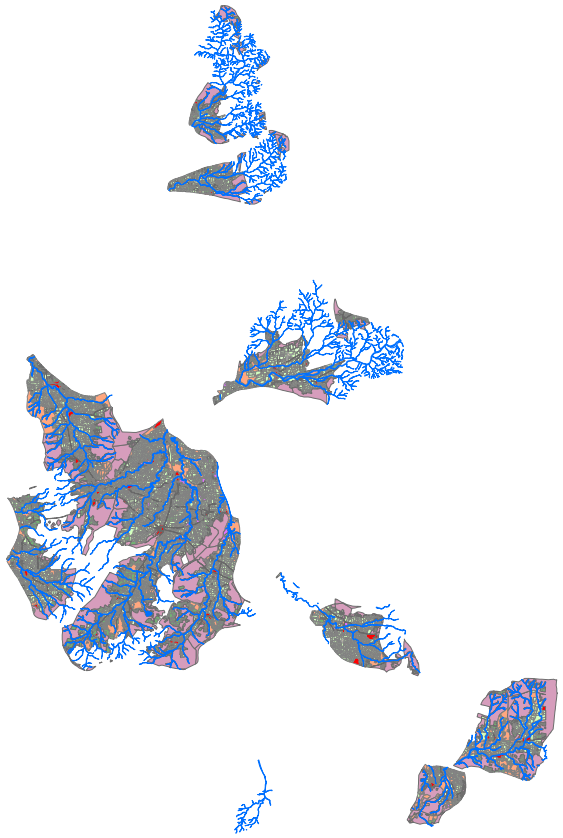
Cluster Agricultural Competitiveness Plan (CACP)

Watershed Cluster Manoharthana, Jhalawar
Rajasthan Agricultural Competitiveness Project (RACP)



Theme: Watershed, Block- Manoharthana, District Jhalawar

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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 Manoharthana Watershed Cluster in Jhalawar district has been prepared and an amount of Rs.4944.76 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 agroecological 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.

Manoharthana cluster (Rainfed-watershed) cluster in Jhalawar 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 (Jhalawar), interactions with the local community and various value-chain actors. The area is predominantly rich in agriculture and livestock rearing. Dominant crops in the cluster include Maize, Black gram, Sesamum, Soybean in Kharif and wheat, barley, mustard, Isabgol are the major crops in rabi season in the cluster. Though horticulture is of not much significance, vegetables like Tomato, Brinjal, Garlicand Okra and fruit plants like Orange and Guava are cultivated in around 4.5% 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 Manoharthana watershed cluster of RACP is located in Manoharthana block of Jhalawar district, is about 47 Kms from Manoharthana and 47 km from the district headquarter. The cluster comprises of 16 Gram Panchayats and 47 villages which falls in V Agro Climatic Zone (Humid south eastern plains) of Rajasthan under RACP. About 97% 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 (977 mm/anum) 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 43128 and total number of households is 8225. Out of the total population female population is 49.07%, schedule caste (SC) population is 9.24% and 20.84% is the population of scheduled tribe (ST) population. This refers it is partly a tribal belt with low resources and hence needs support for upliftment.

The total cultivated area in the cluster is 5807 ha out of which 58% is rainfed and 39% is irrigated. Rest is temporary fellow land. Out of the total cultivated area, around 65% 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 5^0C in the winter to 48^0C in the summer.

Maize crop is sown in about 1484.20 ha, Soybean in 1250 ha, Sesamum in 150, Sorghum in 110 ha followed by other crops. In Rabi season Mustard is sown in 273, wheat in 410.80, Gram in 620 ha & Barley in 882 ha. Only 266.46 ha area is sown in horticultural crops. Out of this, the Orange & Guava fruit crops are sown in 16.12 ha. Total area under these crops makes a total cropping intensity of 101.71%. Surplus production of the above mentioned crops is generally available in the area. Out of it the cropping intensity of Kharif crops is 91.71% and in Rabi, it is only 20.08%, in Horticultural Crops it is only 1.16%. Productivity of above crops is at par or little better than the district average except that of orange and Mustard where it is little less.

Soybean in Kharif, Mustard in Rabi and Orange as horticulture crop 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 major cities in Madhya Pradesh, offers immense opportunity for the cultivation of vegetables and fruits. The area is fairly suitable for fruits like Orange and Guava and vegetables like Chilli, Garlic and peas. Hence, some area under cereal & other crops would be diversified in to the cultivation of above these fruits and vegetables crops. Manoharthana cluster being mostly rain fed and partly of tribal region naturally supports goat rearing especially for the small holder farmers. The cluster has substantial goat population (12562) and inclination for goat farming to generate income. The goat value chain is also identified to be supported under project investments. Accordingly, activities enhancing the above potentials are proposed to be implemented in the cluster. It is presumed that success of these technologies would be replicated in the similar areas

There are four APMCs, i.e. one each at Aklera, Bhawani mandi, Jhalarpatan and Khanpur. Jhalawar has 11 cold storages, one 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 42.85 MCM. About 18% of rainfall contribute to the ground water i.e. 7.71 MCM rainwater will contribute ground water. In addition soil moisture would also be available repeatedly and fulfil the crop water requirement of Kharif crops. 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. Total 9.44 MCM 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 5.12 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 12.40 MCM which would be drafted from ground water. Finally the sufficient surface and ground water (14.56MCM) are 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 Mustard, Soybean and Orange 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.1616.33 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.925.47 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.1262.76 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 includes 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.906.07 lakh** 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:

Mustard:

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

that the farmer get good quality of inputs with lower cost of production. • Scope for secondary processing of mustard seeds and prepare value added products like mustard oil, mustard paste, sauce, etc. • Scope to tie up farmer of CFC to oil mill associations bulks buyer like ADM Agro, Amora exporters, etc.	water.

Soybean:

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 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.	• 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 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.	• 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 Orange 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

• 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	

Orange:

Strength	Weakness
• Growing global and national demand fortable variety and juice • Comparative advantage in production- Brazil, China, Indi, USA, Mexico, and Spain.(India-production of 79,86,683T in 2014. • Nagpur santra and kinnow variety grown in Rajasthan. Mandarin in renowned Jhalawar district • Jhalawar in Kota district hectares with 200,000MTproduction per annum. • Strong support institution like “Centre of Excellence for Oranges, Kota” etc.	• High cost of pesticides, unavailability/spurious pesticides. • Constraints vis-à-vis water source for irrigation • Net yield is nominal term for an acre presently is ……
Opportunity	**Threat**
• Variety of value added products have demand: oranges juice, jams, jelly. • Scope to increase net yield in nominal terms • Scope to establish FCSC with washing, sorting, grading and waxing facilities	• Any sudden change in weather may impact the production of oranges • Crop diversification can adversely impact the production of oranges as the producers would tend to grow other crops instead softened. • Import policies of GOI may tend to increase orange imports which can impact prices of local oranges

Goat:

#	Constraints	Action
1.	**Production**	
1.1	Non availability of good variety of goats	Distribution of good variety goats
1.2	Health issues of animals	Animal health services through AH Department
1.3	Nutrition issues of goats	Farmers to be made aware of improved feed practices through traiing from AH department
1.4	Non availability of updated technology on animal rearing and management	Establishment of Rural technology Centre (RTC)
2.	**Post harvest**	
2.1	Entire supply channel of live animals to market captured by multiple level of middlemen	Establishment of Rural hat Promoting FPO operating from rural hat

Total Investments in Manoharthana Cluster

A total investment of **Rs.4944.76 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	1581.84	0	14.49	20	1616.33
2	Agriculture	751.39	232	164.59	11.62	1159.60
3	Horticulture	1,215.76	0	36	11	1262.76
4	Animal Husbandry	616.11	227	47.61	15.35	906.07
	Total	**4,165.10**	**459.00**	**262.69**	**57.97**	**4944.76**

The above table reveals that total investment amounting to Rs.4944.76 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, 84.23% would be incurred on the first component, i.e. Climate Resilient Agriculture, 9.28% on Market and Value Chains, 5.31% on Farmers Organization & Capacity Building and 1.17% 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 Manoharthana 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 8.33 mcm and 17.06 mcm per year. When the investment per unit of water saved is calculated, it is found that MIS activities are able to conserve more water at very low investment of Rs.0.33 crore per mcm of water saved whereas watershed activities can save lesser water at an investment of Rs.1.90 crore per mcm of water per year. Thus, 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 Manoharthana

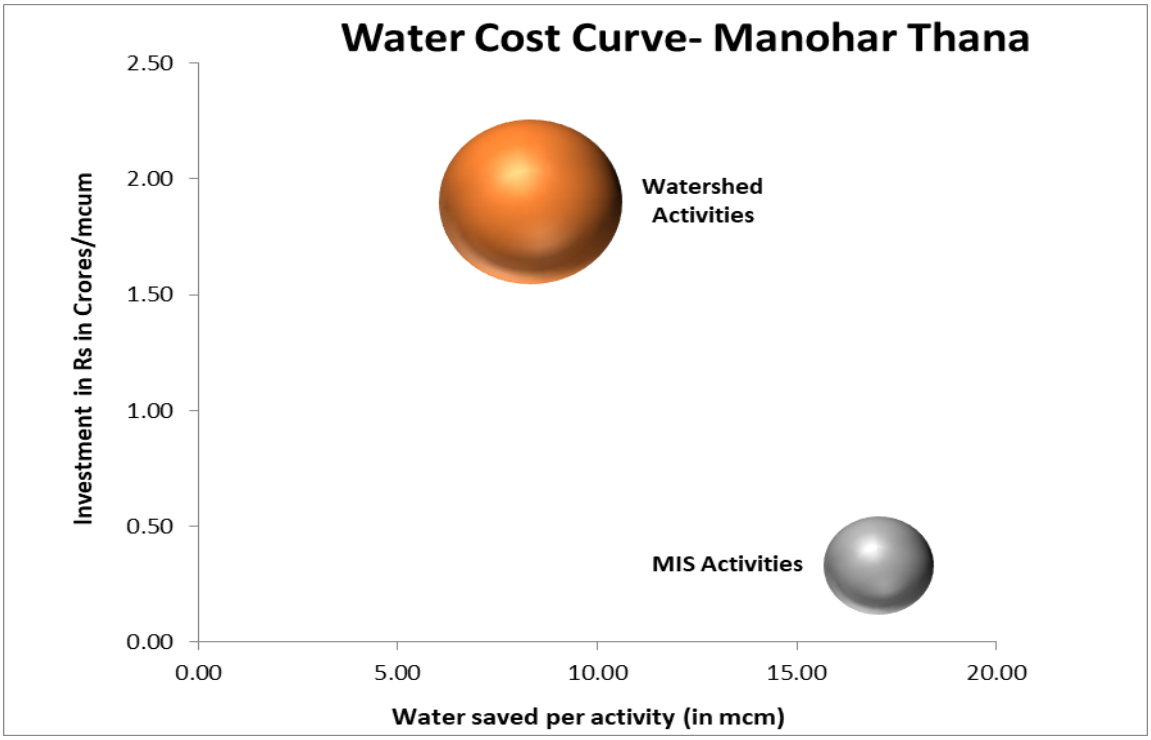


Table 1: Investment (in Rs/mcm) verses Water saved (in mcm) in Manoharthana

Activities undertaken to save water	Water saved- per year in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	13.20	1.20	15.818
MIS Activities	17.06	0.33	5.62

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, Jila Parishad, at district level has been designated as District Project Manager and his office has been designated as office of the District Project Management Unit (DPMU). All concerned offices of the line departments at district level would be Project Implementation Agencies for planning and implementation of project activities in the cluster. There is District Level Implementing Committee (DLIC) will be responsible for coordination and implementation at district as well as at cluster level. District Collector is

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. 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.

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

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

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

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

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

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

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

1.2. Objectives of the CACP

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

1.3. Rationale of selection of the cluster

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 Manoharthana cluster has been selected to achieve the Project Development Objective (PDO). The Manoharthana cluster is a watershed cluster which is a hydrological unit. The Manoharthana watershed cluster is situated in Agro-climatic Zone Vth (Humid South Eastern Plains). Manoharthana is a tehsil headquarter of Jhalawar district located about **47 Kms** from Jhalawar. The Manoharthana Cluster (Rainfed - Watershed) in Jhalawar 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, Jhalawar 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 977 mm in Jhalawar district. As elsewhere discussed, total cropped area is about 5807 ha, out of which 3384.20 ha is in Kharif, 2255.80 ha is in Rabi season. Maize crop is sown in about 1484.20 ha, Soybean in 1250 ha, Sesamum in 150, Sorghum in 110 ha followed by other crops. In Rabi season Mustard is sown in 273, wheat in 410.80, Gram in 620 ha & Barley in 882 ha. Only 266.46 ha area is sown in horticultural crops. Out of this, the Orange & Guava fruit crops are sown in 16.12 ha. Total area under these crops makes a total cropping intensity of 101.71%. The above crops which are sown in the cluster are also the main crops in the district. So, surplus production of major crops is generally available in the area.

The production of maize, soybean and other crops are being sold through unorganized local market and mandi of Manoharthana and Jhalawar. Apart from human consumption most of the produce of Maize including other similar crops is being used as cattle feed, hence looking to the enough livestock population of Jhalawar 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 Barley as alternate crop (looking to the possibility) for malting; it would also be selected as value chain crop for the cluster. Since industrial value of the Mustard crop is significant for any Producer Company (PC), so these crops may be taken as value chain crops in Manoharthana Cluster.

Although there is not much area is under Horticulture/fruit plantations at present, the availability of fertile land and availability of ground water along with connectivity with Indore district of Madhya Pradesh present immense opportunity for the cultivation of vegetables and fruits. The area is fairly suitable for fruits like Orange & Guava & vegetables like Tomato & Brinjal crops. Hence, some area under cereal & other crops would be diversified in to the cultivation of above these vegetables and fruits 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 12562 numbers of goats are available in the villages of the clusters so there is a significant scope of value chain of goat meet.

Therefore, it can be concluded that the availability of fertile land and underground 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, Manoharthana is an appropriate cluster to be developed under RACP.

Chapter -2: Description of the Cluster

2.1. Spatial characteristics

Manoharthana watershed cluster of Rajasthan Agricultural competiveness Project is located in Manoharthana Block of Jhalawar district. The project area is located between the latitudes 24 °.1632051 N to 24 °.988595 N & 76 °.1634625 E to 76 °.810124 E longitudes. The Manoharthana cluster is at a distance of 47 Kms from Manoharthana Block headquarters and 47 kms from Jhalawar district headquarters. The area of the cluster is spread over in 47 villages of 16 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 9, 660 ha. Out of this, the cultivated area is 5807 ha with 3, 384.20 ha rainfed, 2, 272.80 ha irrigated and 150 ha temporary fellow land. The pasture land which belongs to Panchayats of Manoharthana Cluster is 730 ha and waste land is only 208 ha and other land is 2, 717.02 ha which belongs to Government and Community of the cluster. The detail land use pattern of the cluster is summarized hereunder:

Table 2: Land Use Pattern of the Manoharthana Cluster

S. No.	Land Use	Total area in ha			
		Private	Panchayat	Government	Total
1	Agriculture Land	5807	0.00	0.00	5807
2	Temporary fallow	150	0.00	0.00	150
3	Waste land	0.00	150	58	208
4	Cultivated Rainfed	3384.20	0.00	0.00	3384.20
5	Cultivated irrigated	2272.80	0.00	0.00	2272.80
6	Water body	0.00	0.00	3.58	3.58
7	Settlement	0.00	0.00	194.40	194.40
8	Pastures	0.00	700	30	730
9	Others	0.00	0.00	2717.02	2717.02
	Total (2 to 9)	**5807**	**157**	**3003**	**9660**

(Source: DPR of Watershed of Manoharthana Cluster**)**

2.1.2. Current connectivity

At present there is unorganized market in the cluster and farmers sell their produce in the local markets. The Jhalawar mandis (markets) are located 90 & Binaganj mandi(MP) 29 km from the

cluster respectively. It is located 115 Kms from Baran district and 89 Km Guna mandi and 188 Kms from Kota. Manohar Thana cluster is connected to Jhalawar APMC as it is located on border of State of Madhya Pradesh.

2.2. Agro-ecological characteristics

2.2.1. Slope

The slope of the area ranges from 0 to more than 10%. Most of the area is under the slope category 3 to 5% slope. The category wise slope area is being summarized under:

Table 3: Slope range and area under the category

S. No.	Slope percentage	Area in hectares
1	0 to 1 %	2300
2	1 to 3 %	2500
3	3 to 5 %	3063
4	5 to 10 %	1245
5	10% to above	552
	TOTAL	**9660**

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

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. The soil profile of the project area is being summarized as under:

Table 4: Table Soil Profile of Manoharthana Cluster

S. No.	Major Soil Classes	Area in hectares
1.	Barren Land	3220.48
2.	Coarse Loamy	2800.12
3.	Loamy	3639.40
	Total	**9660**
	Soil Depth :	
B	**Depth (cm)**	**Area in hectares**
1	0.00 to 16.50	1040
2	16.50 to 45.00	5896
3	> 45.00	2724
	Total	**9660**

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

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

Table 5: The Soil fertility level of the Project Area

Soil fertility Status	Kg/ha	Recommended
N	90-180	280
P	36-80	56
K	190-450	336
Micronutrients	PPM	Recommended
Zn	0.4-1.01	0.60

Fe	4.5-12	6.50

(Source: Agriculture Dept, Jhalawar**)**

2.2.3. Rainfall Pattern in Project Area

This cluster falls under humid region climate. Winter season is observed during late November to mid-March months followed by summer season extending till June. July to September is the period that in which rainfall occurs. The identified project area falls under the Indian Metrological Department (IMD) Station Jhalawar.

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 Jhalawar, Government of Rajasthan. The rain fall data (Refer Annexure 2.7) as obtained and given in the following table have been utilised while planning watershed development interventions in the cluster.

The average rainfall of the cluster area is 977 mm which has been used for calculation of water budgeting and similar other aspects.

2.2.4. Temperature

The temperature during the summers (from April to July) remains high and generally reach up to 45ºC and some time to touch as high as 48ºC. Hot wind commonly known as "*Loo*" blows between the months of May-June. On the other hand, winters have generally sunny and pleasant days and bitterly cold nights. At time the temperature can also touch to a lower level of around 3-4ºC, mostly during the nights.

2.2.5. Source of Irrigation

Manoharthana 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 Manoharthana cluster the main source of irrigation is recharged through rain fall of 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:

2.1.1.1. Ground Water Status in Manoharthana Cluster

About 2272.80 ha area is irrigated in the cluster. Out of this an area of 1065.80 ha is irrigated from dug wells, 135 ha area from shallow tube wells, 320 ha area is irrigated from deep tube wells and 752 ha from pumping sets. Almost 365 days of the year water is available in deep wells and only in dug wells ground water is available only for 245 days. The functional depth of ground water is ranging from about 30 – 250 mts.

Table 6: Ground Water Status

S. No	Source	No.	Functional depth (mts)	Dry	Area irrigated (ha)	Water availability (days)
i)	Dug wells	1256	30-50	35	1965	245
ii)	Shallow tube wells	35	80-110	2	135	295
iii)	Pumping sets	250	200-250	-	917	-
iv)	Deep Tube Wells	80	120-150	0	320	365

	Total	**1621**			**3337**	

(Source: Watershed DPR, Manoharthana)

Hydrology

The principal source of recharge to ground water is rainfall. Normal monsoon and Normal non-monsoon rainfall (mm) from 1901-2008 to 1901-2012 and annual monsoon and non-monsoon rainfall (mm) from the year 2008 to 2012 of the Block Manoharthana district Jhalawar 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 eight wells in the Cluster Area. The average Pre-Monsoon depth to water varies from 9.32 mts to 12.50 mts below ground level and Post-monsoon depth to from 6.21mts to 8.69 mts. The Water levels are given in Annexure 2.14.

Water Level trends (2003 – 2016)

16 years Water Level Trend for Pre monsoon, 2001–2016 and Post monsoon, 2001 - 2016 have been presented in figure- 1 & 2 respectively. During Pre-monsoon period in the long term, increasing trend of ground water levels of 0.03 m/year has been observed in Pre-Monsoon period. Decline trend of 0.04 m/year in ground water levels of Post-Monsoon period from 2001 to 2016 has been observed in the Cluster Area. The Water levels trends are given in Annexure – 2.14.

Ground Water Extraction Status

Existing Gross Ground Water Draft of 8.91 MCM for Irrigation are withdrawn through 1536 wells/Tube wells for irrigation purposes in the Manoharthana Cluster area. The details are given in Table-2 of Annexure - 1. Existing Gross Ground Water Draft of 0.25 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 Manoharthana Cluster area as on 31.3.2013 is 97.00% which indicates Cluster area are coming under Critical Zone but Pre-Monsoon period showing increasing trend and post-monsoon trend sowing decreasing trend therefore Basalt Potential Zone categories as Semi-Critical (Table-7 of Annexure-1). The scope of ground water development for Irrigation purposes is already exhausted. The Draft for irrigation should be reduced to 8.84 MCM bringing a balance between water recharge and extraction over time for Sustainable Ground Water availability.
Efficient use of ground water on farm water usages through:

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

For monitoring of impact assessment of Investments proposed in the Cluster area, one Piezometer on 20 Sq.km areas or as per Site Specific requirement with installation of Digital water Level Recorder (DWLR-Telemetric) may be constructed.

2.3. Demographic Characteristics

The Manoharthana cluster comprises sixteen (16) Gram Panchayats having forty seven (47) villages. The villages falling in the Project Area are characterized by low and undependable rain. Ground water is the only source of irrigation.

2.3.1. Population

Total population of the cluster is 43128. Out of the total population female population is 49.07% and schedule caste (SC) population is 9.24% and 20.84% is schedule tribe (ST) population. 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 7: Population Details

Male	Female	Total	SC	ST
21967	21161	43128	3983	8988
50.93%	**49.07%**	**100.00%**	**9.24%**	**20.84%**

(Source: Watershed DPR of Manoharthana 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 8.95%. It means about 91.05% farmers require support for upliftment.

Table 8: Household Details

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
2130	492	2861	4136	736	**8225**	1690	1959
25.90%	**5.98%**	**34.78%**	**50.29%**	**8.95%**	**100.00%**	**20.55%**	**23.82%**

(Source: Watershed DPR of Manoharthana 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 Manoharthana and mandi of Jhalawar. The produce of Maize & Sorghum 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 crop. The Manoharthana & district mandies (markets) are located just 47 Kms from the cluster.

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 9: The development indicators of the project area

S. No.	Development Indicators	Rajasthan State	Project Area
1	Per capita income (Rs.)	16260	145160
2	Poverty ratio	0.22	0.32
3	Literacy (%)	60.40%	40.47%
4	Sex Ratio	1000:928	1000:956

(Source: Watershed DPR of Manoharthana 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

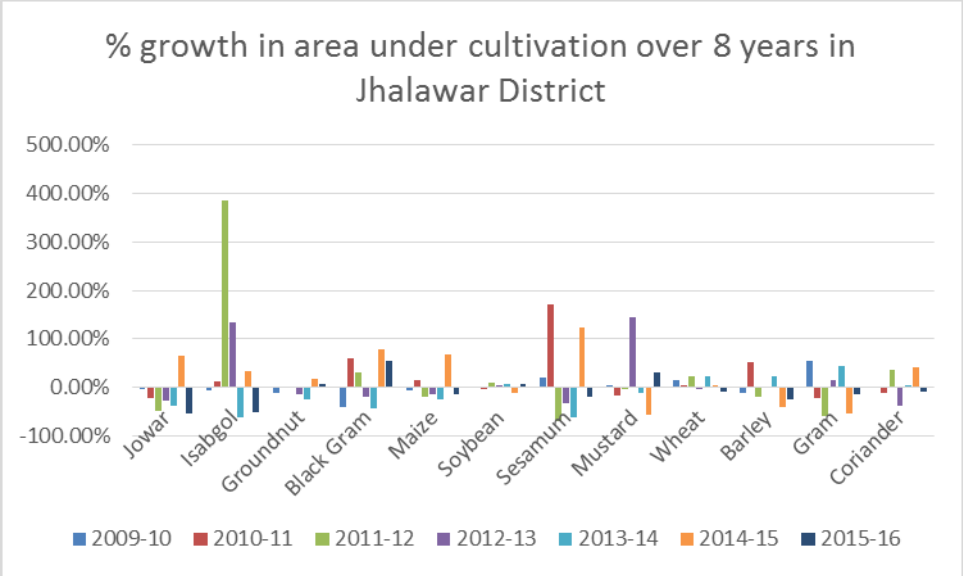
Agriculture is the chief contributor towards the economy of the district. Jhalawar district occupies an important place in the agricultural production of the state. It falls in V Agro Climatic Zone (Humid south eastern plains) as discussed earlier. It is located 47 Kms from Jhalawar district and 377 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 42175 ha and irrigated area is 295544 ha. At the same time some area is also double cropped with the help of irrigation and hence the total cropped area is 637116 ha. So the cropping intensity of the district is 191% against the state average of 143%.

2.4.1. Cropping Pattern of Agricultural Crops

Maize,Soybean, Sesamum (Til) & Sorghum (Jowar) are major crops which are being grown in Kharif in Jhalawar district whereas in Rabi season major crops like Wheat, Barley, Gram, and Mustard etc. are being cultivated in the district. In the Kharif season, crops are sown in about 314789 hectares which is 2.05% of state's Kharif area (15369717 ha). In the Rabi, the crops are cultivated in about 322327 ha which is 3.46% of state's Rabi area i.e. 9308039 ha. Thus, the total cropped area of the district is 637116 ha. The prime sources of irrigation here are wells and tube wells. A net area of around 279885 hectares is being irrigated by 5031 tube wells & 74005 wells in the district. By other sources like canals and tanks, an area of about 12869 ha is irrigated.

