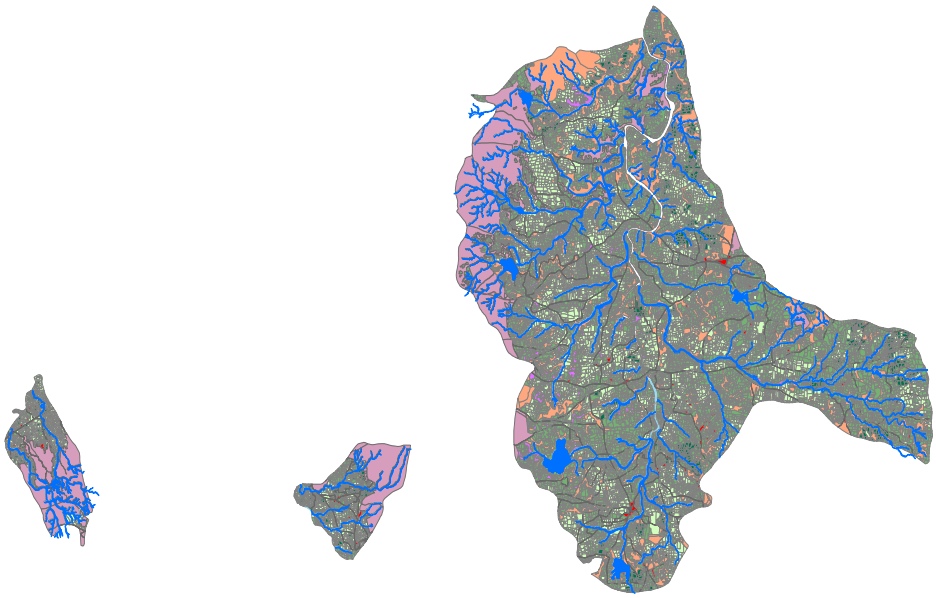
Cluster Agricultural Competitiveness Plan (CACP)

Watershed Cluster Kushalgarh, Banswara
Rajasthan Agricultural Competitiveness Project (RACP)



Theme: Watershed, Block- Kushalgarh, District – Banswara

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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 Kushalgarh Watershed Cluster in Banswara district has been prepared and an amount of Rs.5,009.59 lakh 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 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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List of Abbreviations

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.

Kushalgarh cluster (Rainfed-watershed) cluster in Banswara 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 (Banswara), 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 Maize, Soybean, Cotton, Black gram and Paddy are the major crops in Kharif whereas wheat, gram and rabi maize are the major crops in rabi season in the cluster. Though horticulture is of not much significance, vegetables like Tomato, Brinjal and Okra and fruit plants like Pomegranate and Mango are cultivated in around 1.09% area of the cluster. Local and cross-breed goat population along with proximity to major markets of MP viz. Ratlam, Indore and Bhopal also offers potential for both goat meat and to some extent goat milk.

The Kushalgarh index catchment (watershed) cluster of RACP is located in Kushalgarh Block of Banswara district, which is about 65 Kms from Banswara district headquarters and 570 Kms from Jaipur. The cluster comprises of 15 Gram Panchayats and 49 villages, which falls in IV-B Agro-Climatic Zone (Humid Southern Plains) of Rajasthan under RACP. About 87% of farmers belong to small, marginal category and a significant number of farmers are landless farmers in the cluster. Hence, they require support for economic upliftment. The project area is characterized as humid and receives good to moderate rainfall (1087 mm/annum) and risks of soil run off and hence requires watershed structures. 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 45503 and total number of households is 8887. Out of the

total population female population is 49.74%, schedule caste (SC) population is 0.77% and 81.11% is the population of scheduled tribe (ST) population. This refers it is a purely tribal belt with low resources and hence needs support for upliftment.

The total cultivated area in the cluster is 6569 ha out of which 64% is rain fed and balance 26% is irrigated. Out of the total cultivated area, around 90% is being cultivated by farmers other than large farmers. Most of the area is under 5% slope category. The soil of the Project Area is shallow to moderately deep, dominantly fine loam soil to coarse loom, imperfectly drained, and moderately to severely eroded. The climate is extreme with hot and humid summers and chilly winters. The temperature ranges from as much as 3^0C in the winter to 48^0C in the summer.

Maize crop is sown in about 2387 ha, Soybean in 1236 ha, Cotton in 1323, Black gram in 402 ha followed by other crops. In Rabi season Wheat is sown in 1430, & Gram in 702 ha. Only 31.50 ha area is sown in horticultural crops. Total area under these crops makes a total cropping intensity of 133.59%. So, surplus production of the above mentioned crops is generally available in the area. Out of it the cropping intensity of Kharif crops is 99.66% and in Rabi, it is only 33.45%, in Horticultural Crops it is only 0.48%. Productivity of above crops is at par or little better than the state average.

Soybean and Maize in Kharif and Bengal gram in Rabi 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. Although there is not much area is under Horticulture/fruit plantations at present, the availability of good land and quality water along with connectivity with Ratlam district of Madhya Pradesh and Dahod district of Gujarat, immense opportunity for the cultivation of vegetables and fruits. The area is fairly suitable for fruits like Mango, Guava, Lemon & Pomegranate and vegetables like Okra, Tomato, Brinjal, Chilli & Guar crops. Hence, some area under cereal & other crops would be diversified in to the cultivation of above these fruits and vegetables crops. Kushalgarh cluster being mostly rain fed and predominantly of tribal region naturally supports goat rearing especially for the small holder farmers. The cluster has substantial goat population (11094) 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 is only one APMC at Banswara and two warehouses one of SWC and one of CWC of capacity 15600 MT provide marketing and warehousing support to the produce of the region.

The crops in the cluster also face adverse climatic conditions, high soil erosion, 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.

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.

The Project area is categorised as Average to bad catchment area. Based on the catchment area, total yield of the rainfall will be about 112.30 MCM. About 18% of rainfall contribute to the ground water i.e. 11.23 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 elsewhere, the adoption of Micro Irrigation System (MIS) can save about 50% of crop water demand. The field and horticulture crops being grown in Rabi seasons 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 4.28MCM ground water, is available annually in the cluster and there is no need to reduce present draft for maintaining water balance in the cluster. Total 6.86 MCM is proposed to be harvested and recharged ground water through various structures, in addition to in-situ moisture conservation. It clearly shows that Kharif can be grown with in – situ moisture conservation and as mentioned above, about 50% crops of Rabi season are grown with conserved moisture. It means the crop water requirement of Rabi crops may be reduced to 50%. Keeping in view, 100% area is covered under micro irrigation system the final crop water requirement would be about 8.16 MCM which would be drafted from ground water. Finally, the sufficient ground water is available in cluster against the crop water requirement.

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 Maize, Soybean and Bengal gram have been selected for value chain study and intervention. Some basic interventions for Goat value chain planned under the project are; establishment a rural haat, and a Rural Technology Centre. 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, poor awareness in good package of practices, limited storage and primary processing facilities etc.

To address the issues of improvement of water use of efficiency, production constraints, poor access to market management etc. following appropriate investments would be done 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) so limiting activities of Rain water management like contour / field bunding, construction of lined waste weir, sunken pond/ percolation tanks, mini percolation, Continuous Contour trenches, V-ditches, minor masonry structures / anicuts, construction of nadies (water storage structures), Azolla, afforestation, pasture development, sub surface barrier and training are proposed to be executed during the project period in the cluster. In addition to the above some expenditure on project management costs would also be done. Ultimately on these activities a total amount of **Rs.1636.01 lakh** would be incurred. The works would be executed on the pattern of Mukhyamantri Jal Swamlamban Abhiyan (MJSA) already agreed under the project keeping ensured community participation implementation of the activities. The Watershed Development and Soil Conservation department is responsible to implement these activities with the support of field staff, community groups and field NGO.

B. The activities of Technology transfer and market led advisory services in:

(I) Agriculture production (i) Promotion of efficient techniques of irrigation viz. drip and mini sprinklers to increase the irrigation efficiency, improve productivity and reduce cost of production (ii) 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 (iii) Promotion of farm mechanization to reduce the cost of production (iv) Promotion of seed production to improve the SRR and the farmer income (v) Promotion of fodder production to reduce the gap of demand and availability of fodder for the animals (vi) Introduction of ICT based extension system for the quick reach of the solutions to the beneficiaries (vii) Establishment of

FCSC(feasibility of utilising infrastructure created for AH like Rural Haat will be done for utilising for FCSC) to encourage the farmer organization of cluster for their own input arrangement and facilitate the value addition and marketing of agro-produce and (viii) Capacity building of the beneficiaries to achieve the PDO. An investment of **Rs.893.59 lakh** would be incurred on these aspects. The Agriculture department is responsible to implement these activities with the support of field staff, community groups and field NGO.

(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, pack 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.1472.05 lakh** would be incurred. The Horticulture department is responsible to implement these activities with the support of field staff, community groups and field NGO.

(III) Livestock Strengthening & Management activities will include:

(i) improve 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.773.81** Lacs would be incurred. The Animal Husbandry department is responsible to implement these activities with the support of field staff, community groups and field NGO.

2. Market and value chains activities include:

Market Value chain and marketing infrastructure will be developed in the cluster with the support local community crops i.e. Maize, Soy, Wheat and Goat value chains. These crops are being selected for value chain development in the cluster. Accordingly the Farmer Producer Company and individual beneficiaries would be supported through (i) institutional cost for functional support, (ii) Value chain for FPCs and capital expenditure for individual agri preneurs. Total 4 units under FPC and 4 units for individual agri preneurs can be supported under the project. A tentative investment of **Rs.232 lacs** would be incurred during the project period on these activities and cost of Goat Value chain development has been included in 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, Agri-Business Promotion Consultants and field NGO.

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

Maize:

S.no	Constraints	Action
1.	**Production**	
1.1	Unavailability of high yielding varieties of maize for farmers	Seed production programme using sources of Raj seeds etc.
1.2.	Lack of appropriate post-harvest equipment	Promotion of small scale units with harvesting and shelling facility; also may be part of FCSC
2.	**Post-Harvest**	
2.1	Moisture content in harvested maize is high	Drying facility at farmer level through PC
2.2	Dearth of adequate storage facility	Storage facility for farmers as part of FCSC

2.3	Higher level of dirt and impurities in harvested maize	Provide cleaning and grading facility to farmers as part of FCSC
3.	**Processing**	
3.1	Limited number of processing units such as poultry feed mill and maize flakes manufacturers in the region	Facilitate start up in secondary processing from among PC members or individual entrepreneurs; ties with large players such as Cargill
3.2	Lack of packaging facilities which result in losses as well as contamination	Provision of packaging facilities as part of FCSC.
3.3	Lack of initiatives towards securing direct purchase licence	Dissemination of information on benefits of direct purchase licence (should be issued to processing units without linked conditions ideally)
3.4	Cess is levied on utilized raw materials which affects procurement optimisation by processors	To reconsider the provision under form 8 where cess is levied if raw material is not utilized within 30 days

Soybean:

Sr.no	Constraints	Action
1.	**Production**	
1.1	Low income generating black soybean are favoured by the farmer community and not HYV yellow soybean	PCs to undertake input sourcing activities under the joint umbrella of FCSC to facilitate
2.	**Post-Harvest**	
2.1	Dearth of adequate storage facilities for the producers	Establish storage facilities by PC as a part of FCSC
2.2	Limited access to market intelligence about price arrivals of the soybean in different markets	Market intelligence system to be developed in FCSC
3.	**Processing**	
3.1	Lack of facilities for oil testing to determine the content in produce resulting in increased price yield to farmers	Oil content testing facilities as part of FCSC
3.2	Inadequate processing unit of soybean such as soymilk processing unit, soya chunks, soy paneer.	Facilitate start up in secondary producing from amongst PCs or individual entrepreneurs
3.3	Lack of any cleaning grading unit of soybean	Establishment of quality sorting and grading by along with facilities for packaging & vehicle to facilitate transportation through FCSC

Bengal gram:

Sr.No.	Constraints	Action
1.	**Production**	
1.1	Limited knowledge of Bengal gram production technologies and inadequate availability about improved & good quality varieties of Bengal gram among producers	To promote both table purpose varieties and processing purpose varieties
2.	**Post-Harvest**	
2.1	Contractual harvesting of Bengal gram	Setting up alternate channel to sell directly through PC to processor or large retail shops like Walmart, Big basket
2.2	Due to same harvesting time prices collapses and hence storage/pack house option could help reduce distress sale.	Storage facility/ mini cold storage for farmers as part of FCSC

3.	Processing	
3.1	Lack of precooling and cold storage facility in the cluster	Setting up pre cooling and/or cold storage facility as part of FCSC or individual enterprise or start ups
3.2	Limited processed product available in the market which limits the marketing potential of the commodity	Facilitate the entrepreneur development to set up small scale processed product like Bengal gram powder, paste, peeled Bengal gram
3.3	Lack of proper washing and cleaning facility	To make farmer aware about quality parameter of Bengal gram for processing like value added products; washing facility as part of FCSC

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 training 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

Total Investments in Kushalgarh Cluster

A total investment of **Rs.5009.59 lakh** is proposed to be incurred in the cluster during the project period to make the farmers and cluster competitive to get improvement in water as well as agricultural productivity and better market access. The summary of phasing is being given as hereunder:

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	1600.51	0	15.50	20.00	1636.01
2	Agriculture	715.76	232.00	170.90	9.06	1127.72
3	Horticulture	1,425.05		36.00	11.00	1,472.05
4	Animal Husbandry	489.04	2240	43.67	17.10	773.81
	Total	**4,230.368**	**456.00**	**266.07**	**57.16**	**5009.59**

The above table reveals that total investment amounting to **Rs.5009.59 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, 84.45% would be incurred on the first component, i.e. Climate Resilient Agriculture, 9.10% on Market and Value Chains, 5.31% 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 Kushalgarh 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 8.05 mcm and 5.81 mcm per year. When the investment per unit of water saved is calculated, it is found that watershed activities are able to conserve water at higher investment of Rs.1.99 crore per mcm of water saved, whereas MIS activities can save water at an investment of Rs.1.00 crore per mcm of water per year. MIS activities like installation of drips and sprinklers for the agricultural and horticultural crops can have far reaching impact in the span of a year.

Figure 1: Investment (in Rs crore/mcm) verses Water saved (in mcm) in Kushalgarh

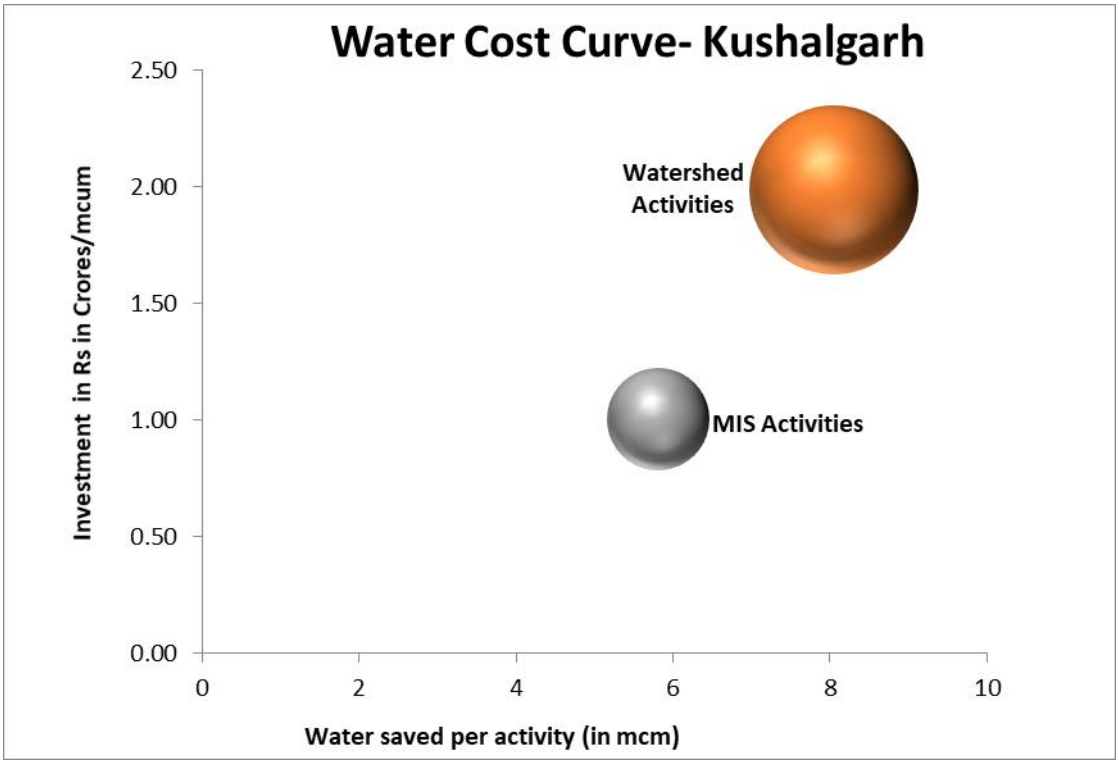


Table 1: Investment (in Rs/mcm) verses Water saved (in mcm) in Kushalgarh

Activities undertaken to save water	Water saved- per year in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	8.05	1.99	16.005
MIS Activities	5.81	1.00	5.83

Out of above investments, more than 8887 households will be benefitted 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

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, Zila 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

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 the 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 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 surface water 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 surface water cluster, proposed activities in the watershed cluster including studies/Field Surveys, institutional activities, trainings, surface water 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 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

The Rajasthan Agricultural Competitiveness Project (RACP) will be implemented in selected locations of the particular agro-ecological zones (AEZ) in Rajasthan. The AEZ will be supported by one or several commodities in a value chain approach. The same commodity can be supported across two and up to three AEZs. Commodities can include traditional crops (annual, perennial) cultivated in Rajasthan and for which an AEZ is believed to have a comparative advantage; or new crops for which a clear rationale and analysis exists that a comparative advantage can indeed be established over time. Small ruminant (goat and sheep) development will be taken forward as a value chain in eight AEZ.

Within an AEZ one District will be identified across which cluster will be developed with a primary focus on improving water management across the three water sources, i.e. either canal water or ground water or harvested rainwater (watersheds).

The principles for Cluster selection include: (1) Each Cluster provides for a demonstration or pilot on how to effectively support sustainable and profitable agriculture with a view towards potentially scaling up this model (if successful) in the future (outside of the RACP). For a Cluster to be "testable" it requires a defined theme, demonstration objective and research/development hypothesis that needs to be made explicit at the on-set and supported through the definition of a results framework (key indicators, baseline and monitoring arrangements). (2) If multiple Clusters are identified within one Cluster (based on selected lead commodity), these Clusters will be implemented within the same District to facilitate implementation. (3) For each Cluster the relevant hydrological catchment area will be identified which provides for the basis of water resource management activities. (4) Each Cluster will comprise at least 10,000 ha of cultivation for the lead commodity under the Value Chain approach.

Keeping in view the principles of the cluster selection, the Kushalgarh cluster has been selected to achieve the Project Development Objective (PDO). The Kushalgarh cluster is a watershed cluster which is a hydrological unit. The Kushalgarh watershed cluster is situated in IV-B Agro-climatic Zone (Humid Southern Plains). Kushalgarh is a tehsil headquarter of Banswara district located about **57 Kms** from Banswara. The Kushalgarh Cluster (Rainfed - Watershed) in Banswara district has been selected to be developed under the RACP after undertaking various field visits by the PMU coordinators and having consultations with the officials of WD&SC Department, Jaipur & Project Manager, WCDC cum Ex. En. (Land Resources), Zila Parishad, Banswara 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 1087 mm in Banswara district. As elsewhere discussed, total cropped area is about 8774.50 ha, out of which Maize crop is sown in about 2387 ha, Soybean in 1236 ha, Cotton in 1323, Black gram in 402 ha followed by other crops. In Rabi season Wheat is sown in 1430, & Gram in 702 ha. Only 31.50 ha area is sown in horticultural crops. Total area under these crops makes a total cropping intensity of 133.59%. So, surplus production of the above mentioned crops is generally available in the area. Out of it the cropping intensity of Kharif crops is 99.66% and in Rabi, it is only 33.45%, in Horticultural Crops it is only 0.48%. Productivity of above crops is at par or little better than the state average. The above crops are sown in the cluster are also the dominant crops in the district. So, surplus production of major crops is generally available in the area.

The production of Maize, Cotton, Paddy, Blackgram, Soybean and other crops is being sold through unorganized local market and mandi of Kushalgarh and Banswara. Apart from human consumption most of the produce of Maize including other similar crops is being used as cattle feed, hence looking to the considerable livestock population of Banswara district, there is a considerable scope of value addition in these crops. The Soybean crop is to be used for extracting oil and other purposes. Apart from this, the area being sown under less paying crops would be diversified into cultivation of high pay off crops i.e. horticultural crops in future.

In view of the major crops which are being grown in Rabi season and the scope of Wheat as alternate crop (looking to the possibility) for flour and other uses; it would also be selected as value chain crop. Since industrial value of the Maize and Wheat crops are significant for any Producer Company (PC) so these crops may be taken as value chain crops in Kushalgarh Cluster.

Although there is not much area is under Horticulture/fruit plantations at present, the availability of good land and quality water along with connectivity with Ratlam district of Madhya Pradesh and Dahod district of Gujarat, immense opportunity for the cultivation of vegetables and fruits. The area is fairly suitable for fruits like Mango, Guava, Lemon & Pomegranate and vegetables like Okra, Tomato, Brinjal, Chilli & Guar crops. Hence, some area under cereal & other crops would be diversified in to the cultivation of above these fruits and vegetables crops.

As the dairy is experienced quite successful business in the cluster, cultivation of fodder crops has an important role in the cropping pattern to the local farmers. Similarly, the Goat rearing is quite popular in this area. About 11094 numbers of goats are available in the villages of the cluster so there is a significant scope of value chain of goat meet.

Therefore, it can be concluded that the availability of fertile land and good quality water along with the proximity to Indore, Madhya Pradesh provides enough opportunity for the development of value chain crops and cultivation of vegetables and fruits, as well as scope of value chain in goat meat production. Therefore, Kushalgarh is the appropriate cluster to be developed under RACP.

Chapter -2: Description of the Cluster

2.1. Spatial characteristics

Kushalgarh watershed cluster of Rajasthan Agricultural competiveness Project is located in Kushalgarh Block of Banswara district. The project area is between the latitudes 25°33'52" N to 75°52'35" E longitudes. The Kushalgarh cluster is at a distance of 8 Kms from Kushalgarh block headquarters and 65 Kms from the Banswara district headquarters. The area of the cluster is spread over in 49 villages of 15 Gram Panchayats. The name and area of the Gram Panchayats and villages covered in the Project area are given in Annexure 2.1.

2.1.1. Land Use Pattern of the Cluster

Total area of the cluster is 10331 ha. Out of this the cultivated area is 6569 ha with 3966.60 ha rainfed, 2349.40 ha irrigated and 253 ha temporary fellow land. The pasture land which belongs to Panchayats of Kushalgarh Cluster is 1132 ha and others land is 2304 ha which belongs to Government of the cluster. The detail land use pattern of the cluster is summarized as hereunder:

Table 2: Land Use Pattern of the Kushalgarh Cluster

S. No.	Land Use	Total area in ha			
		Private	Panchayat	Government	Total
1	Agriculture Land	6569	0.00	0.00	6569
2	Temporary fallow	253	0.00	0.00	253
3	Cultivated Rainfed	3966.60	0.00	0.00	39966.60
4	Cultivated irrigated	2349.40	0.00	0.00	2349.40
5	Water body	0.00	0.00	79.59	79.59
6	Settlement	0.00	0.00	246.41	246.41
7	Pastures	0.00	1132	0.00	1132
8	Others	0.00	0.00	2304	2304
	Total (2 to 9)	**6569**	**1132**	**2630**	**10331**

2.2. Agro-ecological characteristics

2.2.1. Slope

The slope of the area ranges from the 0 to more than 10%. Most of the area is under the slope category upto 5% slope. The category wise and micro watershed wise area is being summarized under:

S. No.	Slope percentage	Area in hectares
1	0 to 1 %	3780.18
2	1 to 3 %	5759.11

3	3 to 5 %	1909.41
4	5 to 10 %	295.76
5	10% to above	58.54
	TOTAL	**11803.00**

(Source: DPR of Watershed, Banswara**)**

2.2.2. Soil Types

The soil of the Project Area is shallow to moderately deep, dominantly fine loam soil to coarse loom, 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 being summarized as under:

Table 3: Table Soil Profile of Kushalgarh Cluster

S. No.	Major Soil Classes	Area in hectares
1.	Red Soil	3735.8
2.	Black soil	1379.2
3.	Sandy soil	3137
	Silt clay loam	3551
Soil Depth :		
B	**Depth (cm)**	**Area in hectares**
1	0.00 to 16.50	450
2	16.50 to 45.00	1448
3	> 45.00	9905
	Total	**11803**

(Source: Agriculture Dept., Banswara**)**

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

Table 4: The Soil fertility level of the Project Area

Soil fertility Status	Kg/ha	Recommended
N	23	6
P	20	30
K	490	174-336
Micronutrients	PPM	Recommended
Zn	0.4PPM	0.8 PPM
Fe	0.4	0.5

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

The analysis of soil data given in the above table shows the need to improve and maintain soil fertility. Soil health card will be provided to each and every farmer, for all crop season, which will include the recommendation for application micro nutrients and fertilizers.

The need is:

- To check land degradation
- To reduce excessive biotic pressure by maintaining of optimum number of livestock and management
- To check cultivation on sloping lands without adequate precautions of soil and water conservation measures
- To discourage cultivation along susceptible nalla beds

- To check faulty agriculture techniques
- To check uncontrolled grazing and developed cattle tracks
- To check deforestation of steep slopes
- **For delineated watershed projects:** To check erosive velocity of runoff, store Runoff, to arrest silt carried by runoff and to recharge Ground Water structures, like Earthen check dams, gully plugs, Bank Stabilization, Loose stone check Dams, Gabions, Earthen embankment (Nadi) and Anicuts would be taken up.

2.2.3. Rainfall Pattern in Project Area

This cluster falls under humid region climate. Winter season is observed between late November to Mid-March and summer season extending till June. July to September is the period that in which rainfall occurs. The Agro Climatic Zone is marked as IV-B under which the Project Area fall. The selected project area falls under the Indian Metrological Department (IMD) Station Banswara.

The average rainfall data are required to carry out water budgeting and based on which appropriate water harvesting structures are proposed have been obtained from Irrigation Department of Banswara, Government of Rajasthan. As reported, the data (Refer annexure 2.7) has been procured by the Watershed Department from the local station of the IMD and being utilised while planning watershed development interventions in the cluster.

The average rainfall of the cluster area is 1087 mm which is to be used for calculation of water budgeting and similar other aspects.

2.2.4. Temperature

The temperature during the summers (from April to July) reaches to as high as 48ºC. Hot wind commonly known as "*Loo*" blows between the months of May-June. On other hand winters have sunny and pleasant days and bitterly cold nights. Temperature can touch to a lower level of around 3ºC, mostly during the nights.

2.2.5. Source of Irrigation

Kushalgarh cluster is a watershed cluster so the rainwater is the main source of water which is required for crop production in Kharif season. The rainwater is also the main source of ground water recharge in the cluster. The Kharif crops are cultivated based on the rain water received during the monsoon. In Kushalgarh 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 as under:

Ground Water Status in Kushalgarh Cluster

Hydrology

The principal source of recharge to ground water is rainfall. Normal Monsoon & Non-Monsoon (1901-2012) and Annual monsoon and non-monsoon rainfall (mm) from the year 2008 to 2012 of the Block Kushalgarh district Banswara are given in Annexure 2.14. In canal irrigated areas, a part of canal water through seepage from conveyance system and part of water utilized for irrigation that returns to ground water contribute to storage.

Ground Water Level

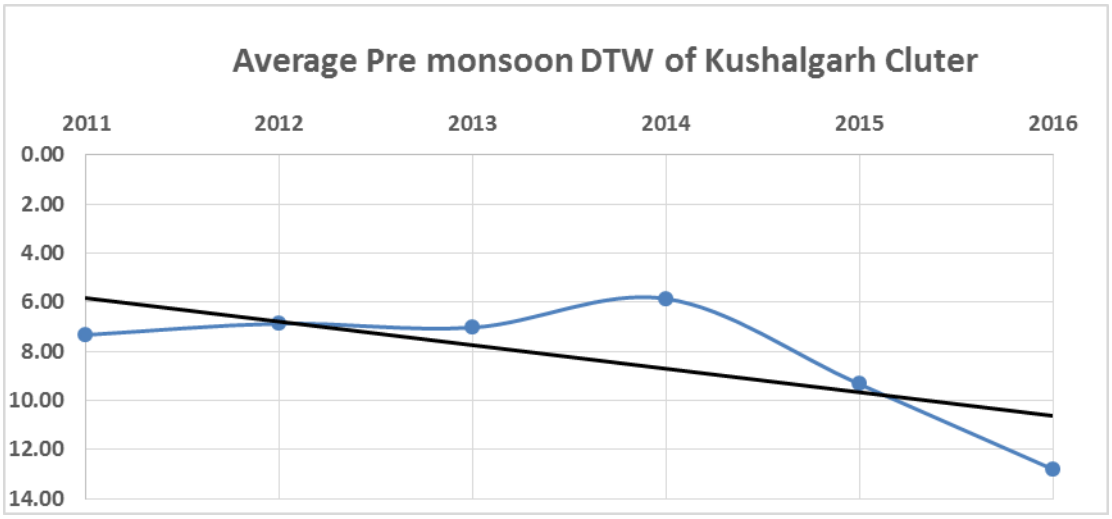
Ground Water department is monitoring four wells in the Cluster Area. The Pre-Monsoon depth to water varies from 05.85 mts to 12.80 mts below ground level and Post-monsoon depth to from 01.20 mts to 06.25 mts. The Water levels are given in Annexure 2.14

Water Level trends (2001 – 2016)

16 years Water Level Trend for Pre monsoon, 2001–2016 and Post monsoon, 2001 - 2016 have been presented in figure-1 & 2 of Annexure-1 respectively. During Pre-monsoon period in the long term, declining trend of ground water levels of 0.10 m/year has been observed in Pre-Monsoon period from 2001 to 2016. Decline trend of 0.08 m/year in ground water levels of Post-Monsoon period from 2001 to 2016 has been observed in the Cluster Area (Table-2 & 3 of Annexure-). The average trend of 2001-12 has been observed increasing trends in post monsoon and decreasing trends in pre-monsoon (Table- 9 & 10). The average trend of 2001-16 is shown declining from average trend of 2001-2012. Increased ground water draft to meet the increased demand of agriculture sector is the main cause for declining trend of ground water levels. The Water levels and trend are given in Annexure-2.14.

Year	2011	2012	2013	2014	2015	2016
Average Pre monsoon DTW of Kushalgarh Cluster	7.33	6.87	7.03	5.85	9.33	12.8

The average trend of four wells monitoring by the Ground Water department for the period 2011 to 2016 during pre-monsoon period in the Kushalgarh Cluster Area:



Ground Water Extraction Status

Existing Gross Ground Water Draft of 3.00 MCM for Irrigation are withdrawn through 338 wells/Tube wells for irrigation of about 614 ha area in the Kushalgarh Cluster area. The details are given in Annexure 2.14. Existing Gross Ground Water Draft of 0.34 MCM for Domestic purposes are withdrawn from Wells/Tube wells/Hand pumps. The details are given in Annexure 2.14.

Stage of Ground Water Development:

Stage of ground water development in the Kushalgarh Cluster area as on 31.3.2013 is 69.51% which comes under Safe Zone which indicates that there is scope of ground water development for Irrigation purposes. 1.28 MCM of Ground Water is available for Ground Water Development in addition to present draft of 3.00 MCM. The Kushalgarh Cluster area is coming under Safe Zone (Refer Annexure 2.14).

For monitoring of impact assessment of Investments proposed in the Cluster area one Piezometer is to be constructed on 20 Sq.km areas or as per site specific requirements with installation of Digital

Water Level Recorder (DWLR-Telemetric). The estimated cost per Piezometer including DWLR-Telemetric will be around 3.00 Lakhs.

2.3. Demographic Characteristics

Kushalgarh cluster comprises twelve (15) Gram Panchayats having forty-nine (49) villages. 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

Total population of the cluster is 45503. Out of the total population female population is 49.74% and schedule caste (SC) population is 0.77% and 96.36% is schedule tribe (ST) population. Similarly, marginal farmers are 37.85% followed by BPL, Small, Large farmers and there are no landless households in the cluster as indicated in the following tables. During the implementation of the project activities the involvements of all farmers/households have to be ensured whether these are from lower backward and other weaker classes or upper classes.

