboards on the buses, folders at bus stands, Mandi, street etc.

Template for IEC activities

IEC required on activities wise for implantation of Environment Management Plan (EMP) as per Environment Management Safeguard (EMSF) guidelines under RACP as follows:-

Stakeholders	Content of Information as per activity wise under RACP	Reference of Environment guideline(EG) as per EMSF	Methods to convey the Information (Methodology)	Responsibility
House holds	Crop Selection, Seed Selection, Soil Health & Nutrient Management, Pest & Disease Management, Water use Management, Storage & Handling of Agri-inputs, Water Harvesting Recharge & Storage Structures Farmer Producer company(FPCs), Establishing Food Processing Units and Construction of Warehouse/ Food processing Unit	EG Agri 1,2,3,4,5,6 EG water 7-1 EG common 11-2 EG producer organisation 12-1 EG common 10-1	IPC with Poster, Leaflet, Brochure	Line Departments and NGOs
Community			Hoarding and workshops of Town leader and IPC at Community level with town leaders and NGOs as community participation. Lecture Series Exhibitions, Panel Discussion and Group meeting.	
Mass level			Print Media, Electronics Media, Poster, Hoardings, Use of Public Transport and Workshop at village level of Govt. officers and public Representation.	

Tentative Cost Estimation for the IEC & Capacity development activities at Cluster and village level on yearly basis.

SN	Detail of activity	Unit	Unit cost	Estimation Cost	Remarks
1	Workshop at clusters and village level	5	10,000	50,000	One day workshop in village having population more than 500
2	Installation of Hording	10	1000	10,000	Hording Size 8 ft*5ft
3	Community Rally	5	2000	10,000	rally in village having population more than 500
4	Youth rally	5	2000	10,000	Rally in village having population more than 500
5	Women rally	5	2000	10,000	Rally in village having population more than 500
6	Rally by school student	5	2000	10,000	Rally in village having population more than 500 with the participation of all school.
7	Essay and drawing competition	10	1500	15,000	Sensitization of school children
8	Nukkad natak	5	1500	7500	One Nukkad natak at public place
9	Poster	100	500	50,000	Poster size 1.6ft×2ft
10	Leaflet	200	100	20,000	Size A4
11	Brochure	100	200	20,000	Half fold
Total for Cluster				2,12,500/-	

The above expenditures of IEC activities for capacity building on implementation of Environment Management Plan (EMP) are included in budget of sub-component activities of agriculture. This activity will be implemented through DPM with the support of Environment Specialist and NGO. The expenditure of training will be incurred through Project Management Unit. The provision of the training related to EMP has not been included in cluster plan.