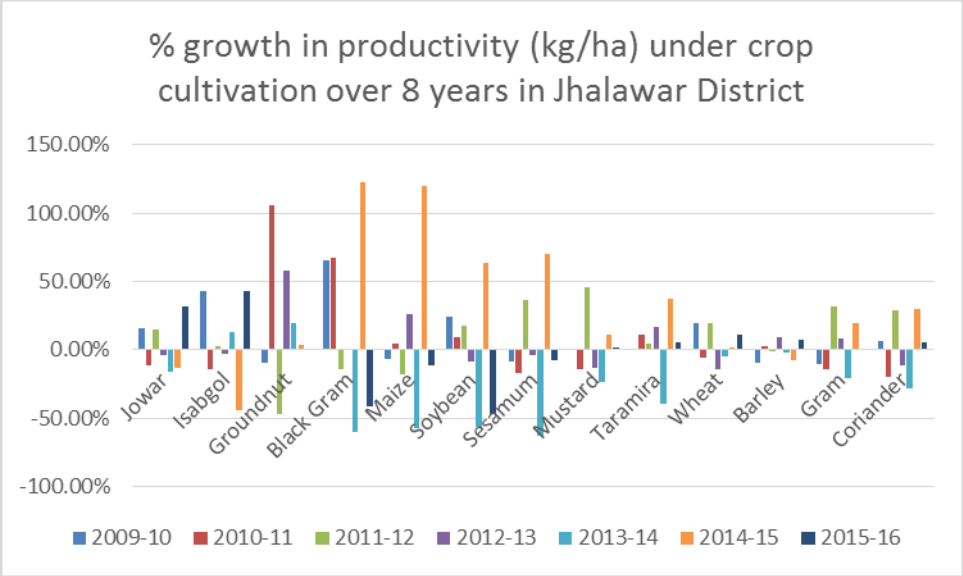
In Kharif, Maize, Soybean, Sesamum (Til) & Sorghum (Jowar) etc. crops and in Rabi season Mustard, Wheat, Barley & Gram crops are the main crops in Manoharthana cluster. Before discussing Manoharthana cluster, the details of area of these crops in the State as well as in the district have to be kept in mind. So a comparison of the area of these crops in the State and district for the last 10 years from 2006-07 to 2015-16 is presented in Annexure 2.2. In addition to the increase (+) / decrease (-) over 10 years in cropped area and % area in district over state average have also been summarized in Annexure 2.2.

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



The data (Annexure 2.2) reveals that the Maize and Soybean in Kharif and Mustard and Barley 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 from year to year. 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 Jhalawar district because of their suitability in this area for production.

Figure 3: Percentage growth in productivity (kg/ha) under crop cultivation over 8 years in Jhalawar District



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 for the years 2012-13 and 2013-14:

Table 10: 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								
Mustard	6.36	2.83	44.55	1	6.70	3.08	45.95	1
Wheat	30.00	3.06	10.21	5	31.19	2.81	9.01	4
Barley	NA	NA	NA	NA	NA	NA	NA	NA
Gram	8.52	1.25	14.70	2	10.22	1.92	18.82	2

(Source: Agriculture department, Manoharthana)

The above table reveals that the state was having first rank in the case of Mustard crops in both years (2012-13 & 2013-14). Whereas in 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 also indicates that the said ranks in above crops is still continuing.

2.4.1.1. Overview of the crops identified in Manoharthana Cluster

Since the Manoharthana cluster is situated 47 kms from Manoharthana, so nomenclature of the cluster is based on the name of the tehsil i.e. Manoharthana of Jhalawar district. The cluster has been selected based on the 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.

2.4.1.2. Category wise Cultivated Area in Manoharthana 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 5807 ha and the total households in the cluster are 8225. The category wise cultivated area in Manoharthana cluster is being summarized in Annexure 2.3.

The data (Refer Annexure 2.3.) clearly indicates that about 91% farmers are marginal, small, landless & BPL farmers. Only about 8.95% farmers are large in Manoharthana cluster. Out of the total cultivated irrigated area, about 32.41% area is with large farmers. Similarly, 60.86% cultivated rainfed area is either with marginal, small or BPL farmers. Out of the total cultivated area, 41.31% total cultivated area is belongs to OBC category farmers followed by Schedule Caste, General and Schedule Tribe farmers.

The total irrigated area is only 39.14% of the total cultivated area and out of it 50.36% irrigated area is with small farmers followed by large, marginal & BPL farmers. The rainfed area is 60.86% and out of it 49.32% area belongs to small farmers followed by large, marginal and BPL farmers. Out of the total area, the area 41.31% belongs to OBC followed by ST, ST & General farmers.

2.4.1.3. The Status of Cropped area of Agricultural Crops in the Manoharthana cluster:

The cropped area has been compiled from the data collected while Participatory Rural Appraisal (PRA) which was performed by NGO during the year 2016-17. As discussed earlier, the major field crops of Kharif are Maize and Soybean whereas Wheat, Mustard and Gram crops are important crops in Rabi season in Manoharthana cluster. Kharif crops are mostly grown on the basis of Monsoon rains. However, lifesaving, irrigation is provided during the dry spells wherever irrigation facilities are available. The crop wise area under these crops is being summarized in Annexure 2.4.

The data (Refer Annexure 2.4.) clearly shows that Kharif crops are sown in 60.72% area whereas Rabi crops are sown in 37.21% area. Thus there was a total cropping/intensity of 97.93% during the year 2015-16 in the cluster which is very less than the district average i.e. 191% and state average of 143%. Area under irrigated crops has been decreased 0.85%, it means 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 those crops that water requirement is less and relative water use efficiency is more. For instance, the area of Wheat's crop for which water requirement is more can be reduced and at the same time such crops requiring less water like Mustard, Barley & Gram can be promoted

in Rabi season. Similarly, in Kharif the area under Maize & Soybean crops have to be promoted because these crops are having value chain importance.

2.4.2. Cropping Pattern of Horticultural Crops

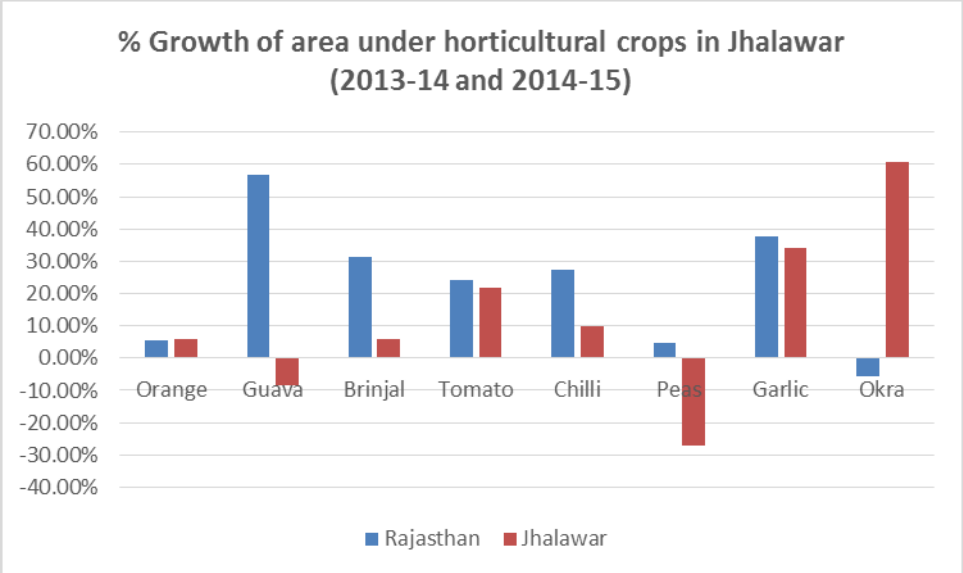
Similarly, for better integration, the area under the horticultural crops has also been gathered from the Agriculture department. The area under horticultural crops is very less in comparison to agricultural crops because looking to the potential of the state as well as the district, the area is increasing very slowly 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 Manoharthana cluster the Tomato, Brinjal & Chilly crops are most encouraging and similarly Orange & Lemon fruit crops are suitable for the Manoharthana cluster. The Garlic is also an important crop in the cluster.

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

The horticultural crops like Tomato & Brinjal in vegetable crops and Orange in fruit crops and Garlic in spice crop are suitable for the area. The Orange fruit crop can be taken as value chain crop of the cluster but other horticultural crops have to be promoted through crop demonstrations in the area in the benefit of farmers of the cluster. On the basis of data which are available with the Horticulture department a comparison of State and Jhalawar district is being given for last 5 years from 2011-12 to 2015-16 in Annexure 2.5

The Figure 3 reveals that the Orange fruit and Garlic spice crops are very important crops of the district. However, the other crops except Okra data is not encouraging. Looking at the scope of marketing and potential and facility of the area, the horticulture cultivation has to be promoted through crop demonstrations and persuasions. The data also reveal that looking to the potentiality of the area needed effort has not been made in the district to promote horticultural crops. Hence effort has to be made to enhance area under horticultural crops in project area so that the economic condition of selected farmers can be uplifted. A set of intervention has to be demonstrated in the area to link the farmers with the project to achieve the project development objective (PDO).

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

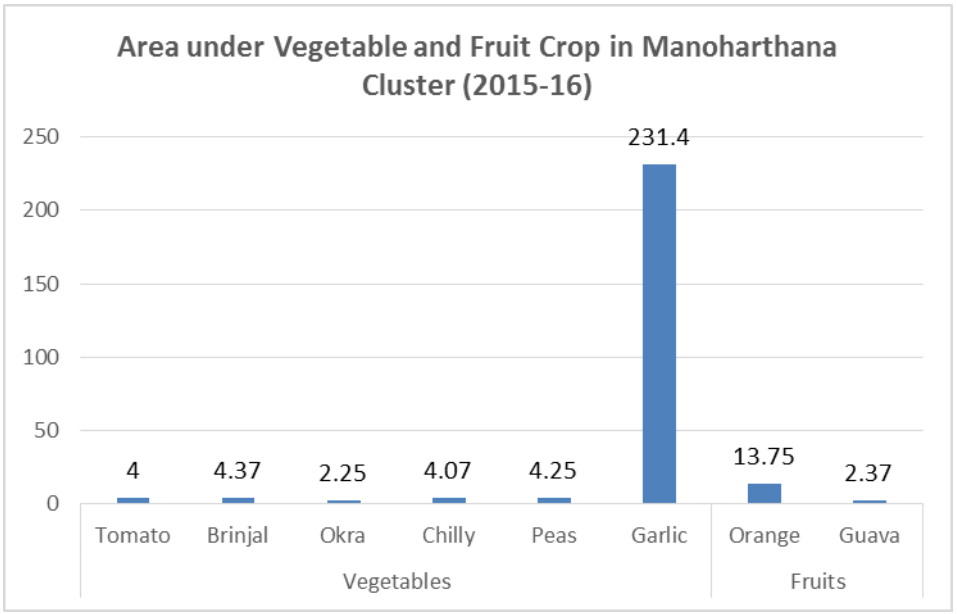


(Source: Analysis by Team ABPF)

Crop wise area of Horticultural crops in Manoharthana Cluster

To finalize the proposed area in horticultural crops, current area of horticultural crops in cluster has to be discussed in the selected cluster. A field survey has been conducted in the project cluster to assess the area under horticultural crops and it was found that there was no significant area under these crops during the year 2015-16. Therefore, whatever area has been reported under these crops are being summarized in Annexure 2.6

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



(Source: Data analysis by ABPF)

The above figure clearly shows that the area under horticultural crops is only 4.59% of the total agriculture land (5807 ha) but there is a considerable scope to increase the area under these crops i.e. vegetables: Tomato & Brinjal, fruits: Orange and Guava and spice: Garlic crop. By diversification of area from food grain crops to the horticultural crops upliftment of economic level of farmers of the cluster could be done.

2.4.3. Crop Water Requirement in Manoharthana Cluster

The Crop Water Requirement of crops being grown in the Manoharthana cluster is being summarized in Annexure 2.13

Data in Annexure 2.13 shows that due to watershed development activities, the total cropped area is proposed to be increased from 5732.46 ha to 5864.4 ha, it means 131.94 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 0.42 MCM has been reduced due to proposed cropping pattern of Rabi season means adopting more area under such crops which are having less crop water requirement, but since area is increased under Horticulture crops which are high payoff crops, the crop water requirement of

13.45 MCM has been increased over 12.29 MCM current crop requirement and proposed cropped area has been increased 131.94 ha.

The crop water requirement of Kharif crops is 3.53 MCM, which would be met out from in-situ moisture conservation in arable area. There is total crop water requirement of Rabi is 8.06 MCM & horticultural crops are14.16 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 during course of implementation gradually over course of time, 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 12.40 MCM crop water will be met out from the ground water and water will be harvested through different measures to be implemented /constructed in the cluster, total 5.12 MCM rain water either harvested as surface water or this water contributed ground water.

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 11: Requirement of drinking water in project area

S. No.	Particular	Nos.	Per day requirement (in liter)	Total Requirement (in liter)
1	Human	46295	40	1851800
2	Big animal	14547	40	581880
3	Small animal	13217	15	198255
4	Birds	245	0.15	36.75
Total (in litres) Day				**2631971.80**
Per year Requirement of drinking water (in litres)				**960669689**
Per year Requirement of drinking water (in cum)				**960670**
Per year Requirement of drinking water (in MCM)				**0.96**

(Source: DPR, WDSC, Manoharthana)

Above table reveals that the estimated total water requirement for human beings, animals & birds etc. is 960670 cum.

Water Budgeting and Water Balance

Based on the ground water data (Annexure 2.14), the ground water level is showing decreasing trend therefore cluster area is treated as semi critical category. The scope of ground water development for Irrigation purposes is already exhausted. The Draft for irrigation should be reduced to 8.84 MCM bringing a balance between water recharge and extraction over time for Sustainable Ground Water availability. Although, 9.44 MCM Ground Water is available as on 31.03.2013 for Ground Water Development.

The entire Project Area was categorised based on the nature and characteristics of the area. Total catchment area is 9660 ha and annual average rainfall is 977 mm of the area. Based on the catchment area and annual average rainfall, the total yield of the rainfall will be about 42.85 MCM calculated based on strange table. As per ground water study about 6-18% of rains contribute ground water, which depend type of catchment, formation, intensity & quantity of rainfall etc. Manoharthana 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 about 7.71 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 it the cropped area is covered under MIS during course of implementation gradually. 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 9.44 MCM ground water, is available annually in the cluster. If surface water 5.12 MCM harvested through watershed development activities is considered, then total 14.56 MCM water will be available so 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 12: 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	3.53	3.17	0.35
2	Crop water requirement of Rabi crops	8.06	4.03	4.03
3	Crop water requirement of Horticultural crops	14.16	7.08	7.08
4	Domestic & drinking water requirement	0.94	0.00	0.94
	Total	**26.69**	**14.28**	**12.40**

As mentioned above, total 5.12 MCM is proposed to be harvested and recharged ground water through various structures, in addition to in-situ moisture conservation and available ground water. 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% if the cropped area is covered under MIS during course of implementation gradually. Keeping in view, 100% area is covered under micro irrigation system the final crop water requirement would be about 12.40 MCM which would be drafted from ground water. Finally, the sufficient surface and ground water (14.56MCM) are available in cluster against the crop water requirement.

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

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

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

The Maize & Soybean crops in Kharif and Mustard, Barley and Gram crops in Rabi are suitable for cluster and the scope of value chain in these crops is good. Although seed replacement rate in most of the crops are very low which ranges from 0% to 94.01% in the year 2013-14 whereas in the year 2014-15, it ranges from 0% to 100%. If the SRR of the district is compared with state average, it is higher in the case of Mustard in 2013-14 but in the year 2014-15 it is much lower than the state average besides Mustard crop, almost all crops is less it is higher than the state average in both the years. It indicates that except mustard in almost all the crops the SRR is less than desired level. If the productivity of these crops is to be increased with certified seed of high yielding varieties have to be sown for all the crops there for the SRR may have to be increased for getting optimum / desired productivity in the years to come in the district and cluster.

Seed Replacement Rate (SRR) in Manoharthana cluster:

During the field survey, it was observed that the Seed Replacement Rate (SRR) for Wheat and Soybean in Manoharthana cluster is higher as compared to the SRR of the district whereas slightly lower in case of Mustard and Maize. It means the focus is to be given on adoption of certified seed and high yielding varieties which are having disease & insect-pest resistance, have higher economic & commercial value in view of the storage capacity & marketing linkages and / or values. (Data in Annexure 2.10)

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

The consumption of fertilizers for the supply of nutrients is very significant to increase the productivity. But at the same time it is very necessary that they should be used judiciously 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 the state as well as in the district. The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons) is being summarized under:

Table 13: The current status of Fertilizer Consumption in Terms of Nutrients during 2014-15 (In Lac Tons)

State/District	Nitrogenous (N)			Phosphatic (P)			Potashic (K)			Total Fertilizer in terms of NPK			Per ha Fertilizer Consumed (Kg/ha)		
	K	R	T	K	R	T	K	R	T	K	R	T	K	R	T
Rajasthan	3.47	6.05	9.52	1.75	1.56	3.31	0.06	0.09	0.15	5.29	7.70	12.99	34.40	82.76	52.64
Jhalawar	0.13	0.22	0.35	0.066	0.082	0.148	0.0016	0.0022	0.0038	0.20	0.30	0.50	64.03	93.53	78.95

(K – Kharif, R – Rabi & T – Total)
(Source: Agriculture Department, Manoharthana**)**

Above table reveals that average consumption of fertilizers in the district in Kharif & Rabi season is higher than the state average. In totality the consumption of fertilizers in the district is 78.95 kg/ha which is higher than the state average. The judicious use of fertilizers is now needed & the farmers have to be promoted to adopt package of practices and the apply fertilizer in the crops very judiciously.

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

The aspect of adoption of plant protection measures in the crop production is of paramount importance. 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 crop production in Agricultural as well as Horticultural crops.

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

The data (Refer Annexure 2.12) indicates that the seed treatment, soil treatment, poly treatment, intensive treatment, rat & weed control etc. is being adopted nearly as per the package of practices which need further improvement 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 Manoharthana Cluster:

During the field survey, it was observed that the area covered and technical grade material (TGM) used under Plant Protection Measures in Manoharthana 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) are having disease & insect-pest resistance, have higher economic & commercial value in view of the storage capacity & marketing linkages and / or value chain.

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

The crop wise area covered and technical grad material (TGM) used under plant protection measures in the crop production is very important factor to keep the productivity optimum. But excess use of chemicals is threat to the health. So INPM has to be kept in mind in the process of crop production and very careful use of plant protection measures in crop production.

The crop wise area covered and technical grad material (TGM) used under plant protection measures in state and district is being summarized in Annexure 2.11.

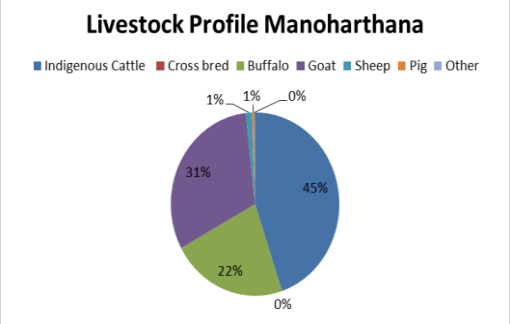
The data (Refer Annexure 2.11) indicates that the crop wise area covered and technical grade material (TGM) used under plant protection measures in the state as well in the district is less than the optimum level. It means that the adoption of package of practices is not being done at the optimum level. So further improvement it is needed in a big way keeping in view the Integrated Pest Management (IPM) 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 Manoharthana Cluster:

Likewise, the data for Manoharthana cluster is available at the movement. During the field survey, it was observed that the crop wise area covered and technical grade material (TGM) used under Plant Protection Measures in Manoharthana 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 crop wise area to be covered and technical grade material (TGM) used under Plant Protection Measures keeping in view IPM and high yielding varieties which are having disease & insect-pest resistance and, have higher economic & commercial value in view of the storage capacity & marketing linkages and or value chain.

2.5. Livestock profile of Manoharthana Cluster

In the Manoharthana cluster large no of households possess cattle, buffalo, goats and sheep. The district milk union collects around 15000-20000 liters of milk per day. Goats are also reared by substantial no



of households and these households are primarily small holders with limited resources. The tribal population of the cluster prefers to keep animals with low resource requirements. Jhalawar being near to Kota and Madhya Pradesh and local demand of meat have good scope leading to goat farming for meat as well as milk. The household wise livestock profile of the cluster is given in Annexure 2.16 as per the Livestock Census 2012. Livestock Profile of Manoharthana cluster shows high population of the goats i.e. 31% among the livestock population. Goat rearing can become a significant contributor to the livelihoods of the small and marginal farmers and tribal population in the cluster. So there is good 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.

The cluster has 90 goat specific MTGs and around 4039 families own 12562 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

The structural infrastructure in the Manoharthana 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 Jhalawar but they have offices at as well as district level too.

2.6.2. Farmer Producer Companies

Manoharthana cluster comes under watershed area. Jaipur seva foundation has been working in the cluster for formation and mobilization of 470 MTGs of Agriculture and horticulture farmers, 35 MTGs of goat rearers in 47 villages of 16 gram panchayats over 9660 ha area of watershed. 2 FPOs are proposed to be formed covering 9225 household in Watershed. Satya NGO is in process to federate all this groups in Farmer producer organization under RACP. However no FPO found to be active in cluster area of Manoharthana. Hence proper training for NGO, Staff, BOD , and line department staff (stakeholders of RACP) is required to clear the vision of formation of FPO and working of farmer common service center of FPO, steps and guidelines for formation of FPO and common service center. There is need for training and exposure of board of directors of newly registered FPOs in the cluster.

2.6.3. APMCs

There are APMCs in the district which can have an impact on Manoharthana cluster.

a. Aklera
b. Bhawani Mandi
c. Jhalarapatan
d. Khanpur

2.6.4. Cold Storages and warehouses

There is warehousing facility of State Warehousing Corporation at Manohar Thana and Star agri warehousing at about 90 km from the cluster at Jhalawar. All types of food grains can be kept in warehouse. Ware house receipts are provided on which producer can avail credit from the bankers.

Currently there are 12 cold stores in existence in the Jhalawar district with a total capacity of 23,844 MT (Refer Annexure 2.19)

2.6.5. 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.

2.6.6. Predominant practices for cultivation

Following are the predominant practices being carried out in the Manoharthana 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. Mustard, Maize, Soybean and Wheat are the major crops from the cluster along with Orange in fruits crops 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 Soybean has higher productivity when compared to their respective national average productivity, while all other crops have relatively lower 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 Mustard oil, it has been considered as 60% while that for Soybean oil and Wheat flour, is taken as 10% only and Corn flour to be 20%.

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. Mustard and Soybean score the highest with around Rs.124 per quintal followed by Wheat with Rs.64 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. Soybean scores highest in getting maximum return per acre followed by Mustard, Maize and Wheat.

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 Mustard 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 Wheat has second highest score followed by Mustard and Maize.

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 the highest for Soybean (12.18%) followed by Maize (8.07%), then Mustard (5.05%) and Wheat (3.06%). (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 Mustard (29.45%) followed by Wheat (28.28%). Mustard 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, Maize and Soybean with lowest water requirement of 1000 cum/ha have the highest scope for crop diversification followed by Mustard (3000 cum/ha) and Wheat with that of 5000 cum/ha. (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 relative productivity when compared to national average. It also has the highest 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 crop from value chain intervention is Mustard because it is the highest scoring crop in Kharif as per the matrix. Major reason is it has the highest potential for value chain intervention and the least crop water requirement in Kharif season.

Third crop for value chain intervention is Orange. Although the cropped area and production is not significant but the potential for value addition is immense in Orange. 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)

Orange

The current marketing channel of Kinnow consists of commissioning agents and APMC mandis which procure from the farmers and perform the primary processing such as waxing, sorting, grading and packaging. After this, it is sold to the processors and fruit and vegetable mandis located in the city where secondary processing of Kinnow takes place such as to prepare concentrate, pulp, flavoured drinks, etc. it is then packed and branded to be sold into wholesalers, retailers, supermarkets from where it is purchased by the consumers. It is also exported from there. (Annexure 3.3)

Typically, the gross yield enjoyed by producers is about 112 quintals per acre. Gross value realisation on sale at Rs.2, 000 per quintal is Rs.104, 000 per acre. The cost of cultivation is about Rs.120, 000 per acre and the net value realisation is the same as the gross profit i.e. Rs 104, 000 per acre. (Annexure 3.6)

Mustard

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

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

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.1400 per quintal is Rs.15, 680 per acre. The cost of cultivation is about Rs.7, 840 per acre and the net value realisation is about Rs.7, 840 per acre. (Annexure 3.6)

3.4. Strategic context of Goat Value chain in Manoharthana cluster

2.6.7. 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 14: 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	100 to 180 liters

months	

Source: Department of AH

The cluster has a total of around 12562 goats out of which 28% are milking animals. The estimated milk yield would be around 8635 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 3454 L per day is the potential for collection as on date and this can grow up to 8635 L/day if maximum potential is achieved by developing a separate remunerative value chain for Goat milk. However, due to absence of specific markets, intervention on goat milk chain is not considered.