Table 5: Population Details

Male	Female	Total	SC	ST
22872	22631	45503	351	43848
50.26%	**49.74%**	**100 %**	**0.77%**	**96.36%**

(Source: Watershed DPR of Kushalgarh Cluster)

2.3.2. Socio-economic condition of the cluster

The table below reveals that most of the farmers are either small, BPL or marginal farmers. Large farmers are only 12.61%. It means more than 87% farmers require support for upliftment.

Table 6: Household Details

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
2435	0	1967	3364	1121	8887	52	7208
27.40%	**0.00%**	**22.13%**	**37.85%**	**12.61%**	**100 %**	**0.59%**	**81.11%**

(Source: Watershed DPR of Kushalgarh Cluster)

Currently there is unorganized market in the cluster and farmers sell their produce in the local markets. The production of Maize, Soybean and other crops is being sold through unorganized local market of Kushalgarh and mandi of Banswara. The produce of Maize & similar crops is also being used as cattle feed, hence looking to the considerable livestock population of the cluster as well as district, there is a huge scope of value addition in this Maize & Gram crops. The Kushalgarh & district mandis (markets) are located just 8 Kms and 65 Kms from the cluster respectively.

The poor source of irrigation, poor infrastructure development, low literacy and high level of migration are predominantly observed during times of drought. The development indicators of the project area are being summarized under:

Table 7: The development indicators of the project area

S. No.	Development Indicators	Rajasthan State	Project Area
1	Per capita income (Rs.)	16260	12170
2	Poverty ratio	0.22	0.70
3	Literacy (%)	60.40%	57.20%
4	Sex Ratio	1000:928	1000:989
5	Infant mortality rate	NA	NA
6	Maternal mortality ratio	NA	NA

(Source: Watershed DPR of Kushalgarh 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. Although poverty ratio and sex ratio are more than the state average, literacy is less than the state average in the cluster. All these parameter needs to be elevated in the project area for understanding the development to the occurred after the project implementation.

2.4. Agriculture-related livelihood characteristics

Agriculture is the chief contributor towards the economy of the district. Banswara district occupies an important place in the agricultural production of the state. It falls in IV-B Agro Climatic Zone (Humid southern plains) as discussed earlier. It is located 65 Kms from Banswara district and 570 Kms from Jaipur. The total geographical area of the district is 632235 hectares which is about 1.85 per cent of the state. Out of this, the net area sown is 337719 ha. Out of this the rainfed area is 26944 ha and irrigated area is 310775 ha. At the same time some area is also double cropped with the help of irrigation and hence the total cropped area is 646729 ha. So the cropping intensity of the district is 191% against the state average of 143%.

2.4.1. Cropping Pattern of Agricultural Crops

A number of crops are grown in Banswara district. In the Kharif season, Sorghum (Jowar), Maize, Soybean and Groundnut etc. are sown in about 237618 hectares which is 6.33% of state's area (16378420 ha). In the Rabi season Wheat, Barley, Gram, etc. are cultivated in about 100900 ha which is 2.16% of state's area i.e. 4666000ha. Thus, the total cropped area of the district is 345438 ha. The prime sources of irrigation here are wells and tube wells. A total area of around 19173 hectares is being irrigated by 1209 tube wells & 9102 wells in the district. By other sources like canals and tanks, an area of about 27138 ha is irrigated.

It is worthwhile to mention here that the above crops are also prominent crops of the state as they have very signification rankings, if their area is compared to the area of all India level as summarized below for the years 2012-13 and 2013-14:

Table 8: Area Status of Rajasthan area Compared to all India under Major Crops (Area in Million ha)

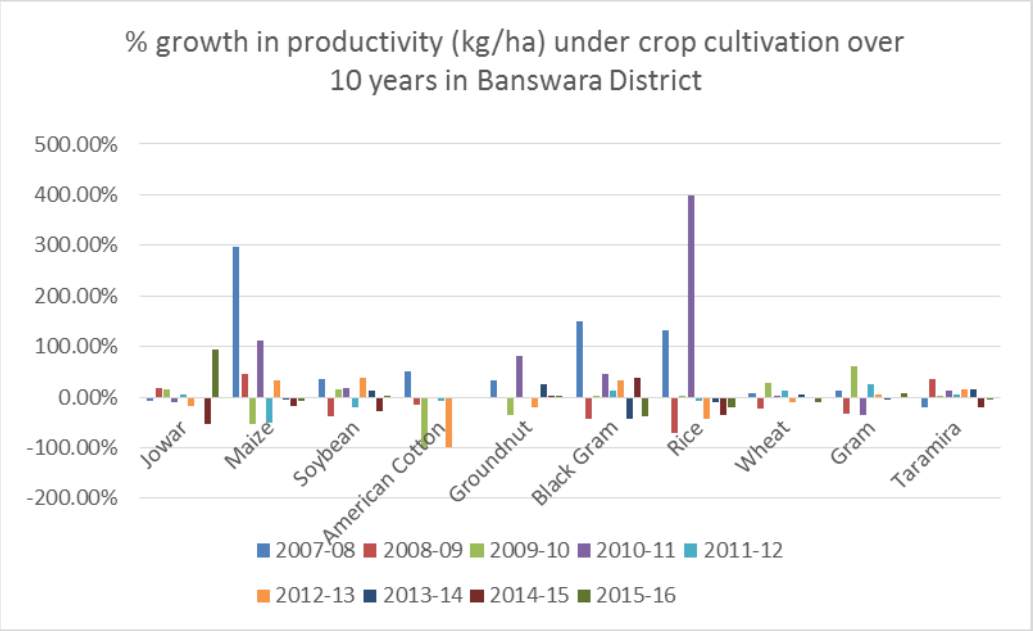
Crops	2012-13				2013-14			
	India	Rajasthan	% share	Rank	India	Rajasthan	% share	Rank
Kharif								
Maize	22.26	1.76	7.89	5	24.35	1.50	6.17	6
Soybean	14.67	0.98	10.01	3	11.99	0.98	8.13	3
Rabi								
Wheat	30.00	3.06	10.21	5	31.19	2.81	9.01	4
Gram	8.52	1.25	14.70	2	10.22	1.92	18.82	2

(Source: Agriculture department, Kushalgarh)

The above table reveals that the state was having first rank in case of Mustard crop in both years (2012-13 & 2013-14), whereas, the Wheat crop, the state was having 5th rank in the year 2012-13 and 4th rank in the year 2013-14. The latest estimation of the state has also indicated that the said ranks in above crops is still remained.

Cotton crop area has declined over past 10 years. In terms of Maize crop the growth is bit stable with slight declining and increasing trend. The major rabi crop grown in the district is Wheat, this crop has shown stable growth. Soybean has clearly shown an increasing trend in past 3 years. The reason for increase or decline in the area is due to market prices, demand & supply and water availability.

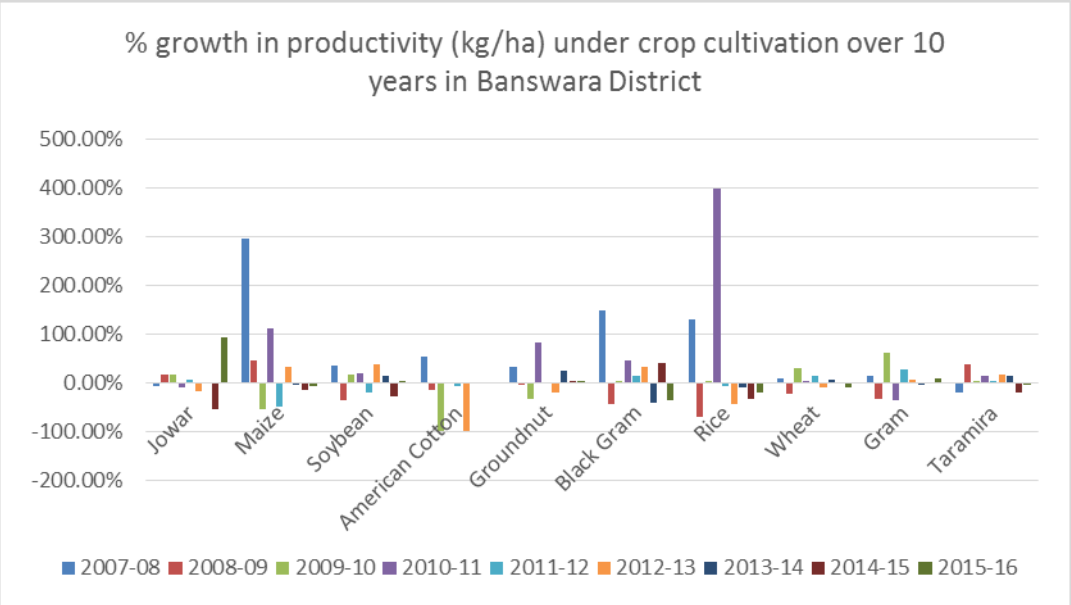
Figure 2: Percentage growth in area under cultivation over 10 years in Banswara District



The data (Refer annexure 2.2) reveals that the Maize and Soybean in Kharif and Wheat in Rabi season are major crops of the district. As far as area is concerned, there is no major change in the cropping pattern of the district as well as in the state. But due to occurrence of rains during the concern season, the area may have reduced or increased under the above crops. It is also relevant to mention here that the above crops are well established in state as well as in Banswara district because of their suitability in this area for production.

As per the **above** the growth in productivity of Groundnut, Rice and Maize is shown as 81%, 399% and 113% respectively in cluster in year 2010-11 the reason behind the huge deviation was that year 2009-10 was a drought year and crop failure cases may be more. In terms of rabi crops, Wheat crop has shown maximum growth in year 2009-10 with 29%.

Figure 3: Percentage growth in productivity (kg/ha) under crop cultivation over 10 years in Banswara District



(Source: Data analysis by ABPF)

2.4.1.1. Overview of the crops identified in Kushalgarh Cluster

Since the Kushalgarh cluster is situated 8 kms from Kushalgarh, so nomenclature of the cluster is based on the name of the tehsil i.e. Kushalgarh of Banswara district. The cluster has been selected based on basis of watershed approach. Therefore, improvement in water use efficiency would be achieved through watershed management and Agricultural productivity including agricultural & horticultural crops would be increased by the way ensuring water availability whether in-situ moisture conservation or water harvesting in existing water harvesting structures or in proposed water harvesting structures or through conservation measures to be adopted/constructed in the cluster. As far as cluster area is concerned, the total area is 10331 ha and a total of 49 villages falling in 15 Gram Panchayats in the cluster. The cluster consists of 3 macro watersheds and 15 micro watersheds.

2.4.1.2. Category wise Cultivated Area in Kushalgarh Cluster

Using remote sensing and Geographical Information System (GIS) and Participatory Rural Appraisal (PRA), the irrigated and rainfed area has been assessed. Using revenue as well as remote sensing data category of the farmers has been compiled into large, small, marginal and below poverty line (BPL) farmers as well as landless households. At the same time the farmers have been categorized into General, scheduled caste, scheduled tribe and other back ward classes. The total cultivated area of the cluster is 6569 ha and the total households in the cluster are 8887. The category wise cultivated area in Kushalgarh cluster is being summarized in Annexure 2.3.

The table (Refer Annexure 2.3) clearly indicates that there are about 87% farmers are marginal, small, landless & BPL farmers. Only about 12.61% farmers are large in Kushalgarh cluster. Out of the total cultivated irrigated area, more than 91% area is with other than large farmers. Similarly, more than 89% cultivated rainfed area is either with marginal, small or BPL farmers. Out of the total cultivated area, 91.11% total cultivated area is with farmers who belongs OBC category followed by Schedule Caste, General and Schedule Tribe farmers.

The total irrigated area is only 35.76% of the total cultivated area and out of it 61.55% irrigated area is with marginal farmers followed by small, BPL & large farmers. The rainfed area is 64.24% and out

of it 41.07% area belongs to marginal farmers followed by small, BPL and large farmers. Out of the total area, the area 85% belongs to ST farmers followed by SC, OBC & General farmers.

2.4.1.3. Status of Cropped area of Agricultural Crops in the Kushalgarh cluster

The cropped area has been compiled from the data collected while Participatory Rural Appraisal (PRA) was performed by Watershed Development and Soil Conservation Department during the year 2015-16. As discussed earlier, the major field crops of Kharif are Maize, Paddy, Soybean, Cotton, Black gram, Sorghum & Groundnut whereas Wheat and Gram crops are important crops in Rabi season in Kushalgarh cluster. Kharif crops are mostly grown on Monsoon rains. However, irrigation is provided during the dry spells wherever irrigation facilities are available. The crop wise area for 10 years (from 2006-07 to 2015-16) under these crops is being summarized in Annexure 2.4.

The data given in the above table clearly show that Kharif crops are sown in 99.66% area whereas Rabi crops are sown in 33.45% area. In addition to above, the horticultural crops are being grown though only in 0.48% area. There is a total cropping/intensity of 133.59% during the year 2015-16 in the cluster which is very less than the district average i.e. 191% and state average of 143%. In totality 9 ha decline is proposed in cropped area then net agriculture area. Very less micro irrigation system is being practiced in irrigated crops in project area. It also indicates that currently there is a scope to enhance use of drip irrigation system in the area for bringing rainfed area into drip irrigation.

As far as crops are concerned, there is a scope to reduce the area of high water requiring crops and increase the area of these crops that water requirement is less and relative water use efficiency is more. For instance, the area of Cotton and Paddy crop water requirement is more can be reduced and at the same time such crops requiring less water like, Maize & Soybean can be promoted in Kharif season.

2.4.2. Cropping Pattern of Horticultural Crops

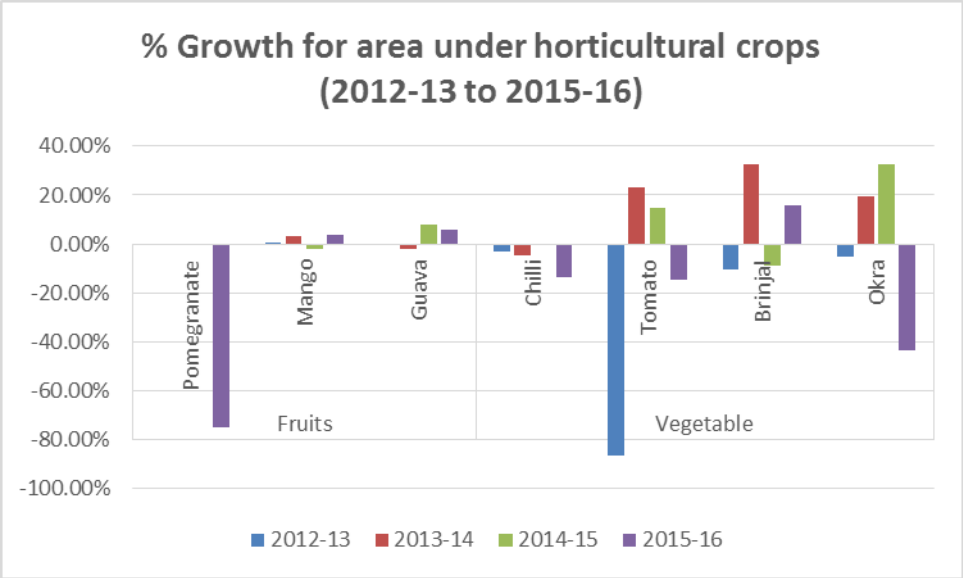
For better integration, the area under the horticultural crops has also been gathered from the Agriculture department. Although the area is very less in comparison to agricultural crops under horticultural. But looking to the potential of the state as well as the district, area is increasing very slow under horticultural crops i.e. fruits and vegetable crops but there is a scope to increase area under horticultural crops and efforts need to be made by the concerned department. In case of Kushalgarh cluster the Tomato, Brinjal & Chilli crops are most suitable vegetable crops for the cluster and Pomegranate, Guava and Mango fruit crops are suitable for the Kushalgarh cluster.

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

The horticultural crops like Chilli, Brinjal and Tomato vegetable crops and Guava, Mango & Pomegranate fruit crops are suitable for the area. But there is no scope to take them as the value chain crop in the cluster due less production and area. Even the horticultural crops have to be promoted through crop demonstrations in the area for the benefit of the farmers of the cluster.

As per the **Figure 5** (Refer Annexure 2.5), the status of Tomato crop is not encouraging and showing declining trend in growth percentage of area both in district and state whereas Brinjal crops and mango is showing slightly increasing trend in district.

Figure 4: Percentage growth for area under horticulture crops (2013-14 and 2014-15)

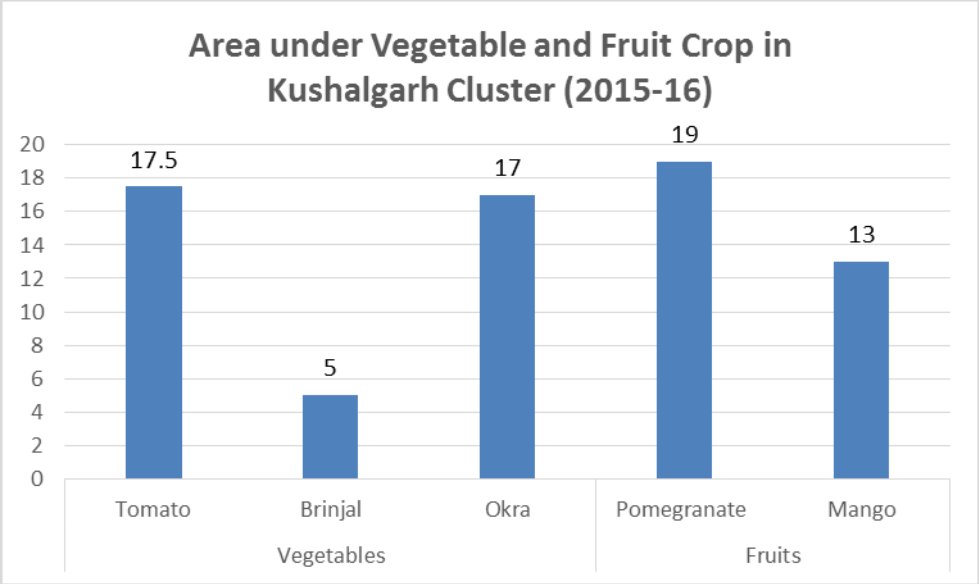


(Source: Data analysis by ABPF)

Crop wise area of Horticultural crops in Kushalgarh Cluster

To finalize the proposed area after the project, the area of horticultural crops in Kushalgarh cluster has to be discussed. The area being taken under horticulture a field survey has been conducted and found that there is no significant area under these crops during the year 2015-16. Whatever area has been reported under these crops, being summarized as under:

Figure 5: Area under horticultural crops in Kushalgarh Cluster (2015-16)



(Source: Data analysis by ABPF)

As per the Annexure 2.6, it shows that Pomegranate is having major area under fruit crop with 19 ha whereas Tomato is major vegetable crop with 17.5 ha. The total area covered by both vegetable and fruit crop is just 31.5 ha therefore the scope of intervention is very limited.

2.4.3. Crop Water Requirement in Kushalgarh Cluster

The Crop Water Requirement of crops being grown in the Kushalgarh cluster is being summarized in Annexure 2.3. The table shows that due to watershed development activities, the total cropped area is proposed to be increased from 8816 ha to 8896 ha, it means 80 ha more area is to be sown. This area is proposed to be increased due to creation of additional water resources in watershed area and use of micro irrigation system. As per the objective of the project area under such crops have been proposed which are having less crop water requirement resulting total crop water requirement 0.87 MCM has been reduced and proposed cropped area has been increased 80ha.

The crop water requirement of Kharif crops is 18.42 MCM, which would be met out from in-situ moisture conservation in arable area. There is total crop water requirement of Rabi & horticultural crops are 29.14 MCM. It is also significant to mention here that in such watershed areas almost 50% Rabi crops are grown on conserved moisture, means only 25% crop water requirement of Rabi & horticulture crops will be taken from ground water in the cluster. In addition, if demand side water application methods are adopted on each and every wells/tube wells, about 50% of total water requirement may be saved out of total crop water requirement in lifesaving irrigation in Kharif and in Rabi & horticultural crops, it means total 8.14 MCM crop water will be met out from the ground water and water will be harvested through different measures to be done in the cluster.

2.4.3.1. Drinking Water Requirement

The water requirement of human being, animals, birds etc. will also be met out from the cluster. The total of such water requirement is being summarized as under:

Table 9: Requirement of drinking water in project area

S. No.	Particular	Nos.	Per day requirement (in litre)	Total Requirement (in litre)
1	Human	46295	40	1851800
2	Big animal	14547	40	623910
3	Small animal	13217	15	166410
4	Birds	245	0.15	675.60
Total (in litres) Day				**2642796**
Per year Requirement of drinking water (in litres)				**964620394**
Per year Requirement of drinking water (in cum)				**964620**
Per year Requirement of drinking water (in MCM)				**0.96**

(Source: DPR, WDSC, Kushalgarh)

Above table reveals that the estimated total water requirement for human beings, animals & birds etc. is 0.96 MCM.

2.4.3.2. Water Budgeting and Water Balance

Based on the ground water data mentioned elsewhere, the ground water level is showing increasing trend therefore cluster area is treated as safe instead of semi critical category which indicates that the scope of ground water development for irrigation purposes is available. 1.28 MCM of Ground Water is available for Ground Water Development in addition to present draft of 3.00 MCM. The Kushalgarh Cluster area is coming under Safe Zone.

The entire Project Area was categorised based on the nature and characteristics of the area. Total catchment area is 10331 ha and annual average rainfall is 1087 mm of the area. Based on the catchment area and annual average rainfall, the total yield of the rainfall will be about 112.30 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. Kushalgarh 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 6.74 to 11.23 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 elsewhere, the adoption of Micro Irrigation System (MIS) can save about 50% of crop water demand. The field and horticulture crops being grown in Rabi seasons 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 4.28MCM ground water, is available annually in the cluster and there is no need to reduce present draft 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 10: 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	18.42	16.58	1.84
2	Crop water requirement of Rabi crops	8.57	4.29	4.29
3	Crop water requirement of Horticultural crops	2.15	1.08	1.08
4	Domestic & drinking water requirement	0.96	0.00	0.96
	Total	**30.11**	**21.94**	**8.16**

Total 6.86 MCM is proposed to be harvested and recharged ground water through various structures, in addition to in-situ moisture conservation. It clearly shows that Kharif can be grown with in – situ moisture conservation and as mentioned above, about 50% crops of Rabi season are grown with conserved moisture. It means the crop water requirement of Rabi crops may be reduced to 50%. Keeping in view, 100% area is covered under micro irrigation system the final crop water requirement would be about 8.16 MCM which would be drafted from ground water. Finally, the sufficient ground water is available in cluster against the crop water requirement.

2.4.4. The Seed Replacement Rate (SRR) in Kushalgarh cluster:

2.4.4.1. Seed Replacement Rate (SRR) in the State & in District:

The status of Seed Distribution and Seed Replacement Rate in State & District has to be discussed with reference to the project area i.e. Kushalgarh cluster. The status of Seed Distribution and Seed Replacement Rate in State & District is being summarized in Annexure 2.9.

As Pigeon Pea, Paddy, Maize & Black Gram crops in Kharif and Wheat and Gram crops in Rabi are suitable for cluster as scope of value chain in the cluster. Seed replacement rate in Cotton, it is 100% in both of the years & similar pattern is seen in Soybean crop in the year 2013-14 while decreasing trend was found to 51.46% in the year 2014-15 in this crop. Although seed replacement rate in Maize crop is higher than the state average but in Paddy, Pigeon Pea and Black Gram it lower than the state average in the year 2013-14. Similar pattern is being seen in the year 2014-15 in all remaining crops over the state.

Likewise, in Wheat it is higher than the state average in 2013-14 but in the year 2014-15 it is lower than the state average. In Gram crop, it is lower than the state average in the year 2014-15. In the case of Barley crop, it is lower than the state average in both the years. It indicates that in almost all the crops the SRR is less than desired level. If the productivity of these crops is to be increased, then certified seed of high yielding varieties have to be sown for all these crops so that SRR may be increased for getting optimum / desired productivity level in the district.

2.4.4.2. Seed Replacement Rate (SRR) in Kushalgarh cluster:

During the field survey, it was observed that the Seed Replacement Rate (SRR) in Kushalgarh cluster is almost the same as the SRR of the district as shown in Annexure 2.10. The data reveals that the SRR in Kushalgarh cluster is lesser than the district average except Black gram and Paddy crops. The data indicate that the focus is to be given on adoption of certified seed of high yielding varieties which having disease & insect-pest resistant, have higher economic & commercial value in view of the storage capacity & marketing linkages in almost all the crops.

The status of Fertilizer Consumption in Terms of Nutrients in State & District:

The consumption of fertilizer for supply of nutrients play significant role to increase the productivity but at the same time it is very significant that it should be used judiciously use in the crops. Integrated Nutrient Management (INM) is also important in the production sector. The department has also finalized the package of practices for adoption of INM in crop production. The current status of fertilizer consumption in terms of nutrients is being discussed here as used in state as well as district. The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons) is being summarized under:

Table 11: The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons)

State/ District	Nitrogenous (N)			Phosphatic (P)			Potassium (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	6.06	9.52	1.76	1.56	3.31	0.06	0.09	0.15	5.29	7.7	13	34.4	82.76	52.64
Banswara	0.13	0.16	0.29	0.25	0.24	0.49	0.00 18	0.00 13	0.00 13	0.16	0.19	0.34	69.1	130.8	93.05

(K – Kharif, R – Rabi & T – Total)

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

Above table reveals that average consumption of fertilizer of district in Kharif & Rabi seasons is higher than the state average. In totality the consumption of fertilizer in district is 93.05 kg/ha which is higher than the state average. The data indicate that the judicious use of fertilizer is to be needed & the farmers have to be promoted to adopt package of practices of INM and the fertilizer consumption judiciously.

The Area Covered and Technical Grade Material (TGM) used under Plant Protection Measures in State & District:

The aspect is adoption of plant protection measures in the crop production. Although the use of plant protection measures is not healthy in term of human health but optimum level of production is also need of the time. While adoption of plant protection measures, the Integrated Pest Management has to be kept in mind and accordingly package of practices for IPM has to be adopted at the time of crop production in Agricultural as well as Horticultural crops.

Here the current status of seed treatment, soil treatment, poly treatment, intensive treatment, rat & weed control etc. is being summarized in table as summarized in Annexure 2.12

The data indicates that the seed treatment, soil treatment, poly treatment, intensive treatment, rat & weed control etc. is being adopted as per the package of practices which need further improvement in a big way keeping in view the Integrated Pest Management so that crop production can be increased without effecting environmental impact.

The Area Covered and Technical Grade Material (TGM) used under Plant Protection Measures in Kushalgarh Cluster:

The data for Kushalgarh cluster is available at the moment. But during the field survey, it was observed that the area covered and technical grade material (TGM) used under Plant Protection Measures in Kushalgarh cluster is almost the same as per the district. It means the focus is to be given on adoption of package of practices for enhancing the area to be covered and technical grade material (TGM) used under Plant Protection Measures keeping in view IPM and high yielding varieties which having disease & insect-pest resistant, have higher economic & commercial value in view of the storage capacity & marketing linkages.

2.5. Livestock profile of Kushalgarh Cluster

In the Kushalgarh cluster large no of households possess cattle, buffalo, goats and sheeps. The district milk union collects around 15000-20000 liters of milk per day. However, the network is not that strong in the cluster area. Goats are also reared by substantial no of house hold and these house hold are primarily small holders with limited resource. Banswara being near to Madhya Pradesh and local demand of meat have good scope for goat farming for meat and milk. The household wise livestock profile of the cluster is given in Annexure 2.16 as per the Livestock Census 2012. Livestock Profile of Kushalgarh cluster shows high population of the goats i.e. 40% families rearing goats. This signifies the importance of goat rearing for livelihood security of the farmers in the cluster. The small holders of the cluster prefer to keep animals with low resource requirements. So there is the scope of popularising goat farming with suitable interventions for improving milk and meat productivity. Project intervention will also support small holders to collectively market breeding animals to institutional buyers. Goat rearing serves as a secondary source of livelihood for many farmers in the cluster.

The cluster has 80 goat specific MTGs and around 3531 families own 11094 goats, averaging around 3 goats per goat rearing family. The village wise data for Goat population segregated further into male, female, calved etc. is in Annexure 2.17

As evident from the above data, Goat rearing is quite popular in this area, and there is a significant scope of the value chain of goat meat.

2.6. Structural characteristics

Kushalgarh cluster is located in Banswara district. The district has a number of industrial areas like Thikariya, Peepalwa, Ghatol, Partapur and Kushalgarh (source: MSME Development Institute, "Brief industrial profile of Banswara district"). Apparently there are over 8 registered SME and 581 food products unit in the district. Some of the supporting institutions and service providers supporting processing units with region are given in the Annexure 2.15

The structural infrastructure in the Kushalgarh cluster that may influence Agri business activities in the clusters presented below:

2.6.1. Government departments

There is presence of Agriculture, Horticulture and Watershed departments. These departments have head office in Kushalgarh but they have offices at district as well as district level too.

2.6.2. APMCs

There is APMC in the district which can have an impact on Kushalgarh.

a. Banswara

2.6.3. Warehouses

Currently there are 2 warehouses in existence in the Banswara district with a total capacity of 23,844 MT:

Table 12: List of warehouses in existence in the Banswara district

S. No.	Name of Warehouse	Capacity (MT)
1	State warehouse corporation	12200
2	Central warehouse corporation	3400
	Total	**15600**

During the discussion with the farmers of the Dooni cluster, it was found that their presence of public and private warehousing structure in the cluster. Due to inefficient type of 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.

2.6.4. e- Markets

We are currently witnessing the transition to online marketing for various marketing activities involved in agriculture business. Government has taken various initiatives to introduce trading platforms for the support of agriculture business. As of now no e-markets are available in the cluster.

2.6.5. Predominant practices for cultivation

Following are the predominant practices being carried out in the Kushalgarh cluster with regard to the purchase of inputs, crop cultivation and transport of harvested produce-

Sr.no	Particulars	Present Practice
1	Seeds/Fertilizers	Local Input Shops
2	Fungicide & Pesticide	Local Input Shops
3	Land Preparation and other cultivation practices	Local Labour 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 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. Bengal gram (Chickpea), Cotton, Maize, Soybean and Wheat are the major crops from the cluster that have been considered and compared using this scoring parameter. (Annexure 3.2)

3.1.1. Existing size of the crops

The first category of parameters may be broadly categorised under with respect to existing size of crops in the cluster with regard to their area under cultivation, production and average cluster level productivity relative to national average productivity. Maize scores the highest in this category as it has maximum production and cropped area. When it comes to relative productivity of the crops in the cluster, only Maize and Wheat have lower productivity when compared to their respective national average productivity, while all other crops have relatively higher productivity than national average. (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 to 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 Corn flour, it has been considered as 20% while that for Soybean oil and Wheat flour, is taken as 10% only.

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. Bengal Gram scores highest with around Rs. 240 per quintal followed by Cotton with Rs. 192 per Quintal. 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 fodder locally without any value addition. The fodder yield for Bengal gram is almost that is 5 Qtl/acre.

The next parameter is on scope for processing in the state of Rajasthan, there are comparatively more number of secondary and tertiary processing units of Bengal gram and Soybean. 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.

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, Soybean has the highest number of value added products like oil, tofu, dal, soy sauce and milk whereas Bengal gram and Wheat

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 Soybean (12.18%) followed by Maize (8.07%), then Bengal gram (5.05%) Wheat (3.06%) and Cotton (1.05%). (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 Bengal gram (46.97%) followed by Cotton (32.82%). Bengal gram has 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, Soybean with lowest water requirement of 1000 cum/ha have the highest scope for crop diversification followed by Maize (2500 cum/ha) and Bengal gram with that of 2500 cum/ha. Wheat and Cotton have the most water requirement of 5000 cum/ha, making it least preferred for crop diversification. (Annexure 3.2)

3.2. Inference from the Scoring Matrix

It could be concluded from the total scores of the matrix that Soybean is the most important value chain crop in the matrix. It has the highest cropped area with one of the highest production in the cluster. It has a good scope at mandi but the scope for value addition and processing in the state is above average. It is the major crop of Rabi with the highest volatility in price for past 3 years hence it has maximum scope for intervention to stabilise the price in turn benefitting the farmers.

Second highest scoring crop is Maize as per the matrix, for which the major reason is it has the highest cropped area in Kharif season and the least crop water requirement similar.. Potential for value addition is average based on the fact that the crop has not much scope for value addition and processing in the state..

Third highest scoring crop as per the matrix is Bengal gram. Although the cropped area and production is not significant but the potential for value addition is immense in Bengal gram. Price volatility is the highest in the last 4 years which gives chance of value chain intervention.