2.6.8. 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 500 km) from major bakra mandis i.e. Kota (170 Km) ,Ratlam, Indore and Bhopal. 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.. animals have to be brought live out of the state. Transportation costs for these movements are 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 rearers. 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 rearers 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. It is therefore suggested to organize rural haat to provide better market linkages to the goat rearers.

2.6.9. Fodder Requirement and availability.in Manoharthana cluster

The data given in the, Annexure 3.7 indicates the fodder requirement of livestock population of Manoharthana cluster at 43110 MT. The fodder availability table in Annexure 3.7 indicates that the

fodder availability 47774 MT MT which is excess the requirement. Manoharthana cluster is thus self-sufficient in its fodder requirement.

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
2	Rabi	Mustard, Orange

(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. Mustard

Mustard is a major Rabi crop grown in Manoharthana cluster. Mustard is mainly grown for oil and oilcake purpose.

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

lower cost of production. • Scope for secondary processing of mustard seeds and prepare value added products like mustard oil, mustard paste, sauce, etc. • Scope to tie up farmer of CFC to oil mill associations bulks buyer like ADM Agro, Amora exporters, etc.	

4.1.2. Soybean

Soybean is a major Kharif crop grown in Manoharthana 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 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.	• 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 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 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 Orange 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

• 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	

4.1.3. Orange

Orange is a major horticultural crop grown in Manoharthana cluster.

Strength	Weakness
• Growing global and national demand fortable variety and juice • Comparative advantage in production- Brazil, China, Indi, USA, Mexico, and Spain.(India- production of 79,86,683T in 2014. • Nagpur santra and kinnow variety grown in Rajasthan. Mandarin in renowned Jhalawar district • Jhalawar in Kota district hectares with 200,000MTproduction per annum. • Strong support institution like “Centre of Excellence for Oranges, Kota” etc.	• High cost of pesticides, unavailability/spurious pesticides. • Constraints vis-à-vis water source for irrigation • Net yield is nominal term for an acre presently is ……
Opportunity	**Threat**
• Variety of value added products have demand: oranges juice, jams, jelly. • Scope to increase net yield in nominal terms • Scope to establish FCSC with washing, sorting, grading and waxing facilities	• Any sudden change in weather may impact the production of oranges • Crop diversification can adversely impact the production of oranges as the producers would tend to grow other crops instead softened. • Import policies of GOI may tend to increase orange imports which can impact prices of local oranges

4.1.4. Goat

Strength:	Weakness:
• 90 goat specific MTGs, and 4039 families own 12562 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 8635 L of goat milk per day.	• 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

• The weather supports goat rearing • It is a secondary source of livelihood for the small holder farmers in the cluster • There is sufficient availability of fodder and water in the cluster for goat rearing • Manoharthana is near to major markets inkota and MP i.e. Ratlam, Indore and Bhopal where goat meat is of great demand.	• 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 and support system from the RACP project provide enough opportunity for the goat rearars in the area for enhancing livelihood opportunity through creating new value chain for milk and efficient value chain linkages for live goat marketing	• 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 without weighing the animal

4.2. Constraints in value chain crops of Manoharthana Cluster

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

4.2.1. Production related constraints

Orange

Orange is dominant fruit crop in Jhalawar district with average production of 2.5 lakh MT in a year. Production and productivity level is low for following reasons

a. Improper selection of soil
b. Unavailability of good quality seedlings/ cultivars
c. Dense Plantation
d. Lack of proper watering methods
e. Imbalanced Fertiliser application
f. Lack of application of micronutrients
g. Lack of proper bahar treatment
h. Lack of proper training and pruning
i. High mortality due to decline and die back

Soybean

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

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

Mustard

Mustard is important oilseed crop in Manohar Thana cluster in rabbi season. mustard contains about 36 to 42 % of oil . Productivity & production level in the cluster is low for following reasons

a. Improper field preparation
b. Non adoption of good quality seed.
c. Improper integrated nutrient management
d. Poor water management practices
e. Improper protection from pest and diseases followed
f. Improper weed management

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 farmer's income in terms of money. For increasing level of adoption of good agriculture practices to reduce the 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 –scientist's 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

Orange

Farmers are getting low output in terms of rupees for the following reasons.

- 15 -20% post-harvest losses due to lack of proper handling fruits
- No pack houses and adequate infrastructure on farms for proper packaging
- No facilities for grading
- Low prices due to lack of sorting of fruits
- No storage facilities for storage fruits

Soybean

Soybean cannot be harvested directly through Combine harvester hence manually harvesting and threshing is laborious. Sun drying is difficult due to cloudy conditions and humidity at the time of harvesting. Unavailability of labour, threshers and commercial dryers in peak harvesting period is a major constraint.

Mustard

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

Inadequate storage facilities in rural areas: Storage facilities in villages are found to be inadequate which contributes leads to distress sale. Due to lack of storage facilities, substantial quantity of commodity is also lost. Distress sale is obligatory on some farmers as they have to repay

the loan availed from traders during the time of sowing for seed, fertilisers etc . whereas storage facility of Indian Warehousing Corporation and Star Agri pvt ltd is available in Jhalawar near the cluster area.

Transportation facilities at producers' level: Due to inadequate facilities of transportation at the village level, producers are forced to sell 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

Orange:

Infrastructure facility is necessary for proper marketing interventions and to get reliable prices for fruit crops in the cluster. Some constraints in processing, marketing and export are as under,

- Not possible to maintain quality standards for export marketing
- No facility for Waxing of fruits and precooling & refer van to increase shelf life during transportation
- Glut in the market and unavailability of processing facility

Soybean & Mustard

Processing facility is set up at kota, Baran and MP districts from the cluster area by the private ltd companies like Goyal, Ruchi industries 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. Soybean and Mustard is processed by small processors in Jhalawar district.

Traditional system of marketing: In the cluster, there is an absence of alternate channels of marketing. So farmers typically sell only through APMCs or village level traders. The only rare exceptions are some contract farming and direct marketing initiative but in fruits marketing is directly from the farm through the traders. KS oil mill and Ruchi oil mill procure significantly through APMCs in the cluster.

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

Lack of primary processing infrastructure:

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

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

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

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

Distant markets: The nearest market from the cluster is the Jhalawar, Patan APMC that is 90 kms away. This leads to farm gate selling where farmers receive non-competitive prices for their produce.

Fluctuations in prices: Generally, the prices of commodities go down in the post-harvest period due to heavy arrivals in the market and later prices 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 produce in nearby Mandis without studying the price trends.

Adoption of grading: Grading of wheat and garlic 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 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.

Hundekari System : farmers are compelled to sell the produce to the trader from whom he has received credit for sowing of crops**.** It was observed that even MSP procurement is facilitated by the respective trader of that farmer for weighing and bagging of his produce to FCI through Indian ware Housing Corporation.

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.

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

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

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

4.3.1. Mustard:

Table 15: Indicative intervention plan of Mustard value chain

Strength	Weakness
• Mustard ranks second in terms of production in India. • However, due to more oil content (35%-40%) mustard ranks first in term of oil yield among all oil seed crops. • Rajasthan, UP, MP, Haryana, Gujarat and West Bengal states accounted for nearly	• Mustard production trends represent fluctuating scenario. • The yield level also have been variable ranging from 1001(2007-08) to 1250(kg/ha) (2013-14) during last five years. • There was reduction in area and production of mustard in Rajasthan, Gujarat and U.P.

86.5% area and 91.4% production of mustard in India during 2012-13. • Rajasthan ranks third in term of mustard productivity in the country after Haryana and Gujarat.	• Adoption of scientifically recommended technology in mustard production, harvesting and processing is lower among both farmer and processors respectively.
Opportunity	**Threat**
• There is scope to grow the HYV of Mustard which are genetically enhanced. • Scope to develop thermos- and photo insensitive mustard varieties. • Scope for FPOs undertake joint input sourcing activities for seeds, fertilizer, pesticides such that the farmer get good quality of inputs with lower cost of production. • Scope for secondary processing of mustard seeds and prepare value added products like mustard oil, mustard paste, sauce, etc. • Scope to tie up farmer of CFC to oil mill associations bulks buyer like ADM Agro, Amora exporters, etc.	• High temperature during crop establishment and terminal stages cause shorting of growing seasons • Fog and intermittent rain during crop growth can reduce yield considerably. • Depleting availability and deteriorating quality of water.

4.3.2. Soybean:

Table 16: 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. Orange:

Table 17: Indicative intervention plan of Orange value chain

#	Constraints	Action
1.	**Production**	

1.1	High cost of pesticides, unavailability or spurious pesticides	Aggregated input facilitation through FCSC ensuring good quality and reasonable price
1.2	Lack of appropriate information on availability of good quality versus scrummed planting material	FPC to undertake joint input sowing activities for seed fertilizer, pesticides, etc under umbrella of FCSC
2.	**Post-Harvest**	
2.1	Lack of adequate water resources result in poor quality fruit	Farmer training on water shed management, means of irrigation drip/ sprinklers, pond farm, etc.
2.2	Lack of knowledge of standard package of post-harvest practices	Farmers training on standards package of post-harvest practises
3.	**Processing**	
3.1	Inadequate sorting and grading facility	Technical services, establishment of common facility services are imperative
3.2	Lack of post-harvest farm level washing fungicidal treatment & waxing facility	Provision of packing, waxing, washing facility of FCSC
3.3	Very limited oranges development: pulping, juice manufacturing units, etc	Facilitate start-ups in secondary processing from amongst FPOs / individual entrepreneurs

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 Manoharthana 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 these investments

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

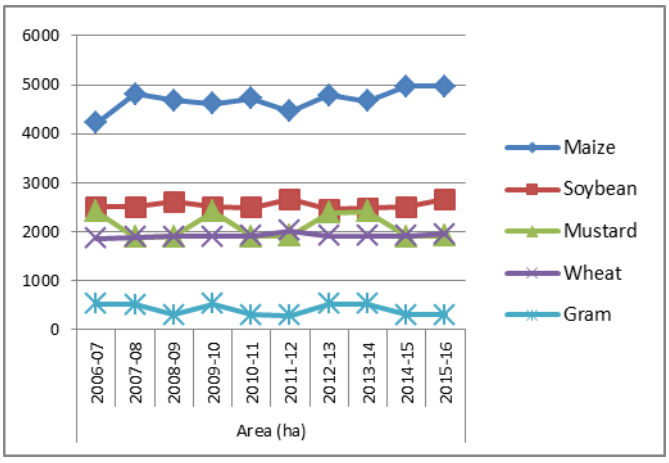
As goat or small ruminants are basic livelihood of the villagers / farmers, so the emphasis on these aspects is to be needed in the cluster. Therefore, appropriate investment provision has to be made in the cluster. The support to small ruminants will focus on improving productivity through breeding, 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.

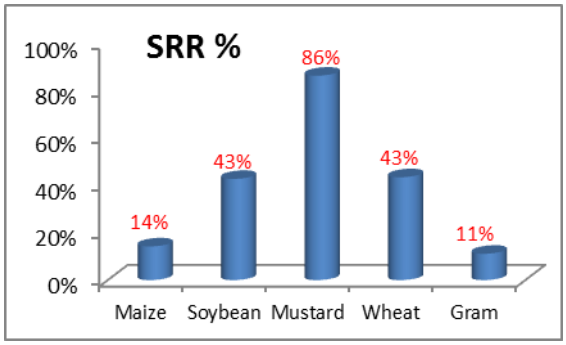
5.2.1. Agriculture

Maize, Soybean, Mustard, Wheat and Gram are the major crops of the cluster. The area as well as the productivity of the crops states the constant stage. The productivity of the crops needs to be enhanced. 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 improved seed of the Mustard crop is being used but the seed replacement rate (SRR) for Soybean, Wheat, Gram and Maize needs to be further enhanced by more promising varieties. The SRR for Maize and Gram is quite low which needs special intervention. 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 and Barley with the aim to improve the irrigation water use efficiency and to develop a new value chain crop through demonstrations and capacity building.

c. Promotion of farm mechanization to reduce the cost of production.

d. Promotion of seed production and adaption support to improve the SRR and the farmer income.

e. Promotion of fodder production to reduce the gap of demand and availability of fodder for the animals.

f. Introduction of ICT based extension system for the quick reach of the solutions to the beneficiaries.

g. Capacity building of the beneficiaries to achieve the PDO

The Investments and Cost Estimates under Agriculture Subcomponent under RACP Manoharthana

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.925.47 lacs** have to be done under Agriculture sub component. Out of this an amount of **Rs.736.96 Lacs** is proposed to be provided from the project and **Rs.188.50 Lacs** is proposed to be borne by the beneficiaries.

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

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

Table 18: Investments and Cost Estimates under the Agriculture Subcomponent under RACP

S. N.	Name of sub-component	Unit	Unit cost	Assistance (%)	Physical	Assistance	Beneficiary Contribution	Total Project Cost
						Financial 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	15	13.94	4.65	18.59
3	Drip Irrigation System	ha	1.30	75	25	24.375	8.12	32.50
4	Mini/ Micro Sprinkler Irrigation System	ha	0.90	75	110	74.25	24.75	99.00
5	Sprinkler Irrigation System	ha	0.20	75	617	92.50	30.83	123.33
6	Pipeline for piped conveyance of irrigation water	100 mtr	0.10	75	533	40.00	13.33	53.33
	Sub Total 1A					**253.32**	**84.44**	**337.75**
1B	**Sub Component 1B: Technology transfer and market led advisory services (Promoting Adoption and Documentation of Improved Technologies)**							
1	Soil Testing	Nos.	0.00	100	1000	1.00		1.00
2	Demonstrations on production technologies for value chain crops to bridge gap	Ha	0.10	75	1748	115.06	38.35	153.42
3	Demonstrations on farm mechanization and PHM technologies	Nos.	1.00	75	111	82.50	27.50	110.00
4	Demonstrations on forage/ fodder	Ha	0.10	75	250	17.13	5.71	22.84
5a	1. Promotion to seed production	Ha	0.05	100	600	27.88		27.88
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	20	15.00	5.00	20.00
	Sub Total 1 Ba					**286.08**	**95.36**	**381.43**
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.	3.50	100	2	7.00		7.00
2	Agriculture Research Institute strengthening to serve as level II/ III platform for ICT	Nos.	3.00	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	3	1.50		1.50
	Sub Total 1 Bb					**23.50**	**0.00**	**23.50**
	Sub Total 1 Ba +1 Bb					**309.57**	**95.36**	**404.93**
	Sub Total 1 (1A + 1 B)					**562.89**	**188.50**	**751.39**
2	**Component 2: Markets and Value Chains**							
3	**Component 3: Farmer Organization and Capacity Building**							
1	Field days, exposure visits, orientation, capacity building	LS		100	18	20.72		20.72
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		141.74		141.74
	Sub Total 3					**162.46**	**0.00**	**162.46**
4	**Component 4: Project Management, Monitoring and Learning**							
1	PIA Operating costs	LS		100		11.62		11.62

S. N.	Name of sub-component	Unit	Unit cost	Assistance (%)	Physical	Assistance	Beneficiary Contribution	Total Project Cost
						Financial in Lacs		
	Sub Total 4					11.62	0.00	11.62
Total Cost (Agriculture Department)						736.96	188.50	925.47

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 fruits as well as vegetables. The area is suitable for fruits like Guava & Mandarin hence, the area under Soybean and Pearl millet in Kharif crops, would be diversified in to the cultivation of vegetables and fruits crops. Looking to the potentiality and acceptance of the area Chilly, Tomato, Okra, Brinjal, Garlic in vegetable crops and Guava and Mandarin 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.565.71 lacs is to be made on demonstration and establishment of 201.32 ha orchard with Pomegranate, lemon and papaya orchard establishment. The assistance will be provided to farmers 75% of total unit cost Rs.2.81lacs 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. 27.85 lacs is to be incurred for demonstration and establishment of 5 ha orchards with Pomegranate HDP (3x3m 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. 86.95 lacs is to be incurred on demonstration and cultivation of 29.78 ha with Chilly, Tomato, Carrot and Cucurbits, which are the leading crops & selected for demonstration. The assistance will be provided 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.

Assistance on green house

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 88.00 lacs is to be needed for establishment of green house in 8,000 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.36.00 lacs for 4,000 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. 220.00 lacs for 40 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.56.00 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.37.50 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.

Micro irrigation in horticulture crops

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. 21.00 lacs.

Farmers training, Seminars, Exhibition Kisan mela

These extension methodologies have been proposed to make farmers acquainted with the best available technologies and to promote adoption so training programmes, exposure visits, seminars, kisan mela etc would be organized with the support of Irrigation Management and Training Institute (IMTI) and other suitable institute. The trainings would be implemented as per the training manual of RACP.

Investments under the horticulture sub component

Total **Rs.1262.76 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 Manoharthana cluster. Out of this an amount of Rs.922.69 Lacs is proposed to be provided from the project and Rs.340.07 Lacs is proposed to be borne by the beneficiaries themselves. The investments are being summarized as under:

Table 19 Investments and Cost Estimates under the Horticulture Subcomponent under RACP

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Grand Total (Rs. In lacs)			
						Physical	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	201.32	141.33	424.38	565.71
i.	First year Maintenance support	ha	0.58	75	0.435	110.00	15.95	47.85	63.80
ii.	Second year Maintenance support	ha	0.75	75	0.561	10.00	1.89	5.61	7.50
2	High density plantations	ha	5.57	75	4.178	5.00	6.96	20.89	27.85
i.	First year Maintenance support	ha	1.09	75	0.818	5.00	1.36	4.09	5.45
ii.	Second year Maintenance support	ha	1.32	75	0.986	0.00	0.00	0.00	0.00
3	Assistance on production technologies for vegetable Cultivation	ha	2.92	75	2.19	29.78	21.74	65.21	86.95
4	Assistance on green house	SqM	0.01	75	0.00816	8000.00	22.72	65.28	88.00
5	Assistance on shade net house	SqM	0.01	75	0.00647	4000.00	10.12	25.88	36.00
6	Solar Pump Program	Nos	5.5	70	3.85	40.00	66.00	154.00	220.00
7	Post-Harvest Management	Nos	28	50	14	2.00	28.00	28.00	56.00
8	Horticulture Mechanization	Nos	7.5	50	3.75	5.00	18.75	18.75	37.50
9	Micro Irrigation in Horticulture Crops (Drip System)	Ha			0	0.00	0	0	0.00
	Fruits		0.80	75	0.60	10.00	2.00	6.00	8.00
	Vegetable		1.30	75	0.975	10.00	3.25	9.75	13.00
	Sub Total IB						**340.07**	**875.69**	**1215.76**
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	0	LS	100	0	0		11	11

S. No.	Name of sub-component / Activity	Unit	Unit cost	Assistance (%)	Amount of Assistance	Grand Total (Rs. In lacs)			
						Physical	Financial		
							Farmer share	Project	Total
	outsourcing, mobility (hired taxi), TA for District unit)p								
	Sub Total IV					**0**	**0**	**11**	**11**
	G. Total						**340.07**	**922.69**	**1262.76**

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 theprimary 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 prepared through a participative process involving a broad range of stakeholders, including private sector.

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

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

Market and value Chain 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 arrive 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

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

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.

Table 20 Project distributed bucks and goats

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Buck Distribution	600	436	164	0
Goat Distribution	180 MTG Members	44	86	50
Animal Insurance	1320	612	508	200

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. It is to improve the breed of the goat of the farmers in the project clusters; it is envisaged to induct quality bucks to those MTG members already keeping goats.

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 propose 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 organised Farms (very few) and in case of non-availability/ suitability they may procure from private farmers of the breeding tract.

In 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.

Improved feeding practices:

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

Azolla Demonstration to MTG members

The cost norm for demonstrations would cover the expenditure on provision of critical inputs i.e. know-how, seeds, fertilizers, insecticides, micronutrients etc. Fodder Demonstration will be organized/laid out on the field of members of MTGs 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 to concentrates led us to a wonderful plant azolla, which holds the promise of providing a sustainable feed for livestock.

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

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

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Azolla Demonstration	900	0	500	400

Chaff cutter Demonstration to MTG members

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

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Chaff Cutter Distribution	500	100	200	200

Feed supplement to Goat & Buck of cluster:

Goats have an ability to thrive in the harshest environments. Their high digestive ability enables them to deal with high cellulose/high fibre diets of a very coarse nature; with its relatively large digestive system in relation to its body size, the work of digestion involves the use, and loss, of large quantities of minerals. Goats are also prolific breeders; achieve sexual maturity at the age of 10-12

months. Gestation period is short and at the age of 16-17 months and starts giving milk. Twining is common and triplets and quadruplets are also possible.

It is observed that growth rate (body weight gain) and timely fertility gain of female goat restricts goat farming economics in the cluster. One of the 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) for demonstrate the benefits:

Activity	Total Requirement (KG)	Year Wise requirement		
		Ist year	II year	III Year
Feed Supplement	12562	0	6281 Buck & Goat	6281 Buck & Goat

Animal Health Services

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

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

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

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

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

DAH have 3 Veterinary hospitals (Jawar, Manoharthana, Chandipur) and 8 sub centres (kamkhera, banskhera, Kherkhera, kolukheri kalan, manpasar, dangipura, semlihaat, shorti) and one vet. Dispensary (Awalhera). But available infrastructure is not sufficient to provide effective services to the livestock owners. Additionally support is required for extension and capacity building services at technology centres

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

RTC "A" Grade:- Manoharthana with Rural Haat

RTC"B" Grade;- 1. Awalhera 2. Jawar

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 12 Gram Panchayats so 12 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 (PashuPalakGoshti) 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)	608	224	192	192

Mobile Emergency Animal Health Van cum Ambulatory clinic:

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

The Project will provide one Mobile animal health van cum ambulatory clinic in cluster and 100% cost will be borne by the project and it will be procured by the project as per the World Bank procurement guidelines. The project will also support its running and recurring expenditure during the project period. It will be handed over to the DAH and will be used for providing 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 **24 villages** of project cluster do not have travis installed for animal inspection so 24 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 percent running expenditure on feeding material. To minimise the cost it is of utmost importance to reduce the wastage and contamination of feed and to increase efficiency of feeders. It will also help in the prevention of goat diseases, caused due to contamination of feed and water. Design developed by CIRG (central Institute for Research on Goats) Makhdoom U.P. will be utilised as these feeders are suitable for various types of feed and fodder.

Activity	Total Requirement(No)	Year Wise requirement		
		Ist year	II year	III Year
Feeding & Water Trough	900	100	400	400

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 percent of goat house cost and remaining 25 percent cost will born by the beneficiary.

Activity	Total Requirement(No)	Year Wise requirement		
		Ist year	II year	III Year
Goat House	90	0	45	45

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)

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 **54 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.

v. 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)/NGO/FPC with the technical guidance of ABPF will initiate the goat marketing operation at Rural Haat and simultaneously build capacity of the Farmer Produce Company (FPC) & PRIs. The FPC will arrange to operate Rural Haat on sustainable basis with the support of TRA/NGO/FPC etc. ABPF/Market Resource Agency/NGO 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 "Manoharthana " 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. Sometime in case of urgent need it becomes ready cash for the farmer. Goat sale usually occurs through middle man, who taking the benefits of approximation cheats the farmer by paying less in comparison to animal's actual weight. Project may provide advisory to MTG members for weighing the animals before selling and will also provide weighing scale for ready use. Weighing scale will also help farmers to know the weight gain of animals for supporting the right quantity of feed intake.

Activity	Total Requirement	Year Wise requirement		
		I year	II year	III Year
Weighing Scale	1350	0	1350	0

a) Goat Milk Value chain and Clean milk production

Jhalawar and Manoharthana cluster in particular has substantial goat milk production and strengthening goat milk value chain will provide remunerative price to the small goat rearer. The value chain may include milk collection, chilling and value addition and packaging. Value addition demands high quality milk and project proposed to support this practice in a coherent manner for adoption at the large scale. Good quality raw milk must be: a. Free from debris and sediment. b. Free from off-flavours. c. Low in bacterial counts. d. Normal composition and acidity. e. Free of antibiotics and chemical.

Capacity Building and Training

Goat Management training of MTG members

A training need analysis has to be done for various stakeholders like goat farmers, NGO, and AHD staff. Accordingly the relevant training programs will be organized for all the stakeholders. It will be ensured that majority of the members of MTG receives basic training involving skill up gradation and orientation on the technical and organizational aspects. . 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 engage 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
MTG Goat Management Training	1350 MTG Members	150	600	600z

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.

Estimated Cost of Investments on Livestock activities

An estimated cost amounting of Rs.817.54 lacs to be incurred as tentative investments to be implemented in Manoharthana cluster. The tentative Action Plan & Cost Estimates for Manoharthana cluster is being summarized as under:

Table 21 Investments and Cost Estimates under the Livestock Subcomponent under RACP

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	600	15	45	60
4	DISTRIBUTION OF GOATS (WIDOWS & DISABLED) (One UNIT OF 4 GOATS)	No.	0.32	0.320	180	0	57.6	57.6
5	GOAT INSURANCE(8% PER ANNUM) OF UNITS RECEIVING IMPROVED BUCKS AND DOES	No.	0.008	0.006	1320	2.64	7.92	10.56
6	Veterinary Health Camp support (one camp Per GP Per month)	No.	0.05	0.050	543	0	27.15	27.15
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	No.	3.6	3.600	6	0	21.6	21.6

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
	including POL for Vehicle **							
10	link worker/MF honorarium (One per Gram Panchayat)	No.	0.36	0.360	48	0	17.28	17.28
11	Azolla Demonstration	No.	0.065	0.065	900	0	58.5	58.5
12	HOUSING SUPPORTS ***	No.	0.66	0.495	90	14.85	44.55	59.4
13	FEEDING & water TROUGHS DISTRIBUTION	No.	0.05	0.038	900	11.25	33.75	45
14	Travis installation in project villages (one per village)	No.	0.15	0.150	47	0	7.05	7.05
15	DISTRIBUTION OF CHAFF CUTTER	No.	0.08	0.060	500	10	30	40
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	1350	0	13.5	13.5
18	Feed Supplement Distribution	No.	0.00126	0.001	12562	0	15.82812	15.82812
17	ICT Support for LLW/MF	No.	0.1	0.100	16	0	1.6	1.6
18	ILD centre	N0	10	10.000	5	0	50	50
	Sub Total					**53.74**	**562.38**	**616.12**
II.	**Market & Value Chain**							
1	FORMATION OF MTG (Goat)	No.	0	0	90	0	0	0
2	ESTABLISHMENT OF RURAL HAAT****	No.	200	200	1	0	200	200
3	Clean Milk Production	No.	0.01	0.01	2700		27	27
4	Goat Milk Collection & Value Add	No.	25	25	0		0	0
	Sub Total					**0**	**227**	**227**
III.	**Farmers Organisation & capacity Building**							
1	MTG members Goat Management	No.	0.02763	0.02763	1350	0	37.3005	37.3005
2	MTG members Refresher Goat Management	No.	0.00545	0.00545	1350	0	7.3575	7.3575
3	LLW training	No.	0.075	0.075	16	0	1.2	1.2
4	Professional staff training	No.	0.075	0.075	10	0	0.75	0.75
5	Goat Exhibition/Seminar	No.	0.5	0.5	2	0	1	1
	Sub Total					**0**	**47.608**	**47.608**
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

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
4	Incentive for different project activities (Rs 1500 per capm)	No.	0.015	0.015	543	0	8.145	8.145
	Sub Total					**0**	**15.345**	**15.345**
	TOTAL					**53.74**	**852.33**	**906.07**

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

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

**** 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

It 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 and ultimate consumers, (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) PESTEL & SWOT analysis for each value chain for intervention. (xiii) Comparative study of stakeholders' role and cost contribution in each cluster separately.

5.3.1. Value chain studies of identified commodities in the cluster

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

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 5.3.

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. **Mustard**

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

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

3. **Orange**

Value chain of Kinnow, post intervention, is shown in Annexure 5.3.

In current practice, farmers sell their orchard, before harvesting, to processors on a mutually agreed upon price. But this results in realizing lower price than potential. Since there is a high demand of waxed Kinnow in market for table purpose hence a small cleaning, grading and waxing unit can service premium price of the produce. These products have far off demand like South Indian cities and neighbouring countries too.

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

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	**Orange grading and waxing unit (2 TPH)**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Cleaning, grading and waxing unit	1,500,000
	Electricity/Generator	50,000
	Vehicle (2 MT)	750,000
	Total	**3,000,000**
3	**Mustard oil unit (3 QPH)**	
	Shed construction (1000 sq ft @ Rs. 700/sq ft)	700,000
	Oil Unit Machines	1,200,000
	Electricity/Generator	50,000
	Vehicle (2 MT capacity)	750,000
	Total	**2,700,000**

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

Table 23 Estimated Cost of Investments on Value chain activities

S. No.	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. and Horti.)**								
	Sub Component 2B: Market Infrastructure and Agribusiness Support								
1	**Nurturing farmers group**								
i)	Registration expenses and other pre-operative expenses- FPC	FPC	1	100%	1	4	0	4	4
ii)	Manpower Expenses - FPC (Rs. 25,000 per month for 2 years)	FPC	6	100%	6	4	0	24	24

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
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						**112**	**120**	**232**

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	Mustard oil mil (Rs.)	Soybean CnG unit (Rs.)	Kinnow waxing, cleaning and grading unit (Rs.)	Goat milk chilling unit (Rs.)
Revenue	31,104,000	1,944,000	1,920,000	4,015,000
Total Revenue	**31,104,000**	**1,944,000**	**1,920,000**	**4,015,000**
Fixed Cost (HR, other fixed cost)	514,000	381,400	508,000	221,000
Variable Cost	25,408,480	731,520	468,000	3,016,798
Total Operational Expenses	**25,922,480**	**1,112,920**	**976,000**	**3,237,798**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**5,181,520**	**831,080**	**944,000**	**777,202**
Depreciation	235,000	222,500	265,000	142,388
Amortization	-			-
Earnings Before Interest and Taxes (EBIT)	**4,946,520**	**608,580**	**679,000**	**634,815**

Particulars	Mustard oil mil (Rs.)	Soybean CnG unit (Rs.)	Kinnow waxing, cleaning and grading unit (Rs.)	Goat milk chilling unit (Rs.)
Interest Expense	-	0	0	177,734
Earnings Before Taxes (EBT)	**4,946,520**	**608,580**	**679,000**	**457,081**
Tax (@ 30%)	1,483,956	182,574	182,574	137,124
Earnings After Taxes (EAT)	**3,462,564**	**426,006**	**496,426**	**319,957**
Financial Indicators				
Net Present Value (@ discount rate 10%)	10,380,669	**221,704**	**722,457**	897,873
Internal Rate of Return	75.43%	13%	18.21%	25.50%
Payback period in years (Equity)	0.77	1.16	0.99	1
Payback period in years (Total)	1.40	3.73	3.36	3
Breakeven point	9.02%	40.91%	43.89%	17.54%

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

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 per year

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 Manoharthana 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 8.33 mcm and 17.06 mcm per year. When the investment per unit of water saved is calculated, it is found that MIS activities are able to conserve more water at very low investment of Rs.0.33 crore per mcm of water saved whereas watershed activities can save lesser water at an investment of Rs.1.90 crore per mcm of water per year. Thus, 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 Manoharthana

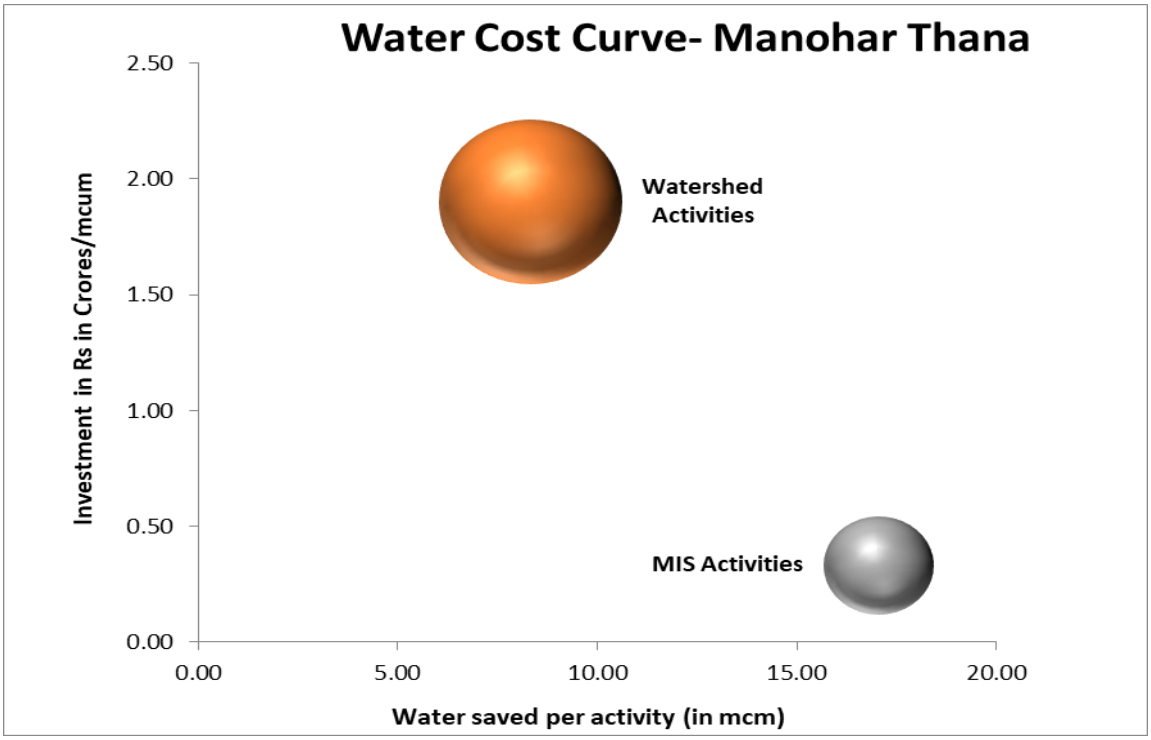


Table 25: Investment (in Rs/mcm) verses Water saved (in mcm) in Manoharthana

Activities undertaken to save water	Water saved- per year in mcm	Investment- Rs crore/mcm	Total investment- Rs crore
Watershed activities	13.20	1.20	15.818
MIS Activities	17.06	0.33	5.62

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

6.1 Description of watershed cluster

The Manoharthana watershed cluster of RACP is located in Panchayat Samiti Manoharthana, Jhalawar district. There are 47 no. of villages situated in 16 Gram Panchayats in the Project area. The elevation difference is from 0-155 meters and slope range from 0-10% & More than 10%. The major water stream is the Ahoo River.

6.2 Objectives of Water Management in the Cluster

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

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

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

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

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

f. Restoration of ecological balance,

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

6.3 Water Budgeting Exercise for the Project Area

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

out the total number and size of water harvesting structure, i.e. how much total runoff is available, out of which how much is being already stored in existing structures and also how much is available for further storage.

a. Estimation of Rainwater

The process to estimate runoff may be summarized as under:

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

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

Average Catchment – cultivated land, forest land with vegetation.

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

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

S. No.	Catchment	Area in Ha
1	Good Catchment	5144.58
2	Average Catchment	8164.20
3	Bad Catchment	1610.22
	Total	**14919.00**

(i) Average Annual Rainfall: 977 mm (Data provided by Water Resource Department, Jhalawar)

Calculation of Runoff (Expected Yield) based on the "Strange-Table" (Table 3.3) As per State Specific Technology Manual for Watershed Development, March 2016, Govt. of Rajasthan.

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.	3549.00	5144.58	16493976.20
Average	Runoff is medium like cultivated land, forest land with vegetation	2661.75	8164.20	19631357.74
Bad	Runoff is minimum and infiltration is maximum e.g. Sandy soil	1774.00	1610.22	2581253.51
Total			**14919.00**	**42845704.05**

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

S. No.	Type of Structure	Nos.	Storage Capacity (In Cum)	Storage Capacity (% of Total Surface Runoff)
1	Farm Ponds	75	67500	4.15 %
2	Nadis	88	70400	
3	Anicuts	98	686000	
4	Village ponds (Talab)	35	700000	
5	Check Dam	102	255000	
	TOTAL		**1778900**	

(ii) Above table reveals that a total of 1778900 cum water is already being harvested through farm ponds, nadis, anicuts, dam, village ponds and local depressions in the cluster.

(iii) Calculation of the Balance Runoff:

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

Balanced Runoff = 42845704.05cum – 1778900cum = 41066804.05 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	Contour Bund	Rmt	80974	1.50	121461
2	**Field bund**	**Rmt**	**92486**	4.50	416187
3	**Peripheral Bund**	**Rmt**	**73391**	4.50	330259.50
	Sub Total A1				**867907.50**
4	**Farm Pond**	**Nos.**	**19**	**8000**	**152000**
	Sub Total A2				**152000**

Note:- As per the on field Study Report of Dr. P.K. Singh, Professor and Head, Soil & Water Conservation Department, MPUAT, Udaipur, (Annexure- 6.2) 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 A-2= 152000 x 2 = 304000 **cum**

Total of likely ground water recharge from Arable Land activities (Cum) =

= Table 1(Sub Total A1) + Table 1(Sub Total A2)

= 867907.50+ 304000 = 1171907.50 **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.

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

S. No.	Activity	Unit	Quantity	Storage Capacity(Cum	Total Storage Capacity (Cum)
B.	**Conservation measures for Non-Arable land**				
1	Mini Percolation Tank L40mt	Nos.	1	1400	1400
2	Mini Percolation Tank L60mt	Nos.	23	1800	41400
3	Mini Percolation Tank L80mt	Nos.	2	2200	4400

S. No.	Activity	Unit	Quantity	Storage Capacity(Cum	Total Storage Capacity (Cum)
4	Diversion Channel 900 Mt.	Nos.	1	3000	3000
5	**Earthen check dam**	**Nos.**	**15**	**8500**	**127500**
6	**Masonry check dam**	**Nos.**	**10**	**20000**	**200000**
7	**Dug out cum Embankment Bund L 60 M**	**Nos.**	**18**	**15000**	**270000**
8	**Sunken Pond**	**Nos.**	**8**	**18500**	**148000**
9	**Single wall MMS**	**Nos.**	**5**	**35000**	**175000**
10	S.G.T. (1000 Nos.)	Nos.	3	12500	37500
11	Deep C.C.T (100 Nos.)	Nos.	3	3500	10500
12	Nadi L100 M.	Nos.	8	2800	22400
13	Nadi L 120mt	Nos.	1	3000	3000
	Total		**98**		**1044100**
c.	**Drainage Line Treatment**				
1	MM Structure L 15 mt.(Stone)	Nos.	5	9500	47500
2	MM Structure L 18 mt. (Stone)	Nos.	5	11500	57500
3	MM Structure L 22 mt. (D.W.C.M.S.)	Nos.	1	16500	16500
4	MM Structure L 25 mt. (D.W.C.M.S.)	Nos.	6	20500	123000
5	**MMS L8 Mt.**	**Nos.**	**6**	**15000**	**90000**
6	**MMS L10 Mt.**	**Nos.**	**14**	**20000**	**280000**
7	**MMS L12 Mt.**	**Nos.**	**20**	**25000**	**500000**
8	**MMS L15 Mt.**	**Nos.**	**18**	**30000**	**540000**
9	**MMS L18 Mt.**	**Nos.**	**13**	**40000**	**520000**
10	**MMS L20 Mt.**	**Nos.**	**8**	**45000**	**360000**
	Total		**96**		**2534500**
	Grand Total (N.A.+ D.L.T.)				**3578600**

Similarly, for above structures proposed structures, 2 times of the total storage capacity i.e. ground water recharge = 3578600 x 2 = 7157200 **Cum**

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

= 1171907.50 + 7157200 = 8329107.50 **cum**

(ii) Remaining (still untapped) Runoff = i.e. 41066804.05 – 8329107.50 = 32737696.55 cum (which is 76.41 % 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)**
42845704.05 Cum	1778900 Cum	41066804.05 Cum	8329107.50 Cum	32737696.55 Cum
100%	**4.15 %**	**95.85 %**	**19.44 %**	**76.41%**

Above table clearly shows that only **23.59% (4.15 + 19.44)** rain water is proposed to be harvested and out of the rest **76.41%** 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 Nadi/Sunken Pond/Percolation Pond and other water storage structures needed in the area. Keeping this in view, field survey has been undertaken in the cluster and is summarized herewith.

Participatory Rural Appraisal (PRA)

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

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

PRA Outcome - SWOT Analysis

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

Strength	Weakness
➢ The project area is blessed in terms of fertility of land resources. ➢ Most of the villages in Project Area are located in the vicinity of 25-35 kms of Jhalawar-Manoharthana SH-37 that enables better access to urban centres such as Aklera. ➢ Good amount of milk is produced in the project area so regular income generating	➢ Mostly Project area is rain-fed no another source of irrigation ➢ Totally depend on groundwater for irrigation ➢ Lack of diversity in livelihood sources, as agriculture and Animal Husbandry are the only major sources of livelihood. This situation compels the villagers to work as daily labourers in the urban areas and even migrate to urban areas during drought periods. ➢ Weak 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.
Opportunity	**Threat**

➢ 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. 21.25 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, 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 Manoharthana and expected beneficiaries/outcome are presented under the following activities proposed for watershed development.

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	ely Beneficiaries (Nos)
1.	Contour bund	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 80974 rmt Contour bund with proposed financial cost Rs.87.54 lacs water will Conserve by in-situ moisture conservation.	121461	800
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	416187	

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	ely Beneficiaries (Nos)
		92486 rmt Field bund with proposed financial cost Rs. 65.67 Lacs water will conserve by in-situ moisture conservation.		
3.	Peripheral Bund	Taken to stabilize the banks of drains/nallah along Agricultural Land, so that land do not erode. 73991 m Peripheral bund with proposed financial cost Rs. 108.62 lacs	330259	650
4.	Chute Spillway	A Chute spillway is a common and basic design which transfer excess water from behind the dam down a smooth decline into the river below. These are usually designed following an ogee curve. Most often, they are lined on the bottom and sides with concrete to protect the dam and topography. Chute spillway can be ingrained with a baffle of concrete blocks but usually have a 'flip lip' and/or dissipater basin which creates a hydraulic jump, protecting the toe of the dam from erosion. By constructing 143 Chute spillway with proposed financial cost Rs. 114.39.	Along bunds at suitable designated places	
5.	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 443 Ramp-cum Waste Weir with proposed financial cost Rs. 43.64 lacs elongation of gullies will stop and will Stabilized on agricultural land.	Along bunds at suitable designated places	
6.	Farm Pond	Farm Ponds, at a lower elevation, are constructed to harvest the excess runoff after in-situ moisture conservation. Farm pond helps in providing supplemental irrigation as well as increasing cropping intensity. By constructing 19 Farm ponds with proposed financial cost Rs. 16.72 Lacs.	304000	19
7.	Sub-surface Barrier	To check sub surface flow in drainage line resulting increase water table in local area. 17 SSB structures will constructed with Rs.11.16 lacs.	Underground recharge	-
8.	Azola unit	Azola activity is proposed to be available in summer for Livestock feeding to increase milk production. By constructing 11 Azola unit in	-	-

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	ely Beneficiaries (Nos)
		arable land with proposed financial cost Rs. 2.07 lacs cultivators will benefitted having alternative income & livestock feeding source		
9.	Mini Percolation Tanks (MPTs)	MPT (Mini percolation tank) activity is proposed to harvest & infiltration of runoff in Drainage line of Ist & IInd order. By constructing 26 MPT's structures in arable& Non-arable land with proposed financial cost Rs.40.76 lacs runoff will harvested for irrigation use	94400	Farmers & Users Groups
10.	Diversion channels	Diversion channels are placed at the top of the arable area to intercept the water running off the slope above and divert it across the slope to a grassed waterway & used as outlets to safely convey runoff from fields, surface and sub- surface drainage systems and serve as emergency spillways for farm ponds or other structures. No. of 1 Diversion channel with proposed financial cost of Rs. 3.12 lacs	Nominal	-
11.	Earthen Check Dam	Earthen Check Dam activity is proposed to harvest & infiltration of runoff in Drainage line of Ist & IInd order. By constructing 15 Earthen Check Dam structures in arable & Non-arable land with proposed financial cost Rs. 36.30 lacs runoff will harvested for irrigation use	255000	Farmers & Users Groups
12.	Masonry Check Dam	Masonry Check Dam activity is proposed to maximum water can be stored on non-arable land. By constructing 10 Masonry Check Dam structures in arable& Non-arable land with proposed financial cost Rs. 36.70 lacs runoff will harvested for cattle & irrigation use	400000	Farmers & Users Groups
13.	Dugout cum Embankment Bund	Dugout cum Embankment Bund, at a lower elevation, are constructed to harvest the excess runoff after in-situ moisture conservation. Farm pond helps in providing supplemental irrigation as well as increasing cropping intensity. By constructing 18 Embankment cum Dugout pond structures in arable & Non-arable land with proposed financial cost Rs. 21.78 lacs runoff will harvested for	540000	Farmers & Users Groups

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	ely Beneficiaries (Nos)
		irrigation use		
14.	Sunken Pond	Storage of runoff for cattle, human & life-saving irrigation use through drip/sprinkler system. Construction of structures to check soil erosion and sand casting. By constructing 8 Sunken pond structures in arable & Non-arable land with proposed financial cost Rs. 8.48 lacs runoff will harvested for irrigation use	296000	Farmers & Users Groups
15.	Single Wall MMS	This type of structure looks like an WHS. the upstream walls of the structure are constructed with cement masonry. By constructing 5 Single Wall MMS structures with proposed financial cost Rs. 10.30 lacs runoff will harvested for irrigation use.	350000	Users Groups
16.	SGT	SGT activity is proposed to reduce the velocity of runoff in drainage line of Ist order	-	-
17.	Deep Continuous Contour Trench (Deep C.C.T.) (100 Nos.)	Deep continuous trenches are made on the slope for soil and water conservation and time afforestation purpose. These trenches heaps are planted with trees. No. of 3 Deep C.C.T. (100 Nos.) with proposed financial cost of Rs.2.64 lacs.	Nominal	-
18.	Nadi	To harvest runoff constructed near the point of use where maximum water can be stored on non-arable land. 9 Nadi's with Rs. 36.59 lacs.	50,800	benefits will be ascertained
19.	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 14 hac with Rs. 17.70 lacs.	-	Users Groups
20.	Minor Masonry Structure	MMS structure to be constructed at 3rd & 4th order drainage line because in 3rd & 4th order drainage the runoff & intensity of	5069000	Users Groups

S. No.	Activity	Description	Water Recharged/ Harvested (Cum)	ely Beneficiaries (Nos)
		water flow is high & the Earthen structure is not sustainable. By constructing 96 MMS structures with proposed financial cost Rs. 839.57 lacs runoff will harvested for irrigation use.		

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 Manoharthana, 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:

a. GIS Based thematic layers (Maps) prepared on the basis of high resolution NRSA data.

b. GIS based Flow Accumulation layer utilised to estimate water accumulation at various points/locations and the corresponding catchment areas for each such location.

c. 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

d. GIS based Drainage/Water-Bodies layer utilised to mark the location and required dimensions of drains and water bodies

e. Reconnaissance survey carried out for location of *Nallah* marked on the drainage/water-bodies GIS layer and *Nallah* figure correctly marked on the map

f. GIS based Land-Use-Land-Cover layer utilised to access usages of the land and accordingly selection of appropriate location for various structures

g. 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

h. 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

i. Standard criteria and formats being followed by the Department of Watershed, Government of Rajasthan, adopted for the purpose of designing structures.

j. Latest BSR of PR&RD, P.S. Manoharthana, District Jhalawar & Irrigation Department Jhalawar 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 Manoharthana 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)**				**7.73**
1.2	**Hydrological Monitoring Network (HNM) & Crop Water Budgeting (CWB) Etc.**				**50.00**
1.3	**ACTIVITIES ON ARABLE LAND**				
1.3.1	**Arable Conservation Measure**				
1	Contour Bund	0.00108	Rmt	80974	87.54
2	Field Bund	0.00071	Rmt	92486	65.67
3	Peripheral Bund	0.00148	Rmt	73391	108.62
4	Chute Spill way	0.80	Nos.	143	114.39
5	Ramp-cum waste weir	0.10	Nos.	392	38.41
6	Farm Pond	0.88	Nos.	19	16.72
7	Ramp-cum waste weir (5 m)	0.10	Nos.	51	5.24
8	Sub-surface barrier L 60 mt. (C.D.)	0.66	Nos.	17	11.16
	Total 1.3.1				**447.74**
1.3.1	**Arable Production Measure**				
1	Construction of Azola unit	0.19	Nos.	11	2.07
	Total 1.3.2				**2.07**
	Total Arable 1.3.1 +1.3.2				**449.82**
1.4	**ACTIVITIES ON NON ARABLE LANDS**				

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
1.4.1	**Non-Arable Conservation Measure**				
1	Mini percolation tank L40mt	1.11	Nos.	1	1.11
2	Mini percolation tank L60mt	1.47	Nos.	23	33.70
3	Mini percolation tank L80mt	2.97	Nos.	2	5.95
4	Diversion Channel 900 mt.	3.12	Nos.	1	3.12
5	E.C.D.	2.42	Nos.	15	36.30
6	Masonry Check Dam	3.67	Nos.	10	36.70
7	Dugout cum Embankment Bund L 60 M	1.21	Nos.	18	21.78
8	Sunken Pond	1.06	Nos.	8	8.48
9	Single Wall MMS	2.06	Nos.	5	10.30
10	S.G.T. (1000 Nos.)	4.85	Nos.	3	14.55
11	Deep C.C.T. (100 Nos.)	0.88	Nos.	3	2.64
12	Nadi L100mt	3.95	Nos.	8	31.58
13	Nadi L 120mt	5.01	Nos.	1	5.01
	Total 1.4.1				**211.22**
1.4.2	**Non-Arable Production Measure**				
1	Pasture Development	1.26	Ha	14	17.70
	Total 1.4.2				**17.70**
	Total Non-Arable (1.4.1+1.4.2)				**228.93**
1.5	**Drainage Line Treatment**				
1	M.M.S L 8 mt.	6.72	Nos.	6	40.32
2	M.M.S L 10 mt.	7.00	Nos.	14	98.00
3	M.M.S L 12 mt.	7.81	Nos.	20	156.20
4	M.M.S L 15 mt.	9.04	Nos.	18	162.72
5	M.M.S L 18 mt.	10.31	Nos.	13	134.03
6	M.M.S. L 20 mt.	11.18	Nos.	8	89.44
7	MM Structure L 15 mt. (Stone)	7.31	Nos.	5	36.56
8	MM Structure L 18 mt. (Stone)	7.63	Nos.	5	38.13
9	MM Structure L 22 mt. (DWCMS)	10.16	Nos.	1	10.16
10	MM Structure L 25 mt. (DWCMS)	12.34	Nos.	6	74.01
	Total D.L.T. 1.5				**839.57**
	Grand Total NRM Measures (1.3+1.4+1.5)				**1518.31**
1.6	Consolidation of Works				5.80
	Total 1 (1.1 to 1.6)				**1581.84**
2	**Component 2 : Markets and value chain**				
3	**Component 3 : Farmer Organization & Capacity building**				
3.1	Community Mobilization, IEC, Group Formation, training, Capacity Building				14.49
	Sub Total 3				**14.49**
4	**Component 4 : Project Management, Monitoring and Learning**				

S. No.	Name of Activity	Unit Cost	Unit	Total of New CACP provisions	
				Phy.	Fin.
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)				**1616.33**

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

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

SMP consists of the following strategies:

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

Social baseline information Manoharthana Cluster):-

Project Area covers an area of 9660 hectare (ha) comprising sixteen (16) Gram Panchayats and forty seven (47) villages. The Cluster village has a population of 43128 of which 21967 are males while 21161 are females as per field survey by NGOs. In the cluster scheduled caste 3983 and scheduled tribe category 8988 population. Cluster had household of 8225 of which of which small farmer 2861, marginal farmer 4136, large farmer 736 and remaining farmer landless.