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)

Bengal gram

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 Bengal gram is supplied to domestic brewers and distillers (channel 1) and larger international brewers and distillers (channel 2). In channel 3 feed and Bengal gram 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 Bengal gram 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 Bengal gram 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)

Maize

The pre-intervention value chain for maize involves two production-distribution or activity-marketing channels, one related to yellow maize and the other related to white maize. The yellow maize largely targets the animal feed industry while white maize is for the food (Starch, pop-corn, sweet corn etc.) segment. Presently, village traders and the mandi largely facilitate aggregation of produce. Producers suffer from want of storage, grading and sorting facilities and value accruals are limited. (Annexure 3.3)

Typically, the gross yield enjoyed by producers is barely 6 quintals per acre. The gross value realisation on sale at Rs.1600 per quintal is Rs.15, 360 per acre and the cost of cultivation is about Rs.10, 528 per acre. The net value realisation is about Rs. 4,832 per acre. NAFED also supplies to retailers in Channel 1 and Channel 2. (Annexure 3.6)

Soybean

The present pre-intervention or value chain for Soybean may be viewed as one with three 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 raw soybean while channel 2 is for feed market. The producers market their produce in both value chains through local traders/ processors and APMC Commission agents largely. (Annexure 3.3)

Typically, the gross yield enjoyed by producers is barely 11.2 quintals per acre. Gross value realisation on sale at Rs.1,400 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).

3.4. Strategic context of Goat Value chain in Kushalgarh cluster

3.4.1. Goat for milk production

The goat farmers mostly 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 10 - 12/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. However goats start to produce 2-3 years earlier, and have considerably lower cost of production for both feed and water, and there are no limitations for slaughter of non-productive animals Among the breeds of goats in the cluster, some of important milk production traits noted in field areas have been as follows.

Table 13: 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 11094 goats out of which 31% are milking animals. The estimated milk yield would be around 8790 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 3516 L per day is the potential for collection as on date and this can grow up to 8790 L/day if maximum potential is achieved by developing a separate remunerative value chain for Goat milk. The nearest markets could be Ajmer and Jaipur. However, the Goat milk collection and other value addition can be seen as a pilot and initially one Chilling centre of 500 L capacity can be established to see the response.

3.4.2. Goat for meat production

The market linkage for live goats poses difficulties, as it is highly informal and the cluster is located nearby (within a radius of 300 km) from major bakra mandis of Madhya Pradesh i.e. Ratlam (80 Km), Indore and Bhopal. Also much of the stock finds its way to Mumbai as it is hardly within 12 hrs drive from Banswara. Breeders sell to traders who take animals to larger terminal markets as stated above. Traders are an organized group called Khatiks and look out for each other. They are an extremely tight community and make good profits from buying and selling livestock. This means it is not possible to eliminate them as middlemen, and the best option is to ensure fair prices are paid to the breeders. Otherwise, animals have to be brought live out of the state. Transportation cost for these movements is high, but traders who buy locally can organize themselves in groups to transport animals.

Major constraints in goat meat value chain in the cluster:

The process of goat selling and buying though deeply associated with the weight of the animal, do not involve any weighing of animals. • Goat rearers sell male goat and old female goats to traders visiting from nearby cities and town. The price of the animal is quoted by the trader first (on visual estimate) and not by the goat rearer. • Rearers are unaware of the live weights of the animals and fail to correlate the price of the sale with the live weight of the animal. Meat equivalent to 50-60% weight of the animal (depends on age and feed intake) can be obtained from the animal. Social taboo of meat handling also keeps the rearer uninterested. • Rearers have a tendency to sell off their male stocks at an early age. Fear of mortality and losses instigate rearers to sell off the male stocks early. Lack of proper knowledge on efficient and good animal management is generally absent, which increases mortality. • Old female goats are also sold off at very low prices for meat purposes. These goats are used for Defence Cantonment supplies as well as consumption in block/district level meat shops. The Defence Supplies generally go at very low tender rates (Rs 40-50 per kg) where supplying male goats is not viable for the supplier. • All goat parts have commercial value. Goat wool is sold at Rs 10-12 per kg to local traders who supply it to carpet industry in UP, Haryana and within Rajasthan. The skin of the animal is valued at Rs 70-80 per piece and the head for Rs 100.

Factors affecting sale price of goat by farmers:

i) Rearers also end up selling animals at a wrong time due to cash crunch. Generally business planning of selling animals in the festive seasons of Eid is absent. ii) Deciding the quantity of

saleable meat in the goat. On an average the quantity of meat is found to be 50 to 60 % of the live weight of the animal, iii) The look and health of the animals. A sick animal will fetch a very low price. iv) The season and time of the year. Especially during Eid, animals fetch better prices. At this time goats are not judged by the above-mentioned points but by the sacrificial value of the animal. Although sick and imperfect animals are not sacrificed, some animals can fetch a fortune if it has certain religious marks like a star or a half moon etc. on its body.

3.4.3. Fodder Requirement of Kushalgarh cluster

The data given in the, Annexure3.7 indicates the fodder requirement of livestock population of Kushalgarh cluster at 57886 MT. It has to be fulfilled from the fodder to be produced in the cluster and if there is some gap, then two current measures have to be followed, one is to increase production within the cluster through promoting cultivation practices and second is to import from the area outside the cluster.

Fodder availability in Kushalgarh Cluster

The table presented above reveals the estimated total requirement of dry matter (Fodder) is 58929 M.T. against the fodder availability 57886 MT which is matching the requirement. (Refer Annexure 3.7)

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

4.1. Opportunities and challenges

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

#	Season/Type	Crop
1	Kharif	Soybean, Maize
2	Rabi	Bengal gram, Maize

(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. Bengal gram

Bengal gram is a major Rabi crop grown in Kushalgarh cluster. Bengal gram is mainly grown for Dal and Flour purpose.

Strength	Weakness
• India is the largest producer of Bengal Gram in the world and accounts for around 70% of the global production. • Madhya Pradesh, Rajasthan, Uttar Pradesh, Andhra Pradesh and Maharashtra are major cultivators of Bengal gram in India. • Chickpea/kabuli chana is also traded as whole after undertaking cleaning and grading • Sprouted seeds of Bengal gram are recommended for curing scurvy. Malica and Oxalic acids collected from green leaves are prescribed for intestinal disorders. Gram seeds contain a higher percentage of oil (4-5%) than other pulses. • It also has unique characteristic of maintaining and restoring soil fertility. • Chick peas serve as energy and protein source in animal feed and thus making its demand high in the feed industry. • As against difficult to mill varieties like Pigeon pea or Mung bean, Chickpea is an easy to mill variety of pulse. De-husking of chickpea, as a matter of fact, does not require application of oil for loosening of husk.	• Nearly 9.5 % of post-harvest losses are accounted in Bengal gram • Shortage/surplus production, coupled with imports level, make the prices of chickpea unstable which obviously affects producers and consumers both. • The production of the crop is seasonal, but its demand remains for a longer period. Thus, storage facilities are essentially required but not adequately available. Due to inadequate infrastructural facilities with producers, traders, millers and at market level results in marketing inefficiencies • Limited processing units for Bengal gram and its by-products such as Bengal gram dal units, roasted Bengal gram units, etc. • Inadequate grading & sorting facilities. • Large number of intermediaries in the chain leads to low income to producers. • No grading at farm level • Obsolete techniques are used in processing, which reduces the output. • Lack of market information regarding prevailing prices, arrivals etc. force farmers to sell in the

• By-products of Chickpeas are used for processing of popular products like Gram Flour (Besan; one of the main ingredient of famous Bikaneri bhujiya and many other delicacies) and animal feed. • Chickpeas also offer higher protein content than other pulses (except red lentils)	village itself.
Opportunity	**Threat**
• Scope for tie up of FPOs through CFC with firms like Patanjali, Aashirvaad, Ruchi global, LDM Agro, etc. • Scope for tie up of FPOs through CFC with dal mill associations/MSME firms • Scope for tie up of FPOs through CFC with housing societies in urban areas and retail outlets • Scope for facilitation of start-ups amongst FPOs or individual entrepreneurs, in secondary processing of value added products of Bengal gram like dal, flour, snacks, animal feed, etc. • Scope for the 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. • Scope for establishment of storage facilities by FPO as a part of FCSC. • 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 • FPOs to undertake custom hiring services and hence lead farm mechanisation through CFC • Large Scope of advanced level innovation and development of products like low fat-high protein biscuits/crackers, nutrition bars, pasta, etc. • Large scope of contract farming, buyback contracts and participation in tenders, etc.	• Adverse climatic conditions can impact the crop production and productivity • Abrupt or less rainfall during various developmental stages of Bengal gram may reduce production or cause pest/disease attack. • Taxation related policies (for example – proposed 5% GST on branded goods) liberal imports, etc. affects the price level. • Processors operate on low profit margins and are also exposed to high speculation of prices in market, also increasing the probability of sickness.

4.1.2. Soybean

Soybean is a major Kharif crop grown in Kushalgarh cluster. Soybean is consumed in the form of whole pulse as well as other processed forms like soy milk, tofu, etc.

Strength	Weakness
• Low risk crop • Higher profit than other crops • Lower water requirement • Cost of cultivation is low • Lower incidence of pest and disease attack • High demand for the value added soya products in the market • The growing consciousness of the public on processed products of soybean • High net returns for value added products • High value for the soya products at Nation and International level • Entry of branded companies into the soya markets like Reliance, Orion commodities and services Pvt. Ltd., Ruchi Soya	• Lack of proper and adequate market intelligence system • Low income-generating black soybeans are favored by the farming community. • Limited farmers have access to information about the price and arrivals of the soybean in different markets • Dearth of adequate good storage facilities for the producers • Most farmers sell their produce without any grading which fetches poor price in the market • Lack of facilities for oil testing to determine the oil content in produce leads to poor value accrual • Inadequate processing units for soybean

Industries Ltd-Indore, Gujarat Ambuja Exports Ltd-Pithambur, Prestige food Ltd-Indore and Agro Solvent Products Pvt. Ltd-Gwaliar, Adani Wilmar, Mahyco, Eagle Seeds & Biotech, Gokul Refoils & Solvent, etc.	such as soymilk processing units, certified seed production and trading units, etc. • Low labour availability for farming activity • Picking (harvesting) of soybean pods is difficult • Non availability of quality seed • Dwarf and low yielding varieties • Improper postharvest handling
Opportunities	**Threat**
• Ties with firms like Reliance, Orion commodities and services Pvt. Ltd., Ruchi Soya Industries Ltd-Indore, Gujarat Ambuja Exports Ltd-Pithambur, Prestige food Ltd-Indore and Agro Solvent Products Pvt. Ltd-Gwaliar, Adani Wilmar, Mahyco, Eagle Seeds & Biotech, Gokul Refoils & Solvent, etc. • Ties with soybean processing associations • Oil content testing facilities are also required. • Facilitate start-ups in secondary processing (production of value added products of soybean like soya flour, oil, milk, chunks, etc.) from amongst FPOs or individual entrepreneurs • Establishment of quality sorting and grading facilities by FPOs as part of Farmer Common Services Centers (FSCS), along with facilities for packaging and vehicle to facilitate transportation • Establish storage facilities by FPO as a part of FCSC • High value yielding yellow variety of soybean may be popularised for cultivation to make soybean cultivation more profitable. • Market information about different markets needs to be made available to producers. • FPOs to undertake joint input sourcing activities for seeds, fertilizers, pesticides, etc. • FPOs to also undertake custom hiring services and hence lead farm mechanisation • Resists soil fertility from erosion due to its dense foliage • Chances of reducing Nitrogen containing fertilizers as it fixes N into the soil • Soya products are considered as the best way to combat malnutrition • Assured marketing of soya and soya products • Chance to explore the market to meet the existing demand and supply requirement	• High temperature during summer reduces the seed viability • Heavy rainfall during the last stage of the crop • Non availability of seed in time • Stiff competition in increasing the cultivable area from hybrids and Genetically Modified varieties of maize and cotton • Weak Information management systems on soybean production • Predominance of a single variety in cultivation • Lack of facilities available to prepare soybean products like soya chunks, soya biscuits, etc. • Fluctuation in market prices • Intense competition from other states to market the soya produce

4.1.3. Maize

Maize is a major Rabi crop grown in Kushalgarh cluster.

Strength	Weakness
• Maize ranks as a major crop world wide	• Lack of Primary processing facility for cleaning and grading of maize, which can enhance net

• Yellow maize is largely used for animal feed and white maize as food crop with growing demand • USA is the leading producer country followed by Argentina, Brazil, and Ukraine • A.P , Karnataka, Bihar , Maharashtra, and Rajasthan are important producers in India • Good demand by poultry industry in India constitutes 47% of demand for India's production • Rajasthan is the leading producer of white maize in India.	value accruals to farmers by over 10% • Maize dryers are not available in APMCs nor at village level traders resulting in low price realisation for farmers.
Opportunity	**Threat**
• Growing global demand from Japan, Mexico, EU, South Africa, and Egypt. • Chittore followed by Banswara and Bundi are important producing districts in Rajasthan with scope for related PC led intervention • Great scope for value added products like corn starch, corn oil, corn syrup made of starch of corn used in food to roughen texture, add volume and flavor, corn flakes, etc. • Corn yield per acre is about 20 quintals in many sectors and gross sale value is Rs 1600 per quintal or total yield of Rs 32000 per acre and yielding increase Rs 11,164 per acre- a good income stream for rainfall agriculture.	• Natural Calamity may impact the production of maize • Lower international forces of corn can impact Indian market prices of maize. These lower prices could be credited to global oversupply.

4.1.4. Goat

Strength	**Weakness**
• 69 goat specific MTGs, and 3531families own 11094 goats, averaging around 3 goats per goat rearing family. • It is a good livelihood option as most of the farmers are small and marginal • Goat milk is healthy and the cluster has a potential for collecting around 8790 L of goat milk per day. • The weather supports goat rearing • It is a secondary source of livelihood for the farmers • There is sufficient availability of fodder and water in the cluster for goat rearing • Kushalgarh is near to major markets in Madhya Pradesh i.e. Ratlam, Indore and Bhopal • Many traders also take goats from Banswara area to Mumbai on regular basis	• Low milk yield and weight gain of non-descript goat population • Low penetration of animal health services and poor infrastructure of exiting animal husbandry institutions • Lack of knowledge of scientific goat husbandry practices specially feeding, breeding and management among farmers • Low resources specially among small holders for housing and feeding • Lack of aggregation practices for bulk procurement and marketing • No update knowledge of improves goat husbandry practices among veterinary professionals • Poor marketing practices • Poor Livestock resources (low milk and meat yield) and very poor mechanization resources leads to poor return to the farmers of the project area.
Opportunities	**Challenges**
• Goat specific FPC, and support system from the RACP project provide enough opportunity for the goat rearers in the area for enhancing livelihood opportunity through creating new value chain for milk	• Mortality remains a challenge for the farmers and hence they sometimes tend to sell small animals at half body weight (meat estimation basis). • Traditional Live animal selling practices of

and efficient value chain linkages for live goat marketing • Goat cheese can be a good option and marketed with premium price. Fetches around Rs 1000 to 2000/kg depending upon quality. Mostly sold in five star hotels.	without weighing the animal •

4.2. Constraints in value chain crops of Kushalgarh Cluster

Certain general loopholes observed in the cluster which indirectly impact the value chain of the crops are as follows-

- Mobilization- As farmers are scattered across cluster and reside in the farm itself which makes it difficult to mobilize and federate them.
- Migration- Male farmers migrate to the nearby states for labour work and women farmers are more active in farm practices.
- Literacy- Banswara is largely tribal belt where education level is very poor.
- Cultural issues- Male farmers tend to consume local liquor and waste lot of time in getting social rather than focusing on farming. It ultimately reduces their efficiency as well.
- Rigidity- Due to low literacy level, the farmers are reluctant towards adoption of advance and scientific farming practices.
- Economic condition- Very poor economic condition of farmers compels them to sell their produce in small parts to local traders and middlemen for immediate credit requirements.

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

Bengal Gram

Bengal Gram is a major Rabi crop along with Wheat & Mustard. There is increase in cost of production of Bengal Gram due to fluctuation in price of seeds

Soybean

In Kharif season Soybean has largest area under cultivation in the Kushalgarh cluster. Productivity & production level in the cluster is low for following reasons

a. Use of new high yielding certified, truthful varieties of Soybean, SRR (seed replacement ratio) is low in the cluster.
b. No seed treatment practice followed.
c. Improper field preparation, Timely sowing, Proper row and plant spacing, seed rate is not maintained
d. Improper IPM (Integrated Pest Management) .
e. Improper irrigation at critical stage and inadequate use of water.
f. Improper weed management

Maize

There is unavailability of HYV seeds of maize as well as unawareness among farmers regarding the same.

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.

Increasing adoption level of producer: Farmers are trained with production lead extension approach till date but hence forth market led extension approach is necessary to increase farmers' income in terms of money. For increasing level of adoption of good agriculture practices to reduce constrains in value chain of crops following strategies are proposed in agriculture extension:

- Multi- agency Extension Strategies
- Farming System Approach
- Convergence of ongoing schemes
- Sustainability of Extension Services
- Improving productivity and income of existing crops.
- Promoting diversification and or intensification of crops and enterprises
- Improving sustainability in production and income
- Mobilization of farmers Groups
- Increasing Research- Extension – Farmers linkages by organizing farmers –scientists' interaction, Field Days and Kisan Goshties farmer field schools.
- Farmers oriented activities for their capacity building regarding production, post-harvest management, value addition, processing and marketing
- Farm Information Dissemination through District level exhibition, Kisan melas, fruit, vegetable shows, information dissemination through Printed materials, technology package, electronic media
- Mainstreaming Gender Concern

4.2.2. Post-Harvest related constraints

Bengal Gram

There is lack of Primary processing facility except sun drying in Bengal Gram at farm level. Cost of transportation of carrying crops to market is very high.

Soybean

Soybean cannot be harvested directly through Combine harvester hence manually harvesting and threshing takes place which is laborious and tedious task. Sun drying is difficult due to cloudy conditions and high humidity at the time of harvesting. Unavailability of labour, threshers and commercial dryers in peak harvesting period hampers the quality of produce

Maize

Unavailability of appropriate storage facilities even at block level causes the damage to the maize grains as the moisture level increases.

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 Grain and pulses 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

Bengal Gram

Major units of Bengal Gram processing are available at Bikaner city which deal in Primary & Secondary processing.

Soybean

Processing facility is set up at about 25 to 35 km from the cluster area by the private ltd companies like Ruchi soya who are procuring material from traders from APMC with advance payments. They

are interested to procure from farmers through farmer producer organisations only and not from individual farmers at Factory level .

Maize

Market not available at block or district level hence the farmers sell their produce to local vendors. Resource limitation is there in terms of transportation facility, knowledge centre, scattered habitat, purchasing power, migration (20%), credit facilities (only 2 banks in the cluster)

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.

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 Kheruwala 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 Bengal Gram 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.

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

Adoption of grading: Grading of Bengal gram and Green gram 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 Groundnut 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 adv**ersely**

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. As per the discussion carried out by Team ABPF with some of the processors regarding contract farming, the common issues and 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.

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.

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.

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

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

4.3.1. Bengal gram:

Table 14: Indicative intervention plan of Bengal gram value chain

Sr. No.	Constraints	Action
1.	**Production**	
1.1	Limited knowledge of Bengal gram production technologies and inadequate availability about improved & good quality varieties of Bengal gram among producers	To promote both table purpose varieties and processing purpose varieties
2.	**Post-Harvest**	
2.1	Contractual harvesting of Bengal gram	Setting up alternate channel to sell directly through PC to processor or large retail shops like Walmart, Big basket
2.2	Due to same harvesting time prices collapses and hence storage/pack house option could help reduce distress sale.	Storage facility/ mini cold storage for farmers as part of FCSC
3.	**Processing**	
3.1	Lack of precooling and cold storage facility in the cluster	Setting up pre cooling and/or cold storage facility as part of FCSC or individual enterprise or start ups
3.2	Limited processed product available in the market which limits the marketing potential of the commodity	Facilitate the entrepreneur development to set up small scale processed product like Bengal gram powder, paste, peeled Bengal gram
3.3	Lack of proper washing and cleaning facility	To make farmer aware about quality parameter of Bengal gram for processing like value added products; washing facility as part of FCSC

4.3.2. Soybean:

Table 15: Indicative intervention plan of Soybean value chain

Sr.no	Constraints	Action
1.	**Production**	
1.1	Low income generating black soybean are favoured by the farmer community and not HYV yellow soybean	PCs to undertake input sourcing activities under the joint umbrella of FCSC to facilitate

2.	Post-Harvest	
2.1	Dearth of adequate storage facilities for the producers	Establish storage facilities by PC as a part of FCSC
2.2	Limited access to market intelligence about price arrivals of the soybean in different markets	Market intelligence system to be developed in FCSC
3.	**Processing**	
3.1	Lack of facilities for oil testing to determine the content in produce resulting in increased price yield to farmers	Oil content testing facilities as part of FCSC
3.2	Inadequate processing unit of soybean such as soymilk processing unit, soya chunks, soy paneer.	Facilitate start up in secondary producing from amongst PCs or individual entrepreneurs
3.3	Lack of any cleaning grading unit of soybean	Establishment of quality sorting and grading by along with facilities for packaging & vehicle to facilitate transportation through FCSC

4.3.3. Maize:

Table 16: Indicative intervention plan of Maize value chain

S.no	Constraints	Action
1.	**Production**	
1.1	Unavailability of high yielding varieties of maize for farmers	Seed production programme using sources of Raj seeds etc.
1.3.	Lack of appropriate post-harvest equipment	Promotion of small scale units with harvesting and shelling facility; also may be part of FCSC
2.	**Post-Harvest**	
2.1	Moisture content in harvested maize is high	Drying facility at farmer level through PC
2.2	Dearth of adequate storage facility	Storage facility for farmers as part of FCSC
2.3	Higher level of dirt and impurities in harvested maize	Provide cleaning and grading facility to farmers as part of FCSC
3.	**Processing**	
3.1	Limited number of processing units such as poultry feed mill and maize flakes manufacturers in the region	Facilitate start up in secondary processing from among PC members or individual entrepreneurs; ties with large players such as Cargill
3.2	Lack of packaging facilities which result in losses as well as contamination	Provision of packaging facilities as part of FCSC.
3.3	Lack of initiatives towards securing direct purchase licence	Dissemination of information on benefits of direct purchase licence (should be issued to processing units without linked conditions ideally)
3.4	Cess is levied on utilized raw materials which affects procurement optimisation by processors	To reconsider the provision under form 8 where cess is levied if raw material is not utilized within 30 days

4.3.4. Goat

S.no	Constraints	Action
1	Production	
1.1	Most of the available animals are non-descriptive resulting in low yield of milk/meat	Distribution of bucks of good variety
1.2	Farmers do not take proper care of the goats	Training on improved goatry practices including housing, feeding, grazing etc.
1.3	Mortality of goats	Rural Technology Center for providing health care services and promoting rural employment
2	Marketing	
2.1	Non availability of live goat marketing infrastructure	Promotion of goat marketing through FPC through rural haat.
2.2	Non availability of community institution for goat rearers	Promoting a goat specific FPC

4.4. Interventions through FPC in the value chain crops of Kushalgarh cluster

4.4.1. FPC Development Approach

The FPC development approach may be viewed as depicted below:

Figure 6 FPC Development Approach

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 investments

Post-Harvest infrastructure is of great relevance to smallholders, 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 on the market.

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. 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.

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

Soybean, Maize, Wheat, gram, sorghum and black gram are the major crops of the cluster. Use of sprinklers as well as drip irrigation is inevitable 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 maize and cotton crop and improved seed of the wheat crop is being used but the seed replacement rate (SRR) for Gram, Black gram, maize, sorghum 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 mustard 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.

Proposed Cropping Pattern and Productivity of field Crops in Kushalgarh Cluster for the Project Period

The proposed cropping area and cropping pattern (has been calculated on total cultivated area i.e. 6569 ha and productivity of value chain crops in Kushalgarh cluster for the project period is proposed to be as under:

Table 17 Proposed Cropping Pattern and Productivity of Crops

Name of crop	Proposed Area (ha)	Proposed Cropping Pattern (%)	Proposed Productivity (Kg. / ha)
Kharif			
Maize	2626	39.98%	1879
Soybean	1360	20.70%	2049
Cotton	1000	15.22%	1650
Black gram	511	7.78%	975
Paddy	1050	15.98%	1550
Sub total	**6547**	**99.67%**	**-**
Rabi			
Wheat	1260	19.18%	2706
Gram	750	11.42%	1090
Rabi Maize	99	1.51%	
Sub total	**2109**	**32.11%**	**-**
Grand Total	**8656**	**131.77%**	**-**

The investments and Cost Estimates under Agriculture Subcomponent under RACP Kushalgarh

To achieve the above proposed cropping pattern and productivity level, the Seed Replacement Rate has to be increased so that productivity can be increased. To promote farmers to achieve above targets following investments of amounting **Rs.893.59 lacs** have to be done under Agriculture sub component. Out of this total amount of **Rs.716.90 Lacs** is to be provided by the project and **Rs.176.69 Lacs** will be borne by the beneficiaries.

Table 18 Investments and Cost Estimates under Agriculture Subcomponent under RACP Kushalgarh

S. No.	Name of sub-component	Unit	Unit Cost	Assistance (%)	Physical	Assistance	Beneficiary Contribution	Total Project Cost
						Financial Rs. In Lacs		
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	10	10.88	3.63	14.50
3	Drip Irrigation System	ha	1.10	75	25	24.375	8.12	32.50
4	Mini/ Micro Sprinkler Irrigation System	ha	1.00	75	70	47.25	15.75	63.00
5	Sprinkler Irrigation System	ha	0.20	75	417	62.50	20.83	83.33
6	Pipeline for piped conveyance of irrigation water	100 mtr	0.10	75	533	40.00	13.33	53.33
	Subtotal 1A					**193.25**	**64.42**	**257.67**
1B	Sub Component 1B: Technology transfer and market led advisory services (Promoting Adoption and Documentation of Improved Technologies)							0.00
1	Soil Testing	Nos	0.00	100	1000	1.00		1.00
2	Demonstrations on production technologies for value chain crops to bridge gap	ha	0.10	75	1750	117.24	39.08	156.32
3	Demonstrations on farm mechanization and PHM technologies	Nos	1.00	75	110	82.50	27.50	110.00
4	Demonstrations on forage/ fodder	ha	0.10	75	230	17.08	5.69	22.77
5a	1. Promotion to seed production	ha	0.05	100	800	40.00		40.00
5b	2. Promotion to Adaption support	ha	0.05	50	1100	27.50	27.50	55.00
6	Innovative activities/ INM/ IPM	No.	1.00	75	50	37.50	12.50	50.00
	Subtotal 1 Ba					**322.82**	**107.61**	**430.43**

S. No.	Name of sub-component	Unit	Unit Cost	Assistance (%)	Physical	Assistance	Beneficiary Contribution	Total Project Cost
						Financial Rs. In Lacs		
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		7.00
2	Agriculture Research Institute strengthening to serve as level II/ III platform for ICT	Nos	1.00	100	1	3.00		3.00
3	Honorarium to the experts for solution of the problems and facilitate field visits	LS	1.00	100	2	2.00		2.00
4	Digital instruments to field coordinator/ staff	Nos	0.50	100	20	10.00		10.00
5	Potential threats led/ Pro-P based literature on cluster specific crops	Nos	0.50	100	2	1.00		1.00
	Subtotal 1 Bb					**23.00**	**0.00**	**23.00**
	Subtotal 1 Ba +1 Bb					**345.82**	**107.61**	**453.43**
	Subtotal 1 (1A + 1 B)					**539.07**	**176.69**	**715.76**
3	**Component 3: Farmer Organization and Capacity Building**							
1	Field days, exposure visits, orientation, capacity building	LS		100	16	21.31		21.31
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	0	147.46		147.46
	Sub Total 3					**168.77**	**0.00**	**168.77**
4	**Component 4: Project Management, Monitoring and Learning**							
1	PIA Operating costs including Photostat, computer typing & printing, fax, Machine with man, mobility (hired taxi/POL), TA/DA etc.	LS	3.00	100	2	9.06		9.06
	Subtotal 4					**9.06**	**0.00**	**9.06**
Total Cost (Agriculture Department)						**716.90**	**176.69**	**893.59**

5.2.2. Horticulture

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

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 growth strategy, therefore, needs to be on raising productivity by supporting high density plantations, protected cultivation, efficient irrigation methods i.e. micro irrigation, quality planting material, rejuvenation of senile orchards and a thrust on post-harvest management to ensure that the farmers do not lose their produce in the 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 provides immense opportunity for the cultivation of flowers and fruits as well as vegetables. The area is suitable for fruits like Guava, Mango, Lemon and Pomegranate etc., hence, the area under Soybean and Maize in Kharif crops, would be diversified in to the cultivation of vegetables and fruits crops. Looking to the potentiality and acceptance of the area Chilli, Tomato, Okra and Brinjal in vegetable crops, Pomegranate, Guava, Mango & 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.

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

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. The 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.

a. Wide spacing 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. The farmers shall be provided planting material, drip system, mulch, fertilizers and plant protection chemicals.

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

b. 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 orchard gives higher yield as well as returns/unit area due to increasing the no. of plants/unit area resulting 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. 167.12 lacs is to be incurred for demonstration and establishment of 40 ha orchards with Mango HDP (5x5m spacing). The assistance will be provided to farmers 75% of total unit cost Rs. 5.57 lacs 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 the farmers and involvement of high level of technical skills, the rate of adoption of vegetable as well as floriculture is not picking up the 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. 365.00 lacs is to be incurred on demonstration and cultivation of 125 ha with Chilli, Tomato, Brinjal, Okra, which are the leading crops & selected for demonstration. The assistance will be providing to farmers 75% of total unit cost Rs. 2.92 lacs in different inputs.

On farm Demonstration on Protected Horticulture

The protected cultivation has opened avenues for intensifying the land use. This can provide excellent avenue for small size of holdings owned by families having ample of 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 cluster.

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

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. The total investment of Rs. 110.00 lacs is to be needed for establishment of green house in 10,000 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 protect 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 is 75% of total cost of 0.009 per sqm .The total investment for shade net house is Rs.18.00 lacs for 2,000 sqm.

Solar Pump Program:

Energy as input in horticulture has great importance as with increase in intensity of production we need may 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 lac 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 watts 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.165.00lacs for 30 SPV.

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 the 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 lacs. The maximum assistance will be provided 50% of the unit cost of Rs. 28 lacs.

Horticulture Mechanization:

Mechanization is the effective tool to reduce the 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 Lac has been kept for the implements/ mechanization technology per unit.

The total investment for this activity is Rs. 30.00 lacs. The maximum assistance will be provided 50% of the unit cost of Rs.7.5 lacs or 50% of the total cost of machinery and equipment.

Horticulture Mechanization:

With a view to produce more crop per drop of water and also to obtain higher and qualitative yield from horticulture crops, assistance would be provided to the 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 drip irrigation system. A unit cost of Rs. 0.80 lacs for establishment of drip irrigation in fruit orchards and Rs. 1.30 lacs for vegetable cultivation has been decided. Farmers would be provided 75% assistance for adoption of drip irrigation system. The total investment for this activity is Rs. 34.0lacs.

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 as per Capacity Building Manual by line department and as per need training will be conducted by Irrigation Management and Training Institute (IMTI), Kota and other suitable institute.