Consultation held - Key social issue of the Cluster

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

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

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

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

7.2. Environment Management Plan (EMP)

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

- Crop intensification
- Water Management
- 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.

Details can be referred in Annexure 7.2.

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

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

a) 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.)

b) 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.

c) 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. 4944.76 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 Development & Soil Conservation	1581.84	0	14.49	20.00	1616.33
2	Agriculture	751.39	232.00	164.59	11.62	1159.6
3	Horticulture	1,215.76	0	36.00	11.00	1,262.76
4	Animal Husbandry	616.11	227.00	47.61	15.35	906.07
	Total	**4,165.11**	**459.00**	**262.69**	**57.97**	**4,944.76**

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.4944.76 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.4944.76 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 Dev. & Soil Conservation	Agriculture	Horticulture	Animal Husbandry	Total
Goods	0	555.16	847.69	380.49	**1783.34**
Works	1470.13	2.22	0	320	**1792.35**
Consultant Services	57.73	143.74	0	0	**201.47**
Operating Costs	20	19.13	11	104.22	**154.35**
Training	14.49	22.85	36	47.61	**120.95**
Grants	0	116.00	28	0	**144**
Beneficiary Contribution	53.98	300.50	340.07	53.75	**748.3**
Total	**1616.33**	**1159.60**	**1262.76**	**906.07**	**4944.76**

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

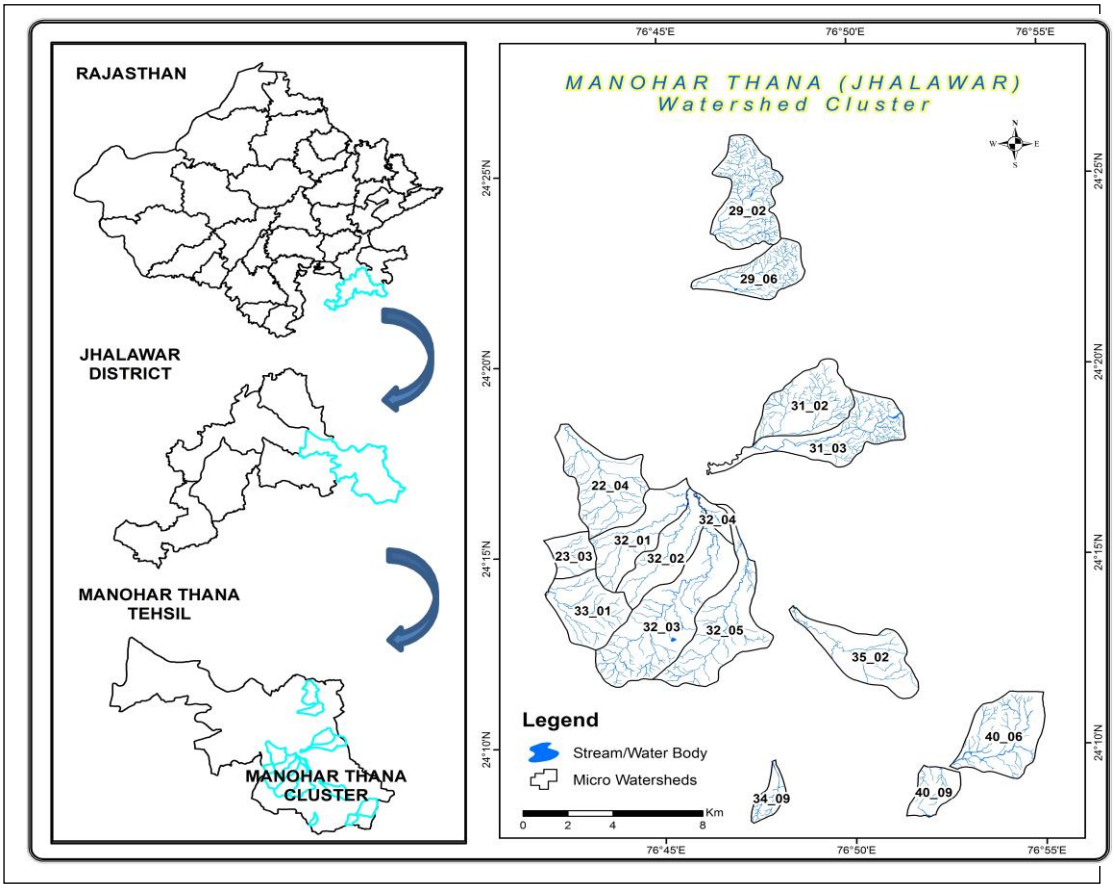
Table 29 Gram Panchayat and Village wise area in Manoharthana Cluster

S. No.	Name of Gram Panchayat	Name of Villages Covered	Area (In Ha.)	% Area in Watershed
1	Anwa lheda	Anwalheda	486.68	5.04%
		Bislai	170.24	1.76%
		Roopaheda	220.18	2.28%
		Guradi	241.05	2.50%
		Jamuniya/kandhari	219.87	2.28%
2	Banskhedi mewatiyan	Banskhedi	448.4	4.64%
		Ghadawali	259.25	2.68%
3	Chandpura bhilan	Chandpura bhilan	731.77	7.58%
4	Chandipur	Chandipur	26.04	0.27%
		Piplya jawar	79.62	0.82%
		Pacheta	212.51	2.20%
5	Garboliya	Ankhkhedi	140.88	1.46%
		Aakoliya	214.76	2.22%
		Bhawanipura lodh.	189.91	1.97%
		Birijipura	0.28	0.00%
		Bishankheda	189.46	1.96%
		Chandpura	46.31	0.48%
		Garboliya	562.49	5.82%
		Manyakhedi	164.62	1.70%
		Pahadpura	285.81	2.96%
6	Kolookhedi maliyan	Gangohani	7.44	0.08%
7	Kherkheda	Mawasa	176.69	1.83%
		Tandi	43.9	0.45%
8	Manpasar	Manpasar	472.26	4.89%
		Maheshpura	184.43	1.91%
		Piplodi	338.42	3.50%
		Jhiri	406.05	4.20%
		Goriyakheda	4.84	0.05%
9	Semlihaat	Semlihaat	625.3	6.47%
		Choldiya	440.87	4.56%

S. No.	Name of Gram Panchayat	Name of Villages Covered	Area (In Ha.)	% Area in Watershed
		Tajpuriya	130.85	1.35%
		Borkhandi Tajpuriya	54.21	0.56%
10	Shorti	Chittoda	28.92	0.30%
		Baroobeh	125.32	1.30%
11	Samrol	Samrol	60.1	0.62%
		Patti	395.33	4.09%
		Patwa	59.21	0.61%
		Junapaani	193.68	2.00%
12	Todari jagannath	Todari jagannath	257.68	2.67%
		Todara	135.87	1.41%
		Kachotiya Jageer	78.92	0.82%
		Khankhara lodhan	218.34	2.26%
		Baldevpura charan	96.33	1.00%
13	Khatakhedi	Madanpura	31.56	0.33%
14	Dangipura	Chittodi	160.61	1.66%
15	Baneth	Gomukh / Lodhipura	37.49	0.39%
16	Kolookhedi Kalan	Kolookhedi kalan	5.25	0.05%
	Total		**9660**	**100.00%**

(Source: Watershed DPR of Manoharthana Cluster)

Figure 8: The index map of Manoharthana cluster



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

Table 30 Area (in ha %) of Agricultural Crops in 2006-07 & 2015-16, increase / decrease over 10 years in State & Jhalawar district

Crops	State							Jhalawar							
	2006-07		2015-16		Increase (+) / Decrease (-) over 10 Years		Average of 10 Years	2006-07		2015-16		Increase (+) / Decrease (-) over 10 Years		Average of 10 Years	% Area over State Average
	Area in ha	Area in %	Area in ha	Area in %	Area in ha	Area in %		Area in ha	Area in %	Area in ha	Area in %	Area in ha	Area in %		
Jowar	662055	3.74%	631170	3.57%	-30885	-0.17 %	**641570.10**	7974	2.86%	628	0.23%	-7346	-2.64%	**3330.70**	**0.52%**
Isabgol	158035	0.89%	304430	1.72%	146395	0.83 %	**215409.30**	422	0.15%	598	0.21%	176	0.06%	**725.90**	**0.34%**
Groundnut	306037	1.73%	516850	2.92%	210813	1.19 %	**387853.00**	1675	0.60%	1102	0.40%	-573	-0.21%	**1275.00**	**0.33%**
Black Gram	107946	0.61%	298714	1.69%	190768	1.08 %	**180374.40**	9579	3.44%	17108	6.14%	7529	2.70%	**10918.80**	**6.05%**
Maize	1032079	5.84%	866541	4.90%	-16553	-0.94	**1020246.80**	44595	16.00 %	31559	11.33 %	-1303	-4.68%	**35103.90**	**3.44%**

					8	%						6			
Soybean	641114	3.63%	120477 3	6.81%	56365 9	3.19 %	**905231.70**	20328 8	72.96 %	26638 5	95.60 %	6309 7	22.64 %	**248820.3 0**	**27.49%**
Sesamum	273345	1.55%	366736	2.07%	93391	0.53 %	**424089.00**	3348	1.20%	979	0.35%	-2369	-0.85%	**2431.90**	**0.57%**
Mustard	309957 0	17.53 %	253233 0	14.32 %	- 56724 0	- 3.21 %	**2561288.3 0**	173	0.06%	39521	14.18 %	3934 8	14.12 %	**36318.70**	**1.42%**
Taramira	112107	0.63%	16792	0.09%	-95315	- 0.54 %	**206125.00**	173	0.06%	62	0.02%	-111	-0.04%	**1282.60**	**0.62%**
Wheat	256484 0	14.51 %	310897 3	17.59 %	54413 3	3.08 %	**2851321.6 0**	72456	26.00 %	10210 8	36.64 %	2965 2	10.64 %	**82216.20**	**2.88%**
Barley	232271	1.31%	256029	1.45%	23758	0.13 %	**281434.60**	374	0.13%	202	0.07%	-172	-0.06%	**345.20**	**0.12%**
Gram	101075 4	5.72%	941950	5.33%	-68804	- 0.39 %	**1297770.4 0**	14082	5.05%	9511	3.41%	-4571	-1.64%	**22552.20**	**1.74%**
Coriander	131137	0.74%	212725	1.20%	81588	0.46 %	**209083.40**	61963	22.24 %	98356	35.30 %	3639 3	13.06 %	**89913.70**	**43.00%**

(Source: Agriculture department, Manoharthana)

Table 31: Area (in ha & %) of Agricultural Crops in the 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	662055	625646	576744	718457	726916	553754	680375	579615	660969	631170	**641570.10**
Isabgol	158035	136275	160544	227705	214974	221740	190229	184566	355595	304430	**215409.30**
Groundnut	306037	276345	324209	326032	349331	414671	402252	461979	500824	516850	**387853.00**
Black Gram	107946	144744	137230	116377	127792	255221	218009	195998	201713	298714	**180374.40**
Maize	1032079	1050663	1053878	1096231	1147191	1039135	1039135	986158	891457	866541	**1020246.80**
Soybean	641114	797587	829450	778382	765494	897042	1039838	1175502	923135	1204773	**905231.70**

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
Sesamum	273345	314871	521210	598306	548011	512765	415128	360613	329905	366736	**424089.00**
Mustard	3099570	2458197	2738014	2212339	2489906	2441254	2424956	2782539	2433778	2532330	**2561288.30**
Taramira	112107	38109	100120	97542	1188738	60994	109785	296459	40604	16792	**206125.00**
Wheat	2564840	2591804	2294848	2394215	3036141	2935341	3063202	3205604	3318248	3108973	**2851321.60**
Barley	232271	249189	286950	223406	327991	278016	307911	309281	343302	256029	**281434.60**
Gram	1010754	1231273	1259428	884358	1783281	1433928	1252908	1923501	1256323	941950	**1297770.40**
Coriander	131137	212841	245198	232139	198052	267827	158879	182726	249310	212725	**209083.40**

Table 32: Cropping Pattern (%) for 10 Years (2006-07 to 2015-16) at the State level

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%	3.66%	3.29%	4.23%	3.96%	3.07%	3.89%	3.17%	3.74%	3.57%	**3.63%**
Isabgol	0.89%	0.80%	0.91%	1.34%	1.17%	1.23%	1.09%	1.01%	2.01%	1.72%	**1.22%**
Groundnut	1.73%	1.62%	1.85%	1.92%	1.90%	2.30%	2.30%	2.53%	2.83%	2.92%	**2.19%**
Black Gram	0.61%	0.85%	0.78%	0.69%	0.70%	1.42%	1.25%	1.07%	1.14%	1.69%	**1.02%**
Maize	5.84%	6.15%	6.00%	6.46%	6.25%	5.76%	5.95%	5.40%	5.04%	4.90%	**5.77%**
Soybean	3.63%	4.67%	4.73%	4.59%	4.17%	4.97%	5.95%	6.43%	5.22%	6.81%	**5.12%**
Sesamum	1.55%	1.84%	2.97%	3.52%	2.99%	2.84%	2.38%	1.97%	1.87%	2.07%	**2.40%**
Mustard	17.53%	14.38%	15.60%	13.03%	13.57%	13.54%	13.87%	15.23%	13.77%	14.32%	**14.49%**
Taramira	0.63%	0.22%	0.57%	0.57%	6.48%	0.34%	0.63%	1.62%	0.23%	0.09%	**1.17%**
Wheat	14.51%	15.16%	13.08%	14.10%	16.55%	16.28%	17.53%	17.55%	18.77%	17.59%	**16.13%**
Barley	1.31%	1.46%	1.63%	1.32%	1.79%	1.54%	1.76%	1.69%	1.94%	1.45%	**1.59%**
Gram	5.72%	7.20%	7.18%	5.21%	9.72%	7.95%	7.17%	10.53%	7.11%	5.33%	**7.34%**

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
Coriander	0.74%	1.24%	1.40%	1.37%	1.08%	1.49%	0.91%	1.00%	1.41%	1.20%	**1.18%**

(Source: Agriculture department, Manoharthana)

Table 33: Area (in ha & %) of Agricultural Crops in Jhalawar 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	7974	6226	4790	4629	3617	1867	1341	844	1391	628	**3330.70**
Isabgol	422	159	202	187	208	1011	2365	904	1203	598	**725.90**
Groundnut	1675	1374	1483	1321	1357	1373	1167	874	1024	1102	**1275.00**
Black Gram	9579	11462	11257	6666	10694	13913	11092	6278	11139	17108	**10918.80**
Maize	44595	40773	37581	35711	40584	33150	28597	21835	36654	31559	**35103.90**
Soybean	203288	224695	236786	243664	240086	262057	271071	288589	251582	266385	**248820.30**
Sesamum	3348	2269	2262	2707	7316	2200	1463	549	1226	979	**2431.90**
Mustard	173	81	38038	39401	32622	32390	79561	71244	30156	39521	**36318.70**
Taramira	173	81	306	1347	7826	530	324	2032	145	62	**1282.60**
Wheat	72456	57376	58810	67915	70511	87563	86055	106834	112534	102108	**82216.20**
Barley	374	324	339	302	461	366	368	449	267	202	**345.20**
Gram	14082	22233	30036	46092	36467	14761	16993	24369	10978	9511	**22552.20**
Coriander	61963	85762	96940	97940	85795	117368	72186	76130	106697	98356	**89913.70**

Table 34: Cropping Pattern (%) for 10 Years (2006-07 to 2015-16) in Jalawar 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	2.86%	1.93%	1.47%	1.84%	1.38%	0.71%	0.51%	0.32%	0.50%	0.23%	**1.20%**
Isabgol 5	0.15%	0.05%	0.06%	0.07%	0.08%	0.38%	0.90%	0.34%	0.43%	0.21%	**0.26%**
Groundnut	0.60%	0.43%	0.46%	0.53%	0.52%	0.52%	0.45%	0.33%	0.37%	0.40%	**0.46%**

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
Black Gram	3.44%	3.55%	3.46%	2.65%	4.09%	5.30%	4.23%	2.37%	4.00%	6.14%	**3.92%**
Maize	16.00%	12.63%	11.54%	14.22%	15.53%	12.62%	10.91%	8.26%	13.15%	11.33%	**12.60%**
Soybean	72.96%	69.58%	72.69%	97.05%	91.85%	99.77%	103.38%	109.11%	90.29%	95.60%	**89.30%**
Sesamum	1.20%	0.70%	0.69%	1.08%	2.80%	0.84%	0.56%	0.21%	0.44%	0.35%	**0.87%**
Mustard	0.06%	0.03%	11.68%	15.69%	12.48%	12.33%	30.34%	26.93%	10.82%	14.18%	**13.03%**
Taramira	0.06%	0.03%	0.09%	0.54%	2.99%	0.20%	0.12%	0.77%	0.05%	0.02%	**0.46%**
Wheat	26.00%	17.77%	18.05%	27.05%	26.98%	33.34%	32.82%	40.39%	40.39%	36.64%	**29.51%**
Barley	0.13%	0.10%	0.10%	0.12%	0.18%	0.14%	0.14%	0.17%	0.10%	0.07%	**0.12%**
Gram	5.05%	6.88%	9.22%	18.36%	13.95%	5.62%	6.48%	9.21%	3.94%	3.41%	**8.09%**
Coriander	22.24%	26.56%	29.76%	39.01%	32.82%	44.68%	27.53%	28.78%	38.29%	35.30%	**32.27%**

(Source: Agriculture department, Manoharthana)

Annexure 2.3 Farmers' category wise Cultivated Area in Manoharthana Cluster

Table35. Farmers' Category-wise Cultivated Area in Manoharthana Cluster

S.N	Category of Farmer	Total Households	Cultivated Area (ha)			Category wise Cultivated Area (ha)			
			Irrigated	Rainfed	Total	General	SC	ST	OBC
1	Large farmer	736	762.88	1119.32	**1882.2**	243.86	162.5	356.44	1119.4
2	Small farmer	2861	1181.38	1743.12	**2924.5**	351.8	462.03	1006.18	1104.5
3	Marginal farmer	4136	328.54	671.76	**1000.3**	212.57	307.6	305	175.13
4	Landless person	492	0	0	**0**	0	0	0	0
5	No. of BPL households	2130	154.82	230.58	**385.4**	19.27	130.62	134.89	100.62
	Total (1 to 4)	**8225**	**2272.8**	**3534.2**	**5807**	**808.23**	**932.13**	**1667.62**	**2399**
	Category wise Cultivated Area in Manoharthana Cluster in %								
1	Large farmer	8.95%	33.57%	31.67%	32.41%	4.20%	2.80%	6.14%	19.28%
2	Small farmer	34.78%	51.98%	49.32%	50.36%	6.06%	7.96%	17.33%	19.02%
3	Marginal farmer	50.29%	14.46%	19.01%	17.23%	3.66%	5.30%	5.25%	3.02%
4	Landless person	5.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	No. of BPL households	25.90%	6.81%	6.52%	6.64%	0.33%	2.25%	2.32%	1.73%
	Total (1 to 4)	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**13.92%**	**16.05%**	**28.72%**	**41.31%**

(**Source:** Watershed DPR of Manoharthana Cluster)

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

Table 36: Area in ha, Cropping Pattern (%), Increase/Decrease trend in last 10 years, Average area and % Area in Manoharthana cluster of District Average

S. No.	Crops	2006-07		2015-16		Increase(+) / Decrease (-) over last 10 Years		Average of 10 Years	Average of 10 Years of district	% Area in cluster of District Average
		Area (ha)	%	Area (ha)	%	Area (ha)	%			
1	Maize	2160.52	37.21%	2268	39.06%	107.48	1.85%	2258.05	1020246.80	0.22%
2	Soybean	1332	22.94%	1258	21.66%	-74	-1.27%	1268.50	905231.70	0.14%
	Total	**3492.52**	**60.14%**	**3526**	**60.72%**	**33.48**	**0.58%**	**3526.55**	**1925478.50**	**0.36%**
1	Mustard	910	15.67%	942	16.22%	32	0.55%	914.60	2561288.30	0.04%
2	Wheat	1103	18.99%	1032	17.77%	-71	-1.22%	1076.85	2851321.60	0.04%
3	Gram	197.4	3.40%	187	3.22%	-10.4	-0.18%	218.40	1297770.40	0.02%
	Total	**2210.4**	**38.06%**	**2161**	**37.21%**	**-49.4**	**-0.85%**	**2209.84**	**6710380.30**	**0.09%**
	Grand Total	**5702.92**	**98.21%**	**5687**	**97.93%**	**-15.92**	**-0.27%**	**5736.4**	**8635858.80**	**0.45%**

(Source: Agriculture Department, Manoharthana)

Table 37: The Status of Cropped area in ha and Cropping Pattern in % of Agricultural Crops in Manoharthana cluster

S. No.	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
1	Maize	2160.52	2216	2246	2304	2252	2234	2404	2292	2204	2268	2258.05
2	Soybean	1332	1310	1330	1292	1304	1210	1151	1229	1269	1258	1268.50
	Total	**3492.52**	**3526**	**3576**	**3596**	**3556**	**3444**	**3555**	**3521**	**3473**	**3526**	**3526.55**
1	Mustard	910	942	936	880	904	932	887	901	912	942	914.60
2	Wheat	1103	1087.24	1092	1080	1100	1090.24	1092	1063	1029	1032	1076.85
3	Gram	197.4	180.32	184	162	252	202	269	272	278.24	187	218.40
	Total	**2210.4**	**2209.56**	**2212**	**2122**	**2256**	**2224.24**	**2248**	**2236**	**2219.24**	**2161**	**2209.84**
	Grand Total	**5702.92**	**5735.56**	**5788**	**5718**	**5812**	**5668.24**	**5803**	**5757**	**5692.24**	**5687**	**5736.4**
	Cropping Pattern in %											
1	Maize	37.21%	38.16%	38.68%	39.68%	38.78%	38.47%	41.40%	39.47%	37.95%	39.06%	38.89%
2	Soybean	22.94%	22.56%	22.90%	22.25%	22.46%	20.84%	19.82%	21.16%	21.85%	21.66%	21.84%
1	Mustard	15.67%	16.22%	16.12%	15.15%	15.57%	16.05%	15.27%	15.52%	15.71%	16.22%	15.75%
2	Wheat	18.99%	18.72%	18.80%	18.60%	18.94%	18.77%	18.80%	18.31%	17.72%	17.77%	18.54%
3	Gram	3.40%	3.11%	3.17%	2.79%	4.34%	3.48%	4.63%	4.68%	4.79%	3.22%	3.76%

(Source: Agriculture department, Manoharthana)

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

Table 38: Area in ha, Cropping Pattern (%) of horticultural crops, Increase/Decrease trend in last 10 years, Average area and % Area in District of State Average

Crops	State							Jhalawar District							
	2011-12		2015-16		Increase (+) / Decrease (-) over last 5 Years		Average of 05 Years	2011-12		2015-16		Increase (+) / Decrease (-) over last 5 Years		Average of 5 Years	% area in district over state average
	Area	%	Area	%	Area	%		Area	%	Area	%	Area	%		
Orange	9535	0.05%	12477	0.07%	2942	0.01%	11211.2	9091	3.26%	11987	4.30%	2895.7	0.00%	10712.204	95.55%
Guava	2299	0.01%	3850	0.02%	1551	0.01%	2720.00	81.09	0.03%	85.37	0.03%	4.28	0.00%	87.88	3.23%
Brinjal	5295.75	0.03%	6078	0.03%	782.25	0.00%	5418.15	195	0.07%	218	0.08%	23	0.01%	201.00	3.71%
Tomato	17645.79	0.10%	20507	0.12%	2861.21	0.02%	17465.56	507	0.18%	697	0.25%	190	0.07%	540.60	3.10%
Chilli	12722	0.07%	12318	0.07%	-404	0.00%	10809.00	457	0.16%	318	0.11%	-139	-0.05%	347.80	3.22%
Peas	12516	0.07%	14219	0.08%	1703	0.01%	12927.40	24	0.01%	16	0.01%	-8	0.00%	27.00	0.21%

Garlic	60223	0.34%	69099	0.39%	8876	0.05%	53618.80	9772	3.51%	13727	4.93%	3955	1.42%	10113.60	18.86%
Okra	3743.21	0.02%	3282	0.02%	-461.21	0.00%	3695.24	85	0.03%	140	0.05%	55	0.02%	102.80	2.78%

(Source: Agriculture department, Manoharthana)

Table 39: Area in ha, Cropping Pattern (%) and Average of last 5 Years of horticultural crops in Rajasthan State and Jhalawar District

Crops	State						District Jhalawar					
	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 5 Years	2011-12	2012-13	2013-14	2014-15	2015-16	Average of 5 Years
Orange	9535	10338	11896	11810	12477	11211.20	9091	9837	11323	11323	11987	10712.20
Guava	2299	2405	2589	2457	3850	2720.00	81	90	89	93	85	87.88
Brinjal	5296	5545	5539	4633	6078	5418.15	195	195	191	206	218	201.00
Tomato	17646	15505	17151	16519	20507	17465.56	507	485	441	573	697	540.60
Chilli	12722	15505	8715	9671	12318	11786.20	457	396	279	289	318	347.80
Peas	12516	15505	13600	13562	14219	13880.40	24	19	54	22	16	27.00
Garlic	60223	15505	45015	50156	69099	47999.60	9772	7919	8908	10242	13727	10113.60
Okra	3743	15505	3953	3481	3282	5992.84	85	97	105	87	140	102.80
Cropping Pattern (%)												
Orange	0.05%	66.68%	0.07%	0.07%	0.07%	0.08%	3.26%	3.53%	4.06%	4.06%	4.30%	3.84%
Guava	0.01%	15.51%	0.01%	0.01%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Brinjal	0.03%	35.76%	0.03%	0.03%	0.03%	0.04%	0.07%	0.07%	0.07%	0.07%	0.08%	0.07%
Tomato	0.10%	100.00%	0.10%	0.09%	0.12%	0.12%	0.18%	0.17%	0.16%	0.21%	0.25%	0.19%
Chilli	0.07%	100.00%	0.05%	0.05%	0.07%	0.08%	0.16%	0.14%	0.10%	0.10%	0.11%	0.12%
Peas	0.07%	100.00%	0.08%	0.08%	0.08%	0.10%	0.01%	0.01%	0.02%	0.01%	0.01%	0.01%
Garlic	0.34%	100.00%	0.25%	0.28%	0.39%	0.34%	3.51%	2.84%	3.20%	3.68%	4.93%	3.63%
Okra	0.02%	100.00%	0.02%	0.02%	0.02%	0.04%	0.03%	0.03%	0.04%	0.03%	0.05%	0.04%

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

Table 40: Crop wise area (in ha) of Horticultural crops in Manoharthana Cluster

S. No.	Season/Crop	Area (ha)	Cropping intensity/pattern (%)
A.	**Vegetables**		
2	Tomato	4	0.07%
3	Brinjal	4.37	0.08%
5	Okra	2.25	0.04%
6	Chilly	4.07	0.07%
7	Peas	4.25	0.07%
8	Garlic	231.4	3.98%
	Total Vegetables	**250.34**	**4.31%**
B.	**Fruits**		
1	Orange	13.75	0.24%
2	Guava	2.37	0.04%
	Total Fruits	**16.12**	**0.28%**
	Total Horticulture	**266.46**	**4.59%**

(Source: Horticulture department, Manoharthana)

Annexure 2.7: Average Annual Rainfall in the last decade in Manoharthana cluster

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

S. No	Year	Average Annual Rainfall (mm)
1	2006	980
2	2007	970
3	2008	960
4	2009	1100
5	2010	950
6	2011	960
7	2012	940
8	2013	960
9	2014	980
10	2015	970
	Total	**9770**
	Average	**977**
	Say	**977**

(Source: Water Resource department, Jhalawar)

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 Manoharthana 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 Manoharthana 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 Manoharthana cluster area block Manoharthana, Alwar district has been estimated as on 31.03.2013 on the basis of GEC-97 Guidelines. Net Annual Ground water Availability as on 31.03.2013 was 9.44 MCM. The details are given in **Annexure 2.14.**

Stage of Ground Water Development: Stage of ground water development in the Manoharthana Cluster area as on 31.3.2013 is 97.00% which indicates Cluster area are coming under Critical Zone but Pre-Monsoon period showing increasing trend and post-monsoon trend sowing decreasing trend therefore Basalt Potential Zone categories as Semi-Critical (Table-7 of Annexure-1). The scope of ground water development for Irrigation purposes is already exhausted. The Draft for irrigation should be reduced to 8.84 MCM

bringing a balance between water recharge and extraction over time for Sustainable Ground Water availability.
Efficient use of ground water on farm water usages through:

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

For monitoring of impact assessment of Investments proposed in the Cluster area, one Piezometer on 20 Sq.km areas or as per Site Specific requirement with installation of Digital Water Level Recorder (DWLR-Telemetric) may be constructed.

Annexure 2.9 SRR in Jhalawar district & Rajasthan

Table 42: Seed Replacement Rate (SRR) in the State and Jhalawar

Crop	Rajasthan						Jhalawar					
	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	**0.22**	**962**	**21.86**	**0.37**	**2450**	**33.11**
Soybean	11.76	220954	23.49	9.23	211668	28.65	2.89	11146	4.82	2.52	13852	6.88
Sesamum	3.61	2188	20.23	3.30	2997	30.27	0.0055	0.00	0.00	0.01	5	16.67
Mustard	**2.78**	**90171**	**81.02**	**2.43**	**87925**	**90.32**	**0.71**	**2679**	**94.01**	**0.30**	**2281**	**100**

Wheat	**32.06**	**1022634**	**31.90**	**33.18**	**1082866**	**32.63**	**1.07**	**13049**	**12.21**	**1.13**	**27852**	**24.75**
Barley	**3.09**	**115195**	**37.25**	**3.43**	**132971**	**38.73**	**0.00449**	**-**	**0.00**	**267**	**0.00**	**0.00**
Gram	19.23	170104	11.79	12.56	171839	18.24	0.24	58	0.32	0.11	2145	26.05

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

Annexure 2.10 SRR in Manoharthana Cluster

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

S. No.	Crop	2011-12	2012-13	2013-14	2014-15	2015-16
1	Maize	11%	12%	12.34%	12.57%	14.18%
2	Soybean	38%	44%	44.66%	44.84%	42.62%
3	Mustard	78%	67%	66.72%	85.98%	86.08%
4	Wheat	35%	42%	42.25%	43.25%	43.32%
5	Gram	7%	4%	5.15%	9.91%	11.09%

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

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

Table 44: The Area Covered and Technical Grade Material (TGM) used under Plant Protection Measures during 2014-15 (Method of Plant Protection)

State/District	Season	Cereals	Pulses	Food Grains	Oilseed	Sugarcane	Cotton	Guar	Others
Rajasthan	K	4049	1277	5326	1856	16	775	1242	445
	R	2862	1160	4022	2289	0	0	0	690
	K&R	6911	2437	9348	4145	16	775	1242	1135
Jhalawar	K	34	12	46	231	0	0	0	6
	R	34	20	54	21	0	0	0	42
	K&R	68	32	100	252	0	0	0	48
Rajasthan (%)	K	26.34%	8.31%	34.65%	12.08%	-	-	-	2.90%
	R	30.75%	12.46 %	43.21%	24.59%	-	-	-	7.41%
	K&R	28.00%	9.88%	37.88%	16.80%	-	-	-	4.60%
Jhalawar (%)	K	10.80%	3.81%	14.61%	73.38%	-	-	-	1.91%
	R	10.55%	6.20%	16.75%	6.52%	-	-	-	13.03 %
	K&R	10.67%	5.02%	15.70%	39.55%	-	-	-	7.53%

(K – Kharif, R – Rabi & T – Total)

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

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

Table 45: The Area (in 000ha) 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
Jhalawar	K	222	1	12	16	0	32	283	42
	R	48	9	6	47	2	5	117	269
	K&R	270	10	18	63	2	37	400	311
Rajasthan (%)	K	45.15%	2.27%	4.55%	7.66%	0.90%	2.31%	62.85%	4.68%
	R	48.38%	3.53%	5.57%	9.11%	2.99%	5.64%	75.21%	21.22%
	K&R	46.37%	2.75%	4.94%	8.21%	1.69%	3.57%	67.51%	10.92%
Jhalawar (%)	K	70.52%	0.32%	3.81%	5.08%	0.00%	10.17%	89.90%	13.34%
	R	14.89%	2.79%	1.86%	14.58%	0.62%	1.55%	36.30%	83.46%
	K&R	42.38%	1.57%	2.83%	9.89%	0.31%	5.81%	62.78%	48.81%

(K – Kharif, R – Rabi & T – Total)

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

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

Table 46. Crop Water Requirement of Agricultural and Horticultural Crops in Manoharthana

Name of crop	Area in Ha	Requirement of water for crops per ha (In cum)	Present Crop Water Requirement in cum	Proposed Area (ha)	Proposed Crop Water Requirement in cum	Additional Crop Water Requirement in Cum
Kharif						
Maize	2268	1000	2268000	1814.4	1814400	-453600
Black Gram	1258	1000	1258000	1711.6	1711600	453600
Total	**3526**		**3526000**	**3526**	**3526000**	**0**
Mustard	942	3000	2826000	1130.4	3391200	565200
Wheat	1032	5000	5160000	825.6	4128000	-1032000
Gram	197.4	2500	493500	215.4	538500	45000
Total	**2171.4**		**8479500**	**2171.4**	**8057700**	**-421800**
Grand Total	**5697.4**	**-**	**12005500**	**5697.4**	**11583700**	**-421800**
Vegetables						
Tomato	4	8000	32000	16	512000	480000
Brinjal	4.37	8000	34960	0	0	-34960
Okra	2.25	8000	18000	12	216000	198000
Chilli	4.07	8000	32560	14	455840	423280
Peas	4.25	5000	21250	10	212500	191250

Name of crop	Area in Ha	Requirement of water for crops per ha (In cum)	Present Crop Water Requirement in cum	Proposed Area (ha)	Proposed Crop Water Requirement in cum	Additional Crop Water Requirement in Cum
Total Vegetables	**18.94**	-	**138770**	**52**	**1396340**	**1257570**
Fruits						
Orange	13.75	9000	123750	100	12375000	12251250
Guava	2.37	11000	26070	15	391050	364980
Total Fruits	**16.12**	-	**149820**	**115**	**12766050**	**12616230**
Total Horticulture	**35.06**	-	**288590**	**167**	**14162390**	**13873800**
Grand Total	**5732.46**	-	**12294090**	**5864.4**	**25746090**	**13452000**

(Source: Agriculture Department & Watershed DPR, Manoharthana)

Annexure 2.14 Data to calculate ground water status of Manoharthana 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 District Jhalawar are attached in the excel sheets with the CACP report of Manoharthana.

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 Jhalawar

Table 47: Supporting institutions and service providers in Jhalawar

S.No.	Type of assistance	Name and address of agencies
1	Provisional Registration Certificate (EM-1) & Permanent Registration	District Industries Centre, Jhalawar Govt. of Rajasthan
2	Identification of Project Profiles, Techno-economic and managerial consultancy services, market survey and economic survey reports	MSME-Development Institute, Govt. of India, Ministry of MSME, 22 Godam Industrial Estate, Jaipur
3	Land and Industrial shed	RIICO, Jhalawar
4	Financial assistance	RFC & Nationalized Banks
5	For Raw material under Govt. supply	NSIC,
6	Plant and Machinery under hire/purchase basis	NSIC,
7	Power/ electricity	Raj. State electricity Board, Jhalawar
8	Technical know-how	MSME-Development Institute, Govt. of India, Ministry of MSME, 22 Godam Industrial Estate, Jaipur
9	Quality &Standard	Bureau of Indian Standards, Jaipur

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

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

S. No.	Village	Cattle	Buffaloes	Goats	Sheep	Pigs	Backyard Poultry	Poultry Farm & Hatcheries
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Akolya	42	46	47	0	0	17	0
2	Ank Kheri	40	41	57	0	0	4	0
3	Anwal Hera	233	174	152	0	0	24	0
4	Baldeopura	90	38	60	0	0	0	0
5	Banskheri Mewatiyan	122	96	114	0	0	2	0
6	Baroo Beh	68	30	22	1	0	19	0
7	Bhawanipura	72	34	39	0	0	19	0
8	Birjipura	28	19	22	3	0	8	0
9	Bishan Khera	51	37	36	0	0	13	0
10	Bislai	131	110	0	0	0	16	0
11	Borkhandi	68	47	56	0	0	0	0
12	Chandipur	357	237	300	0	4	10	0
13	Chandpura Kasba	58	25	66	0	0	4	0
14	Chanpura Bheelan	245	113	166	0	0	104	0
15	Chhorliya	169	99	84	2	0	25	0
16	Chittauri	59	37	25	7	0	0	0
17	Chittora	52	29	38	0	0	3	0
18	Gangahoni	44	48	0	0	0	1	0
19	Garboliya	186	118	178	0	0	8	0
20	Gharawali	164	121	128	2	0	0	0
21	Goraya Khera	64	49	73	2	0	3	0
22	Gurari	155	176	161	0	0	3	0
23	Jamunya @ Kandari	57	48	64	0	0	11	0
24	Jhiri	133	81	125	0	0	17	0
25	Joonapani	82	68	52	0	0	24	0
26	Kachhotiya	0	0	0	0	0	0	0
27	Khankhara Lodhan	98	88	93	0	0	2	0

28	Kolookheri Kalan	321	115	206	5	3	18	0
29	Lodhipura	35	49	34	0	0	8	0
30	Madan Pura	177	162	162	0	0	1	0
31	Maheshpura	21	10	18	2	0	4	0
32	Manapsar	257	164	188	2	0	40	0
33	Manya Kheri	75	52	61	0	0	1	0
34	Mawasa	53	24	32	0	0	15	0
35	Pacheta	226	156	187	0	0	18	0
36	Paharpura	177	67	0	0	0	19	0
37	Patti	238	134	168	0	0	15	0
38	Patwa	34	47	59	0	0	1	0
39	Peeplya Jawar	0	0	0	0	0	0	0
40	Piplodi	86	56	80	0	0	8	0
41	Roopahera	70	75	71	0	0	6	0
42	Samrol	110	88	107	0	0	5	0
43	Semlihat	113	72	72	3	0	7	0
44	Tajpurya	101	94	65	4	0	0	0
45	Tandee	118	23	60	0	0	21	0
46	Todra	232	125	209	0	0	0	0
47	Todri Jagannath	95	91	102	0	0	1	0
TOTAL		5407	3613	4039	33	7	525	0

(Source: Animal Husbandry department, Manoharthana)

Annexure 2.17 Goat Population profile of Manoharthana cluster

Table 49 Goat Population profile of Manoharthana cluster

SNo.	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	Akolya	30	0	30	28	52	14	0	94	124
2	Ank Kheri	33	0	33	37	49	19	0	105	138
3	Anwal Hera	37	30	67	76	118	147	45	386	453
4	Baldeopura	2	0	2	35	35	65	0	135	137
5	Banskheri Mewatiyan	16	32	48	7	20	128	52	207	255
6	Baroo Beh	3	5	8	1	6	30	18	55	63
7	Bhawanipura	29	10	39	32	51	23	2	108	147
8	Birjipura	12	2	14	20	24	9	1	54	68
9	Bishan Khera	22	0	22	32	38	12	0	82	104
10	Bislai	0	0	0	0	0	0	0	0	0
11	Borkhandi	53	10	63	74	108	24	6	212	275
12	Chandipur	85	10	95	176	243	49	89	557	652
13	Chandpura Kasba	50	7	57	46	69	23	0	138	195
14	Chanpura Bheelan	39	51	90	118	145	83	60	406	496
15	Chhorliya	70	12	82	88	140	24	37	289	371
16	Chittauri	4	16	20	3	12	37	16	68	88
17	Chittora	46	18	64	38	66	36	37	177	241
18	Gangahoni	0	0	0	0	0	0	0	0	0
19	Garboliya	82	22	104	116	160	73	6	355	459
20	Gharawali	14	27	41	5	14	132	35	186	227
21	Goraya Khera	74	9	83	94	131	154	0	379	462
22	Gurari	46	27	73	38	97	101	21	257	330
23	Jamunya @ Kandari	25	13	38	16	42	50	19	127	165

SNo.	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		
24	Jhiri	39	0	39	66	90	198	0	354	393
25	Joonapani	8	5	13	21	30	101	7	159	172
26	Kachhotiya	0	0	0	0	0	0	0	0	0
27	Khankhara Lodhan	12	18	30	33	53	65	26	177	207
28	Kolookheri Kalan	139	0	139	156	276	159	102	693	832
29	Lodhipura	7	1	8	31	34	20	0	85	93
30	Madan Pura	83	9	92	91	150	89	76	406	498
31	Maheshpura	18	1	19	31	49	91	0	171	190
32	Manapsar	55	4	59	153	109	375	0	637	696
33	Manya Kheri	32	1	33	40	55	35	2	132	165
34	Mawasa	4	13	17	22	22	68	12	124	141
35	Pacheta	118	6	124	107	221	2	50	380	504
36	Paharpura	0	0	0	0	0	0	0	0	0
37	Patti	21	33	54	81	77	252	0	410	464
38	Patwa	1	3	4	9	10	74	0	93	97
39	Peeplya Jawar	0	0	0	0	0	0	0	0	0
40	Piplodi	31	0	31	74	65	149	0	288	319
41	Roopahera	16	14	30	26	44	61	13	144	174
42	Samrol	10	25	35	30	33	167	0	230	265
43	Semlihat	63	6	69	67	122	33	13	235	304
44	Tajpurya	57	16	73	69	109	44	26	248	321
45	Tandee	9	16	25	21	22	66	24	133	158
46	Todra	25	20	45	168	190	402	32	792	837
47	Todri Jagannath	0	0	0	73	73	134	2	282	282
TOTAL		**1520**	**492**	**2012**	**2449**	**3454**	**3818**	**829**	**10550**	**12562**

(Source: Animal Husbandry department, Manoharthana)

Annexure 2.18: List of Cold Storage in Jhalawar

Table 50 List of cold stores in existence in Jhalawar district

S. No.	NAME & ADDRESS OF COLD STORAGES	C.S.O. LICENCE NO	CAPACITY IN MT	SECTOR	PRODUCTS STORED
1	Surindra Cold Storage & Ice Factory Bhawani Mandi	BWN/1194	450	Private	Multipurpose
2	Surindra Ice Factory & C.S. Indl. Area Jhaira Pastan Jhalawar Distt .JODHPUR	RJST/2629	565	Private	Multipurpose
1	Ganapati Cold Storage Bhadwasia Mandi	NA	4400	Private	Multipurpose
2	Jolly Industries 22(1) A Heavy Ind Area	JDH/1637	660	Private	Multipurpose
3	M/s Dairy Fed. Ltd. Unit Jodhpur Dairy	RJST/2578	204	Cooperative	Milk & Milk Products
4	Parvati Cold Storage E-114 Ind. Area	NA	2400	Private	Multipurpose
5	Shiv Cold Storage Bhadwasia Mandi	RJST/3129	1721	Private	Multipurpose
6	Shiv Shakti C.S. Bhadwasia Mandi	NA	2000	Private	Multipurpose
7	Surya Nagri C.S. Mandore Indl. Area	NA	1600	Private	Multipurpose
8	Steel Plast Corp. C-91/A Industrial Area Marudhar	RJSI/2733	1084	Private	Multipurpose
9	Balasar Balaji Cold Storage Mandoe Road Jodhpur	NA	4360	Private	Multipurpose
10	Tej Paras Associate Mandoe Indl. Area	NA	2400	Private	Multipurpose
11	Tej Paras Intt. Mandore Indl. Area	NA	2000	Private	Multipurpose

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 Manoharthana

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

Table 51: Parameters for prioritization of Value chain commodities in Manoharthana cluster

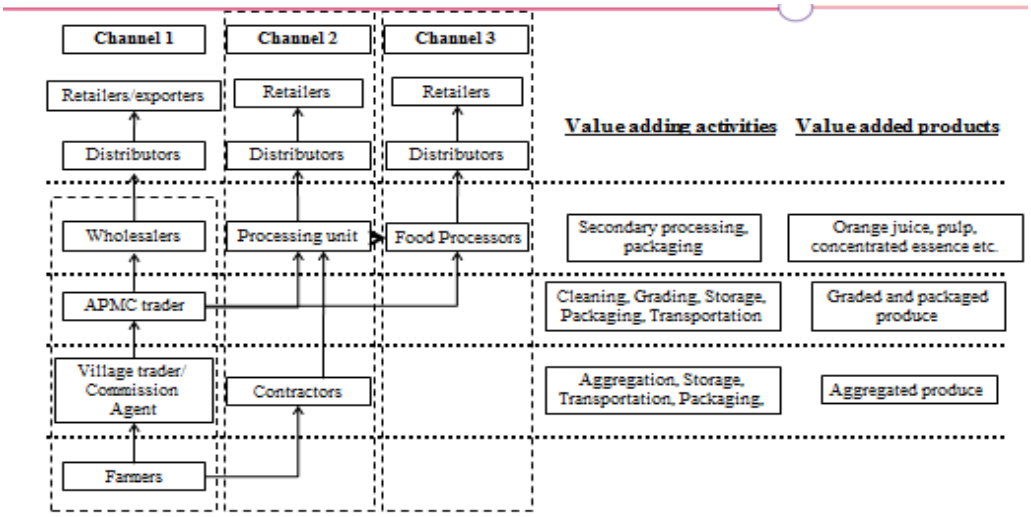
#	Parameters	Weightage	Mustard	Maize	Soybean	Wheat
A.	**Existing size**	**30**	**13.8**	**23.4**	**21.9**	**12.2**
1	Cropped Area of the crop in the cluster (in acre)	10	4.2	10.0	5.5	4.6
2	Crop Production in the cluster (in quintals)	10	3.5	10.0	6.3	4.7
3	Crop Productivity (cluster level compared to national's average)	10	6.1	3.4	10.0	2.9
B.	**Potential for Value addition within Rajasthan (implying scope for increased value addition for local farmers and processors)**	**45**	**28.2**	**26.1**	**39.5**	**22.2**
4	Price spread in Rs/Qtl (Price paid at APMC mandi- realization by farmer at farm level)	5	5.0	2.3	5.0	2.6
5	Price spread in Rs/Qtl (Price paid by customer at retail level- realization by farmer at farm level)	5	1.3	5.0	3.5	2.9
6	Net profit in production (Rs per acre)	5	1.8	1.3	5.0	0.8
7	Scope for processing in the state	10	10.0	5.0	6.0	5.0
8	Scope for value addition (Primary/ secondary/ tertiary processing)	10	6.0	6.0	10.0	8.0
9	Growth in market demand 5 year	10	4.1	6.6	10.0	3.0
C.	**Risk assessment**	**10**	**10.0**	**8.4**	**8.9**	**9.6**
10	Price Volatility (last 5 years; due to monsoon, due to adverse agronomical conditions	10	10.0	8.4	8.9	9.6
D.	**Others (Environmental & Social Parameter)**	**15.0**	**7.5**	**15.0**	**15.0**	**0.0**
11	Water requirement	15.0	7.5	15.0	15.0	0.0
Total		**100.0**	**59.5**	**73.0**	**85.2**	**44.0**