Proposed Cropping Pattern and Productivity of Horticultural Crops in Kushalgarh Cluster for the Project Period

The proposed cropping area and cropping pattern (has been calculated on total cultivated area i.e. 6569 ha) and productivity of horticultural crops in Kushalgarh cluster for the project period is proposed to be as under:

Table 19 Proposed Cropping Pattern and Productivity of Horticultural Crops in Kushalgarh Cluster for the Project Period

Name of crop	Proposed Area (ha)	Proposed Cropping Pattern (%)	Proposed Productivity (Kg. / ha)
Vegetables			
Tomato	50	0.76%	13500
Brinjal	30	0.46%	12500
Okra	50	0.76%	9000
Total Vegetables	**130**	**1.98%**	**-**
Fruits			
Pomegranate	50	0.76%	11000
Mango	60	0.91%	9000
Total Fruits	**110**	**1.67%**	**-**
Total Horticulture	**240**	**3.65%**	**-**

Investments under the horticulture sub component

Total **Rs.1472.05 lacs** is proposed to be invested on inventions mentioned above of horticulture sub component to make farmers competitive for getting optimum water as well as horticultural productivity in Kushalgarh cluster. Out of this an amount of **Rs.1068.01 Lacs** would be incurred from project and **Rs.380.04 Lacs** would be borne by the beneficiaries. The investments are being summarized as under:

Table 20 Investment proposal under horticultural sub component

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Grand Total (Rs. In lacs)			
						Phy.	Financial		
							Farmer share	Project	Total
I.	**Component 1: Climate Resilient Agriculture**								
IB	**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	2.108	105	73.71	221.34	295.05
i.	First year Maintenance support	ha	0.58	75	0.435	70	10.15	30.45	40.6
ii.	Second year Maintenance support	ha	0.75	75	0.561	30	5.67	16.83	22.5
2	High density plantations	ha	5.57	75	4.178	40	55.68	167.12	222.8
i.	First year Maintenance support	ha	1.09	75	0.818	50	13.6	40.9	54.5
ii.	Second year Maintenance support	ha	1.32	75	0.986	30	10.02	29.58	39.6
3	Assistance on production technologies for vegetable Cultivation	ha	2.92	75	2.19	125	91.25	273.75	365.0
4	Assistance on green house	SqM	0.01	75	0.00816	10000	28.4	81.6	110
5	Assistance on shade net house	SqM	0.01	75	0.00647	2000	5.06	12.94	18.00
6	Solar Pump Program	Nos	5.5	70	3.85	30	49.5	115.5	165
7	Post-Harvest Management	Nos	28	50	14	1	14	14	28
8	Horticulture Mechanization	Nos	7.5	50	3.75	4	15	15	30
9	Micro Irrigation in Horticulture Crops (Drip System)	Ha							
	Fruits		0.80	75	0.60	10	2.0	6.0	8

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Grand Total (Rs. In lacs)			
						Phy.	Financial		
							Farmer share	Project	Total
	Vegetable		1.30	75	0.975	20	6.0	19.0	26
	Sub Total IB						**380.04**	**1044.01**	**1425.05**
III.	**Farmer's Organization and Capacity Building**								
1	2 days Farmer's training (50 farmers in each)	Nos	1	100	1	12	0	12	12
2	Exposure visit for 50 farmers for 5 days	Nos.	2	100	2	6	0	12	12
3	Seminar for 100 participants for 2 days	Nos.	2	100	2	6	0	12	12
	Sub Total III					**24**	**0**	**36**	**36**
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	0	0		11	11
	Sub Total IV						**0**	**11**	**11**
	G. Total						**380.04**	**1068.01**	**1472.05**

5.2.3. Livestock

RACP envisage investing and working in a cohesive way with all the identified components for benefitting the farmers especially the small holders in a sustainable manner, up-scaling the successes and documenting the learning. For the purpose it is planned to prepare the Cluster Agriculture Competitiveness plan (CACP).The CACP have a defined objective and after analyzing the 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 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 of Identified and eligible Investments under project are as under.

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 improving market access and local level small value addition.

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

Project management & Monitoring

The impact of investment will be derived from increased profit to farmers by getting 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 in marketing.

Water Productivity in Goats

The economic gain to farmers through Goat rearing on the basis of per unit water consumption is estimated. Following assumptions has been taken to attain body weight of 30 Kg in one year; 245 Kg of feed and 249 litters of water consumption and feed cost Rs.10/-per kg and management cost is 30% of the feed cost with 10% mortality assumed.

Calculation of gains is based on cost of live weight at the rate of Rs.200/- per Kg. For a flock of 100 goats considering 10% mortality net earnings to the farmer is Rs.2533/- per Goat. Economic gain in terms of water consumption is Rs.5.18/- per litre of water.

Estimated Cost of Investments on Livestock activities

An estimated cost amounting of **Rs.773.81 lakh** to be incurred as tentative investments to be implemented in Kushalgarh cluster. Out of this an amount of **Rs.728.77 Lakh** will be provided by the project and rest **Rs.45.04 Lakh** will be borne by the beneficiaries. The tentative Action Plan & Cost Estimates for Kushalgarh cluster is being summarized as under:

Table 21 Estimated Cost of Investments on Livestock activities

S. NO.	Items	UNIT	Unit cost (Rs. In lac)	Assistance (Rs. In lac)	Physical	Total Financial (Rs. In Lacs)		
						Farmer Share	Project Cost	Total Cost
I.	**Climate resilient agriculture**							
1 C	**Livestock Strengthening and Management**							
3	Distribution of bucks (farmers)	No.	0.100	0.075	400	10	30	40
4	Distribution of goats (widows & disabled) (one unit of 4 goats)	No.	0.32	0.320	80	0	25.6	25.6
5	Goat insurance(8% per annum) of units receiving improved bucks and does	No.	0.008	0.006	720	1.44	4.32	5.76
6	Veterinary Health Camp support (one camp Per GP Per month)	No.	0.05	0.050	660	0	33	33
7	Establishment of regional technology center (rtc)							0
i.	A- grade	No.	60	60.000	1	0	60	60
ii.	B- grade	No.	30	30.000	2	0	60	60
8	Vehicle for emergency animal health services	No.	10	10.000	1	0	10	10
9	Operating cost of RTC including POL for Vehicle **	No.	3.6	3.600	6	0	21.6	21.6
10	Link worker/MF honorarium (One per Gram Panchayat)	No.	0.36	0.360	30	0	10.8	10.8
11	Azolla demonstration	No.	0.065	0.065	800	0	52	52
12	Housing supports ***	No.	0.66	0.495	80	13.2	39.6	52.8
13	FEEDING & water TROUGHS DISTRIBUTION	No.	0.05	0.038	800	10	30	40
14	Travis installation in project villages (one per village)	No.	0.15	0.150	49	0	7.35	7.35
15	Distribution of chaff cutter	No.	0.08	0.060	520	10.4	31.2	41.6
16	Animal identification							0
i.	Tags	5000 Nos	0.00018	0.00018	5000	0	0.9	0.9
ii.	Needle	5000 Nos		0.000		0	0	0
iii.	Tag applicator	5000 Nos	0.015	0.015	10	0	0.15	0.15
17	Weighing balance	No.	0.01	0.010	1200	0	12	12
18	Feed supplement distribution	No.	0.00126	0.001	11094	0	13.97844	13.97844
17	ICT Support for LLW/MF	No.	0.1	0.100	15	0	1.5	1.5

S. NO.	Items	UNIT	Unit cost (Rs. In lac)	Assistance (Rs. In lac)	Physical	Total Financial (Rs. In Lacs)		
						Farmer Share	Project Cost	Total Cost
18	ILD centre	N0	10	10.000	0	0	0	0
	Sub total					**45.04**	**444.00**	**489.04**
II.	**Market & value chain**							
1	Formation of mtg (goat)	No.	0	0	80	0	0	0
2	Establishment of rural haat****	No.	200	200	1	0	200	200
3	Clean milk production	No.	0.01	0.01	2400		24	24
4	Goat milk collection & value add	No.	25	25	0		0	0
	Sub total					**0**	**224**	**224**
III.	**Farmers Organisation & capacity Building**							
1	MTG members Goat Management	No.	0.02763	0.02763	1200	0	33.156	33.156
2	MTG members Refresher Goat Management	No.	0.00545	0.00545	1200	0	6.54	6.54
3	LLW training	No.	0.075	0.075	13	0	0.975	0.975
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**	**43.671**	**43.671**
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	0	0	0	0
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	660	0	9.9	9.9
	Sub total					**0**	**17.1**	**17.1**
	Total					**45.04**	**728.77**	**773.81**

5. ** Department of AH Rajasthan has given commitment for sustaining these after project period.

6. *** NREGA Model has been adopted so that remaining beneficiaries can be motivated and linked with NREGA for adoption.

7. **** Physical markets are required so that buyers can developed a faith that on particular date at a particular place farmers gather to sell their animals and they can procure required quantity and quality from these rural haats. In an organized market buying selling can occur in an transparent manner. This place will also use for extension of best practices of goat farming, displaying improved technologies, place for producer company meetings and capacity building of CBOs.

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 centres 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: Soybean, Maize and Bengal Gram. 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. **Soybean**

The concept of FPC as suggested in Chapter 4, will get complimented by an FCSC unit. A reference value chain map of pulses, post intervention, is shown in Annexure 5.4.

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 small warehouse with the cleaning and grading unit can ensure better price realisation.

2. **Bengal gram**

The concept of FPC as suggested in Chapter 4, will get complimented by an FCSC unit. A reference value chain map of pulses, post intervention, is shown in Annexure 5.4.

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 mini dal mill with the cleaning and grading unit can ensure premium use of the unit.

3. **Maize**

The concept of FPC as suggested in Chapter 4, will get complimented by an FCSC unit. A reference value chain map of pulses, post intervention, is shown in Annexure 5.4.

Since there is a high demand of dried maize from the feed industry, especially poultry feed, hence an unit with electric dryer and small warehouse can be set up to increase the rate of returns in the commodity.

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 5.5.

- 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. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
1	**Value Added Unit (Common Facility) - FPC**	FPC	30	75%	22.5	4	30	90	120

Start-ups (Private investment)

Minimum 4 startups will be promoted in the cluster district with average investment of Rs. 20,00,000 per startup. The startups will be identified by conducting startup meets periodically in the region. The startups will mainly focus on the secondary processing activities and which may perform the part of backward or forward linkage for the FCSCs formed in the cluster area.

Team ABPF will support this startup in preparation of bankable proposals and will provide technical support in formation of the unit and will guide the investor periodically.

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
1	**Start up**	Private	20	0%	0	4	80	0	80

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

Table 22 Capital expenditure for the common facilities

#	Suggested value chain interventions in the cluster	Amount (Rs.)
1	**Soybean cleaning and grading unit**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Cleaning and grading unit (1 TPH)	800,000
	Warehouse (100 MT)	850,000
	Vehicle (1.5 MT)	650,000
	Total	**3,000,000**
2	**Bengal gram unit**	
	Shed construction (1500 sq ft @ Rs. 700/sq ft)	1,050,000
	Cleaning and grading unit (2 TPH)	1,000,000
	Weigh scales, stitching machines, moisture meter	50,000
	Mini dal mill (1 TPD)	300,000
	Vehicle (1.5 MT)	600,000
	Total	**3,000,000**
3	**Maize dryer unit**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Electric Dryer (10 TPD)	1,100,000

#	Suggested value chain interventions in the cluster	Amount (Rs.)
	Warehouse (100 MT)	700,000
	Vehicle (1 MT)	500,000
	Total	**3,000,000**

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

Table 23 Estimated Cost of Investments on Value chain activities

#	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Phy.	Financial		
							Farmer share	Project	Total
I.	**Component 2: Market and Value Chain (Agri.)**								
	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
3	**Start up (Private investment)**	Private	20	0%	0	4	80	0	80
	G. Total						**118.25**	**138.75**	**277**

5.3.4. Economic impact

The interventions proposed at the initial level are primary in nature and to build up the Agri business activities in the cluster. The process will lead to increase in business acumen of the farmers along with social and environmental development. At primary level, farmers can realize 15% - 20% more income at their farm.

With the model of FPC, there will be an advantage of aggregation which leads in cutting of cost hence increasing the income by 5%-10%. Members will also receive dividend on the profit earned by FPC through business hence, indicatively, farmer will get 35%-40% increased income once a full model of FPC and FCSC along with market linkages gets established.

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

Table 24 Profitability indicators on proposed value chain units

Particulars	Maize dryer (Rs.)	Bengal Gram (Rs.)	Soybean CnG unit (Rs.)	Goat milk chilling unit (Rs.)
Revenue	1,402,500	9,333,360	1,944,000	4,015,000
Total Revenue	**1,402,500**	**9,333,360**	**1,944,000**	**4,015,000**
Fixed Cost (HR, other fixed cost)	225,400	979,500	381,400	221,000
Variable Cost	285,600	7,323,000	731,520	3,016,798
Total Operational Expenses	**511,000**	**8,302,500**	**1,112,920**	**3,237,798**
Earnings Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**891,500**	**1,030,860**	**831,080**	**777,202**
Depreciation	230,000	247,500	222,500	142,388
Amortization	0	0		-
Earnings Before Interest and Taxes (EBIT)	**661,500**	**783,360**	**608,580**	**634,815**
Interest Expense	0	0	0	177,734
Earnings Before Taxes (EBT)	**661,500**	**783,360**	**608,580**	**457,081**
Tax (@ 30%)	198,450	235,008	182,574	137,124
Earnings After Taxes (EAT)	**463,050**	**548,352**	**426,006**	**319,957**
Financial Indicators				
Net Present Value (@ discount rate 10%)	**210,066**	**499,066**	**221,704**	**897,873**
Internal Rate of Return	12.54%	15.25%	13%	25.50%
Payback period in years (Equity)	1.05	2.62	1.16	1
Payback period in years (Total)	3.66	3.5	3.73	3
Breakeven point	34.95%	54.21%	40.91%	17.54%

Detailed Profit and loss statement for all the models including goat milk unit are given in Annexure 5.6.

5.3.5. 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 Kushalgarh 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 8.05 mcm and 5.81 mcm per year. When the investment per unit of water saved is calculated, it is found that watershed activities are able to conserve water at higher investment of Rs.1.99 crore per mcm of water saved, whereas MIS activities can save water at an investment of Rs.1.00 crore per mcm of water per year. MIS activities like installation of drips and sprinklers for the agricultural and horticultural crops can have far reaching impact in the span of a year.

Figure 7: Investment (in Rs crore/mcm) verses Water saved (in mcm) in Kushalgarh

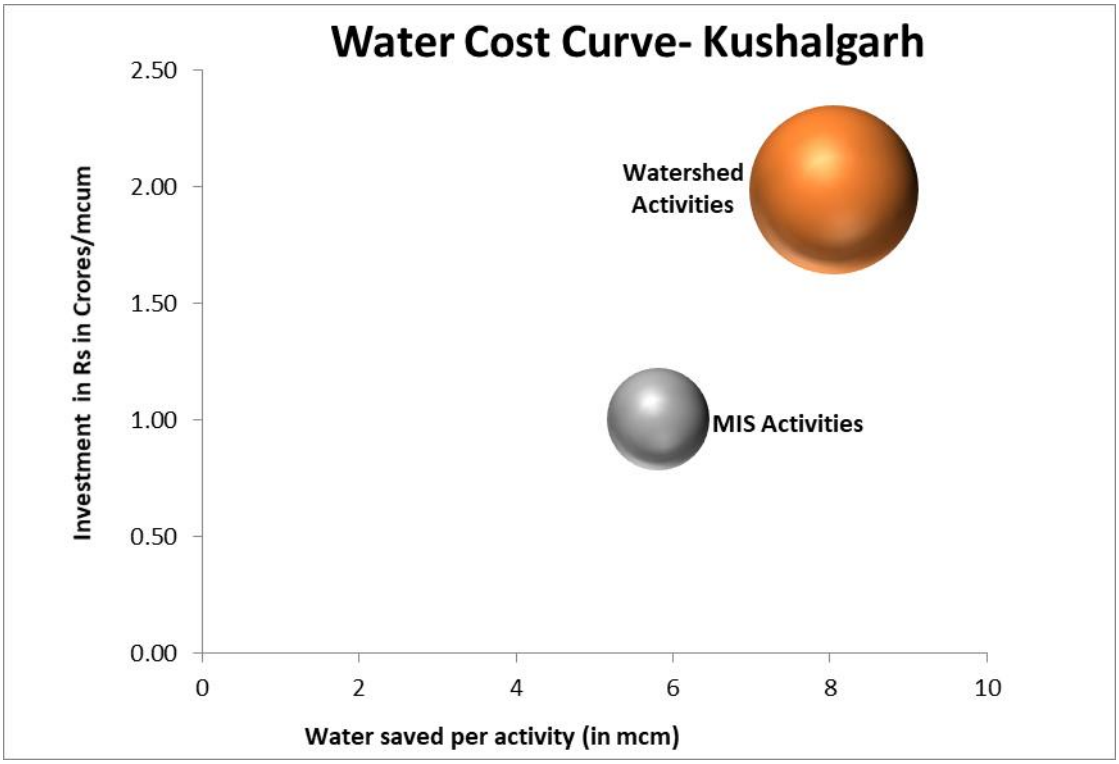


Table 25: Investment (in Rs/mcm) verses Water saved (in mcm) in Kushalgarh

Activities undertaken to save water	Water saved- per year in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	8.05	1.99	16.005
MIS Activities	5.81	1.00	5.83

Chapter – 6: Water Resources Management of Cluster

6.1 Description of watershed cluster

The Kushalgarh watershed cluster of RACP is located in Panchayat Samiti Kushalgarh, Banswara district. There are 49 no. of villages situated in 15 Gram Panchayats in the Project area. The elevation difference is from 0-275 meters and slope range from 0-15%. The major water stream is the Mahi River.

6.2 Objectives of the Water Management in Watershed Cluster

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

ii. To conserve soil, rainwater and vegetation effectively and harvest rain-water to create surface water sources and the stored water may be utilized through drip irrigation and to recharge groundwater.

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

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

v. 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.

vi. 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 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.

S. No.	Catchment	Area in Ha
1	Good Catchment	1472
2	Average Catchment	3762
3	Bad Catchment	6569
	Total	**11803**

(i) **Average Annual Rainfall:** 1087 mm (Data provided by Water Resource Deptt, Banswara)

(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.	4150	1472.00	6108800.00
Average	Runoff is medium like cultivated land, forest land with vegetation	3325	3762.00	12508650.00
Bad	Runoff is minimum and infiltration is maximum e.g. Sandy soil	2232	6569.00	14662008.00
Total			**11803.00**	**33279458.00**

(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	WHS (Nadi)	50	125000	3.00 %
2	Talab	10	200000	
3	Farm Ponds	20	36000	
4	Anicuts	57	456000	
5	Dam	3	180000	
	TOTAL		**997000**	

(iv) The table above reveals that a total of 997000 cum water is already being harvested through Village ponds and local depressions in the cluster.

(v) Calculation of the Balance Runoff:

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

Balanced Runoff = 33279458 cum – 997000 cum = 32282458 Cum

(vi) 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	Field Bund A	Rmt	419097.90	4.50	1885940.55
2	**Field Bund**	**Rmt**	**100881**	**4.50**	**151321.50**
3	**Peripheral Bund**	**Rmt**	**28031**	**4.50**	**126139.50**
	Sub Total A1				**2466044.55**
4	**Embankment cum Dugout Pond**	**Nos.**	**17**	**5500**	**93500.00**
	Sub Total A2				**93500.00**

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 = 93500 x 2 = 187000 cum

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

= 2466044.55 + 187000

= 2653044.55 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.

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

S. No.	Activity	Unit	Quantity	Storage Capacity(Cum	Total Storage Capacity (Cum)
1	**Embankment cum Dugout Pond**	**Nos.**	**22**	**5500**	**121000**
2	**Earthen Check Dam**	**Nos.**	**32**	**6000**	**192000**
3	Mini percolation tank L30mt	Nos.	36	1500	54000
4	Mini percolation tank L40mt	Nos.	25	2500	62500
5	Mini percolation tank L50mt	Nos.	9	3500	31500
6	Mini percolation tank L60mt	Nos.	7	4500	31500
7	Mini percolation tank L100mt	Nos.	3	7500	22500
	Total		**134**		**515000**
c.	**Drainage Line Treatment**				
1	M.M. Structure L18m H1.5m	Nos.	1	11500	11500
2	M.M. Structure L20m H1.5m	Nos.	2	13000	26000
3	M.M. Structure L18m H2m	Nos.	3	12500	37500
4	M.M. Structure L20m H2m	Nos.	4	14500	58000

S. No.	Activity	Unit	Quantity	Storage Capacity(Cum	Total Storage Capacity (Cum)
5	M.M. Structure L25m H2m	Nos.	6	15000	90000
6	M.M. Structure L30m H2m	Nos.	7	16000	112000
7	M.M. Structure L32m H2m	Nos.	4	16500	66000
8	**M.M. Structure L10 Mtr H 1.5 m**	**Nos.**	**8**	**10500**	**60000**
9	**M.M. Structure L10 Mtr H 1.8 m**	**Nos.**	**3**	**11500**	**25500**
10	**M.M. Structure L12 Mtr H 1.5 m**	**Nos.**	**4**	**13200**	**38000**
11	**M.M. Structure L12 Mtr H 1.8 m**	**Nos.**	**23**	**24200**	**322000**
12	**M.M. Structure L12 Mtr H 2.0 m**	**Nos.**	**1**	**25122**	**25122**
13	**M.M. Structure L15 Mtr H 1.5 m**	**Nos.**	**1**	**38000**	**38000**
14	**M.M. Structure L15 Mtr H 2.0 m**	**Nos.**	**1**	**45074**	**45074**
15	**M.M. Structure L50 Mtr H 2.0 m**	**Nos.**	**1**	**51290**	**51290**
16	**Double Wall Cement Masonry Structures L 10 mt**	**Nos.**	**31**	**8000**	**93000**
17	**Double Wall Cement Masonry Structures L 15 mt**	**Nos.**	**30**	**10000**	**120000**
18	**Double Wall Cement Masonry Structures L 20 mt**	**Nos.**	**23**	**15000**	**115000**
	Total		**153**		**2181386**
	Grand Total (N.A.+ D.L.T.)				**2696386**

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.

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.

For above structures proposed structures, 2 times of the total storage capacity = 2696386 x 2= 5392772**Cum**

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

= 2653044.55 + 5392772

= 8045816.55 **cum**

(iv) **Remaining (still untapped) Runoff = i.e.** 32282458-8045816.55 = 24236641.45 cum (which is 72.83% 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)**
33279458.00 Cum	997000 Cum	32282458.00Cum	**8045816.55 Cum**	**24236641.45 Cum**
100%	**3.00 %**	**97.00 %**	**24.17 %**	**72.83%**

Above table clearly shows that only **27.17% (3.00+24.17)** rain water is proposed to be harvested and rest **72.83%** 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 through drip/sprinkler system. Similarly, in Rabi crops, the crop requirement is to be catered either from ground water or from harvested water done through water storage structures needed in the area. Keeping this in view, field survey has been undertaken in the cluster and is summarized herewith.

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.

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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.

Strengths	**6.1. Weaknesses**
➢ 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 55-60 kms of Banswara-Dahod NH-113 that enables better access to urban centres such as Banswara, Thandala Dahod, Kushalgarh. Ratlam.	➢ 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 or absence of village level community based organization / farmers groups presented 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.
Opportunities	**Threats**
➢ Most of the places soil quality is very good, rich in organic matter in growth; has good potential for increase in production and productivity with better input management and water use. ➢ 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.	➢ Dependence on rains for agriculture makes the economy of the entire project area bit challenging ➢ Limited road infrastructure may result into delay in supply and demand chain management. ➢ How to increase the productivity in small land holdings is a issue. ➢ Most of the tribal population has poor literacy ➢ Proximity with urban centres may cause are strong chances 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 automatic rain gauge & instruments housing facility etc. shall be provided. A provision of Rs. 22.73 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 Kushalgarh 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.	Field Bund type A	Contour 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 419097.90 Rmt Contour bund with proposed financial cost Rs.66.76 lacs water will conserve by in-situ moisture conservation.	1885940.55	3199
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 100881 Rmt Field bund with proposed financial cost Rs.121.06 lacs water will conserve by in-situ moisture conservation.	151321.50	1578
3.	Peripheral Bund	Peripheral Bund activity is taken to stabilize the banks of drains/nallah along Agricultural Land, so that land do not erode. By constructing 28031 Rmt Peripheral bund with proposed financial cost Rs. 40.93 lacs.	126139.50	230
4.	Ramp cum Waste weir	Ramp-cum Waste Weir activity is proposed to stop further elongation of gullies, to stabilize gullies & to provide safe disposal of excess water on agricultural land. By constructing 241 Ramp-cum Waste Weir with proposed financial cost Rs.16.87 lacs elongation of gullies will stop and will stabilized on agricultural land.	Along bunds at suitable designated places	
5.	Chute Spillway	A chute spillway is a common and basic design which transfers 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 spillways 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 49 Chute Spillway with proposed financial cost Rs. 38.22 lacs.	Along Peripheral bunds at suitable designated places	
6.	Embankment cum Dugout Pond	Embankment cum Dugout Ponds, at a lower elevation, are constructed to harvest the excess runoff after in-situ moisture conservation. By constructing 39 Embankment cum Dugout pond structures in arable & Non-arable land with proposed financial cost Rs.49.22 lacs runoff will harvested for irrigation use	429000	210
7.	Mini Percolation Tanks (MPTs)	MPT (Mini percolation tank) activity is proposed to harvest & infiltration of runoff in Drainage line	404000	Farmers & Users Groups

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	Likely Beneficiaries (Nos)
		of Ist & IInd order. By constructing 80 MPT's structures in arable & Non-arable land with proposed financial cost Rs. 75.44 lacs runoff will harvested for irrigation use		
8.	Earthen Check Dam	Earthen check Dam activity is proposed to harvest runoff constructed near the point of use where maximum water can be stored on non arable land. By constructing 32 Nadi's structures in arable & Non-arable land with proposed financial cost Rs. 69.44 lacs runoff will harvested for cattle & irrigation use	384000	Farmers & Users Groups
9.	CCT	CCT activity is proposed to reduce the velocity of runoff in drainage line of Ist order	-	-
10.	DCCT	DCCT activity is proposed to reduce the velocity of runoff in drainage line of Ist order		
11.	SGPT	SGPT activity is proposed to reduce the velocity of runoff in drainage line of Ist order	-	-
12.	Azola unit	Azola activity is proposed to be available in summer for Livestock feeding to increase milk production. By constructing 5 Azola unit in arable land with proposed financial cost Rs. 0.97 lacs cultivators will benefitted having alternative income & livestock feeding source	-	-
13.	Pasture land development	1. Fencing of Pasture Lands:- fencing of the area by ditch cum bund supported by vegetative measures. 2. Tree plantation on all un-cultivated Non arable/ Pasture lands to develop a three tier canopy. 3. Over-seeding of grass seeds in pasture land areas:- Broadcasting of locally suited palatable grass seed like Sevan, Dhaman, Stylosanthes Hamataetc Pasture Development activities will carried out in 30 hac with Rs. 20.17 lacs.	-	Users Groups
14.	Minor Masonry Structure (M.M.S.)	MMS structure to be 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. By constructing 69 MMS structures with proposed financial cost Rs.702.71 lacs runoff will harvested for irrigation use.	2576772	Users Groups
15.	Double Wall MMS	This type of structure looks like an WHS. By constructing 84 Double wall Masonry structures with proposed financial cost Rs. 327.12 lacs runoff will harvested for irrigation use.	1786000	Users Groups

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 Kushalgarh, 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 10 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. Kushalgarh, District Banswara & Irrigation Department Banswara 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 Kushalgarh cluster are as under::

Table 26 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)				8.26
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	Field Bund A	0.1052	per ha.	635	66.76
2	Field Bund	0.0012	Rmt	100881	121.06
3	Peripheral Bund	0.0015	Rmt	28031	40.93
4	Ramp-cum waste weir	0.07	Nos.	241	16.87
5	Chute-Spillway	0.78	Nos.	49	38.22
6	Embankment cum Dugout Pond	0.76	Nos.	17	12.92
	Total 1.3.1				296.75
1.3.1	Arable Production Measure				
1	Construction of Azola unit	0.19	Nos.	5	0.97
	Total 1.3.2				0.97
	Total Arable 1.3.1 +1.3.2				297.72
1.4	ACTIVITIES ON NON ARABLE LANDS				
1.4.1	Non-Arable Conservation Measure				
1	Staggered Trenches	0.00431	Nos.	1067	4.60
2	CCT	0.00271	Nos.	417	1.13
3	DCCT	0.00099	Rmt	1428	1.42
4	Embankment cum Dugout Pond	1.65	Nos.	22	36.30
5	Earthen Check Dam	2.17	Nos.	32	69.44
6	Mini percolation tank L30mt	0.62	Nos.	36	22.36
7	Mini percolation tank L40mt	0.99	Nos.	25	24.73
8	Mini percolation tank L50mt	1.11	Nos.	9	9.98
9	Mini percolation tank L60mt	1.68	Nos.	7	11.75
10	Mini percolation tank L100mt	2.21	Nos.	3	6.62
	Total 1.4.1				188.33
1.4.2	Non-Arable Production Measure				
1	Pasture Development	0.67	Ha	30	20.17
	Total 1.4.2				20.17
1.5	Total Non-Arable (1.4.1+1.4.2) Drainage Line Treatment				208.50
1	M.M. Structure L18m H1.5m	8.70	Nos.	1	8.70
2	M.M. Structure L20m H1.5m	9.51	Nos.	2	19.01
3	M.M. Structure L18m H2m	9.88	Nos.	3	29.63
4	M.M. Structure L20m H2m	11.04	Nos.	4	44.14
5	M.M. Structure L25m H2m	12.02	Nos.	6	72.11
6	M.M. Structure L30m H2m	13.66	Nos.	7	95.64

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
7	M.M. Structure L32m H2m	14.96	Nos.	4	59.84
8	M.M. Structure L10 Mtr H 1.5 m	7.18	Nos.	8	57.44
9	M.M. Structure L10 Mtr H 1.8 m	7.33	Nos.	3	21.99
10	M.M. Structure L12 Mtr H 1.5 m	8.43	Nos.	4	33.72
11	M.M. Structure L12 Mtr H 1.8 m	8.72	Nos.	23	200.56
12	M.M. Structure L12 Mtr H 2.0 m	9.00	Nos.	1	9.00
13	M.M. Structure L15 Mtr H 1.5 m	9.93	Nos.	1	9.93
14	M.M. Structure L15 Mtr H 2.0 m	11.00	Nos.	1	11.00
15	M.M. Structure L50 Mtr H 2.0 m	30.00	Nos.	1	30.00
16	Double Wall Cement Masonry Structures L 10 mt,	2.68	Nos.	31	83.08
17	Double Wall Cement Masonry Structures L 15 mt,	4.01	Nos.	30	120.30
18	Double Wall Cement Masonry Structures L 20 mt,	5.38	Nos.	23	123.74
	Total D.L.T. 1.5				1029.83
	Grand Total NRM Measures (1.3+1.4+1.5)				1536.05
1.6	Consolidation of Works				6.20
	Total 1 (1.1 to 1.6)				1600.51
2	Component 2 : Markets and value chain				
3	Component 3 : Farmer Organization & Capacity building				
3.1	Community Mobilization, IEC, Group Formation, training, Capacity Building				15.50
	Sub Total 3				15.50
4	Component 4 : Project Management, Monitoring and Learning				
4.1	District + PIA Level Operating Costs including Photostat, computer typing & printing, fax, mobility (hired taxi/POL), TA/DA etc.				20.00
	Sub Total 4				20.00
	Grand Total (1+2+3+4)				1636.01

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, and Water table in area may also be increased gradually in every year.

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 all the activities are prepared in detail and are available with the PIA-Kushalgarh Watershed.

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 minimize 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 mobilization 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 (Kushalgarh Cluster):-

Project Area covers an area of 10331 hectare (ha) comprising fifteen (15) Gram Panchayats and forty- Nine (49) villages. The Cluster village has a population of 45503 of which 22758 are males while 22745 are females as per field survey by NGOs. In the cluster scheduled caste 351 and scheduled tribe category 43790 population. Cluster had household of 8887 of which of which small farmer 1567, marginal farmer 7022, large farmer 298 and remaining farmer landless.

Consultant held - Key social issue of the Cluster

Major issues in the Kushalgarh 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.
i. Limited access to the regulated markets especially in case of marginal and small farmers as they have the limited quantum of marketable surplus.
j. Marginal/Small farmers lack information about market prices
k. Very low coverage of women in extension programs (to training, decision making, exposure visits, markets & enterprises)
l. Maximum of the farmers who do not have irrigation source meet their water requirement through water markets in which they are charged heavily for pump sets and pipes
m. Grazing lands available only in some villages and those are heavily encroached. Grazing in forest areas is also not permitted.

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
- Livestock Management
- Value chain development activities

Environment Management Plan for Crop Intensification/Water management /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.

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

8.1. Procurement and Financial Management

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.

The procurement is done as per the procurement plan approved by 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.

Financial Management and Procurement Framework for releases of funds to MTAs/FPCs/Individual Beneficiaries (IBs) under grants, as 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, 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:

- 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.)
- 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.5009.59 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 27: 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 management	1600.51	0	15.50	20.00	1636.01
2	Agriculture	715.76	232.00	170.90	9.06	1127.72
3	Horticulture	1,425.05		36.00	11.00	1,472.05
4	Animal Husbandry	489.04	224	43.67	17.10	773.81
	Total	**4,230.368**	**456.00**	**266.07**	**57.16**	**5009.59**

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.5009.59 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.

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.5009.59 lacs** 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 28: Consolidated Investment Plan – by nature of expenditure

Type of Expenditure/ Line Dept.	Watershed Management	Agriculture	Horticulture	Animal Husbandry	Total
Goods	0.00	531.34	1044.51	315.59	1891.44
Works	1506.52	2.22	0.00	320.00	1828.74
Consultant Services	58.26	149.46	0.00	0.00	207.72
Operating Costs	20.00	16.57	11.00	49.50	97.07
Training	15.50	23.44	36.00	43.67	116.48
Grants	0.00	116.00	0.00	0.00	116
Beneficiary Contribution	35.73	288.69	380.54	45.04	750
Total	**1636.01**	**1127.72**	**1472.05**	**773.81**	**5009.59**

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

Annexure 2.1 Gram Panchayat and Village wise area in Cluster

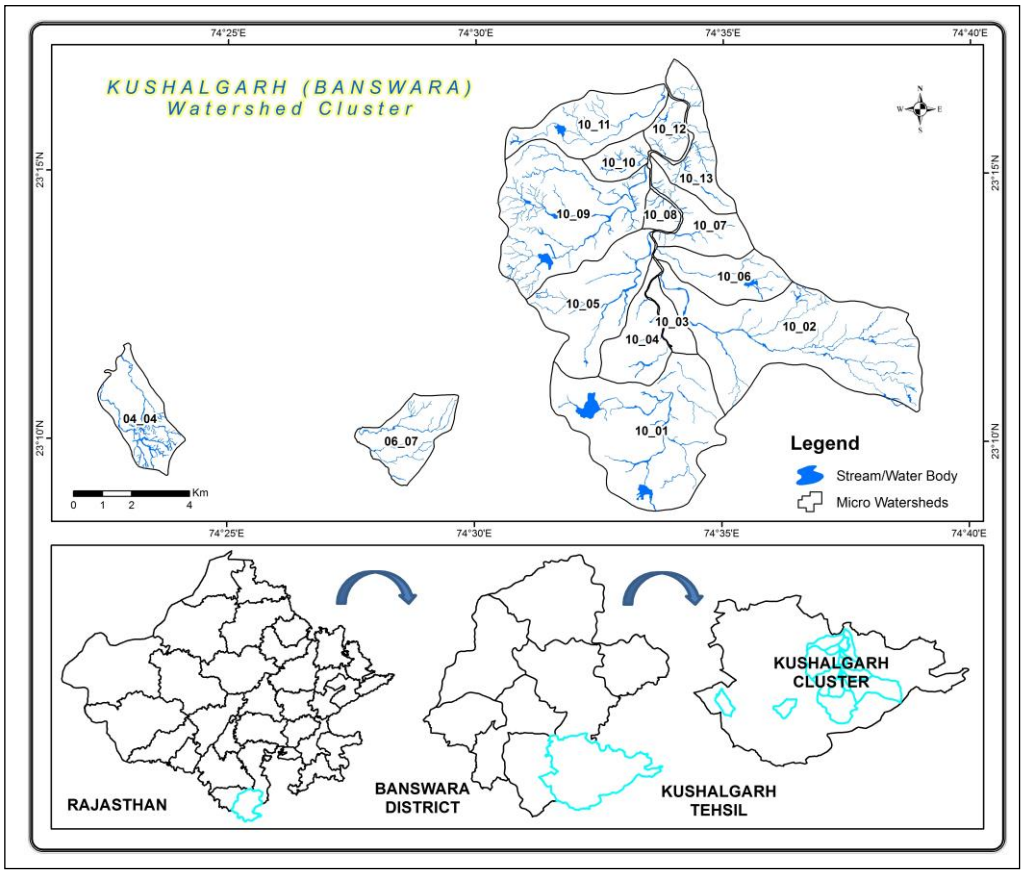
Table 29: The Gram Panchayat and Village wise area in Kushalgarh Cluster

S. No.	Name of Gram Panchayat	S. No. of Villages	Name of Villages Covered	Census code of villages	Area (In Ha.)
1	Doongari Para	1	DevdasSath	99722	178.56
		2	Doongari Para	99720	178.91
2	Lohariya	3	Kheda	99727	28.99
		4	Pipalipara	99721	113.8
3	Ukala	5	Chulipara	99790	25.87
		6	Dhanpuri	99789	59.19
4	Kherapur	7	Kherapur	99850	234.41
		8	Nagadkalan	99849	141.96
5	Kushalapara	9	Sarelmafi	99852	4.76
6	Bassi	10	Bassi	99915	371.8
7	Bavaliyapara	11	Amalipara	99643	176.06
		12	Bawali Dindor	99642	483.8
		13	BavaliNinama	99859	302.25
		14	Bavaliyapara	99895	672.1
		15	Galdhar	99870	281.22
8	Bijoribadi	16	Bijoribadi	9987	882.73
9	Chotisarwa	17	Chotisarwa	99891	232.7
		18	Gandwan	99874	368.77
		19	HawaRundi	99893	228.49
		20	Kheriyapara	99889	192.13
		21	Nalwai	99892	234
10	Gopalpura	22	Bijorikurd	99868	249.41
		23	Dara	99873	307.8
		24	Gopalpura	99872	330.91
		25	Sadera	99871	96.79
		26	Semalda	99869	197.79
11	Mahuda	27	Chorwat	99920	464.91
		28	Karanghati	99919	60.43
		29	Mahuda	99921	213.19
12	Mokhamapura	30	Bhoraj	99909	72.94
		31	Mokhamapura	99898	214.94
		32	Orwa	99911	29.98
		33	Sundaripara	99908	89.14
		34	Taraliya	99899	261.47
		35	Khanapada	99907	76.4
13	Roopgarh	36	Badly para	-	119.18
		37	Bhawanokitoli	99894	56.63
		38	Khed	99917	140.14
		39	Sataliyakitodi	99896	71.52
		40	Sunariya	99918	324.13

S. No.	Name of Gram Panchayat	S. No. of Villages	Name of Villages Covered	Census code of villages	Area (In Ha.)
		41	Roogarh	99916	155.15
14	Satliya	42	Bhawarada	99910	34.19
		43	Haldoodara	99912	47.18
		44	Sataliya	99897	363.87
		45	Surwan	99857	352.48
15	Shobhawati	46	Bhoriya	99875	98.98
		47	Paraniyadev	99877	123.77
		48	Sarpota	99878	1.47
		49	Shobhawati	99879	383.71
			TOTAL		10331

(Source: Watershed DPR of Kushalgarh Cluster)

Figure 8: Index Map of Kushalgarh cluster



Annexure 2.2 Trend of change in cropped area and cropping over 10 years in Rajasthan & Banswara district

Table 30: Area in ha and Cropping Pattern in % of Major Agricultural Crops in Rajasthan State and district Banswara, Deviation over 10 Years and % area & Production, increase(+)/decrease (-) in Productivity in Kg/ha over state average.

Crops	State							Banswara							
	2006-07		2015-16		Deviation over 10 years		Average of 10 Years	2006-07		2015-16		Deviation over 10 years		Average of 10 Years	% area & Production, increase(+)/decrease (-) in Productivity in Kg/ha over state average
	Area	%	Area	%	Area	%		Area	%	Area	%	Area	%		
Jowar	662055	3.74%	631170	3.57%	-30885	-0.17%	641570.1	566	0.25%	265	0.12%	-301	-0.13%	389.1	0.06%
Maize	1032079	5.84%	866541	4.90%	-165538	-0.94%	1020246.8	144544	63.36%	117003	51.29%	-27541	-12.07%	135833.6	13.31%
Soybean	641114	3.63%	1204773	6.81%	563659	3.19%	905231.7	17704	7.76%	50018	21.93%	32314	14.17%	26132.1	2.89%
Deshi Cotton	82166	0.46%	0	0.00%	-82166	-0.46%	63165.3	0	0.00%	134	0.06%	134	0.06%	1482.8	2.35%
American Cotton	44754	0.25%	0	0.00%	-44754	-0.25%	256302.9	13193	5.78%	0	0.00%	-13193	-5.78%	5821	2.27%
Groundnut	306037	1.73%	516850	2.92%	210813	1.19%	387853	224	0.10%	168	0.07%	-56	-0.02%	205.1	0.05%
Black Gram	107946	0.61%	298714	1.69%	190768	1.08%	180374.4	15412	6.76%	10082	4.42%	-5330	-2.34%	12221.5	6.78%
Rice	107758	0.61%	182877	1.03%	75119	0.42%	140697.8	33252	14.58%	27258	11.95%	-5994	-2.63%	50874.1	36.16%
Wheat	2564840	14.51%	3108973	17.59%	544133	3.08%	2851321.6	85835	37.63%	84533	37.06%	-1302	-0.57%	85675.6	3.00%
Gram	1010754	5.72%	941950	5.33%	-68804	-0.39%	1297770.4	15118	6.63%	12345	5.41%	-2773	-1.22%	13964	1.08%
Taramira	112107	0.63%	16792	0.09%	-95315	-0.54%	206125	36	0.02%	23	0.01%	-13	-0.01%	36.8	0.02%

Table 31: Cropping Pattern in % of Major Agricultural Crops in Rajasthan State

Crops	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
Jowar	3.74%	3.54%	3.26%	4.06%	4.11%	3.13%	3.85%	3.28%	3.74%	3.57%	3.63%
Maize	5.84%	5.94%	5.96%	6.20%	6.49%	5.88%	5.88%	5.58%	5.04%	4.90%	5.77%
Soybean	3.63%	4.51%	4.69%	4.40%	4.33%	5.07%	5.88%	6.65%	5.22%	6.81%	5.12%
Deshi Cotton	0.46%	0.46%	0.21%	0.75%	0.22%	0.55%	0.50%	0.20%	0.23%	0.00%	0.36%
American Cotton	0.25%	0.25%	1.45%	1.77%	1.67%	2.66%	2.07%	1.94%	2.44%	0.00%	1.45%
Groundnut	1.73%	1.56%	1.83%	1.84%	1.98%	2.35%	2.28%	2.61%	2.83%	2.92%	2.19%
Black Gram	0.61%	0.82%	0.78%	0.66%	0.72%	1.44%	1.23%	1.11%	1.14%	1.69%	1.02%
Rice	0.61%	0.72%	0.75%	0.85%	0.74%	0.76%	0.71%	0.82%	0.95%	1.03%	0.80%
Wheat	14.51%	14.66%	12.98%	13.54%	17.17%	16.60%	17.33%	18.13%	18.77%	17.59%	16.13%
Gram	5.72%	6.96%	7.12%	5.00%	10.09%	8.11%	7.09%	10.88%	7.11%	5.33%	7.34%
Taramira	0.63%	0.22%	0.57%	0.55%	6.72%	0.35%	0.62%	1.68%	0.23%	0.09%	1.17%

(Source: Agriculture department, Jaipur)

Table 32: Cropping Pattern in % of Major Agricultural Crops in Banswara district

Crops	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
Jowar	0.25%	0.16%	0.20%	0.20%	0.23%	0.17%	0.14%	0.15%	0.10%	0.12%	0.17%
Maize	63.36%	60.78%	60.69%	57.51%	63.44%	61.04%	64.08%	58.80%	54.47%	51.29%	59.55%
Soybean	7.76%	9.82%	10.50%	8.31%	8.34%	8.96%	9.58%	12.02%	17.33%	21.93%	11.46%
Deshi Cotton	0.00%	0.00%	0.00%	4.83%	0.00%	0.00%	1.47%	0.09%	0.06%	0.06%	0.65%
American Cotton	5.78%	4.98%	4.55%	0.00%	4.96%	5.24%	0.00%	0.00%	0.00%	0.00%	2.55%
Groundnut	0.10%	0.10%	0.10%	0.10%	0.08%	0.09%	0.07%	0.08%	0.10%	0.07%	0.09%
Black Gram	6.76%	6.62%	5.37%	5.13%	4.87%	5.05%	5.24%	5.26%	4.86%	4.42%	5.36%

Crops	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
Rice	14.58%	15.71%	13.82%	12.34%	57.48%	58.89%	13.01%	13.11%	12.14%	11.95%	22.30%
Wheat	37.63%	39.80%	33.37%	35.27%	37.72%	38.22%	38.57%	39.29%	38.66%	37.06%	37.56%
Gram	6.63%	7.10%	5.43%	5.66%	6.06%	6.01%	6.03%	6.61%	6.27%	5.41%	6.12%
Taramira	0.02%	0.02%	0.01%	0.02%	0.01%	0.02%	0.02%	0.03%	0.00%	0.01%	0.02%

(Source: Agriculture department, Jaipur)

Table 33: Area in ha and Cropping Pattern in % of Major Agricultural Crops in Cluster from 2006-07 to 2015-16

S. No.	Crops	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Area in ha											
A.	**Kharif**										
1	Maize	2330	2473	2808	2926	3031	3043	3146	2718	2489	2387
2	Cotton	975	1065	987	1014	931	1035	836	959	1037	1323
3	Soybean	965	1023	1210	1097	1067	1103	1210	1296	1230	1236
4	Black Gram	653	691	614	598	588	462	528	695	492	402
5	Paddy	874	811	876	886	856	902	802	889	1215	1197
B.	**Rabi**										
1	Wheat	1821	1308	1400	1814	1821	1769	1744	1885	1220	1430
2	Gram	483	783	669	492	470	514	523	423	468	702
3	Rabi Maize	16	20	22	25	28	31	33	25	39	66
Area in %											
A.	**Kharif**										
1	Maize	35.46%	37.65%	42.75%	44.54%	46.13%	46.32%	47.89%	41.38%	37.89%	36.34%
2	Cotton	14.84%	16.21%	15.02%	15.44%	14.17%	15.76%	12.73%	14.60%	15.79%	20.15%
3	Soybean	14.69%	15.57%	18.41%	16.70%	16.25%	16.79%	18.42%	19.72%	18.72%	18.82%
4	Black Gram	9.94%	10.51%	9.35%	9.10%	8.96%	7.03%	8.04%	10.58%	7.49%	6.12%
5	Paddy	13.30%	12.34%	13.34%	13.48%	13.03%	13.73%	12.21%	13.54%	18.50%	18.23%
B.	**Rabi**										
1	Wheat	27.72%	19.92%	21.32%	27.62%	27.73%	26.93%	26.55%	28.70%	18.57%	21.77%
2	Gram	7.36%	11.91%	10.19%	7.49%	7.16%	7.83%	7.97%	6.44%	7.13%	10.68%
3	Rabi Maize	0.25%	0.31%	0.34%	0.38%	0.43%	0.46%	0.50%	0.37%	0.59%	1.00%

(Source: Agriculture department, Jaipur)

Table 34: Area (in lac ha), Production (in lac MT) and Productivity (in kg/ha) in the State & Banswara district

Crops	Details	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
Jowar	Area	662055	625646	576744	718457	726916	553754	680375	579615	660969	631170	641570.1
	Production	367816	394746	333003	104192	508877	410114	420392	356672	5045000	344269	828508.1
	productivity	556	631	577	145	700	741	618	616	763	545	589.2
Maize	Area	1032079	1050663	1053878	1096231	1147191	1039135	1039135	986158	891457	866541	1020247
	Production	1117941	1954358	1831110	1144716	2061424	1644881	1644881	1858202	1551246	1141696	1595046
	productivity	1083	1860	1737	1044	1797	1583	1583	1884	1740	1318	1562.9
Soybean	Area	641114	1860	829450	778382	765494	897042	1039838	1175502	923135	1204773	825659
	Production	771347	1860	805717	914601	1118097	1385123	1468693	974987	956552	804066	920104.3
	productivity	1203	1860	971	1175	1461	1544	1412	829	1036	667	1215.8
Deshi Cotton	Area	82166	1860	36631	131986	38768	97442	88433	34739	41005	0	55303
	Production	176066	1860	92686	266925	107096	311843	251237	116622	113929	0	143826.4
	productivity	364	1860	430	344	470	540	483	571	472	0	553.4
American Cotton	Area	44754	1860	255670	312445	295002	470133	366658	342300	431335	0	252015.7
	Production	87731	1860	611064	636157	743394	1418914	1085933	1126817	1396778	0	710864.8
	productivity	333	1860	406	346	428	513	520	560	551	0	551.7
Groundnut	Area	306037	1860	324209	326032	349331	414671	402252	461979	500824	516850	360404.5
	Production	399509	1860	540300	354458	686817	800633	623729	900928	1011120	1048718	636807.2
	productivity	1305	1860	1667	1087	1966	1931	1551	1950	2019	2029	1736.5
Black Gram	Area	107946	1860	137230	116377	127792	255221	218009	195998	201713	298714	166086
	Production	31557	1860	40590	30572	94156	131689	125279	70561	112228	114592	75308.4
	productivity	292	1860	296	263	737	516	575	360	556	384	583.9
Rice	Area	107758	1860	133418	150691	131126	134337	125635	145577	167752	182877	128103.1
	Production	169823	1860	241082	228284	265545	2533620	222514	312564	366676	369780	471174.8
	productivity	1576	1860	1807	1515	2025	1886	1771	2147	2186	2022	1879.5
Wheat	Area	2564840	1860	2294848	2394215	3036141	2935341	3063202	3205604	3318248	3108973	2592327

Crops	Details	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
	Production	7755883	1860	7287016	2384808	10424350	10160427	10766607	11020139	9823876	10468161	8009313
	productivity	3024	1860	3175	3133	3433	3461	3515	3438	2961	3367	3136.7
Gram	Area	1010754	1860	1259428	884358	1783281	1433928	1252908	1923501	1256323	941950	1174829
	Production	872559	1860	981135	534630	1600718	989986	1277303	1640387	911085	840341	965000.4
	productivity	863	1860	779	605	898	690	1019	853	725	892	918.4
Taramira	Area	112107	1860	100120	97542	1188738	60994	109785	296459	40604	16792	202500.1
	Production	38691	1860	13586	35910	486366	25979	54634	176292	16772	7279	85736.9
	productivity	345	1860	365	368	409	426	498	595	413	433	571.2

(Source: Agriculture department, Jaipur)

Table 35: Area (in lac ha), Production (in lac MT) and Productivity (in kg/ha) in the Banswara district

Crops	Details	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
Jowar	Area	566	360	454	447	526	383	319	335	236	265	389.1
	Production	355	207	307	350	368	284	197	206	180	144	259.8
	productivity	627	575	676	783	700	742	618	615	281	543	616
Maize	Area	144544	138647	138439	131187	144715	139246	146182	134124	124249	117003	135833.6
	Production	53215	202073	279075	134358	298984	144286	202084	177921	137907	119441	174934.4
	productivity	368	1457	2127	971	2066	1036	1382	1327	1110	1021	1286.5
Soybean	Area	17704	22411	23953	18958	19030	20429	21857	27419	39542	50018	26132.1
	Production	14654	25011	16776	15404	18316	15455	22829	32393	33399	42936	23717.3
	productivity	828	1116	700	813	962	757	1044	1181	845	858	910.4
Deshi Cotton	Area	0	0	0	11021	0	0	3348	195	130	134	1482.8
	Production	0	0	0	19432	0	0	6641	490	85	23615	5026.3
	productivity	0	0	0	300	0	0	337	427	111	447	162.2

Crops	Details	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 10 Years
American Cotton	Area	13193	11365	10390	0	11308	11954	0	0	0	0	5821
	Production	14461	18938	14562	0	25398	24960	0	0	0	0	9831.9
	productivity	186	283	238	0	382	355	0	0	0	0	144.4
Groundnut	Area	224	219	239	233	189	205	163	193	218	168	205.1
	Production	292	378	398	253	372	396	253	376	440	341	349.9
	productivity	1304	1726	1665	1086	1968	1932	1552	1948	2018	2030	1722.9
Black Gram	Area	15412	15093	12244	11706	11104	11520	11962	11998	11094	10082	12221.5
	Production	3086	7513	3459	3395	4693	5523	7581	4389	5660	3253	4855.2
	productivity	200	498	283	290	423	479	634	366	510	323	400.6
Rice	Area	33252	35829	31530	28139	131126	134337	29687	29900	27683	27258	50874.1
	Production	18756	46656	12376	11416	265543	253360	31564	28952	17631	13767	70002.1
	productivity	564	1302	393	406	2025	1886	1063	968	637	505	974.9
Wheat	Area	85835	90801	76116	80466	86052	87177	87975	89620	88181	84533	85675.6
	Production	160011	183398	118511	161762	176322	203751	186789	202260	195462	170917	175918.3
	productivity	1864	2020	1557	2010	2049	2337	2123	2257	2217	2022	2045.6
Gram	Area	15118	16205	12386	12904	13828	13719	13751	15089	14295	12345	13964
	Production	14957	18068	9264	15575	10763	13497	14239	14910	14087	13236	13859.6
	productivity	989	1115	748	1207	778	984	1035	988	985	1072	990.1
Taramira	Area	36	45	33	41	29	37	42	71	11	23	36.8
	Production	12	12	12	15	12	16	21	4	5	10	11.9
	productivity	333	267	364	366	414	432	500	571	455	435	413.7

(Source: Agriculture department, Kushalgarh)

Annexure 2.3 Farmers' category wise Cultivated Area in Kushalgarh Cluster

Table36. Farmers' Category wise Cultivated Area in Kushalgarh Cluster

Category of Farmer	Total Households	Cultivated Area (ha)			Category wise Cultivated Area (ha)			
		Irrigated	Rainfed	Total	General	SC	ST	OBC
Large farmer	1121	197.63	459.54	657.17	79.43	30.36	462.3	85.08
Small farmer	1967	647.4	1098	1745.4	130	212.1	1338	65.3
Marginal farmer	3364	1446	1733	3179	40	130	2941	68
Landless person	0	0	0	0	0	0	0	0
No. of BPL households	2435	58.37	929.06	987.43	12	68.32	838.08	69.03
Total	**8887**	**2349.4**	**4219.6**	**6569**	**261.43**	**440.78**	**5579.38**	**287.41**
Category wise Cultivated Area in Kushalgarh Cluster in %								
Large farmer	12.61%	8.41%	10.89%	10.00%	1.21%	0.46%	7.04%	1.30%
Small farmer	22.13%	27.56%	26.02%	26.57%	1.98%	3.23%	20.37%	0.99%
Marginal farmer	37.85%	61.55%	41.07%	48.39%	0.61%	1.98%	44.77%	1.04%
Landless person	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
No. of BPL households	27.40%	2.48%	22.02%	15.03%	0.18%	1.04%	12.76%	1.05%
Total	**100%**	**100%**	**100%**	**100%**	**4%**	**7%**	**85%**	**4%**

(Source: Watershed DPR of Kushalgarh Cluster)

Annexure 2.4 Status of Cropped area of Agricultural Crops in Kushalgarh cluster

Table 37. The Status of Cropped area of Agricultural Crops in Kushalgarh cluster

S. No.	Crops	2006-07		2015-16		Average of 10 Years	District Average of 10 Years	% Area in Cluster over district average
		Area in ha	%	Area in ha	%			
A.	**Kharif**							
1	Maize	2330	35.46%	2387	36.34%	2735.036	135833.6	2.01%
2	Cotton	975	14.84%	1323	20.15%	1016.237	7303.8	13.91%
3	Soybean	965	14.69%	1236	18.82%	1143.624	26132.1	4.38%
4	Black Gram	653	9.94%	402	6.12%	572.328	12221.5	4.68%
5	Paddy	874	13.30%	1197	18.23%	930.803	50874.1	1.83%
	Total	**5797**	**88.23%**	**6545**	**99.66%**	**6398.03**	**232365**	**26.81%**
B.	**Rabi**							
1	Wheat	1821	27.72%	1430	21.77%	1621.387	85675.6	1.89%
2	Gram	483	7.36%	702	10.68%	552.785	13964	3.96%
3	Rabi Maize	16	0.25%	66	1.00%	30.403	-	-
	Total	**2320**	**35.33%**	**2198**	**33.45%**	**2204.58**		**5.85%**
	Grand Total	**8117**	**123.56%**	**8743**	**133.11%**	**8602.6**		**32.66%**

(Source: Agriculture department, Kushalgarh & Watershed DPR, Kushalgarh)

Annexure 2.5 Change in Area and Cropping Pattern of horticultural crops over 5 years in Rajasthan and Banswara district

Table 38: Year and Crop wise area in ha & cropping pattern (%) of horticultural crops in Rajasthan and Banswara district in ha

Crops	State							Banswara							
	2011-2012		2015-2016		Deviation over last 5 years		Average of 05 Years	2011-2012		2015-2016		Deviation over last 5 years		Average of 05 Years	% area over state average
	Area	%	Area	%	Area	%		Area	%	Area	%	Area	%		
Pomegranate	875	0.005%	2465	0.014%	1590	0.009%	1526	4.0	0.002%	1.0	0.000%	-3	-0.001%	2.8	0.186%
Mango	6045	0.034%	5001	0.028%	-1044	-0.006%	5514.2	473	0.207%	497	0.218%	24	0.011%	483.08	8.761%
Guava	2299	0.013%	3850	0.022%	1551	0.009%	2720	195	0.085%	218	0.096%	23	0.010%	201	7.390%
Chilli	12722	0.072%	12318	0.070%	-404	-0.002%	10809	389	0.171%	310	0.136%	-79	-0.035%	359.2	3.323%
Tomato	17646	0.100%	20507	0.116%	2861	0.016%	17465.56	287	0.126%	47	0.021%	-240	-0.105%	95.2	0.545%
Brinjal	5296	0.030%	6078	0.034%	782	0.004%	5418.15	123	0.054%	84	0.037%	-39	-0.017%	107	1.975%
Okra	3743	0.021%	3282	0.019%	-461	-0.003%	3695.24	60	0.026%	51	0.022%	-9	-0.004%	65.2	1.764%

(Source: Horticulture department, Kushalgarh)

Table 39: Year and Crop wise area in ha of horticultural crops in Rajasthan and Banswara district in ha

Crops	State						Banswara					
	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 05 Years	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 05 Years
Pomegranate	875	902	1323	2065	2465	1526	4.0	4.0	4.0	4.0	1.0	3.40
Mango	6045	5557	5514	5454	5001	5514.2	473	476	490	480	497	483.20
Guava	2299	2405	2589	2457	3850	2720	195	195	191	206	218	201.00
Chilli	12722	10619	8715	9671	12318	10809	389	377	360	360	310	359.20
Tomato	17646	15505	17151	16519	20507	17465.6	287	39	48	55	47	95.20
Brinjal	5296	5545	5539	4633	6078	5418.2	123	136	92	100	84	107.00
Okra	3743	4017	3953	3481	3282	3695.2	60	57	68	90	51	65.20

Annexure 2.6 Change in Area and Cropping Pattern of horticultural crops over 5 years in Kushalgarh cluster

Table 40: Cropping Pattern (in ha & %) of Horticultural crops in Kushalgarh Cluster

Crops	Area (ha)	Cropping Intensity (%)
Vegetables		
Chilli	10	0.15%
Tomato	7	0.11%
Cole Crops	8	0.12%
Total	25	0.38%
Fruits		
Guava	2	0.03%
Lemon	3	0.05%
Papaya	1.5	0.02%
Total	**6.5**	0.10%
Grand Total	**31.5**	0.48%

(Source: Horticulture department, Kushalgarh)

Annexure 2.7 Average Annual Rainfall in the last decade in Kushalgarh cluster

Table 41: Average Annual Rainfall in the last 10 years (decade) in Kushargarh cluster

S. No	Year	Average Annual Rainfall (mm)
1	2006	537.4
2	2007	713.5
3	2008	449.8
4	2009	1429.7
5	2010	2188.2
6	2011	1297
7	2012	1241
8	2013	1341
9	2014	936
10	2015	732
	Total	**10865.6**
	Average	**1086.56**
	Say	**1087**

(Source: Water Resource department, Banswara)

Annexure 2.8: 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. Basalt is the only Aquifer in Kushalgarh Cluster. The Deccan Lava Plateau is mainly confined to parts of Banswara, Kota, Jhalawar and Chittorgarh districts. The availability occurrence and movement of Ground water depends upon the topography, structures, geomorphology and hydrologic properties of water bearing formation. Ground water occurs under Water table conditions but confined conditions are also common. Basalts of Deccan Trap depend upon the weathered mantle, joints and fractured system and intensity, secondary porosity developed by fracturing which provide only limited storage space. Therefore, only a part of the rainfall is available as ground water storage in many areas.

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 are 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.

Further, areas where the quality of ground water is beyond the usable limits should be identified and handled separately. The remaining area, after deleting the hilly area and separating the area with poor ground water quality, has been delineated into command and non-command areas. Ground water assessment in Kushalgarh Cluster is done on non-command areas for monsoon and non-monsoon seasons and consolidated as Net Annual Ground water Availability in the Cluster area.

Ground water potential of Kushalgarh cluster area block Kushalgarh, Banswara 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 04.81 MCM. The details are given in Annexure 2.14.

Annexure 2.9 SRR in Banswara district & Rajasthan

Table 42: Seed Replacement Rate (SRR) in Rajasthan and Banswara

Crop	Rajasthan						District-Banswara					
	2013-14			2014-15			2013-14			2014-15		
	Area (lac ha)	Seed Dist. (Qtl)	SRR (%)	Area (lac ha)	Seed Dist. (Qtl)	SRR (%)	Area (lac ha)	Seed Dist. (Qtl)	SRR (%)	Area (lac ha)	Seed Dist. (Qtl)	SRR (%)
Maize	9.16	100668	**54.93**	8.91	91529	**51.35**	1.34	18362	**68.51**	1.24	17512	**70.61**
Paddy	1.46	3677	**10.07**	1.68	4307	**10.25**	0.3	0	**0**	0.28	0	**0**
Pigeon Pea	0.15	449	**15.25**	0.13	611	**23.43**	0.05	40	**4**	0.05	130	**12.5**
Sorghum	5.79	12715	**21.95**	6.61	10876	**16.45**	0.004	150	**100**	0.002	4	**16.67**
Black Gram	1.96	9663	**11.9**	2.02	4398	**10.87**	0.12	439	**18.29**	0.11	137	**6.23**
Soybean	11.76	220954	**23.49**	9.33	211668	**28.65**	0.27	24309	**100**	0.4	16260	**51.46**
Ground nut	4.62	28041	**4.051**	5.1	65348	**8.7**	0.002	0	**0**	0.002	0	**0**
Cotton	2.74	3787	**31.9**	2.91	3922	**100**	0.1	138	**100**	0.09	12	**100**
Wheat	32.06	1022634	**37.25**	33.18	1082866	**32.63**	0.9	48839	**54.5**	0.88	25560	**28.99**
Barley	3.09	115195	**11.79**	3.43	132971	**38.73**	0.01	10	**0.92**	0.08	315	**37.72**
Gram	19.24	170104	**-**	12.56	171839	**18.24**	0.15	2816	**24.88**	0.14	1867	**17.41**

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

Annexure 2.10 SRR in Kushalgarh cluster

Table 43: Seed Replacement Rate (SRR in %) in the Kushalgarh Cluster from 2011-12 to 2015-16

S. No.	Crop	Name of Certified / Improved varieties being shown in the cluster	Seed Replacement Rate (SRR) (%)		
			Kushalgarh	District	Difference
1	Maize	Ganga Safed-2, Mahi Dhawal,Vijaya	57	70	-13
2	Soybean	JS-9560, JS9305, JS335.	32	76	-44
3	Cotton	Pratap Kapi, DCH-32, H-8, BT Cotton	96	100	-4
4	Blackgram	Barkha, T-9, PU-31	18	12	6
5	Paddy	Vagad Dhan, Mahi sughandha, Khushabu. Gujarat-17	3	0	3
6	Wheat	RAJ-3765, RAJ-3077 RAJ-4220, RAJ 4238	28	42	-14
7	Gram	GNG-469, GNG-1511, Pratap Chana, Dhahod Yellow, Local	9	21	-12

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

Annexure 2.11 Area Covered and Technical Grade Material used under Plant Protection Measures during 2014-15 in Rajasthan & Banswara

Table 44. The Area (in 000ha) Covered and Technical Grade Material (TGM) used under Plant Protection Measures during 2014-15 in Rajasthan and Banswara (Method of Plant Protection)

State/District	Season	Cereals	Pulses	Food Grains	Oilseed	Cotton	Sugarcane	Guar	Others
Rajasthan	K	4049	1277	5326	1856	775	16	1242	445
	R	2862	1160	4022	2289	0	0	0	690
	K&R	6911	2437	9348	4145	775	16	1242	1135
Banswara	K	126	9	135	44	11	0	1	3
	R	56	15	71	2	0	0	0	20
	K&R	182	24	206	46	11	0	1	23
Rajasthan	K	69.71	62.63	0.07	93.73	-	-	-	8.03
	R	78.1	87.64	0.08	924.13	-	-	-	37.43
	K&R	72.96	72.48	0.07	186.05	-	-	-	15.37
Banswara	K	55.46	3.96	59.42	19.37	4.84	0.00	0.44	1.32
	R	38.84	10.40	49.25	1.39	0.00	0.00	0.00	13.87
	K&R	49.01	6.46	55.47	12.39	2.96	0.00	0.27	6.19

(K – Kharif, R – Rabi & T – Total)

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

Annexure 2.12 Area Covered and Technical Grade Material used under Plant Protection Measures during 2014-15 in Kushalgarh cluster

Table 45 Area Covered and Technical Grade Material (TGM) used under Plant Protection Measures during 2014-15 (Method of Plant Protection)

State/District	Season	Seed Treat	Soil Treat	Poly Treat	Intensive Treat	Rat Control	Weed Control	Total Area	TGM in tones
Rajasthan	K	6940	349	700	1178	138	355	9660	719
	R	4503	329	518	848	278	525	7001	1975
	K&R	11443	678	1218	2026	416	880	16661	2694
Banswara	K	146	3	13	15	0	17	194	10
	R	66	3	4	5	1	14	93	9
	K&R	212	6	17	20	1	31	287	19
Rajasthan	K	45.154	2.271	4.554	7.664	0.898	2.31	62.851	26.69
	R	48.378	3.535	5.565	9.11	2.987	5.64	75.215	73.31
	K&R	46.37	2.747	4.936	8.21	1.686	3.566	67.514	100
Banswara	K	64.27	1.32	5.72	6.60	0.00	7.48	85.40	4.40
	R	45.78	2.08	2.77	3.47	0.69	9.71	64.51	6.24
	K&R	57.09	1.62	4.58	5.39	0.27	8.35	77.29	5.12

(K – Kharif, R – Rabi & T – Total)

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

Annexure 2.13 Crop Water Requirement of Agricultural and Horticultural Crops in Kushalgarh

Table 46. Crop Water Requirement of Agricultural and Horticultural Crops in the project area

Name of crop	Current Cropped Area in Ha	Crop Water Requirement per ha in cum	Current Crop Water Requirement in cum	Proposed Cropped Area in ha	Proposed Crop Water Requirement in cum	Additional Crop water requirement (in cum)
Kharif						
Maize	2387	2000	4774720	2626	5252000	477280
Soybean	1236	1000	1236350	1360	1360000	123650
Cotton	1323	5000	6617350	1000	5000000	-1617350
Blackgram	402	1000	402080	511	511000	108920
Paddy	1197	6000	7183620	1050	6300000	-883620
Sub total	**6547**	**-**	**20214120**	**6547**	**18423000**	**-1791120**
Rabi						
Wheat	1430	5000	7150000	1260	6300000	-850000
Gram	702	2500	1755000	750	1875000	120000
Rabi Maize	66	4000	264000	99	396000	132000
Sub total	**2198**	-	**9169000**	**2109**	**8571000**	**-598000**
Grand Total	**8745**	**-**	**29383120**	**8656**	**26994000**	**-2389120**
Vegetables						
Tomato	17.5	8000	140000	50	400000	260000
Brinjal	5	8000	40000	30	240000	200000
Okra	17	8000	136000	50	400000	264000

Name of crop	Current Cropped Area in Ha	Crop Water Requirement per ha in cum	Current Crop Water Requirement in cum	Proposed Cropped Area in ha	Proposed Crop Water Requirement in cum	Additional Crop water requirement (in cum)
Total Vegetables	**39.5**	-	**316000**	**130**	**1040000**	**724000**
Fruits						
Pomegranate	19	9000	171000	50	450000	279000
Mango	13	11000	143000	60	660000	517000
Total Fruits	**32**	-	**314000**	**110**	**1110000**	**796000**
Total Horticulture	**71.5**	-	**630000**	**240**	**2150000**	**1520000**
Grand Total	**8816**	-	**30013120**	**8896**	**29144000**	**-869120**

(Source: Agriculture Department & Watershed DPR, Kushalgarh)

Annexure 2.14 Data to calculate ground water status of Kushalgarh cluster

The principal source of recharge to ground water is rainfall. Annual monsoon and non-monsoon rainfall (mm) from the year 2008 to 2012 of the Banswara District are attached in the excel sheets with the CACP report of Kushalgarh.