Source: Data analysis by ABPF- Grant Thornton

Appendix 3.3 Current marketing chain of Value chain crops in Manoharthana

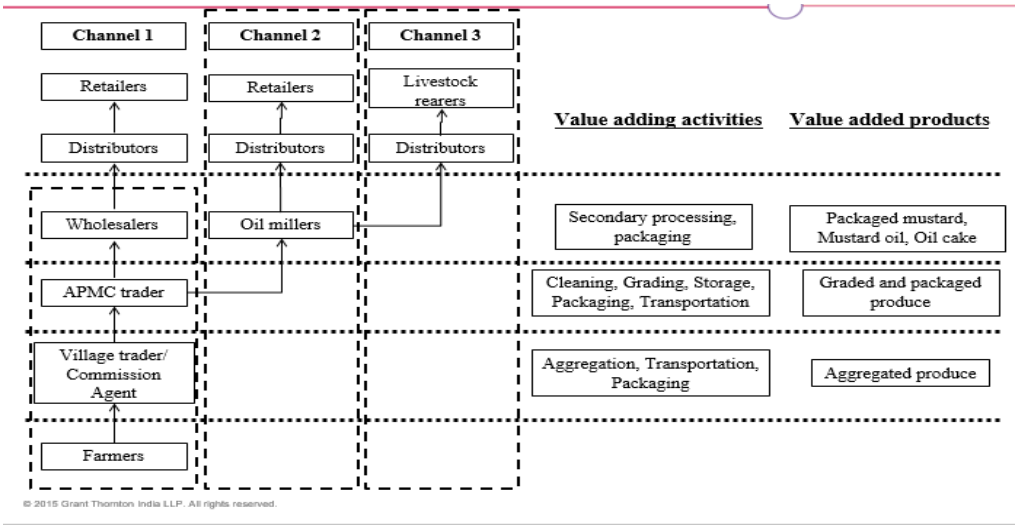
- **Orange**

Figure 9: Current structure of marketing chains - Orange



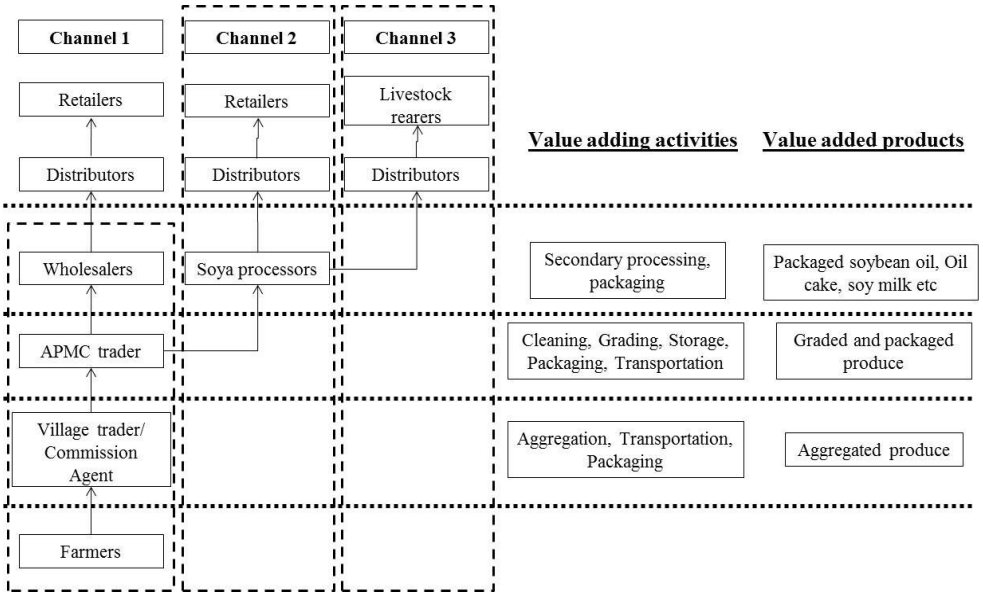
- **Mustard**

Figure 10: Current structure of marketing chains - Mustard



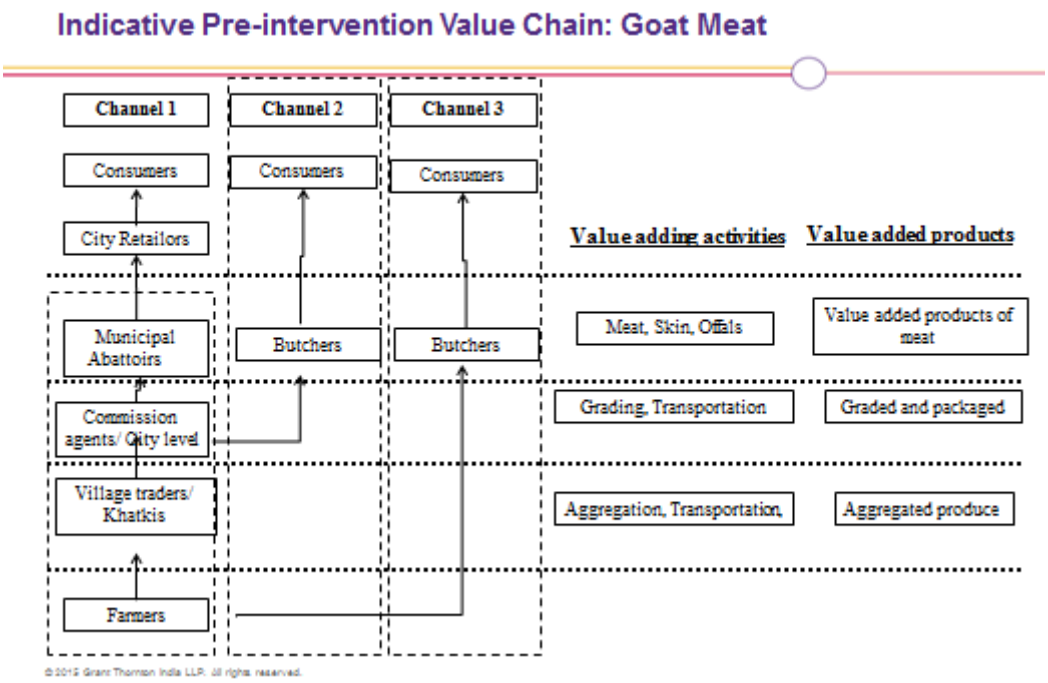
- **Soybean**

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:

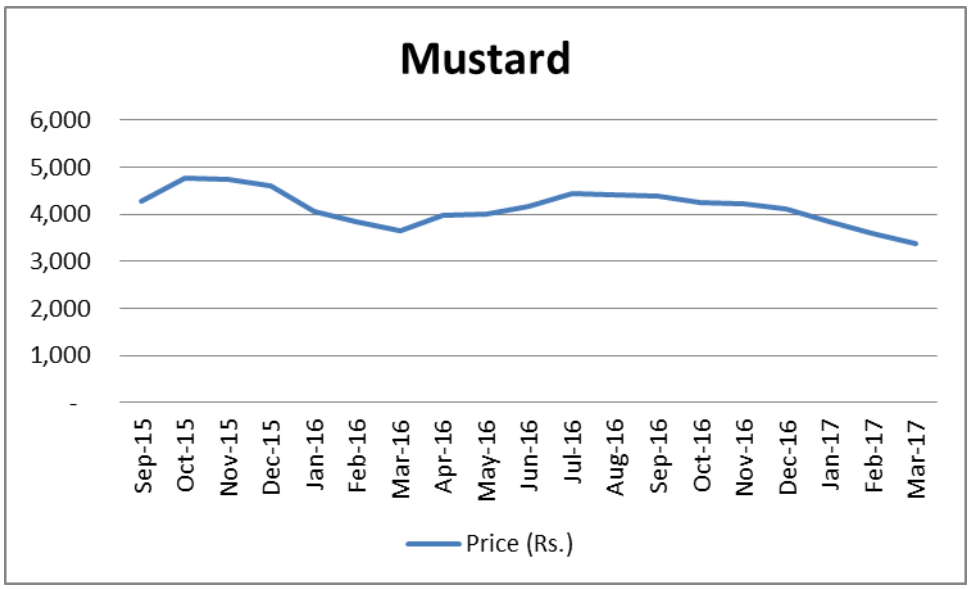
Mustard

Table 52: Price trend of Mustard in mandi for 2 years

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

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

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



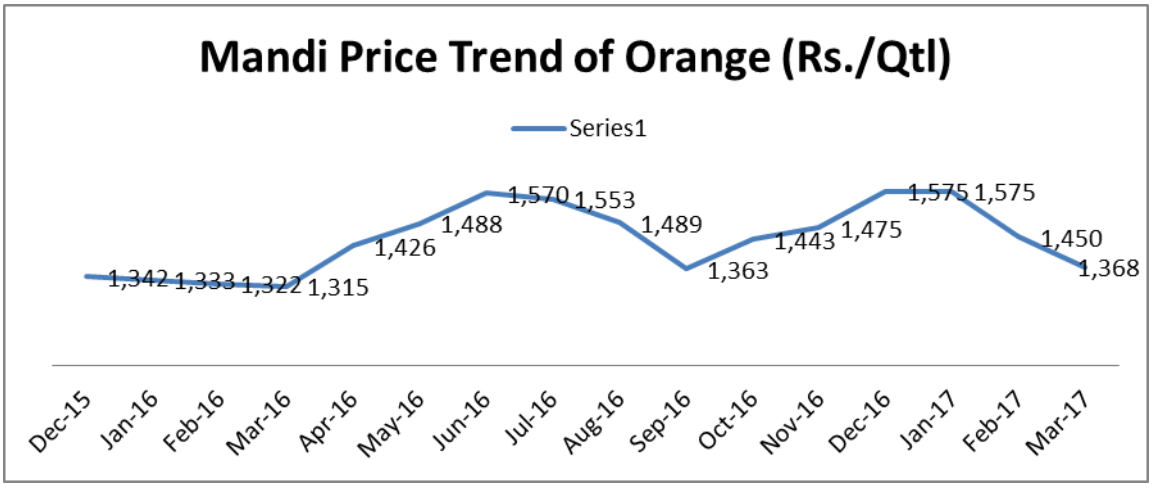
Orange

Table 53: Price trend of Orange in mandi in last 3 years

Month	Price (Rs./Qtl)
Dec-15	827
Jan-16	889
Feb-16	1,473
Mar-16	1,782
Nov-16	1,533
Dec-16	1,463
Jan-17	1,233
Feb-17	1,185
Mar-17	2,208

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 Orange in past 3 seasons



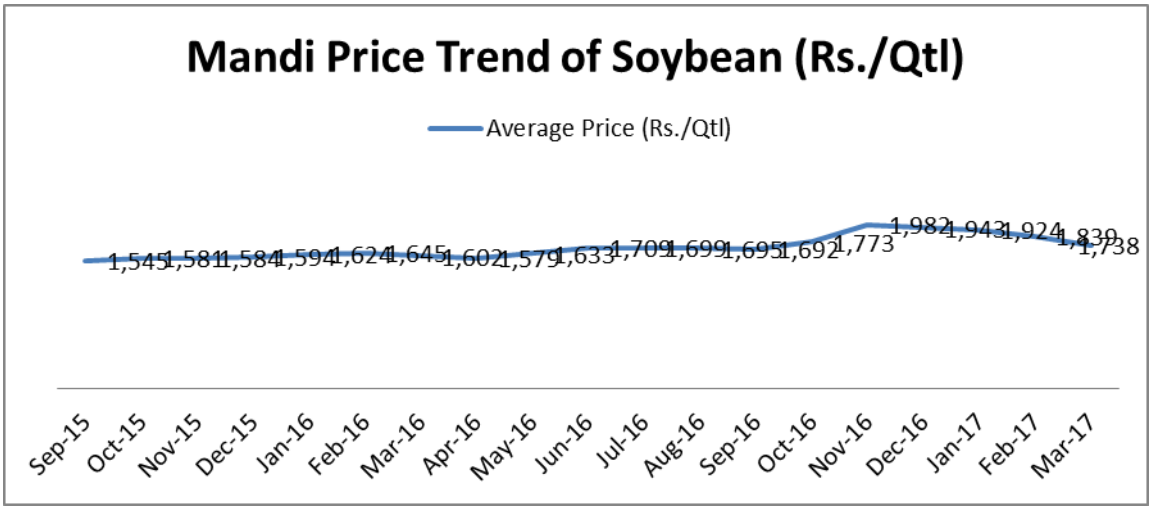
Soybean

Table 54: 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 Mustard 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 Mustard has been formulated which is shown in the table below.

Mustard

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

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

Orange

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

National Demand Growth of Orange (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 55: 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	Orange	12,000	3.12	6,000	6,696	8,696
2	Mustard	11,600	5.5	3,100	17,050	6,000
3	Soybean	8,000	4.08	10,000	32,800	32,800
4	Wheat	11,000	11.50	1,600	7,400	12,200

Appendix 3.7 Livestock population and Fodder Requirement of Manoharthana cluster

Table 56: Livestock population and Fodder Requirement of Manoharthana 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)	5795	2.712	Lit/day	7	14806
2	Cattle (CB)	0	0		7	0
2	Buffaloes	8752	5.103	Lit/day	7	22361
3	Goat	12562	0.50 – 0.75	Lit/day, kg/no.	1.2	5502
4	Sheep	472	0.50 – 0.75/ 1-2	Lit/day, kg/Yr.	1.2	207
7	Piggery	183			3.5	234
	Total	**27764**				**43110**

(Source: Animal Husbandry Department, Manoharthana)

Table 57: Fodder availability in Manoharthana Cluster (Qty. in MT)

Name of crop	Proposed Area (ha)	Productivity (Kg/ha)	Production (in MT)
Kharif			
Mustard	1814.4	4000	7257.6
Black Gram	1711.6	4000	6846.4
Total	**3526**		**14104**
Rabi			
Mustard	1130.4	0	0
Wheat	825.6	40000	33024
Gram	215.4	3000	646.2
Total	**2171.4**		**33670.2**
Pasture & Community Lands	730	16463.25	9013.6294

Name of crop	Proposed Area (ha)	Productivity (Kg/ha)	Production (in MT)
Grand Total			**47774.2**

(Source: Agriculture Department, Manoharthana)

Annexure-5.1: Operational and Implementation Arrangements

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.
6. The department of Agriculture has some set procedure to procure these inputs from the cooperative/ public sector agencies which prevails from long time. Moreover, field functionaries are not allowed to procure and store such inputs from private market. Hence, procurement through bidding process will be contradictory to the field functionaries

Annexure 5.2 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.

The inputs like seed, fertilizer and P.P. 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.

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.

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 Gujrat, 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: 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.

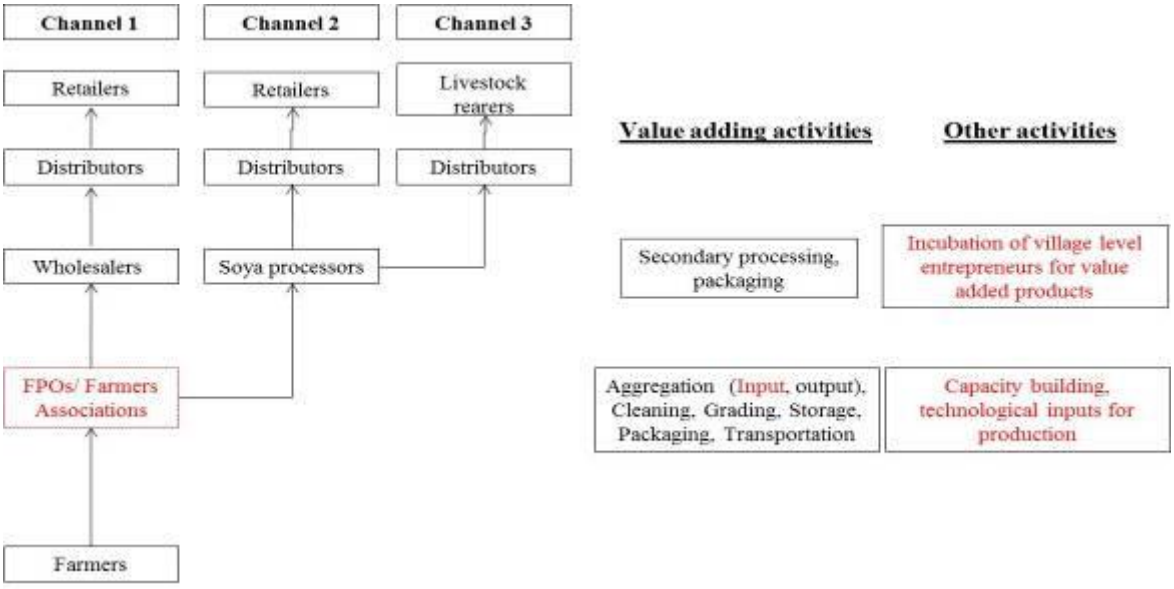


Figure 16: Indicative post-intervention value chain map of Soybean

2. Mustard

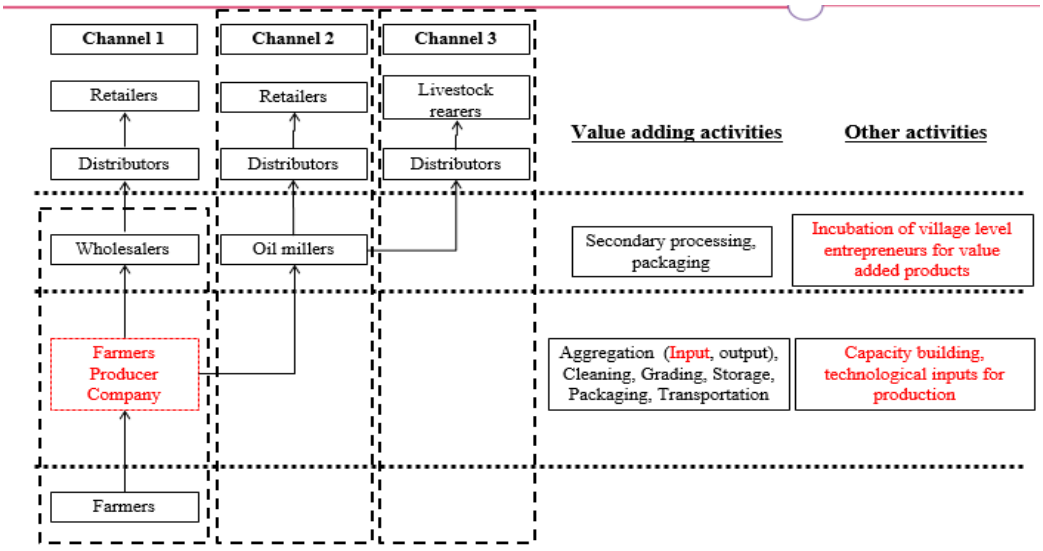


Figure 17 Indicative post-intervention value chain map of Mustard

3. Orange

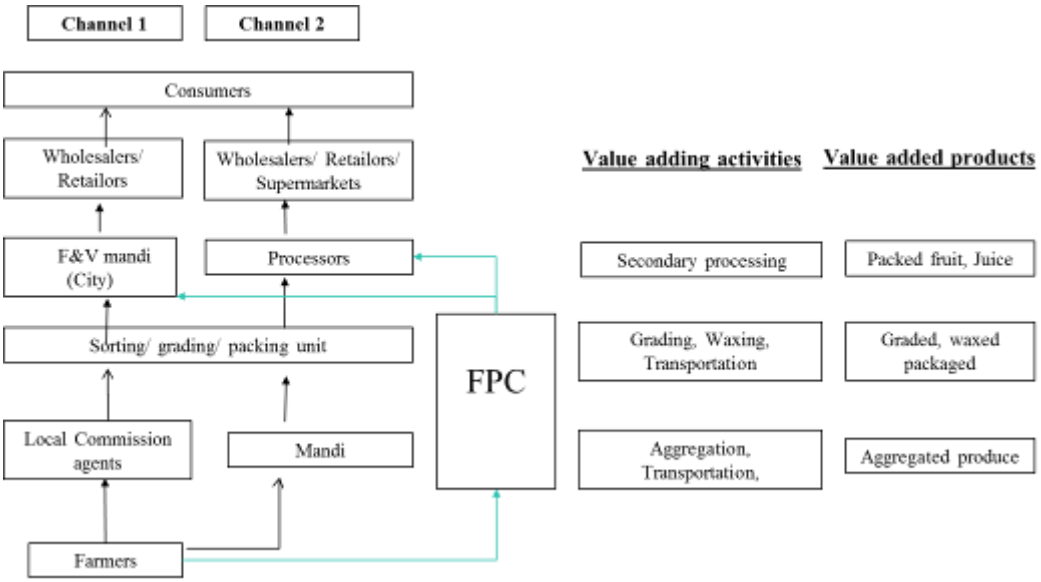


Figure 18 Indicative post-intervention value chain map of Orange

4. Goat

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

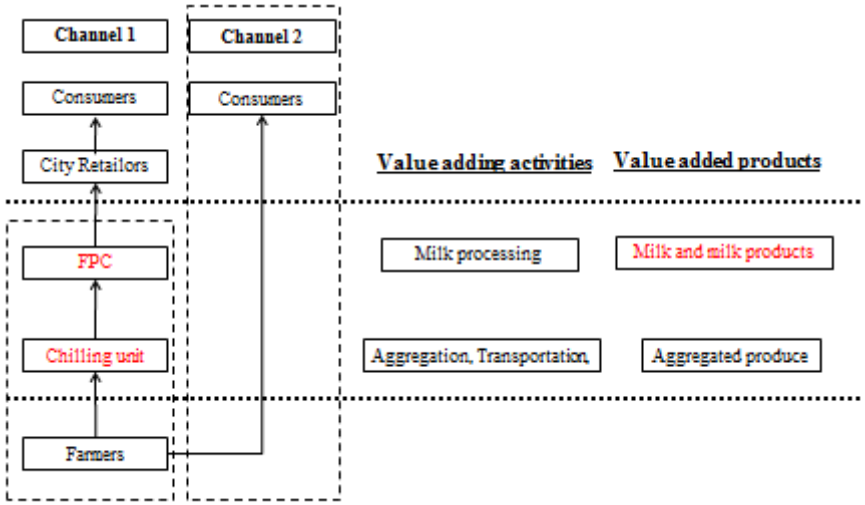


Figure 19 Indicative Post intervention value chain map of Goat milk

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

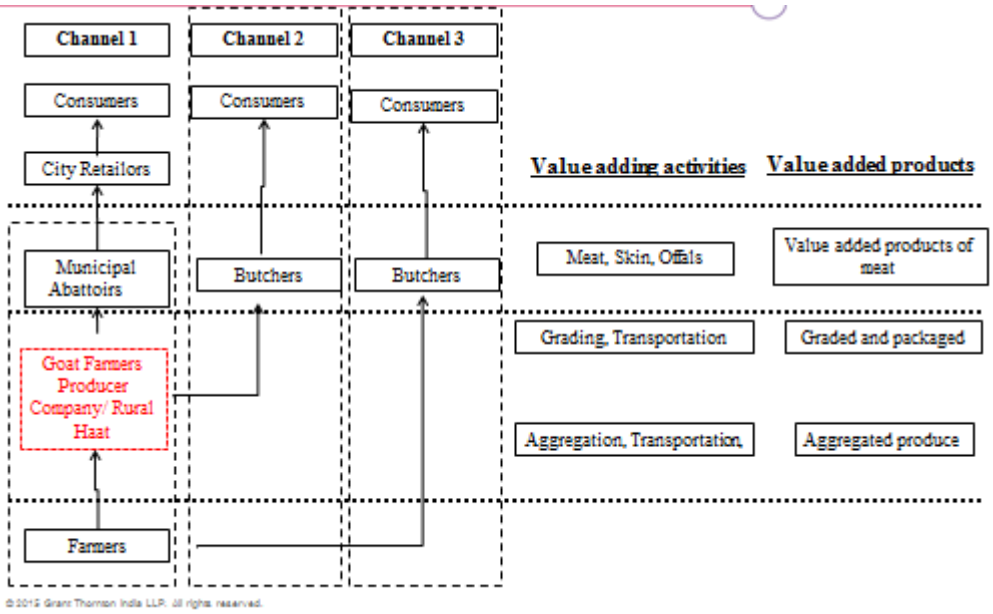


Figure 20 Indicative Post intervention value chain map for goat meat

Annexure 5.4: Activities for soft intervention

Scouting of technologies and business ideas for such identified commodities

The ABPF shall scout for new and innovative models in agriculture and allied sector for developing local entrepreneurship for providing productive services to value chain stakeholders.

It shall include the following activities, but not limited to: (i) review of literature, (ii) participatory meetings with market participants and representatives of relevant business models such as – producers, aggregators, transport facilitators, storage facilitators, commission agents, wholesalers, retailers and ultimate consumers, (iii) field work (surveys on existing cold stores, pack houses, ripening rooms etc., surveys to assess the potential for establishing new marketing venture for FCSC, E-Trading and the role of local aggregators), (iv) analysis of the data / information, (v) feedback from market participants & relevant agencies, (vi) sharing the business models on a web platform.

Incubation services to Agri-entrepreneurs

ABPF shall provide agri-business incubation services, with the objective to identify, mobilize and groom emerging agro entrepreneurs and CBOs.

Training on market research methodologies, business proposals, business skills, business plan preparation, grants access, financial linkages and market linkage, legal framework, etc. to establish own business through competent trainers subject to approval from PMU-RACP.

ABPF shall also empower the youth and women to start their agri-business resulting in their social and economic development. At least 10% women candidates are desirable among the candidates trained under incubation program. The ABPF will be responsible for networking with other entrepreneurs, customers and other support agencies; provide mentorship support through development of a resource base of mentors, and subsequently ensure their deployment.

Management and Business Training to FCSC and Producer Companies personnel

The ABPF shall undertake training for management & business skill building for personnel of the Producers' Companies (PCs) and Farmer Common Service Centres (FCSCs) under the project. The ABPF shall develop comprehensive training plan.

Training is provided to personnel with an objective of enhancing the knowledge & skills of PC personnel (related to management of FCSC) for efficiently facilitating management & business of the FCSC.

#	Name of Component	Name of sub-component
1	Capacity building	Field days, exposure visits, orientation, capacity building
		Field days
		Exposure visits (Within state)
		Exposure visits (Out of state)

		Orientation
		Capacity Building

Facilitating Agri Policies

Agro-Processing and Agri-Marketing has been included as a Thrust sector in RIPS 2014. All Agro-Processing and Agri-Marketing Units shall be eligible for benefits under RIPS 2014.

Following additional incentives would be admissible under this Policy after obtaining the entitlement certificate under RIPS 2014.

Incentive for market development and diversification:

- Transport subsidy on export of the spices
- Subsidy on the export insurance
- Vehicle Registration Concession (Reefer vans and chilled milk transportation vehicles
- Incentives for quality and certification
- Incentive for project development
- Transport subsidy on export of Fruits & vegetables
- Incentive for Research & Development
- Incentives in Land Related Issues

It shall also facilitate agriculture policy seminars thereby providing a forum for stakeholders (agri industry, NGOs, PCs, Govt. bodies, etc.) in Rajasthan to discuss improvements to the agribusiness investment climate.

Linking producers and producer groups to the market

The ABPF shall retain the important role to identify and develop linkages between producers and processors so that return realized should be greater and major part of the consumer money should go down to the producer.

Market Information services

After the analysis of the existing information services, there is a scope of development of online portal based on the inputs from mobile based application as well as conventional method. As a pilot intervention, such portal can be developed to cater to the cluster area and which can gradually be rolled over to the whole district and eventually the state.

Existing sources of information services are as follows:

a. Mobile based applications

- **Agmarknet**

AGMARKNET portal also providing market information by connecting more than three thousand regulated markets of country to the farmers but due to lack of awareness and computer system, farmers are unable to access it. AGMARKNET Portal provides following information to farmers:

  - Dissemination of market information for arrivals and prices of crops grown across the states without the limit of geographical boundaries
  - Provides information on weather forecast, crop advice, use of fertilizers & pesticides etc.
  - Up loads latest research reports related to marketing and analysis of information and trends in prices, demand on continual basis.