It also includes the following-

a. Ground water level of the cluster
b. Ground water extraction status

Annexure 2.15 Supporting institutions and service providers in Banswara

Table 47: Supporting institutions and service providers in Banswara

S. No.	Type of assistance	Name and address of agencies
1	Provisional Registration Certificate (EM-1) & Permanent Registration	District Industries Centre, Banswara
2	Identification of Project Profiles, Techno-economic and managerial consultancy services, market survey and economic survey reports	MSME-Development Institute, Govt.
3	Land and Industrial shed	RIICO, Banswara
4	Financial assistance	RFC & Nationalized Banks
5	For Raw material under Govt. supply	NSIC, Jaipur
6	Plant and Machinery under hire/purchase basis	NSIC, Jaipur
7	Power/ electricity	Raj. State Electricity Board, Banswara
8	Technical know-how	MSME-Development Institute, Govt.
9	Quality & Standard	Bureau of Indian Standards, Jaipur
10	Marketing/ Export Assistance	MSME-DI Jaipur, NSIC Jaipur, DIC Banswara
11	Other Promotional Agencies	DIC Banswara, RIICO Banswara, RFC Banswara

Annexure 2.16 Number of Household and Household Enterprises owing Animal/Poultry Birds in Kushalgarh Cluster

Table 48: Number of Household and Household Enterprises owing Animal/Poultry Birds in Kushalgarh Cluster

S. No.	Village	Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
1	Amalipara	98	18	89	0	0	0	0
2	Badly para	66	19	46	0	0	0	0
3	Bassi	655	203	572	0	0	0	0
4	Baori Ninama	148	12	38	0	0	0	0
5	Bavaliyapara	288	54	76	0	0	0	0
6	Bhawanokitoli	14	12	13	0	0	0	0
7	Bhanwarda	76	220	32	0	0	0	0
8	Bhoraj	66	10	18	0	0	0	0
9	Bhoriya	56	17	30	0	0	0	0
10	Bijalpur	126	32	53	0	0	0	0
11	Bijorikurd	65	16	26	0	0	0	0
12	Chorbar	136	38	45	0	0	0	0
13	Chotisarwa	117	30	94	0	0	0	0
14	Chulipara	109	33	0	0	0	0	0
15	Dara	60	13	34	0	0	0	0
16	DevdasSath	106	89	97	0	0	0	0
17	Dhanpuri	81	10	57	0	0	0	0
18	Doongari Para	252	199	182	0	0	0	0
19	Galdhar	184	158	87	0	0	0	0
20	Gandwan	183	48	107	0	0	0	0
21	Gopalpura	94	6	40	0	0	0	0
22	Haloopara	61	26	25	0	0	0	0
23	HawaRundi	87	24	55	0	0	0	0
24	Karanghati	45	14	43	0	0	0	0

S. No.	Village	Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
25	Kharod Chatra	145	56	91	0	0	0	0
26	Kherda	135	42	106	0	0	0	0
27	Kheda	61	12	47	0	0	0	0
28	Kherapur	218	63	166	0	0	0	0
29	Kheriyapara	106	40	78	0	0	0	0
30	Mahuda	230	75	120	0	0	0	0
31	Mokhamapura	111	53	64	0	0	0	0
32	Nagadkalan	153	53	70	0	0	0	0
33	Nalwai	95	27	64	0	0	0	0
34	Orwa	0	5	3	0	0	0	0
35	Paraniyadev	61	20	0	0	0	0	0
36	Pipalipara	128	48	120	0	0	0	0
37	Roogarh	208	55	114	0	0	0	0
38	Sadera	42	14	28	0	0	0	0
39	Sarelmafi	33	2	12	0	0	0	0
40	Sarpota	76	28	33	0	0	0	0
41	Sataliya	239	78	106	0	0	0	0
42	Sataliyakitodi	33	11	18	0	0	0	0
43	Semalda	108	118	46	0	0	0	0
45	Shobhawati	386	119	198	0	0	0	0
46	Sunariya	121	34	86	0	0	0	0
47	Sundaripara	52	2	23	0	0	0	0
48	Surwan	78	30	26	0	0	0	0
49	Taraliya	110	48	53	0	0	0	0
TOTAL		6102	2334	3531	0	0	0	0

(Source: Animal Husbandry department, Kushalgarh)

Annexure 2.17 Goat Population profile of Kushalgarh cluster

S. No.	Village	Male			Female					Total Goats
		Under 1 Year	1 Year and Above	Total	Under 1 Year	1 Year and Above			Total	
						In Milk	Dry	Not Calved Once		
1	Amalipara	61	21	82	63	98	42	9	212	294
2	Badly para	11	6	17	28	34	28	3	93	110
3	Bassi	224	24	248	313	587	346	115	1361	1609
4	Baori Ninama	38	57	95	57	76	0	0	133	228
5	Bavaliyapara	123	53	176	134	170	16	0	320	496
6	Bhawanokitoli	9	2	11	24	27	3	5	59	70
7	Bhanwarda	4	0	4	30	34	6	11	81	85
8	Bhoraj	8	3	11	26	34	10	0	70	81
9	Bhoriya	6	0	6	3	4	38	0	45	51
10	Bijalpur	1	0	1	0	0	85	0	85	86
11	Bijorikurd	3	6	9	1	2	54	0	57	66
12	Chorbar	10	11	21	42	81	26	0	149	170
13	Chotisarwa	43	4	47	46	60	112	37	255	302
14	Chulipara	0	0	0	0	0	92	0	92	92
15	Dara	1	0	1	0	0	58	0	58	59
16	DevdasSath	0	0	0	54	55	130	0	239	239
1 7	Dhanpuri	5	0	5	0	0	90	0	90	95
18	Doongari Para	58	0	58	129	186	237	0	552	610
19	Galdhar	97	79	176	132	169	47	4	352	528
20	Gandwan	46	0	46	47	46	104	44	241	287
21	Gopalpura	0	1	1	1	1	60	0	62	63
22	Haloopara	1	0	1	20	22	5	12	59	60
23	HawaRundi	10	0	10	9	17	88	0	114	124
24	Karanghati	0	0	0	37	75	21	1	134	134
25	Kharod Chatra	17	7	24	33	38	210	0	281	305
26	Kherda	16	2	18	29	145	96	0	270	288

S. No.	Village	Male			Female					Total Goats
		Under 1 Year	1 Year and Above	Total	Under 1 Year	1 Year and Above			Total	
						In Milk	Dry	Not Calved Once		
27	Kheda	14	16	30	28	53	16	14	111	141
28	Kherapur	66	0	66	200	253	74	0	527	593
29	Kheriyapara	27	0	27	29	13	128	1	171	198
30	Mahuda	19	22	41	37	156	9	0	202	243
31	Mokhamapura	41	22	63	52	79	39	5	175	238
32	Nagadkalan	32	0	32	62	94	33	0	189	221
33	Nalwai	16	0	16	18	14	86	13	131	147
34	Orwa	0	0	0	0	4	1	0	5	5
35	Paraniyadev	0	0	0	0	0	0	0	0	0
36	Pipalipara	95	28	123	77	145	67	7	296	419
37	Roogarh	44	11	55	67	91	56	41	255	310
38	Sadera	2	1	3	1	1	47	0	49	52
39	Sarelmafi	7	2	9	7	13	6	0	26	35
40	Sarpota	0	0	0	40	39	62	9	150	150
41	Sataliya	35	24	59	51	85	31	51	218	277
42	Sataliyakitodi	4	0	4	5	8	7	5	25	29
43	Semalda	49	61	110	45	73	56	3	177	287
45	Shobhawati	36	27	63	36	126	190	146	498	561
46	Sunariya	38	6	44	32	144	2	0	178	222
47	Sundaripara	16	3	19	27	43	11	0	81	100
48	Surwan	18	14	32	22	37	23	1	83	115
49	Taraliya	35	19	54	52	84	28	1	165	219
TOTAL		**1386**	**532**	**1918**	**2146**	**3516**	**2976**	**538**	**9176**	**11094**

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 Kushalgarh

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

Table 49: Parameters for prioritization of Value chain commodities in Kushalgarh cluster

Sr. No.	Parameters	Weightage	Bengal Gram	Cotton	Maize	Soybean	Wheat
A.	**Existing size**	**30**	**14.7**	**20.4**	**26.8**	**20.8**	**22.7**
1	Cropped Area of the crop in the cluster (in acre)	10	2.9	5.5	10.0	5.2	6.0
2	Crop Production in the cluster (in quintals)	10	1.7	4.9	10.0	5.7	8.6
3	Crop Productivity (cluster level compared to national's average)	10	10.0	10.0	6.8	10.0	8.1
B.	**Potential for Value addition within Rajasthan (implying scope for increased value addition for local farmers and processors)**	**45**	**32.2**	**21.3**	**25.0**	**37.0**	**20.9**
4	Price spread in Rs/Qtl (Price paid at APMC mandi- realization by farmer at farm level)	5	5.0	4.0	1.2	2.6	1.3
5	Price spread in Rs/Qtl (Price paid by customer at retail level- realization by farmer at farm level)	5	5.0	3.5	5.0	3.5	2.8
6	Net profit in production (Rs per acre)	5	4.1	4.6	1.3	5.0	0.8
7	Scope for processing in the state	10	6.0	4.0	5.0	6.0	5.0
8	Scope for value addition (Primary/ secondary/ tertiary processing)	10	8.0	4.0	6.0	10.0	8.0
9	Growth in market demand 5 year	10	4.1	1.2	6.6	10.0	3.0
C.	**Risk assessment**	**10**	**10.0**	**7.0**	**5.3**	**5.6**	**6.0**
10	Price Volatility (last 5 years; due to monsoon, due to adverse agronomical conditions	10	10.0	7.0	5.3	5.6	6.0
D.	**Others (Environmental & Social Parameter)**	**15.0**	**9.4**	**0.0**	**11.3**	**15.0**	**0.0**

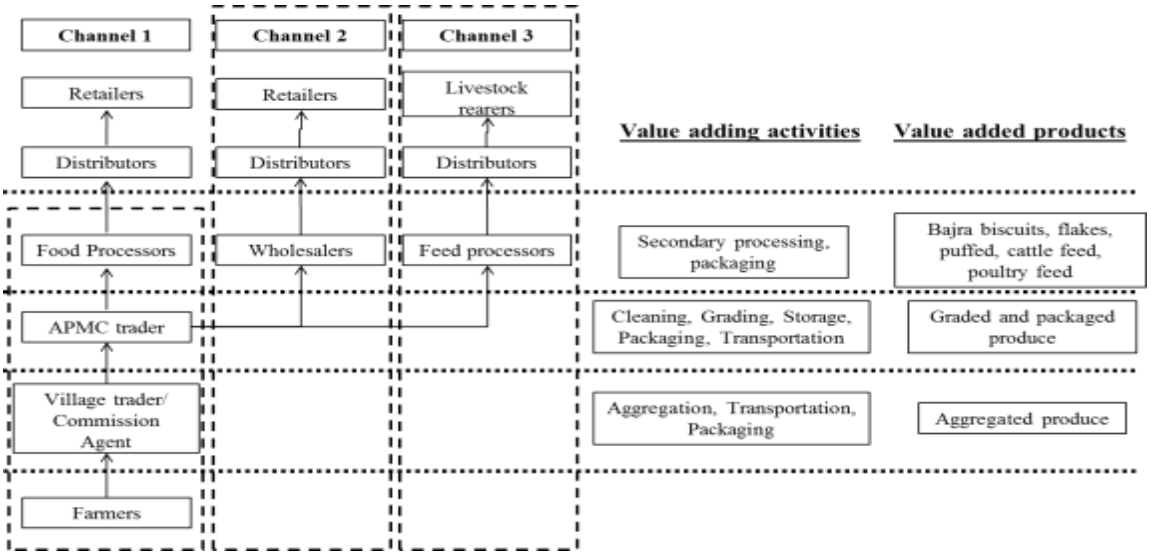
11	Water requirement	15.0	9.4	0.0	11.3	15.0	0.0
Total		**100.0**	**66.2**	**48.7**	**68.4**	**78.4**	**49.6**

Source: Data analysis by ABPF- Grant Thornton

Appendix 3.3 Current marketing chain of Value chain crops in Kushalgarh

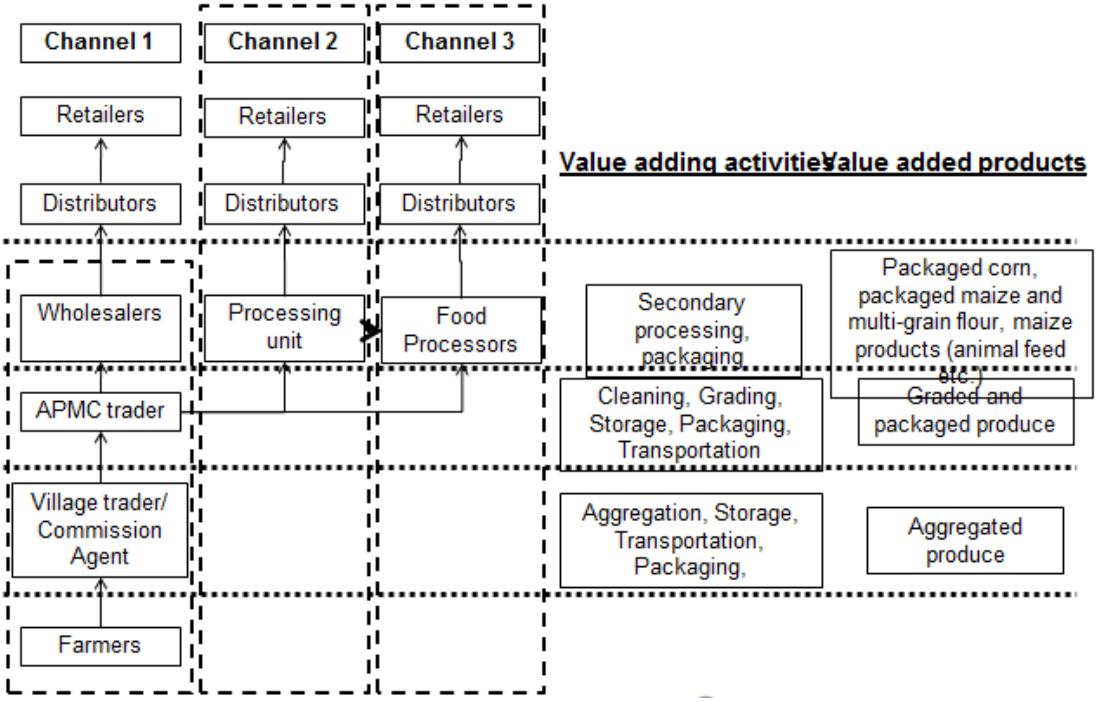
- **Bengal gram**

Figure 9: Current structure of marketing chains - Bengal gram



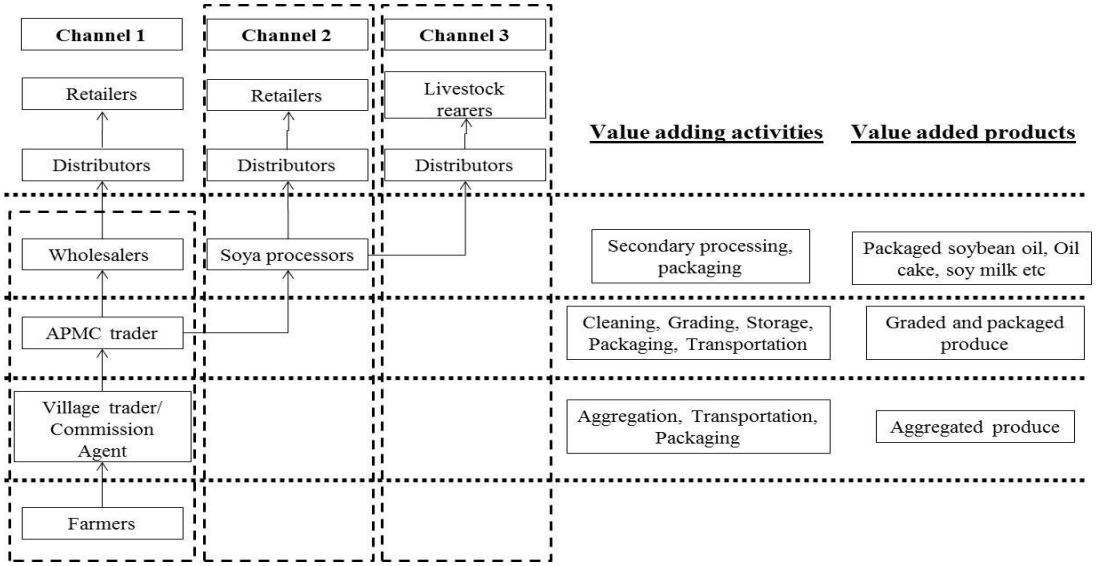
- **Maize**

Figure 10: Current structure of marketing chains - Maize



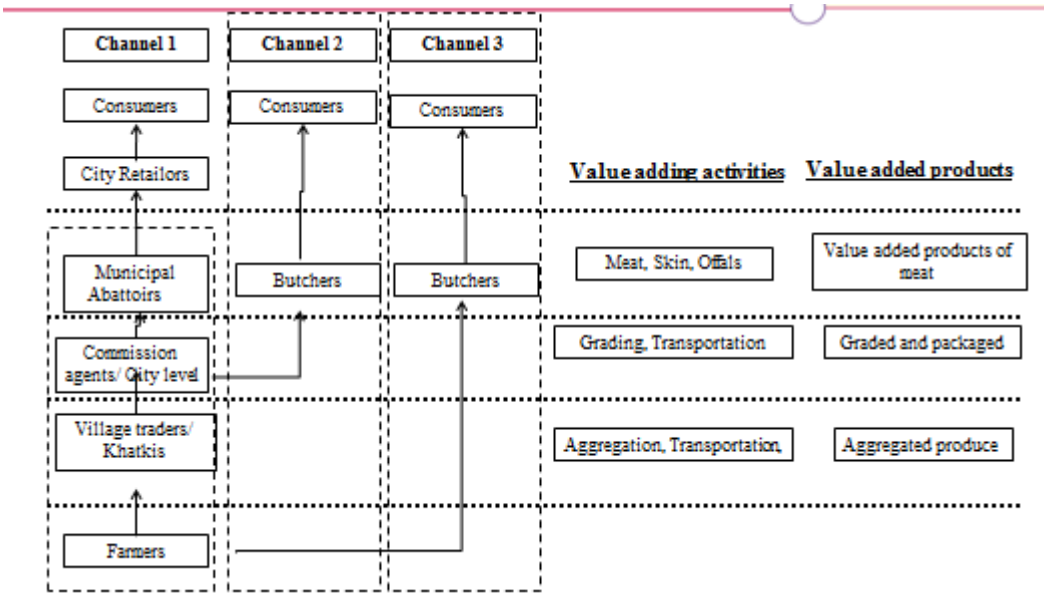
- **Soybean**

Figure 11: Current structure of marketing chains of Soybean



- **Goat Meat**

Figure 12: Current structure of marketing chains of Goat Meat



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:

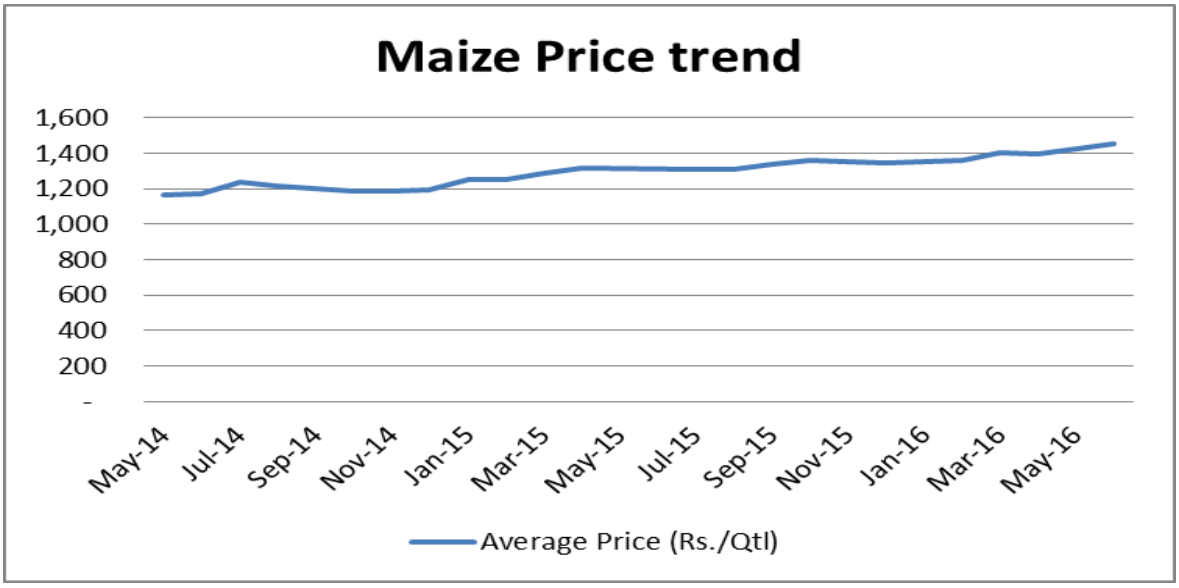
Maize

Table 50: Price trend of Maize in mandi for 2 years

Month	Price (Rs./Qtl)	Month	Price (Rs./Qtl)
Jun-16	1,450	Jul-15	1,309
May-16	1,425	Mar-15	1,287
Mar-16	1,402	Feb-15	1,255
Apr-16	1,396	Jan-15	1,249
Oct-15	1,363	Jul-14	1,236
Feb-16	1,358	Aug-14	1,212
Jan-16	1,354	Sep-14	1,198
Nov-15	1,350	Dec-14	1,193
Dec-15	1,348	Oct-14	1,189
Sep-15	1,338	Nov-14	1,188
Apr-15	1,313	Jun-14	1,171
Aug-15	1,310	May-14	1,162

The trend shows that in Rajasthan, price of the commodity is increasing over the period of 3 years. This is unique with respect to other commodities where the general trend is that price dips during harvesting and increase in off season. Reason for continuous growth in the price is the market demand of the commodity.

Figure 13: Price trend of Maize in mandi for 2 years



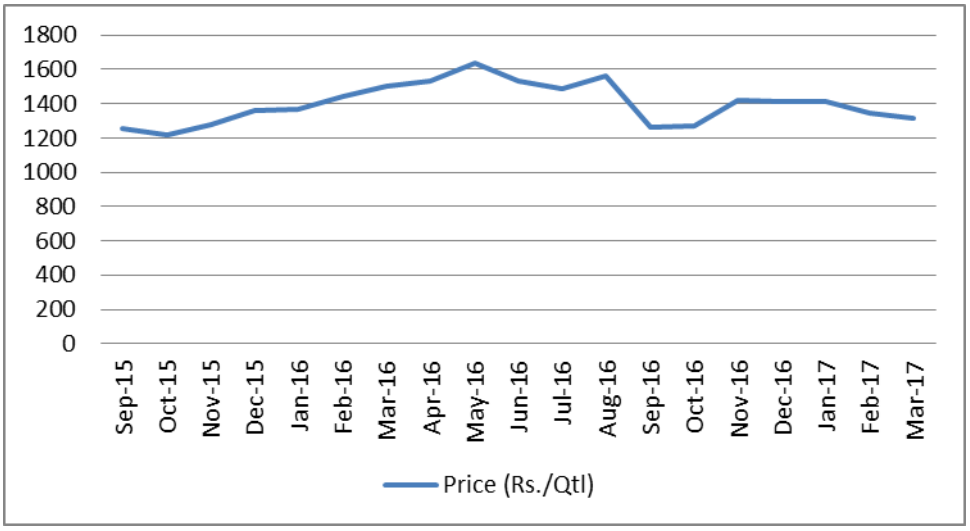
Bengal gram

Table 51: Price trend of Bengal gram in mandi in last 3 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 14: Price range of Bengal gram in past 3 seasons



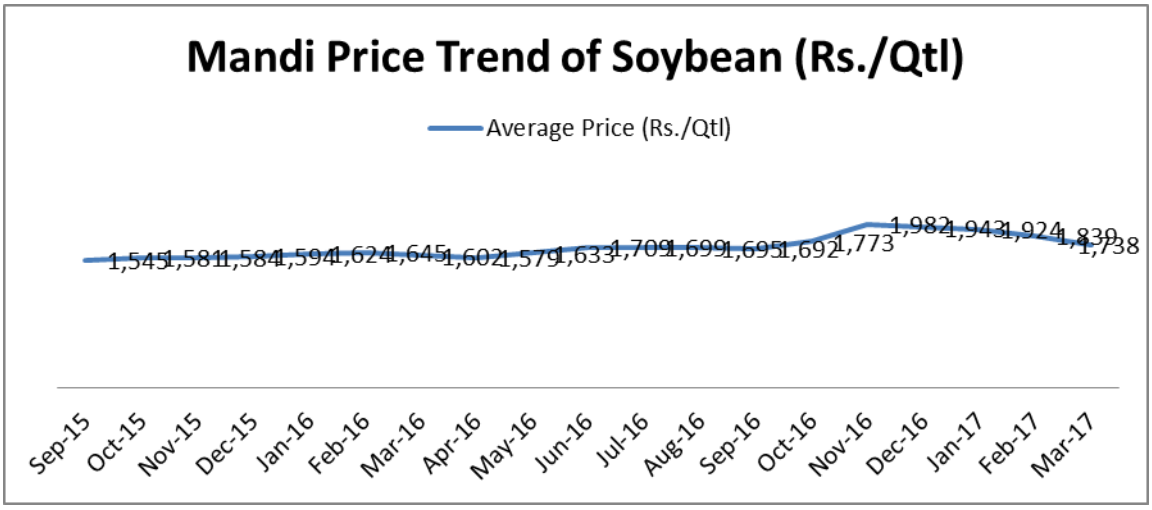
Soybean

Table 52: Price trend of Soybean in mandi in last 3 years

Month	Price (Rs./Qtl)	Month	Price (Rs./Qtl)
Jan-16	3,517	Sep-16	3,098
Feb-16	3,488	Oct-16	2,902
Mar-16	3,592	Nov-16	2,958
Apr-16	3,800	Dec-16	2,945
May-16	3,752	Jan-17	2,911
Jun-16	3,691	Feb-17	2,852
Jul-16	3,534	Mar-17	2,813
Aug-16	3,458	Apr-17	2,807

Price range of Soybean in past 3 seasons was from Rs. 2800 to Rs. 3800.

Figure 15: Price range of Soybean in past 3 seasons



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 Maize 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 Maize has been formulated which is shown in the table below.

Maize

The national consumption of Maize in the year 2017-18 is 1,062,299 MT which has grown at CAGR of 8.07% in last 5 years.

National Demand Growth of Maize(000 MT)					
2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
17,500	19,600	22,350	23,550	24,600	25,800

Bengal gram

Bengal gram has larger consumption in rural areas than urban. Although the demand for food Bengal gram 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 Bengal gram.

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

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

Soybean

The national consumption of Soybean in the year 2017-18 is 11.6 MT which has grown at CAGR of 12.18% in last 5 years.

National Demand Growth of Soybean (000 MT)					
2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
6,530	6,940	8,600	10,010	10,600	11,600

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 53: 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	Bengal gram	12,000	3.12	6,000	6,696	8,696
2	Maize	7,500	6.83	1, 400	2, 062	4, 165
3	Soybean	8,000	4.08	10,000	32,800	32,800
6	Wheat	11,000	11.50	1,600	7,400	12,200

Appendix 3.7 Livestock population and Fodder Requirement of Kushalgarh cluster

Table 54: Livestock population and Fodder Requirement of Kushalgarh cluster

S. No.	Description of animals	Population in No.	Yield (milk/mutton/ Wool)	Units	Dry Matter Requirement per animal (KGPD)	Total requirement per year in M.T.
1	Cattle (Indigenous)	17059	2.712	Lit/day	7	43586
2	Cattle (CB)	12	0		7	31
2	Buffaloes	3726	5.103	Lit/day	7	9520
3	Goat	11094	0.50 – 0.75	Lit/day, kg/no.	1.2	4859
4	Sheep	0	0.50 – 0.75/ 1-2	Lit/day, kg/Yr.	1.2	0
7	Piggery	0			3.5	0
	Total Livestock	**31891**				**57996**

(Source: Animal Husbandry Department, Kushalgarh)

Table 55: Fodder availability in Kushalgarh Cluster (Qty. in MT)

Name of crop	Proposed Area (ha)	Productivity (Kg/ha)	Production (in MT)
Kharif			
Maize	2626	4000	10504
Soybean	1360	4000	5440
Cotton	1000	0	0
Black gram	511	4000	2044
Paddy	1050	30000	31500
Sub total	**6547**		**49488**
Rabi			
Wheat	1260	4500	5670
Gram	750	4500	3375
Rabi Maize	99	4000	396

Name of crop	Proposed Area (ha)	Productivity (Kg/ha)	Production (in MT)
Sub total	**1319**		**9441**
Grand Total	**7393.29**		**58929**
Pasture & Community Lands	1132	16463.25	2795.46
Grand Total			**61724.46**

(Source: Agriculture Department, Kushalgarh)

Annexure 5.1: Operational and Implementation Arrangements (Agriculture)

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, 1.00 and 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:

b. 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.

c. 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.

d. 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.

e. 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.

f. 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.

g. 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.

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.

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: Operational and Implementation arrangements (Horticulture)

Procurement of Planting Material of Fruit Plants and Inputs

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.

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 farmer may get the inputs collectively and distributed as per their requirement. It is practically not possible in private suppliers.

Requirement of some inputs, especially, P.P. chemicals 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.

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The requirement of planting material is very small and cluster specific according to selected value chain crop. Most of the planting material is imported from other State like Gujarat, Maharashtra, and Uttar Pradesh etc. Planting material is very soft and succulent and intend to high motility during transport so that it is not feasible to procure the small quantity of different kind of planting material from different States. RAJHANS is the only option for timely supply of planting material due to availability of all kind of planting material in their local nurseries. RAJHANS grows planting material in their 27 nurseries and also procure the planting material from different State and provide quality hybrid or grafted planting material in State.

Annexure 5.3: Operational and Implementation arrangements (Livestock)

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

a. Climate Resilient Agriculture

Productivity enhancement

Breed improvement

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

i. Improved Bucks distribution to MTG members

ii. Goat distribution to Widows and/or especially 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 the farmers income. Department of Animal Husbandry breeding policy recommends Sirohi breed for the cluster area, so it is planned to induct elite breeding bucks in the area. Project will support distribution of breeding bucks to those MTG (Goat) members 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	400	250	100	50
Goat Distribution	80 MTG Members	30	25	25
Animal Insurance	720	370	200	150

The primary objective of investment under 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 the 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. 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 who are already keeping goats.

Project will primarily support **sourcing of elite bucks from open nucleus farm for multiplier herds (RAJUVAS) and from the multiplier herd to the MTG members**.Goat usually reared by small & medium landholders that too 50-100 in numbers (max) by a farmer; looking to the constraint of resources esp. fodder & space availability. These farmers keep very good quality goats and bucks and by selling the progeny maintain their herd size. These farmers are usually available on the breeding tract of the particular breed. So in a sense well organized suppliers/vendors in the form of large breeders are very limited for buck & goat procurement. There would be many breeding herd from which MTG can select animals directly without involvement of any middleman.

It is proposed to **procure buck and goats** by a cluster level committee (including MTG members & Veterinary doctor of the department of animal husbandry). The committee will procure from organized Farms (very few) and in case of non-availability/ suitability they may procure from private farmers of the breeding tract.

In the case of animals' procurement, **selection of each animal is important because standardization of all characters and uniformity among all is not possible**. In the project farmer's contribution for buck purchase is 25 percent of the purchase cost. Bucks & goats being the valuable asset of poor small holder farmer, it is always advisable to cover the risk factor of mortality of the animal or permanent disability through insurance coverage. Considering the importance of Buck/Goat insurance coverage, the component was included in the animal husbandry activities. MTG members will also contribute 25 percent of the insurance premium cost and rest 75 percent will be supported as project contribution.

Integrated Livestock Development Centres: Project will support establishment of Integrated Livestock Development Centers (ILD) for the Services of **Artificial Insemination and veterinary first AID to Cows & Buffaloes the doorsteps of the Farmers**. There shall be one ILD Centre for 1500 breed-able cattle & buffalo population in one or two panchayat having no Veterinary Institution. Depending upon the density of animal population, DAH may relax this condition in certain cases. Exact location would, however, be decided in consultation with the District officers of state department of Animal Husbandry

Improved feeding practices:

This may include 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. Watershed department is doing pasture development work in the project clusters. It will be suggested them for plating as per the local climatic conditions and fodder requirement. Potential for storage and pelleting will also be explored This will improve feeding practices which proposed are described in the following points:

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 linking up with 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 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 the new technology, initial 1-2 days field training & hand holding support and all inputs will be provided with project support. One demonstration is proposed to be given to a farmer.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Azolla Demonstration	400	0	200	200

Chaff cutter Demonstration to MTG members

To save the wastage and improve digestibility of fodder, the project will demonstrate and motivate 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	300	0	150	150

Feed supplement to Goat & Buck of the 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 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 reasons 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 project may support the goat population of the cluster for feed supplement (20 gm per day for 90 days in a year) to demonstrate the benefits:

Activity	Total Requirement	Year Wise requirement		
		Ist year	II year	III Year
Feed Supplement	9340	0	4670 Buck & Goat	4670 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 needs 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 the above proposed activities/facilities the following investments are planned for livestock owners especially the small holders Animal Health services will be provided to Large as well as small animals through Animal health Camps, RTC and Mobile Van

Establishment of Rural Technology Centres (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 have 5 Veterinary hospitals (Chhotisarva, Bassi, Kushalgarh, Ramgarh, Unkala)) and 4 sub centres (Kotariranga, Lohariya, Chokwara, Shogawati) and one vet. Dispensary (Mohakampura) in the project area. But available infrastructure is not sufficient to provide effective services to the livestock owners. Therefor additional support is required for extension and capacity building services at technology centres.

Following Locations in discussion with community and department of AH are identified for RTC's in the Kushalgarh cluster

RTC "A" Grade:- Chhotisarva with Rural Haat

RTC"B" Grade:- 1.Unkala 2. Bawalipada

Project will support building construction and procurement of basic furniture, equipment's and recurring expenditure during project period for effective functioning of RTCs. RTC will have 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. 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. 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 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 and provide services at the village level itself. The health camps will be organized for vaccination; deworming, etc. **at least once in a month in each gram Panchayat**. The cluster covers 10 Gram Panchayats, so 9 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 Requirement (No)	Year Wise requirement		
		I year including 2015-16	II year	III Year
Animal health Camps (One per GP per month)	660	300	180	180

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 the 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 the services in the cluster The Mobile vehicle shall be equipped with storage of medicine/ vaccines, primary testing and minor surgical interventions. Department of Animal Husbandry Rajasthan has given commitment for operating RTC and Mobile van to provide regular services to the project cluster even after the project period. The assets has been handover to the DAH

Installation of Travis in project cluster:

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 professional 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. It is found that **22 villages** of project cluster do not have Travis installed for animal inspection, so 2 Travis will be procured and installed with project support.

Animal husbandry management and advisory support

Distribution of Feeding and water troughs to MTG members

It is observed that there 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 per cent 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 (No)	Year Wise requirement		
		Ist year	II year	III Year
Feeding & Water Trough	400	0	200	200

Heifer International will also be consulted for alternative model. This unit (One feeding trough and one water trough) is costing Rs 5000 i.e. USD 80 only. Average life of the troughs are at least 5 years. In feeding trough fodder and concentrated can be feed in parallel. Through Water trough it will be demonstrated the importance to making available water ad lib for improving milk productivity and growth. Many Breeding Farm and herds are already using CIRG model by themselves.

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.

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. NREGA Model has been adopted so that remaining beneficiaries can be motivated and linked with NREGA for adoption

Project will support construction of goat house for one (20 goats+1Buck) Unit with 220 Sq Feet floor space. The design will be prepared by utilising the local material to reduce cost.

As referred from the NREGA guidelines the goat house for 20 goats cost Rs.66000 per house. The same low cost houses may be supported in the project. Goat farming is primarily adopted by poor and small holders' farmers and their capacities to create asset is always limited. Project may support 75 per cent of goat house cost and remaining 25 per cent cost will born by the beneficiary.

Activity	Total Requirement (No)	Year Wise requirement		
		Ist year	II year	III Year
Goat House	80	0	40	40

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 initially for monthly work related honorarium. After Project period the model will be self-sustainable. The LLWs will make following services available to the goat farmers and on cost basis:-

1. Sale of Bucks and Goats (On commission Basis)
2. Selling feed and other inputs
3. Selling inputs like Azolla, Chaff cutter, Clean milk Kits, weighing balance, feed and water troughs etc. They will be linked with the quality supplier of the project.
4. LLWs may also be train for goat milk collection and testing so they can work as milk collection center operator (commission Basis)

. b. 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 **80 MTGs (Goat) will be organized in the project cluster**. Selection criteria for Small Ruminants (SR) farmers to become member of MTG would be as follows. Farmer should be:

i. Only women and preferably small or marginal goat rearer

ii. possess at least 3 goats (not essential for widows and specially abled)

iii. Willing to participate in the programme and willing to contribute her investment as per pattern of funding.

iv. Members of SC/ST community must be included at least as per the funding pattern.

The list of members shall be informed to Gram Panchayat, if Gram Panchayat have any observation/suggestion shall be communicated to Implementing Agency for improvement.

Small ruminant market "Rural Haat" in the project cluster

Marketing is most crucial activity for producers to realize proper price and income of their farm produce. One of the major constraints identify to raise the income of goat farmers in the cluster is absence of any animal/Small ruminant markets Further no standards are laid down for small ruminants marketing.

In goat value chain actors involved are farmer, block/district/state level trader, butcher, retailer and consumer. Live goat, initially, moves from farmer to traders at different level and further moves up in the value chain in processed form (meat). The key actors involved in goat value chain are as follows:

Farmer- Goat rearing farmers are usually small and marginal farmers who have small landholdings of 0.6 hectare to 1.4 hectare. Their entire livelihood depends on wage labor & agriculture and allied activities. These farmers have flock size of five to twenty five goats. Average flock size of 7 goats per farmer was found in Rajasthan. Farmers are not oriented towards sale of goat milk and limit themselves to the sale of live goat which is mainly used for meat purpose.

Trader- The traders in goat trading business are mainly from Khatik and Muslim Community in Rajasthan and they work on different levels i.e. block, district and state level in goat value chain. Traders visit 4-5 villages to directly procure goats from farmers and sell it either to retailer (butcher) or block and district traders. Depending upon collection, traders in turn sell live goats either to district and state level markets or directly bring it to Ghazipur (Delhi) and Mumbai market. They also deal in marketing of Bakra-Eid goat which is governed by different marketing dynamics.

Commission Agent- Commission agents facilitate transactions between buyers and sellers in goat market. These commission agents provide services such as shed area to stock goats in night; credit facility to buyers and accommodation facilities to traders who arrive in goat markets.

Retailer (Butcher) - Butchers have their retail shops at village/block/district level. In some cases it was found that block traders double up as butcher and generally slaughter 2-3 goats daily at their retail shop. The district and state level retailers also double up as butchers and daily slaughter 10 to 40 goats and more.

Consumer- Live goat moves from farmers to traders and butchers. It is the goat meat that is consumed by end consumer located at village/block/district and state level. Each level of consumer shows

different buying behavior and preference and can be broadly categorized in two i.e. regular goat meat consumer and Bakra -Eid consumer.

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 centralized 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 Panchayat 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, DAH and RACP contract staff and Technical Resource Agency (TRA)/ABPF will build capacity of Farmer Producer Company (FPC) / PRIs of goat farmers to initiate the goat marketing operation at Rural Haat independently. ABPF will support community/PRIs give business plan and build their capacity to do the business. TRA/ABPF will support for operations of Rural Haat by community/PRI on sustainability basis. Technical / Market Resource Agency /ABPF in consultation with PMU/PIU/DAH will finalize the SOP (standard operating procedures) of Rural Haat functioning.

Physical markets are required so that buyers can developed a faith that on particular date at a particular place farmers gather to sell their animals and they can source required quantity and quality from these rural haats.. In an organized market buying selling can occur in an transparent manner. This place will also use for extension of best practices of goat farming, displaying improved technologies, place for producer company meetings and capacity building of CBOs

The issue was discussed with the community, PRIS, local department of animal husbandry officials and "Kushalgarh" 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.

Distribution of weighing scale to MTG members

Live goat sale is the largest adopted method by the small holder farmers. Some time in case of urgent need it becomes ready cash for the farmer. Goat sale usually occurs through middle man, who are taking the benefits of approximation and 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	1200	0	1200	0

c. 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 upgradation and orientation on the technical and organizational aspects. Farmer Field School (FFS) model will also be adopted in the project.

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 the 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 Goat management 3 Days training 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
3 days MTG Goat Management Training & 1 day refresher course	1200 MTG Members	300	600	300

Professional Training

It is observed that the knowledge of the veterinary professionals in the project cluster is also limited for goat management practices especially for latest development for feed and breeding as well as for cattle and buffalo. Veterinarians focus on animal health and have little knowledge of feeding and nutrition, breed improvement, housing and management, and marketing. They also do not receive any training in business management, farmer extension and communications

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 for rearing quality animals and showcasing the 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

Annexure 5.4: Post intervention value chain map

1. Soybean

The post intervention value chain map for Soybean may be visualised as one with three production-distribution or activity-marketing channels: edible oil, feed and value added products like soy paneer, tofu and Soybean flakes. It is also envisaged that PCs of producers with FCSCs is evolved. Such FCSCs only undertake 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 Soybean cultivation may be enhanced. Presently, the gross yield per acre is 12 quintals per acre. The market rate of sale is about Rs.3300 per quintal or Rs.39, 600 per acre. The cost of cultivation is about Rs.12, 044 per acre. The net realization is Rs 27, 556 per acre. Other than good harvest practices, input facilitation (high seed prices during cropping season) needs to be provided/disseminated amongst farmers.

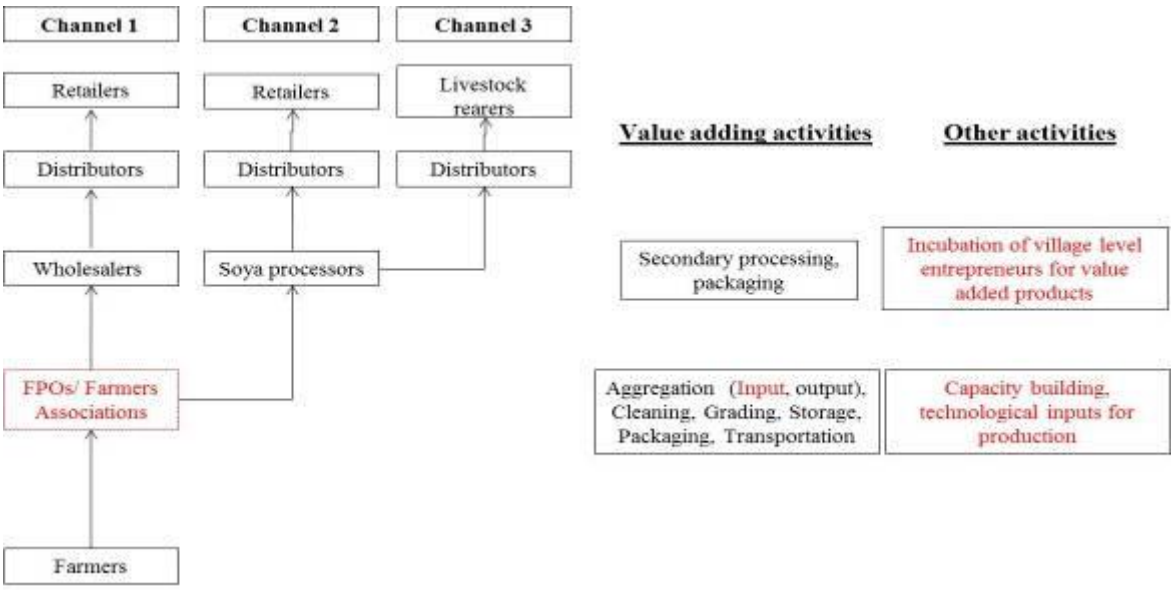


Figure 16: Indicative post-intervention value chain map of Soybean

2. Bengal gram

In the envisaged post-intervention re-structured value chain, channel 1 and 2 will have to be developed as alternate marketing channels where FCSCs play the role of an alternate private market yard and undertake basic primary processing (grading, sorting and packing) of Bengal gram. In addition, an alternate marketing channel namely that of supplying to large retailers like Tata Rallis, Walmart, Patanjali may be developed. The FCSCs can also offer gamut of other services to members in terms of input facilitation, custom hiring as well as facilitating market connectivity. The restructuring of the chain will also involve catalysing value added units in a range of snacks and feed as individual enterprise start-ups.

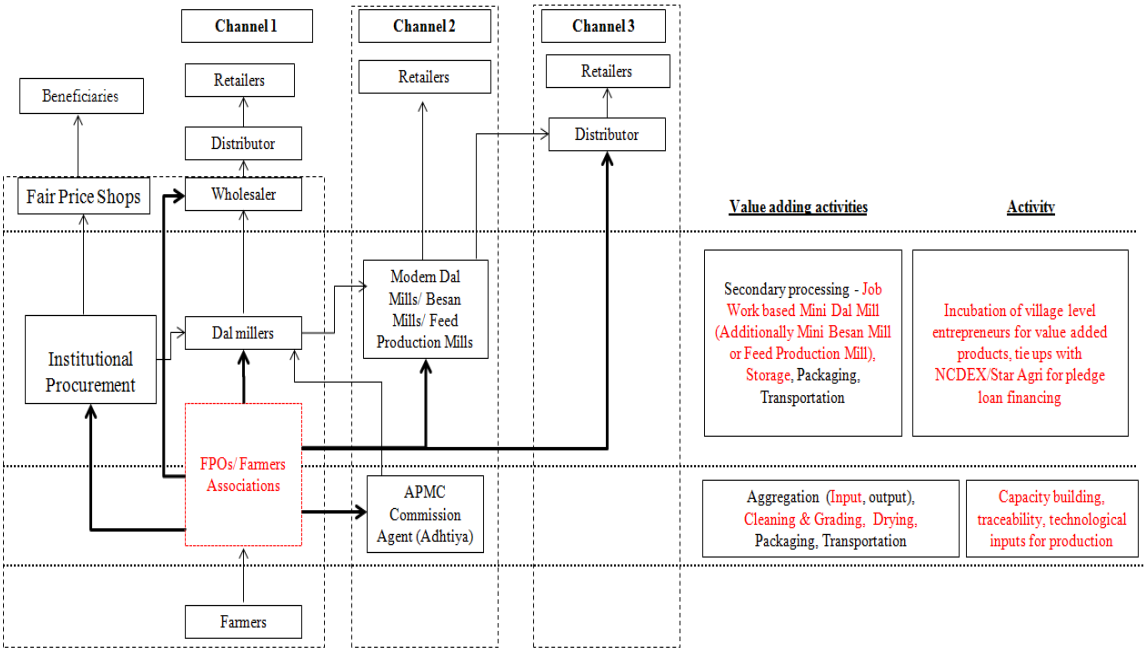
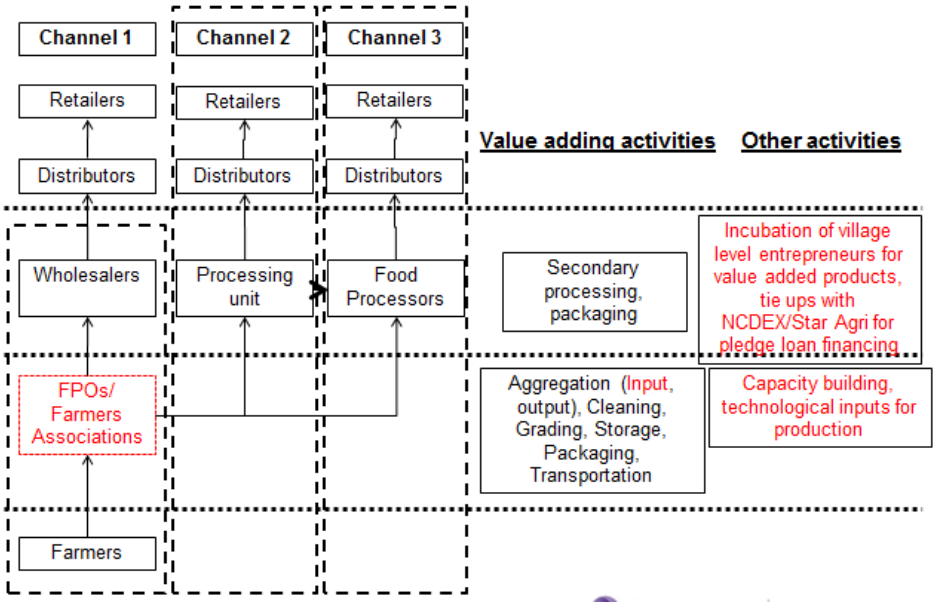


Figure 17: Indicative post-intervention value chain map of Bengal gram

3. Maize

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 need input facilitation, custom hiring and marketing of produce.

Figure 18 Post intervention map of value chain map of Maize



4. Goat

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

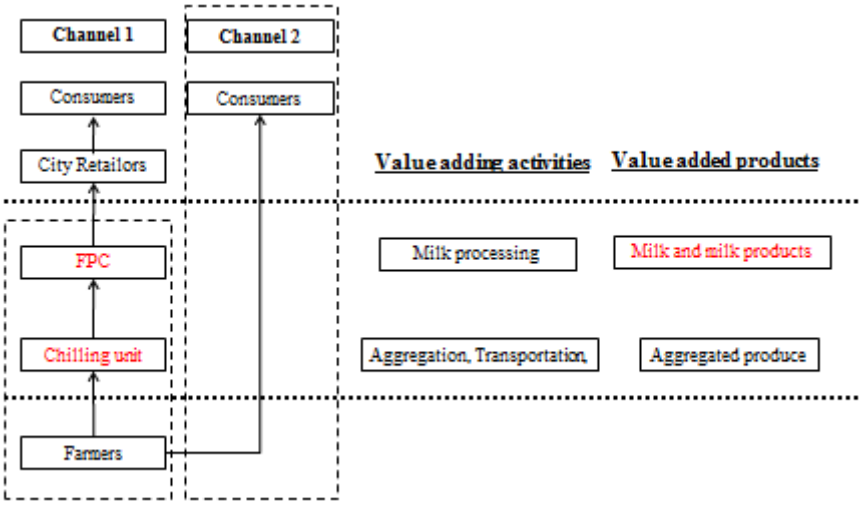


Figure 19 Indicative Post intervention value chain map of Goat milk

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

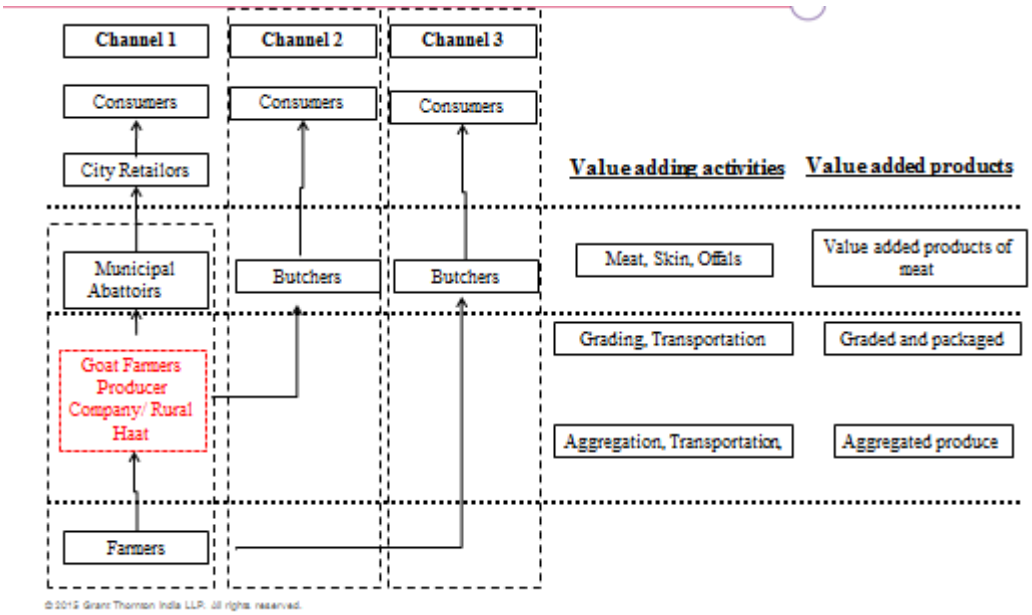


Figure 20 Indicative Post intervention value chain map for goat meat

Annexure 5.5: 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)**[1]

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.

[1] http://liferajasthan.blogspot.in/2011/04/know-kissan-call-center-1800-180-1551.html

Annexure 5.6 Profit and loss statements of selected business models

Table 56: Profit and loss statement of Maize drying unit

Particulars	Y1	Y2	Y3	Y4	Y5
Drying charge	1,402,500	1,559,250	1,728,169	1,910,081	2,005,585
	-	-	-	-	-
Total Revenue	**1,402,500**	**1,559,250**	**1,728,169**	**1,910,081**	**2,005,585**
Fixed Cost	225,400	236,670	248,504	260,929	273,975
Variable Cost	285,600	317,520	351,918	388,962	408,410
Total Operational Expenses	**511,000**	**554,190**	**600,422**	**649,891**	**682,385**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**891,500**	**1,005,060**	**1,127,747**	**1,260,191**	**1,323,200**
Depreciation	230,000	230,000	230,000	230,000	230,000
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**661,500**	**775,060**	**897,747**	**1,030,191**	**1,093,200**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**661,500**	**775,060**	**897,747**	**1,030,191**	**1,093,200**
Tax	158,054	208,594	259,853	312,319	341,774
Earnings After Taxes (EAT)	**503,447**	**566,466**	**637,895**	**717,872**	**751,426**

Table 57: Profit and loss statement of Bengal gram unit

					Figures in Rs.
Particulars	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**
Cleaning and Grading	1,036,800	1,179,360	1,333,584	1,500,282	1,680,316
Dal Revenue	7,918,560	8,482,698	9,083,453	9,723,078	10,403,956
Job Work	378,000	429,975	486,203	546,978	612,615
Total Revenue	**9,333,360**	**10,092,033**	**10,903,240**	**11,770,337**	**12,696,887**
Fixed Cost	979,500	1,028,475	1,079,899	1,133,894	1,190,588
Variable Cost	7,323,000	7,876,312	8,466,648	9,096,327	9,767,808
Total Operational Expenses	**8,302,500**	**8,904,787**	**9,546,547**	**10,230,221**	**10,958,396**
Earnings Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**1,030,860**	**1,187,246**	**1,356,693**	**1,540,116**	**1,738,491**
Depreciation	247,500	247,500	247,500	247,500	247,500
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**783,360**	**939,746**	**1,109,193**	**1,292,616**	**1,490,991**
Interest Expense	39,738	39,399	39,275	39,334	39,550
Earnings Before Taxes (EBT)	**743,622**	**900,347**	**1,069,918**	**1,253,283**	**1,451,440**
Tax	183,429	248,659	315,500	384,583	456,505
Earnings After Taxes (EAT)	**560,193**	**651,688**	**754,417**	**868,699**	**994,935**

Table 58: Profit and loss statement of Soybean Cleaning and grading unit

Particulars	Y1	Y2	Y3	Y4	Y5
Cleaning and Grading	1,944,000	2,211,300	2,500,470	2,813,029	3,150,592
	-	-	-	-	-
Total Revenue	**1,944,000**	**2,211,300**	**2,500,470**	**2,813,029**	**3,150,592**
Fixed Cost	381,400	400,470	420,494	441,518	463,594
Variable Cost	731,520	832,104	940,918	1,058,532	1,185,556
Total Operational Expenses	**1,112,920**	**1,232,574**	**1,361,411**	**1,500,050**	**1,649,150**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**831,080**	**978,726**	**1,139,059**	**1,312,978**	**1,501,442**
Depreciation	222,500	222,500	222,500	222,500	222,500
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**608,580**	**756,226**	**916,559**	**1,090,478**	**1,278,942**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**608,580**	**756,226**	**916,559**	**1,090,478**	**1,278,942**
Tax	182,574	202,194	264,617	329,521	397,439
Earnings After Taxes (EAT)	**426,006**	**554,032**	**651,942**	**760,957**	**881,503**

Table 59: Profit and loss statement of goat milk processing unit

Figures in Rs.

Particulars	Y1	Y2	Y3	Y4	Y5
Cleaning and Grading	1,944,000	2,211,300	2,500,470	2,813,029	3,150,592
Total Revenue	**1,944,000**	**2,211,300**	**2,500,470**	**2,813,029**	**3,150,592**
Fixed Cost	381,400	400,470	420,494	441,518	463,594
Variable Cost	731,520	832,104	940,918	1,058,532	1,185,556
Total Operational Expenses	**1,112,920**	**1,232,574**	**1,361,411**	**1,500,050**	**1,649,150**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**831,080**	**978,726**	**1,139,059**	**1,312,978**	**1,501,442**
Depreciation	222,500	222,500	222,500	222,500	222,500
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**608,580**	**756,226**	**916,559**	**1,090,478**	**1,278,942**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**608,580**	**756,226**	**916,559**	**1,090,478**	**1,278,942**
Tax	141,701	202,194	264,617	329,521	397,439
Earnings After Taxes (EAT)	**466,879**	**554,032**	**651,942**	**760,957**	**881,503**

Annexure 7.1: Social Management Plan under RACP (Implementation strategy of 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 15 gram panchayats of Kushalgarh Watershed Cluster. Major issues in the Kushalgarh cluster that emerged from the farmer and group consultations during field visit are summarized below.

a. Banswara district comes under TSP (Tribal Sub Plan) and the tribal development schemes are implemented by Department of Tribal Area Development, which provides the special grants for this area for Socio-Economic development purposes. Kushalgarh cluster is 75 kms from the district headquarters and the habitation is scattered and road connectivity is poor. Hence the development schemes are not fully utilized in the cluster.
b. The average land holding are ranging 0.7 ha with undulating topography. In the cluster, muximum area is rainfed.The community takes only one crop for self-consumption purpose and there is negligible surplus production. Livelihood of the community depends onmainly agriculture and agriculture labor (MP and Gujarat).
c. 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.
d. The liquor consumption and evil social systems are reasons of debt on higher interest rates.
e. Women mentioned 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.
f. Maximum families migrate for agriculture labour at nearby state MP and Gujarat
g. Limited access to the regulated markets especially in case of marginal and small farmers as they have the limited quantum of marketable surplus.
h. Lack of timely supply of agriculture inputs including seed and fertilizers.
i. Marginalization of small and marginal farmers in technologies and investments, training and capacity building.
j. Lack of breed improvement and livestock health care services.
k. Outreach of extension services is very low in villages.

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.

1.1 Field Consultant held - Key social issue of cluster

We have conducted 27 meeting at village level in the 15 gram panchayats with MTG group, Women's group and Village level leader & Stakeholder. During field visit major issues in the cluster that identified after consultation, are summarized below:

Sr. NO	Village	G.Panchayat	Date	Participates
1	Bavdi Dindor	Bawaliapada	07.01.2017	20
2	Bavdi Ninama	Bawaliapada	20.02.2017	23
3	Bawaliyapada	Bawaliapada	06.01.2017	20
4	Galdhar	Bawaliapada	19.01.2017	19
5	Bijori Kalan	Bijori Kalan	24.01.2017	14
6	Choti Sarwa	Choti Sarwa	24.02.2017	23
7	Devdasath	Dundaripada	07.01.2017	25
8	Doongripada	Dundaripada	09.01.2017	20
9	Bijori Khurd	Gopalpura	10.02.2017	20
10	Dara	Gopalpura	12.02.2017	16
11	Gopalpura	Gopalpura	11.02.2017	15
12	Semlada	Gopalpura	21.01.2017	21
13	Kherpur	kherpur	26.01.2017	45
14	Nagda Kalan	kherpur	27.01.2017	28
15	Khera	Lohariya	10.01.2017	20
16	Chorwar	Mahuda	21.01.2017	17
17	Mahuda	Mahuda	27.02.2017	16
18	Khanapada	Mokhampura	03.01.2016	30
19	Mokhampura	Mokhampura	18.01.2017	19
20	Taraliya	Mokhampura	09.01.2017	20
21	Badlipada	Roopgarh	12.01.2017	16
22	Bharatpura	Roopgarh	11.01.2017	15
23	Satliya Ki Todi	Roopgarh	13.01.2017	14
24	Shobhawati	Sobhawati	24.01.2017	17
25	Satliya	Satliya	21.1.17	17
26	Chulipada	Ukala	28.02.2017	21
27	Dhanpuri	Ukala	25.02.2017	20

Agriculture:-

In the cluster area maximum area is rainfed the community takes only one crop per year. Development of irrigation facilities is a major challenge. Watershed activities would be beneficial for increasing water level and source of irrigation water.

1. Majority of farmers have marginal or small land holding and hence design of project activities should be for marginal and small farmers.
2. Major crops in Kharif are Maize, cotton, paddy and Soybean but productivity is very low
3. Major Crops in Rabi are Wheat and Gram. However the area under cultivation in Rabi is very less and productivity of Rabi crops is very less.
4. More focus should be given on crop seed variety replacement for climate resilience as well as productivity enhancement
5. Sprinkler is very successful in cluster area as most of the area is undulating.

6. Regular farmer training and exposure tour activities should be conducted so that they can adopt new technology and innovation idea in Agriculture field.
7. Farm land fencing could be done to save crops from wild animals.
8. Those farmers who are belongs to BPL ST should be gave more subsidy or support from convergence (TADD).

Watershed:-

1. Ground Water table is very low and area is considered to be black zone. Tube wells are failure in the cluster and hence creation of surface water sources should be given priority
2. Slope of area is high and hence soil water conservation practices will help in ground water recharge
3. There are 921 wells, 150 tube wells, 2 ponds and 7 villages have canals

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. Goatry should be promoted as it is proven to benefit marginal and small women. Majority of families already have goats.
3. The goats in area are local and their productivity is low in terms of milk as well as meat. Hence breed improvement and provision of better breed goats is recommended.

Market Linkages:-

1. Though the cluster area is scattered populated and lack of transportation among the farmers, there is a felt need of Market development / linkages.
2. Ratlam and Bajna (Both in MP) are the only market nearer to cluster area.
3. Due to lack of investment money with farmers, they generally borrow 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 / businessma

Value Chain:-

1. Maize, Wheat, Soybean and Gram are the major crops in the cluster area.
2. Soybean and Gram crop is the large scale Production in the cluster area so under value chain activities, both crops should be developed as value chain crop.

1.2 Findings of PRA in cluster area

As of field consultation during field visits, Participatory Rural Appraisal (PRA) activities viz. Resource mapping, Social mapping, Group Discussion, time line and Transit walk etc. were also carried out in the cluster area. The main findings during PRA exercise in Kushalgarh cluster are summarized as under:

S. No	Village Name	Date	S. No	Village Name	Date
1	DOONGRAIPADA	28.7.16	26	SADERA	23.8.2016
2	DEVDASATH	12.8.2016	27	CHORBAR	11.9.16
3	PEEPALIPADA	4.8.2016	28	KARANGATI	10.9.16
4	KHERA	3.8.2016	29	MAHUDA	5.8.2016
5	CHULIPADA	16.8.2016	30	BHORAJ	5.9.16
6	DHANPURI	5.9.16	31	MOKHAMPURA	18.9.16
7	NAGDA KALAN	29.7.16	32	ORWA	28.8.2016
8	KHERPUR	28.7.16	33	SUNDRIPADA	26.8.2016
9	SAREL MAFI	19.9.16	34	TARALIYA	25.8.2016

S. No	Village Name	Date	S. No	Village Name	Date
10	BASSI	7.8.2016	35	KANAPADA	25.8.2016
11	AMLIPADA	10.8.2016	36	BHANWARDA	24.8.2016
12	BAVDI DINDOR	06.8.2016	37	HALOOPADA	5.9.16
13	BAVDI NINAMA	03.8.2016	38	SATALIYA	31.8.2016
14	BAWALIYAA PADA	20.7.16	39	SURWAN	29.8.2016
15	GALDHAR	17.8.2016	40	BORIYA	30.8.2016
16	BIJORI KALAN	7.8.2016	41	SHOBHAWATI	30.8.2016
17	CHOTI SARWA	31.8.2016	42	PERANIYA DEV	19.8.2016
18	GANDVAN	4.8.2016	43	SARPOTA	20.9.16
19	HAWA RUNDI	30.8.2016	44	BADLIPADA	19.9.16
20	KHERIYA PADA	27.8.2016	45	BHAWANON KI TODI	20.8.2016
21	NALWAI	19.9.16	46	KHERA	23.8.2016
22	SEMALDA	5.8.2016	47	SATALIYA KI TODI	12.8.2016
23	BIJORI KHURD	6.8.2016	48	SUNARIYA	19.9.16
24	DARA	20.8.2016	49	BHARAPURA	20.9.16
25	GOPALPURA	24.8.2016			

Findings of PRA in cluster area

a) All Project area is situated near by MP and Gujarat Border
b) Entire Project Area is Rain-fed and agriculture is fully dependent on rains there.
c) Project Area has been receiving average amount of rainfall for last two-three years resulting in less availability of water in ponds, *naadis* etc and subsistence level of agriculture production.
d) The villagers indicated their choice for the location for the proposed infrastructure (*naadis*, ponds, anicut, water harvesting structures etc.) on the resource map.
e) In the month of March to June month maximum families migrate for Agriculture labour to nearby MP and Gujarat cities
f) Maximum families having less than one ha land (hence marginal and small farmers are in ma
g) Maximum families having less than one ha land (hence marginal and small farmers are in majority)
h) Lack of technical knowledge in agriculture and animal husbandry
i) Scattered habitation
j) Lack of government infrastructure and facilities
k) Market facilities are not available

1.3 Social mobilization strategy

The consultations with participant are followed by / carried out through Information, Education and Communication (IEC) activities like Wall panting, Nukkad Natak, School Rallies, display board and pamphlet distribution on project 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	Nukkad Natak	30	30
3	Pamphlet Distribution	20000	20000
4	Awareness Rallies of School Children	40	40
5	Flex Stand	8	8
6	Slogan Writing	400	400

IEC findings:

1. IEC is an extremely important component of the programme that should lay the basis for its successful implementation. The community showed high interest in the project during the IEC campaign.
2. They understood that the project will build their capacity in a position to have the necessary information for informed decision-making and the relevant skills to improve their livelihoods
3. They understood that water is a primary resource in agricultural productivity and efficient use of the same is highly necessary
4. RACP being an integrated development program involves four line departments and their action plans will be implemented for the purpose of increasing the agricultural productivity, efficient use of water in irrigation, consolidation of benefits by formation of CBOs and market linkage of FPC

2. Socioeconomic Profile (based on CACP baseline data)

Project Area covers an area of 11898 hectare with 15th gram panchayat and 49 villages. The Cluster village has a population of 45503 and 8887 households in which 22758 are males while 22745 are female population. In the cluster scheduled Tribal 43790 (96.23%) and population of scheduled cast is 351(0.77%). Cluster had household of 8887 of which almost all farmers are marginal/small farmer's amount to 8591 (96.66%) and 2745 are BPL families

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

Male	Female	Total	SC	ST
22758	22745	45503	351	43790
50.00%	**50.00%**	**100.00%**	**0.77%**	**96.23%**

Household Details

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
2745	0	1567	7022	298	8887	64	8480
30.88%	**0.00%**	**17.63%**	**79.00%**	**3.35%**	**100.00%**	**00.72%**	**95.42%**

Village wise House hold detail

Name of villages	No. Of farmers	Farmers types and Numbers									
		Farmers types				Cotegories wise				BPL	Woman headed
		Landless	Small	Marginal	Large	General	SC	ST	OBC		
Doongraipada	217	0	21	191	5	9	2	202	4	52	4
Devdasath	198		28	163	7	1	0	195	2	92	1
Peepalipada	135		11	120	4	0	12	121	2	47	
Khera	76		6	68	2	1	0	75	0	23	
Chulipada	169		33	130	6	3	0	165	1	101	
Dhanpuri	131		9	118	4	0	1	130	0	75	
Nagda kalan	250		35	210	5	0	0	248	2	65	
Kherpur	359		30	322	7	2	0	357	0	106	
Sarel mafi	46		3	43	0	0	0	44	2	0	
Bassi	682		124	547	11	10	0	670	2	238	
Amlipada	65		13	51	1	4	0	60	1	37	
Bavdi dindor	257		55	197	5	2	0	253	2	76	
Bavdi ninama	173		36	129	8	0	1	172	0	57	
Bawaliyaa pada	413		63	341	9	5	0	407	1	185	
Galdhar	189		34	144	11	0	0	189	0	34	
Bijori kalan	484		42	384	58	0	0	484	0	52	
Choti sarwa	278		41	233	4	75	16	182	5	68	
Gadwan	251		48	196	7	1	0	248	2	42	
Hawa rundi	118		29	86	3	0	0	116	2	53	
Kheriya pada	131		33	95	3	1	0	130	0	27	1
Nalwai	144		34	107	3	0	0	144	0	60	
Semalda	109		24	83	2	0	0	109	0	38	
Bijori khurd	118		19	94	5	0	0	118	0	25	
Dara	159		24	131	4	0	0	159	0	57	
Gopalpura	214		38	172	4	5	0	207	2	59	
Sadera	75		21	48	6	0	0	75	0	23	
Chorbar	240		47	187	6	1	0	237	2	27	
Karangati	76		7	67	2	0	1	75	0	18	
Mahuda	225		30	190	5	1	5	217	2	28	
Bhoraj	94		14	76	4	1	0	90	3	55	

Name of villages	No. Of farmers	Farmers types and Numbers									
		Farmers types				Cotegories wise				BPL	Woman headed
		Landless	Small	Marginal	Large	General	SC	ST	OBC		
Mokhampura	272		86	175	11	123	17	115	17	74	
Orwa	25		9	13	3	0	0	25	0	11	
Sundripada	99		17	78	4	0	0	99	0	64	
Taraliya	214		46	163	5	6	0	205	3	66	
Kanapada	124		18	102	4	1	0	118	5	97	
Bhanwarda	120		27	90	3	2	0	116	2	98	
Haloopada	97		25	68	4	4	0	93	0	32	
Sataliya	322		112	205	5	0	0	320	2	86	
Surwan	39		6	30	3	0	0	39	0	9	
Boriya	85		13	68	4	0	0	85	0	24	
Shobhawati	491		75	409	7	3	2	485	1	145	
Peraniya dev	65		29	34	2	1	0	64	0	14	
Sarpota	110		14	90	6	0	0	110	0	28	
Badlipada	87		22	60	5	0	0	87	0	35	
Bhawanon ki todi	25		1	22	2	0	0	25	0	3	
Khera khalsa	96		10	80	6	1	0	95	0	21	
Sataliya ki todi	292		59	222	11	3	5	284	0	7	
Sunariya	65		11	49	5	0	0	64	1	41	
Bharapura	183		35	141	7	10	0	172	1	70	
Total	**8887**	**0**	**1567**	**7022**	**298**	**276**	**62**	**8480**	**69**	**2745**	**6**

Category wise Cultivated Area in Kushalgarh Cluster

The cluster has marginal and small farmers in majority. These farmers have less than 1 hectare land which have low productivity through adverse climatic condition like drought, low fertility of soil and desertification.

S.N	Type of Farmer	Total Households (NOs)	Area (in ha)			Area (in ha) Category wise			
			Irrigated	Unirrigated	Total	General	SC	ST	OBC
1	Large farmer	298	256	435	691	127	7	503	54
2	Small farmer	1567	647	1098	1745	232	28	1443	42
3	Marginal farmer	7022	1446	2687	4133	79	20	4008	26
4	Landless person	0	0	0	0	0	0	0	0
5	No. of BPL households	2745	58	886	944	10	67	804	63
	Total (1to 4)	**8887**	**2349**	**4220**	**6569**	**438**	**55**	**5954**	**122**
Category wise Cultivated Area in Kushalgarh Cluster in %									
1	Large farmer	3.35	37.05	62.95	**10.52**	18.38	1.01	72.79	7.81
2	Small farmer	17.63	37.08	62.92	**26.56**	13.30	1.60	82.69	2.41
3	Marginal farmer	79.01	34.99	65.01	**62.92**	1.91	0.48	96.98	0.63
4	Landless person	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00
5	No. of BPL households	30.89	6.14	93.86	**14.37**	1.06	7.10	85.17	6.67

S.N	Type of Farmer	Total Households (NOs)	Area (in ha)			Area (in ha) Category wise			
			Irrigated	Unirrigated	Total	General	SC	ST	OBC
	Total (1to 4)	**100**	**35.76**	**64.24**	**100**	**6.67**	**0.84**	**90.64**	**1.86**

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.

Individual beneficiaries will be selected through the meetings of MTG. The schemes of all four line departments will be explained to the MTGs in meetings and they will take proposal for suggesting individual beneficiary to various schemes based on interest, economic conditions, need and basic resources available with the individual beneficiaries' for successful adoption of the interventions

The ST population is 96.23% in the cluster and Marginal and Small farmers are 96.63%. Hence the benefits will be distributed in the same proportion to them. Women empowerment and benefit sharing to women will also be done as per the norms under the project.

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 at-least 30% 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 major Livelihood options for tribes are Agriculture, Animal Husbandry and labour employment. In Agriculture depends on rains, because most of not having the irrigation facilities and in command have irrigation facilities, but sufficient access is issue. The access to quality agriculture input and purchase power of quality input affects the agricultural productivity. So, depend on other option as animal husbandry, but same thing with animal husbandry is quality & sufficient feed to cattle's affects the productivity, so migrate in search of wage employment in cities of Gujarat and Madhya Pradesh.

Executive Summary:

The Kushalgarh cluster area comes under TAD Department and cluster is constituted by 96.23% tribal population. The average land holding are ranging 0.7 ha with undulating topography. In the cluster, 65% area is rainfed and only 2349 ha area is covered by irrigation facilities out of total 10331 effective ha. Farming community takes only one crop for self-consumption purpose and there is no surplus production. Livelihood of community depends upon mainly agriculture and agriculture labor in nearby states (MP and Gujarat). The tribal population is deprived of resources and hence is unable to give cash contribution in most of the project activities. Hence a separate proposal for TAD to converge the 15-**20%** contribution to individual benefitted activities of RACP for tribes has been submitted. The sanction by the Commissioner office TAD is awaited.

Area/Cluster description

Kushalgarh cluster area has distance 75 km from Banswara head quarter and attached with Madhya Pradesh and Gujarat Border. Cluster covers 49 villages with 15 gram Panchayats. Less than 10% area is covered by one GP (Khuslapada) and seven villages. 14 villages have less than 50% area under Cluster. The cluster is under Mahi river catchment area. The total geographical area is 16111 ha, project area is 11898 ha and effective area is 10331 ha. Only 6569 ha area is under cultivation.

Consultations:

The consultations were organized with stake holder, PRI and CBOs under project area.
The major issues come out during the consultation are as –

1. The Land holding is fragmented & small.
2. Traditional farming is being practiced and average productivity is very low.
3. The lack of knowledge of High tech agriculture (Micro Irrigation, Solar pump, Protective agriculture and post harvesting management) is there.
4. Market and transportation facilities are negligible.
5. Limited access to the regulated markets especially in case of marginal and small farmers as they have the limited quantum of marketable surplus.
6. Low purchasing power or investment on agriculture
7. The conditions of tribal families are poor, so contribution to the schemes is big hurdle to access the schemes

8. Women mentioned that though they do most of the work in agriculture except for ploughing and selling produce, they have no role in decision making regarding purchase of inputs or selling of produce.
9. Problem of access to credit by small and marginal farmers.
10. Maximum families migrate for agriculture labour at nearby state MP and Gujarat
11. The liquor consumption and evil social systems are rampant in the area.

Situation of tribes in cluster:

The cluster have 96.23 % tribal population and they are resource poor, even some family almost permanently, migrated for the purpose of labour employment, which effects the education & health aspects of children's. Most of the tribes in catchment area are unable to access the irrigation facilities, so depends on rainy season crops and if, it failed then only on labour employment.
The conditions of the tribes are very poor and they are unable to arrange their share to participate in Govt schemes and project activities.

Tribal Livelihood Strategies:
The major Livelihood options for tribes are Agriculture, Animal Husbandry and labour employment. In Agriculture depends on rains, because most of them do not having the irrigation facilities and in command have irrigation facilities, but insufficient access is issue. The access to quality agriculture input and purchase power of quality input affects the agricultural productivity. So, depend on other option as animal husbandry, but same thing with animal husbandry is quality & sufficient feed to cattle's affects the productivity. Due to limited livelihood options the community migrates in search of wage employment in cities of Gujarat and Madhya Pradesh.

Specific adverse impact/s of RACP Activities (related to livelihood):

There is no adverse impact on tribe's livelihood by the RACP activities on private lands or common lands. But, inability to contribute the farmer's share cut off from activities of RACP.

Mitigation measures:

The area is considered by Govt under Tribal Area Development and provides special provisions for tribal development, so convergence with TAD is an opportunity to support the tribal community of the project area under RACP. Under the RACP provision of farmers share is 25, 30 & 50 % in different activities, the TAD may support for farmers share contribution for tribes may help to implement the activities on tribal farmer's field, which may enhance the productivity and support to tribal farmers under the RACP.

The Tribal Development Plan was prepared and submitted to TAD for consideration for Agriculture & Horticultural activities as –

SN	Name of Activity	Total Target	Unit Cost				Total Cost			
(A) HORTICULTURE			Total Cost	RACP Assistance	TAD Grant	Farmer Share	Total Cost	RACP Assistance	TAD Grant	Farmer Share
1	Horti Orchard with Drip	80 Ha	80000	60000	12000	8000	6400000	4800000	**960000**	640000
2	Vegetable with Drip	60 Ha	130000	97500	19500	13000	7800000	5850000	**1170000**	780000
3	Solar Pump 5hp	20 No	427497	299248	85499	42750	8549940	5984960	**1709980**	855000
4	Solar Pump 3hp	10 No	326497	228548	65299	32650	3264970	2285480	**652990**	326500
5	Green House	5000 Sqmt	1100	816	165	119	5500000	4080000	**825000**	595000
	TOTAL (A)		**965094**	**686112**	**182463**	**96519**	**31514910**	**23000440**	**5317970**	**3196500**
(B) AGRICULTURE										
1	Drip in Crop	10 Ha	130000	97500	19500	13000	1300000	975000	**195000**	130000
2	Mini	20 Ha	90000	67500	13500	9000	1800000	1350000	**270000**	180000

SN	Name of Activity	Total Target	Unit Cost				Total Cost			
	Sprinkler									
	TOTAL (B)		**220000**	**165000**	**33000**	**22000**	**3100000**	**2325000**	**465000**	**310000**
	G Total (A+B)				**215463**				**5782970**	

Implementation of TDP:

The tribal development plan is to provide matching grant of farmer's contribution in project activities through Tribal Area Development Department. The line departments have submitted their TDP to TAD separately.

Reporting, monitoring and evaluation:

If, TDP is sanctioned then grant will be with the line department as RACP grant, so similar to RACP, no separate process for reporting, monitoring and evaluation it's as per RACP.

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	Field Bund	Own Land	• The risk of conflicts among water users resulting from collective efforts at establishing more efficient water usage norms. • 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 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
		Azolla cultivation Unit	Own Land		
		SGT/CCT	Common Land		
		DCCT	Common Land		
		Mini percolation Tank	Own Land		
		Pasture land Development	Common Land		
		MM Structure (WHS)	Common Land		
2	Agriculture	Drip Irrigation System	Own land	• Risk of marginal and small farmers; increased food insecurity • Risk of resource-poor smallholder	• Facilitate for market oriented agriculture comprising high-value and high-risk crops. • Promote
		Mini/ Micro Sprinkler Irrigation System	Own land		
		Sprinkler Irrigation System	Own land		
		Pipeline for piped conveyance of	Own land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		irrigation water		farmers being further indebted to moneylenders • Increased perishability, and challenges in marketability of produce (thus risking income) • Risk of livelihood security	establishment of grain banks with exclusive membership of marginal and small farmers. • Promote nutritional security through a kitchen 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
		Promotion of seed production	Own land		
		Demonstration on production technology	Own land		
		Demonstrations on farm mechanization and PHM technologies	Own land		
		Farmer common Facility Center	Common Land		
3	Horticulture	Vegetable Cultivation with drip irrigation system	Own land	• Risk of marginal and small farmers; increased food insecurity • Risk of resource-poor smallholder farmers being further indebted to money lenders • 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 norms in the case of smallholder farmers (to be
		Fruit cultivation with drip irrigation & Mulching	Own Land		
		Solar Pump Program	Own land		
		Post-Harvest Management	Own land		
		Horticulture Mechanization	Own land		
		Green house	Own land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
					decided by the village institution on a case-by-case basis)
4	Animal Husbandry	Buck Distribution	Not applicable	The risk of exclude poorest women of ST, widow, disabled for getting the benefit of activities The risk of women being excluded from training and related activities. The risk of migrant households particularly sheep herds getting excluded from receiving the benefit. Affect access to the land for grazing/ stalling livestock	Identification of women household headed, and ST farmers, and their prioritized inclusion in all project benefits. Develop a cadre of women CRPs and LLW in different thematic areas, including animal husbandry Allow medical supplies (deworming and routine vaccination) for migrant herds to be given in bulk for the duration away from the village. Formation of common land user associations/ resource institutions for development and management of the resource. • 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 house/ livelihood. • Formation of common land user associations/ resource institutions for
		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 Scale	Not applicable		
		Travis Installation In Project Villages	Common Land		
		ESTABLISHMENT OF RURAL HAAT	Common Land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
					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 commercializatio n-on and formalization of markets – further disempowerment of women in the household economy	• 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 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.
		FCSC	Proposed Gram panchayat land		
6	Farmers' organization and capacity building	Formation of MTGs	Not applicable	• Risk of exclusion of women from benefits of training for	• Develop a cadre of women CRPs, cascade training approach for
		Formation of MTAs	Not applicable		
		Formation of FPC	Not applicable		
		Socio economic Data	Not applicable		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		collection		technological interventions. • Risk of exclusion of smallholder farmers. • Women are not recognized as farmers in their own right.	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 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.
		Identification of Beneficiary	Not applicable		
		Capacity building & Training	Not applicable		

8. Grievance Redress

The Grievance Redress Mechanism (GRM) are being developed 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. This has been done already under the project.

Second tier-Grievance Redressal Cell (GRC) at district level headed by cluster representative of PRIs/Zila Parisad with DPMU coordination. We have submitted the names of representatives to DPM and the process of formation by DPM is underway.

Third tier– GRM monitor through web application, toll free number, forward by DPMU by state level GRC which headed by project director. This will be done at state level by PMU.

9. Key Social Indicators

The key social indicators are given below in table:-

Major activity	Sub activity	Social indicators
Watershed	The project will implement watershed development activities like soil water conservation, water resource development through rainwater harvesting etc	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	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 rainfed agriculture 79% of benefit shall be given to BPL marginal farmers 19% of benefit will be given to BPL small farmers Since majority of farming is done by women except heavy field work like ploughing and selling of produce, all these benefits will ultimately be targeted for women of the cluster
Horticulture	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

Major activity	Sub activity	Social indicators
		Vegetable and fruits (from 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 79% of benefit shall be given to BPL marginal farmers 19% of benefit will be given to BPL small farmers Since majority of farming is done by women except heavy field work like ploughing and selling of produce, all these benefits will ultimately be targeted for women of the cluster
Animal Husbandry	Buck Distribution ,Goat distribution to Widows and/or especially abled women, Health and Awareness camps, Fodder Demonstrations on private lands, Azolla Demonstration, Lady Link Worker cum Marketing Facilitator and Chaff Cutter Distribution	All women with goats especially widow on whom whole family is dependent 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. 100% of benefit shall be given to poor women with large family size (mostly marginal BPL farmers)
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
- 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 awareness on the varieties that are suitable to the local conditions.	% of Farmers using the varieties suitable for the region
			Seed selected may be pest or disease infected leading to pest	Use of seeds of good quality that are pests & disease free determines crop performance to a large extent. Therefore, Seeds when purchased		% of farmers has access to certified seed.	

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**
			attack and crop loss or increased use of chemical pesticides	should be only from certified sources and should be used well within the expiry date.			
			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). Package of practices considering the soil nutrient status of the cluster	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	Restricting the use of banned pesticides (as per WHO, list) and promoting the Integrated Pest management Plan (IPM).	Design of Package of Practices & at the time of purchase of pesticides including biopesticides / bio-control agents	% of farmers who have attended training/demonstration 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				

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**
			storing and using chemical pesticides		/pheromone traps for distribution.		
	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 Cropping pattern may be leading to unsustainable use of available water	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.	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.
	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: ➢ Bagged fertilizer must be handled in a manner to prevent fertilizer from escaping to the environment. ➢ Spills should be cleaned up immediately to	Design of Package of Practices & at the time of purchase of seeds, fertilizer, pesticides for distribution.	% of farmers who have attended training on precautions mentioned in measures to be taken/Implemented for storage and Handling of agri-inputs.	% of farmers followed code of practices for storage and handling agri-inputs.

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**
				avoid the potential for soil and groundwater contamination.			
			Poor storage may lead to pest and disease infestation of seeds	Seeds should be stored in air tight containers and away from sunlight, heat and moisture. Before storage, the moisture level of the seeds should be bought down to an appropriate level by drying it in sunlight followed by drying in shade. Seeds of different should be stored in separate containers and clearly labeled.			

Environment Management Plan for Water Management

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 India 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:- Pastureland Development	Top soil removal Cutting of trees	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. 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 and Water harvesting structures as following:- Tree species : Acacia albida. Albizia lebbek, Azadirachta indica, Prosopis cineraria, Zizyphus mauritiana, Acacia senegal, Acacia tortilis, Dichrostachys cineria, Hardwickia binata, etc Shrubs Capparis decidua, Zizyphus sp., Balanites aegyptica, Calligonum polygonoides,etc. Grasses and legumes : Lasiurus	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. % Water harvest structure with vegetative cover to prevent erosion and siltation. % Water harvest structures with safety provisions.	% survival of trees planted under compensatory planting. % of water harvest 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 more than 70 % of total runoff from drained area. % of pastureland developed.

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**
				sindicus, Cenchrus ciliaris, Cenchrus setigerus, Stylosanthes scabra, 8Panicum antidotale, Chloris gayana. Desmodium trifolium, Macroptelium atroperpureum, etc. The basic requirement for pastureland management should be balanced the number of grazing animals (livestock) with grazing capacity (Carrying capacity) and rotational grazing. 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.			
		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.			

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 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. Bunds should be covered with vegetative cover to ensure longevity with lower maintenance costs. Grasses such as Lasiurus sindicus, Cenchrus ciliaris, Cenchrus setigerus, Stylosanthes scabra,Panicum antidotale, Chloris gayana. Desmodium trifolium, Macroptelium atroperpureum,Vetiveria zizaniodes , Saccbarum munja etc. could be grown to help bind the soil together and thereby stabilize the bund.			
		Too many water harvesting structures may affect downstream flows • With ground water getting recharged more bore wells are dug		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 Nadi and tanka 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			

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 more water is extracted.		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			
		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 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. • Kids should also be given very succulent green fodder such as maize, Lucerne, etc. If adult goats are completely			

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**
				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 m away from water bodies, grazing land and other human habitations. These pits should be covered with soil immediately after disposal of the wastes.	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
		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			

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**
				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. pesticides banned/restricted as per WHO classification. 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 ,air pollution , noise 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		% 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**
				B. Charge separation etc. • 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. • Noise protective equipment should be provided to the operator of machines. Silencer should be attached to the equipment to reduce noise from the equipment to surrounding areas. • Use energy efficient equipment for processing (such as steam boilers).			

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**
	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 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		• The sewage system for the labour/ camp is designed, built and operated in such a manner that no health hazard			

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**
		activities.		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. • 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			

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**
				made. • Construction debris should be put to alternate uses such as land filling. If not utilized it should be disposed off in nearby safe places. • 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 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.

Relevant Acts/Rules	Relevance to RACP Project	Provision
Air (Prevention and Control of Pollution) Act 1981	Applicable to, processing activities (dal mills, rice mills fish/ poultry feed manufacture etc.	Setting air quality standards, procedures for consent to operate enterprises, penalties etc. Consent should be taken to establish and operate.
The Water (Prevention and Control of Pollution) Act Amended: 1988	Applicable to any activities that release wastes into water bodies (eg: processing units etc.) The project will address the issue of Water contamination due to chemicals by adopting an IPM strategy.	Laying down the permissible limits/ standards of pollutants likely to be emitted, collection of samples of effluent and analysis and provisions for penalties.
The Biological Diversity Act, 2002 G.S.R.261 (E), [15/04/2004] - Biological Diversity Rules, 2004	The project envisages maintaining the biodiversity. At the same time the project will enhance crop productivity through sustainable natural resource management.	Regulation of access to biological diversity, empower National Biodiversity Authority and State Biodiversity Board to restrict certain activities that affect biodiversity adversely. Provision of appropriate legislation for declaration of Biodiversity Heritage sites at local level.
Scheduled Tribes and other Traditional Forest Dwellers (Recognition Forest Rights) Act, 2006	The Act determines the use rights for the collection Non Timber Forest Product (NTFP), agricultural operation, animal rearing and construction of common facilities.	Recognition of rights and responsibilities and authority for sustainable use, maintenance of ecological balance and strengthening the conservation regimen of forest while ensuring livelihood and food security.
Forest (Conservation) Act, 1980 (With Amendments made in 1988) Forest (Conservation) Rules, 2003 (With Amendments made in 2004)	Applicable to the project where agriculture or Any construction of common facilities are promoted near forest in tribal areas.	Reserved forest or any portion thereof, shall cease to be reserved. Forest land or any portion thereof may be used for any non-forest purpose. Necessary Clearance should be obtained from Forest Dept or Revenue Department for trees cutting and plantation..

Relevant Acts/Rules	Relevance to RACP Project	Provision
The Wild Life (Protection) Act, 1972	Applicable to the activities like livestock Development where grazing is involved in forest areas, collection of NTFP and construction of common facilities near forest areas.	Destruction, exploitation or removal of any wild life including forest produce from a sanctuary of the destruction or diversification of habitat of any wild animal, or the diversion, stoppage or enhancement of the flow of water into or outside the sanctuary is prohibited without a permit granted by the Chief Wildlife Warden.
The Insecticides Act. 1968 Amendment: Insecticides (Amendment) Act, 1977	Applicable to agricultural activities. Mitigation measures taken care in Pest Management Plan	Regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith.
The Fertilizer (Control) Order, 1985	Applicable to POs in cases where stocking and sale of fertilisers may happen	Registration is required for selling fertilizer at any place as wholesale dealer or retail dealer.
The Seeds Act 1966, The Seeds Rules 1968	Relevant to the project. The project does not envisage seed production yet, but will take cognizance of the act if promoted.	Regulation of sale of seeds of notified kinds or varieties. Determine the responsibilities for making and labelling. Certification agency and grant/ revoke of certificate, provision of penalties.
Bio-Medical Waste(Management & Handling) Rules, 1998	Rules will help in managing the waste generated by the veterinary health centres that may have adverse environment affects.	It shall be the duty of the every occupier of an institution generating bio medical waste which includes Veterinary institution and animal house to ensure-that such waste is handled without any adverse effect to the human health and the Environment.
Rajasthan Soil and Water Conservation Acts, 1964	Applicable to water harvesting & storage structures on arable and non-arable land	provide for the conservation and improvement of soil and water resources at cluster
Policies		
National Environment Policy 2006 Rajasthan State Environment Policy, 2010	The project promotes conservation and sustainable use of land, water and biomass which is one of the major challenges in agriculture sector. The project addresses the issue of awareness generation and mitigation measures	To protect and conserve critical ecological system and resources and to ensure equitable access to these resources for communities which are dependent on these resources for their livelihood.

Relevant Acts/Rules	Relevance to RACP Project	Provision
State Water Policy 2010 The Rajasthan Regulation and Control of The development and Management of Ground Water Bill, 2006	Optimization of water resources exploitation and raising the level of reliability of supplies through conjunctive use of surface and ground water.	Necessary permission should be obtained from ground water board or water resources department for extraction of water from ground water through for bore wall or canal for irrigation.
National Policy for Farmers 2007	The project envisages improvement of the land productivity and income of farmers in a sustainable manner.	To improve economic viability of farming by substantial increase in net income of the farmers, to conserve and regenerate land, water and genetic resources for sustainable improvement in productivity, profitability and stability of major farming system. To develop support services including provisions of timely input supply and agriculture credit at affordable interest rates to the farmers. Provide suitable risk management measures for adequate and timely compensation to the farmers.
State Policy for promotion of agro-Processing and Agri-business, 2010	The project envisages promotion of agro-processing industries and agri-business, thus, seeks to address the entire value chain in agro-processing and marketing, including development of the supply chain, market development and diversification.	To promote and encourage value addition and loss reduction in agriculture, including horticulture; introduce new post harvesting technologies; promote export of agriculture products produced and encourage the development of agro processing infrastructure and human resources.

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 **Error! Reference source not found.** :

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	On-field demonstrations, Case Studies, Group Exercises.
			2nd Year a refresher course after preparation of Audit Report	
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

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.

Type of Training	Content	Duration
Sensitization	Sensitization on RACP activities, environmental impacts Brief concept of EMP, Institutional arrangement for implementing EMP	1 day 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	2 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	2 days including 1 day 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	2 days including 1 day 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	EG Agri 4

Intervention	Activity	Reference of Environment guideline(EG) as per EMSF
	Management	
	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												

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

SN	Items	Nos.	No. of Days	Qty.	Rate (Rs.)	Unit	Amount (Rs.)
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	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	

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
	Structures Farmer Producer company(FPCs), Establishing Food Processing Units and Construction of Warehouse/ Food processing Unit		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.