The sampled farmers were not using this facility as they are unaware about these facilities. However, they get market information from fellow farmers and traders.

IKSL –Iffco Kisan Samridhi ltd. is offering voice based message services in this area.

b. Conventional method

- **Kisan Call Center (1800-180-1551)**[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 5.5: Profit and loss statement for FCSC units

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 Mustard oil unit

Particulars	Y1	Y2	Y3	Y4	Y5
Oil	20,736,000	21,772,800	22,861,440	24,004,512	25,204,738
Cake	10,368,000	10,886,400	11,430,720	12,002,256	12,602,369
Total Revenue	**31,104,000**	**32,659,200**	**34,292,160**	**36,006,768**	**37,807,106**
Fixed Cost	514,000	539,700	566,685	595,019	624,770
Variable Cost	25,408,480	26,678,904	28,012,849	29,413,492	30,884,166
Total Operational Expenses	**25,922,480**	**27,218,604**	**28,579,534**	**30,008,511**	**31,508,936**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**5,181,520**	**5,440,596**	**5,712,626**	**5,998,257**	**6,298,170**
Depreciation	235,000	235,000	235,000	235,000	235,000
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**4,946,520**	**5,205,596**	**5,477,626**	**5,763,257**	**6,063,170**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**4,946,520**	**5,205,596**	**5,477,626**	**5,763,257**	**6,063,170**
Tax	1,486,760	1,582,882	1,680,705	1,780,764	1,883,553
Earnings After Taxes (EAT)	**3,459,760**	**3,622,714**	**3,796,920**	**3,982,493**	**4,179,617**

Table 60 Profit and loss statement of Orange waxing, cleaning and grading unit

Figures in Rs.

Particulars	Y1	Y2	Y3	Y4	Y5
CnG Waxing	1,920,000	2,142,000	2,381,400	2,639,385	2,917,215
0	-	-	-	-	-
Total Revenue	**1,920,000**	**2,142,000**	**2,381,400**	**2,639,385**	**2,917,215**
Fixed Cost	508,000	533,400	560,070	588,074	617,477
Variable Cost	468,000	491,400	515,970	541,769	568,857
Total Operational Expenses	**976,000**	**1,024,800**	**1,076,040**	**1,129,842**	**1,186,334**
Earning Before Interest, Depreciation, Taxes and Amortization (EBITDA)	**944,000**	**1,117,200**	**1,305,360**	**1,509,543**	**1,730,881**
Depreciation	265,000	265,000	265,000	265,000	265,000
Amortization	-	-	-	-	-
Earnings Before Interest and Taxes (EBIT)	**679,000**	**852,200**	**1,040,360**	**1,244,543**	**1,465,881**
Interest Expense	-	-	-	-	-
Earnings Before Taxes (EBT)	**679,000**	**852,200**	**1,040,360**	**1,244,543**	**1,465,881**
Tax	163,461	235,134	308,814	385,212	465,002
Earnings After Taxes (EAT)	**515,539**	**617,066**	**731,546**	**859,331**	**1,000,879**

Annexure 6.1: Watershed area distribution

Table 61: Micro Watershed-wise Area for water budgeting purpose

S. No.	Macro No.	Micro No.	Name of Village	Micro Watershed area (in ha)
1	22	4	Banskheri, Kandari,Jhiree, Ghadawali, Goriyakheda, Bislai, Gurari	1722.54
2	23	3	Maheshpura,Piplodi, Goriyakheda	457.08
3	29	2	Baroobeh, Mavasa, Tandi, PiplyaJawar	713.35
4	29	6	Pacheta, Chandipur, Tandi, PiplyaJawar	530.43
5	31	2	Lodhipura, Patee, Samrol	420.32
6	31	3	Lodhipura, Patee, Joonapani, Patwa, Samrol	557.48
7	32	1	Kandri, Jhiree, Maheshpura, Piplodi, AnwalHeda, Bislai, Gurari	982.23
8	32	2	Kandari, Khankhra, Rupaheda, Piplodi, Anwal Hera, Bislai, Gurari	965.20
9	32	3	Ankheda, Akoliya, Khankra, Rupaheda, Bisankheda, Garboliya, Maniyakhedi, Pahadpura, ChandpuraBihlan, KolunkhediKalan, Anwal Hera	1975.32
10	32	4	Akholiya, Khankhra, bislai	756.05
11	32	5	Ankheda, Akoliya, Kankra, Madanpura, BhawanipuraLodan, Birjipura, Garboliya, Pahadpura, Chandpura, ChandpuraBilan	1677.58
12	33	1	Maheshpura, Manapsar	945.53
13	35	2	Baldpuracharan, Gangoni, Kachotiya, Todra, TodriJaganath, Chandpura	948.12
14	40	6	Choldiya, Semlihat	1457.37
15	40	9	Chittori, Tajpuriya, Chitora	810.40
Total	**8**	**15**		**14919.00**

(Source: Watershed DPR, Manoharthana)

Annexure 6.2: Assessment of Groundwater Recharge from Rainwater Harvesting Structures

The project is important for semi-arid regions of Rajasthan especially for hard-rock areas, which makes it difficult to apply basic hydrologic principles derived for alluvial and unconsolidated geologic formations. The study area, is situated in hard-rock region of Udaipur district. Therefore, the results of the study will be mainly applicable to other hard-rock regions of India. The results will definitely be useful for the planners, researchers and decision makers in the study area to formulate suitable strategies for implementing artificial recharge projects on large scale.

Groundwater recharge is one of the vital components of the water cycle and is highly uncertain to be predicted accurately. In hard-rock areas of Rajasthan, cost-effective and feasible methods for artificial groundwater recharging have not been identified. Also, studies on evaluating impact of artificial groundwater recharge on improving groundwater quality are rare.

Water scarcity and depletion of groundwater levels are among the major problems in southern Rajasthan. During May-June every year, most of the wells become dry due to decline in groundwater levels. Artificial recharge of groundwater seems to be an appropriate solution under the present situation. It has been observed that rainwater harvesting-cum-groundwater recharging structures play an effective role in augmenting groundwater tables in the region. The small water harvesting ponds/Anicuts get submerged atleast two times during the entire monsoon season depending on rainfall and other watershed characteristics. In this study the recharge rate and recharge volume through a small masonry check dam/ anicut is determined by monitoring the inflow of runoff and percolation from the reservoir through staff gauge.

Preparation of Depth Capacity Curve for Shishvi Water Harvesting Structure

During the monsoon period of 2012 to 2015 daily surface water levels of water harvesting structure as well as the water table of identified open dug well were monitored to find out the impact of constructed structure for groundwater recharging. During the monsoon months, the constructed structure gets completely filled up two to three times because of occurrence of normal rainfall and its proper distribution. Depth-capacity curve of the structure was prepared by preparing contour map of the submergence area. The capacity of the pond at different depth is given in Table 1. The prepared depth-capacity curve is shown in Fig. 1

Table 62 Storage capacity of groundwater recharges structures constructed at Shishvi

Contour Value	Depth (m)	Capacity (m^3)
98.50	0.5	250.00
99.00	1.0	992.50
99.50	1.5	2285.00
100.00	2.0	4235.00

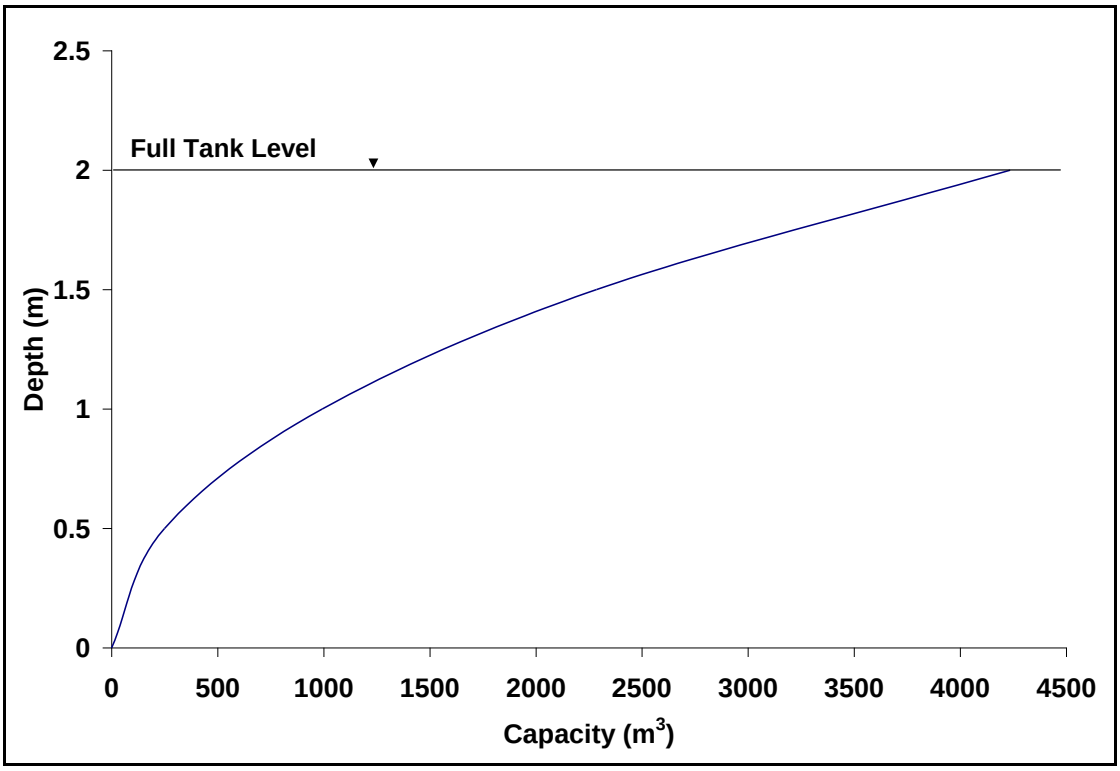


Figure 21 Depth-Capacity Curve of Shishvi Water Harvesting Structure

Assessment of Groundwater Recharge through Rainwater Harvesting Structure Constructed at Shishvi

For assessment of groundwater recharge through rainwater harvesting structures, daily monitoring of surface water level were carried out through the installation of gauge in the Anicut. The water table of the identified open dug well situated in the downstream side of the structure were also measured on daily basis. The pan-evaporation data were collected from the CTAE Meteorological Observatory. The collected data were analyzed for computation of groundwater recharge and recharge rate through the construction of water harvesting structure. The average recharge rate was found to be 3.95 cm/day whereas net recharge volume was 7902.28 m^3 for the year 2015. The net recharge as well as recharge rate is shown in Table 2 and Table 3.

Table 63 Estimation of Recharge Rate through Water Harvesting Structure Constructed at Shishvi

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
16-06-2015	27.00	0.30	0.00	7.20	5.04	0.00
17-06-2015	10.60	0.38	0.04	2.60	1.82	3.82
18-06-2015	6.80	0.40	0.04	5.80	4.06	3.59
19-06-2015	0.00	0.32	0.08	8.30	5.81	7.42
20-06-2015	0.00	0.25	0.07	8.60	6.02	6.40
21-06-2015	0.00	0.17	0.08	7.50	5.25	7.48
22-06-2015	0.00	0.10	0.07	6.40	4.48	6.55
23-06-2015	12.20	0.15	0.04	4.00	2.80	3.72
24-06-2015	0.00	0.06	0.09	4.00	2.80	8.72
25-06-2015	0.00	0.00	0.00	5.50	3.85	0.00
26-06-2015	0.00	0.00	0.00	6.10	4.27	0.00
27-06-2015	0.00	0.00	0.00	6.30	4.41	0.00
28-06-2015	0.00	0.00	0.00	5.50	3.85	0.00
29-06-2015	0.00	0.00	0.00	5.70	3.99	0.00
30-06-2015	0.00	0.00	0.00	6.00	4.20	0.00
01-07-2015	0.00	0.00	0.00	5.90	4.13	0.00
02-07-2015	0.00	0.00	0.00	4.80	3.36	0.00

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
03-07-2015	0.00	0.00	0.00	5.70	3.99	0.00
04-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
05-07-2015	0.00	0.00	0.00	5.90	4.13	0.00
06-07-2015	0.00	0.00	0.00	6.20	4.34	0.00
07-07-2015	0.00	0.00	0.00	6.40	4.48	0.00
08-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
09-07-2015	0.00	0.00	0.00	5.30	3.71	0.00
10-07-2015	0.00	0.00	0.00	5.30	3.71	0.00
11-07-2015	0.00	0.00	0.00	5.50	3.85	0.00
12-07-2015	0.00	0.00	0.00	5.10	3.57	0.00
13-07-2015	0.00	0.00	0.00	4.90	3.43	0.00
14-07-2015	0.00	0.00	0.00	5.60	3.92	0.00
15-07-2015	0.00	0.00	0.00	6.10	4.27	0.00
16-07-2015	0.00	0.00	0.00	4.80	3.36	0.00
17-07-2015	0.00	0.00	0.00	4.30	3.01	0.00
18-07-2015	0.00	0.00	0.00	3.30	2.31	0.00
19-07-2015	12.20	0.00	0.00	1.80	1.26	0.00
20-07-2015	0.00	0.00	0.00	0.80	0.56	0.00
21-07-2015	25.00	0.65	0.04	1.10	0.77	3.92
22-07-2015	0.00	0.60	0.05	2.00	1.40	4.86
23-07-2015	25.70	1.35	0.04	2.20	1.54	3.85
24-07-2015	19.00	1.65	0.04	2.20	1.54	3.85
25-07-2015	0.00	1.58	0.07	1.60	1.12	6.89
26-07-2015	12.20	1.70	0.04	1.60	1.12	3.89
27-07-2015	32.00	2.00	0.04	0.80	0.56	3.94
28-07-2015	0.00	1.94	0.06	0.70	0.49	5.95
29-07-2015	67.40	2.00	0.04	0.60	0.42	3.96
30-07-2015	0.00	1.94	0.06	1.20	0.84	5.92
31-07-2015	0.00	1.89	0.05	1.80	1.26	4.87
01-08-2015	0.00	1.84	0.05	3.00	2.10	4.79
02-08-2015	0.00	1.78	0.06	4.30	3.01	5.70
03-08-2015	0.00	1.73	0.05	5.40	3.78	4.62
04-08-2015	0.00	1.68	0.05	5.50	3.85	4.62
05-08-2015	0.00	1.61	0.07	6.00	4.20	6.58
06-08-2015	0.00	1.54	0.07	6.00	4.20	6.58
07-08-2015	0.00	1.49	0.05	5.60	3.92	4.61
08-08-2015	0.00	1.42	0.07	5.20	3.64	6.64
09-08-2015	0.00	1.36	0.06	5.40	3.78	5.62
10-08-2015	0.00	1.31	0.05	4.30	3.01	4.70
11-08-2015	0.00	1.24	0.07	1.30	0.91	6.91
12-08-2015	43.20	2.00	0.04	0.20	0.14	3.99
13-08-2015	0.00	1.96	0.04	1.30	0.91	3.91
14-08-2015	0.00	1.91	0.05	2.00	1.40	4.86
15-08-2015	43.20	2.00	0.04	1.90	1.33	3.87
16-08-2015	0.00	1.95	0.05	3.10	2.17	4.78
17-08-2015	10.40	2.00	0.04	1.40	0.98	3.90
18-08-2015	7.40	1.96	0.04	1.50	1.05	3.90
19-08-2015	0.00	1.90	0.06	2.20	1.54	5.85
20-08-2015	0.00	1.83	0.07	4.20	2.94	6.71
21-08-2015	0.00	1.76	0.07	2.90	2.03	6.80
22-08-2015	0.00	1.70	0.06	3.20	2.24	5.78
23-08-2015	0.00	1.66	0.04	4.40	3.08	3.69
24-08-2015	0.00	1.60	0.06	4.70	3.29	5.67
25-08-2015	0.00	1.55	0.05	4.50	3.15	4.69
26-08-2015	0.00	1.49	0.06	5.10	3.57	5.64
27-08-2015	0.00	1.45	0.04	4.80	3.36	3.66
28-08-2015	0.00	1.40	0.05	5.30	3.71	4.63
29-08-2015	0.00	1.34	0.06	4.70	3.29	5.67
30-08-2015	0.00	1.29	0.05	4.80	3.36	4.66

Date	Rainfall (mm)	Water level (meters)	Depletion/ addition (meters)	Pan Evaporation (mm)	Actual Evaporation (mm)	Recharge (cm)
1	2	3	4	5	6	7
31-08-2015	0.00	1.21	0.08	4.40	3.08	7.69
01-09-2015	0.00	1.16	0.05	3.40	2.38	4.76
02-09-2015	55.00	2.00	0.04	3.30	2.31	3.77
03-09-2015	0.00	1.95	0.05	3.80	2.66	4.73
04-09-2015	0.00	1.90	0.05	3.90	2.73	4.73
05-09-2015	0.00	1.84	0.06	4.10	2.87	5.71
06-09-2015	0.00	1.78	0.06	4.10	2.87	5.71
07-09-2015	0.00	1.72	0.06	4.00	2.80	5.72
08-09-2015	0.00	1.67	0.05	4.30	3.01	4.70
09-09-2015	0.00	1.62	0.05	4.30	3.01	4.70
10-09-2015	0.00	1.56	0.06	3.80	2.66	5.73
11-09-2015	0.00	1.51	0.05	3.80	2.66	4.73
12-09-2015	0.00	1.47	0.04	4.20	2.94	3.71
13-09-2015	0.00	1.42	0.05	5.50	3.85	4.62
14-09-2015	0.00	1.38	0.04	5.30	3.71	3.63
15-09-2015	0.00	1.32	0.06	4.80	3.36	5.66
16-09-2015	0.00	1.27	0.05	5.90	4.13	4.59
17-09-2015	0.00	1.23	0.04	6.40	4.48	3.55
18-09-2015	8.00	1.20	0.03	4.30	3.01	2.70
19-09-2015	17.20	1.50	0.04	1.70	1.19	3.88
20-09-2015	0.00	1.46	0.04	1.00	0.70	3.93
21-09-2015	0.00	1.41	0.05	1.00	0.70	4.93
22-09-2015	3.60	1.37	0.04	2.10	1.47	3.85
23-09-2015	0.00	1.32	0.05	4.40	3.08	4.69
24-09-2015	0.00	1.28	0.04	4.00	2.80	3.72
25-09-2015	0.00	1.22	0.06	4.20	2.94	5.71
26-09-2015	0.00	1.18	0.04	4.10	2.87	3.71
27-09-2015	0.00	1.13	0.05	3.80	2.66	4.73
28-09-2015	0.00	1.08	0.05	4.60	3.22	4.68
29-09-2015	17.00	1.40	0.04	4.50	3.15	3.69
30-09-2015	0.00	1.36	0.04	4.50	3.15	3.68
01-10-2015	0.00	1.32	0.04	4.40	3.08	3.69
02-10-2015	0.00	1.28	0.04	5.10	3.57	3.64
03-10-2015	0.00	1.22	0.06	5.50	3.85	5.62
04-10-2015	0.00	1.18	0.04	6.00	4.20	3.58
05-10-2015	0.00	1.13	0.05	5.20	3.64	4.64
06-10-2015	0.00	1.08	0.05	5.90	4.13	4.59
07-10-2015	0.00	1.02	0.06	5.20	3.64	5.64
08-10-2015	0.00	0.97	0.05	5.50	3.85	4.62
09-10-2015	0.00	0.93	0.04	5.30	3.71	3.63
10-10-2015	0.00	0.87	0.06	4.50	3.15	5.69
11-10-2015	0.00	0.81	0.06	5.80	4.06	5.59
12-10-2015	0.00	0.77	0.04	4.90	3.43	3.66
13-10-2015	0.00	0.72	0.05	4.90	3.43	4.66
14-10-2015	0.00	0.65	0.07	4.30	3.01	6.70
15-10-2015	0.00	0.60	0.05	4.10	2.87	4.71
16-10-2015	0.00	0.54	0.06	5.10	3.57	5.64
17-10-2015	0.00	0.48	0.06	5.10	3.57	5.64
18-10-2015	0.00	0.41	0.07	5.30	3.71	6.63
19-10-2015	0.00	0.34	0.07	5.70	3.99	6.60
20-10-2015	0.00	0.27	0.07	5.60	3.92	6.61
21-10-2015	0.00	0.20	0.07	4.30	3.01	6.70
22-10-2015	0.00	0.13	0.07	3.90	2.73	6.73
23-10-2015	0.00	0.06	0.07	4.20	2.94	6.71
24-10-2015	0.00	0.00	0.00	4.60	3.22	0.00
					Recharge rate (cm/day)	**3.95**

Table 64 Estimation for Recharge Volume through Water Harvesting Structure at Shishvi

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
16-06-2015	27.00	0.30	0.00	150	180	0.00	0.00	0.00
17-06-2015	10.60	0.38	0.04	190	227	9.08	0.41	8.67
18-06-2015	6.80	0.40	0.04	200	240	9.60	0.97	8.63
19-06-2015	0.00	0.32	0.08	160	190	15.20	1.10	14.10
20-06-2015	0.00	0.25	0.07	125	149	10.43	0.90	9.53
21-06-2015	0.00	0.17	0.08	89	104	8.32	0.55	7.77
22-06-2015	0.00	0.10	0.07	76	64	4.48	0.29	4.19
23-06-2015	12.20	0.15	0.04	87	82	3.28	0.23	3.05
24-06-2015	0.00	0.06	0.09	48	40	3.60	0.11	3.49
25-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
26-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
27-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
28-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
29-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
30-06-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
01-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
02-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
03-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
04-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
05-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
06-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
07-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
08-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
09-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
10-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
11-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
12-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
13-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
14-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
15-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
16-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
17-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
18-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
19-07-2015	12.20	0.00	0.00	0	0	0.00	0.00	0.00
20-07-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
21-07-2015	25.00	0.65	0.04	539	469	18.76	0.36	18.40
22-07-2015	0.00	0.60	0.05	275	432	21.60	0.60	21.00
23-07-2015	25.70	1.35	0.04	2060	1770	70.80	2.73	68.07
24-07-2015	19.00	1.65	0.04	3078	2175	87.00	3.35	83.65
25-07-2015	0.00	1.58	0.07	2407	2013	140.91	2.25	138.66
26-07-2015	12.20	1.70	0.04	3166	2251	90.04	2.52	87.52
27-07-2015	32.00	2.00	0.04	4235	2722	108.88	1.52	107.36
28-07-2015	0.00	1.94	0.06	4108	2641	158.46	1.29	157.17
29-07-2015	67.40	2.00	0.04	4235	2722	108.88	1.14	107.74
30-07-2015	0.00	1.94	0.06	4108	2641	158.46	2.22	156.24
31-07-2015	0.00	1.89	0.05	4002	2573	128.65	3.24	125.41
01-08-2015	0.00	1.84	0.05	3896	2436	121.80	5.12	116.68
02-08-2015	0.00	1.78	0.06	3288	2336	140.16	7.03	133.13
03-08-2015	0.00	1.73	0.05	3222	2290	114.50	8.66	105.84
04-08-2015	0.00	1.68	0.05	3130	2224	111.20	8.56	102.64
05-08-2015	0.00	1.61	0.07	2999	2132	149.24	8.95	140.29
06-08-2015	0.00	1.54	0.07	2355	1967	137.69	8.26	129.43
07-08-2015	0.00	1.49	0.05	2270	1906	95.30	7.47	87.83
08-08-2015	0.00	1.42	0.07	2163	1880	131.60	6.84	124.76
09-08-2015	0.00	1.36	0.06	2072	1715	102.90	6.48	96.42
10-08-2015	0.00	1.31	0.05	1996	1540	77.00	4.64	72.36

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
11-08-2015	0.00	1.24	0.07	1626	1457	101.99	1.33	100.66
12-08-2015	43.20	2.00	0.04	4235	2722	108.88	0.38	108.50
13-08-2015	0.00	1.96	0.04	4150	2668	106.72	2.43	104.29
14-08-2015	0.00	1.91	0.05	4044	2600	130.00	3.64	126.36
15-08-2015	43.20	2.00	0.04	4235	2722	108.88	3.62	105.26
16-08-2015	0.00	1.95	0.05	4129	2654	132.70	5.76	126.94
17-08-2015	10.40	2.00	0.04	4235	2722	108.88	2.67	106.21
18-08-2015	7.40	1.96	0.04	4150	2668	106.72	2.80	103.92
19-08-2015	0.00	1.90	0.06	4023	2587	155.22	3.98	151.24
20-08-2015	0.00	1.83	0.07	3875	2423	169.61	7.12	162.49
21-08-2015	0.00	1.76	0.07	3278	2330	163.10	4.73	158.37
22-08-2015	0.00	1.70	0.06	3166	2251	135.06	5.04	130.02
23-08-2015	0.00	1.66	0.04	3095	2190	87.60	6.75	80.85
24-08-2015	0.00	1.60	0.06	2703	2080	124.80	6.84	117.96
25-08-2015	0.00	1.55	0.05	2360	1975	98.75	6.22	92.53
26-08-2015	0.00	1.49	0.06	2270	1906	114.36	6.80	107.56
27-08-2015	0.00	1.45	0.04	2239	1898	75.92	6.38	69.54
28-08-2015	0.00	1.40	0.05	2132	1818	90.90	6.74	84.16
29-08-2015	0.00	1.34	0.06	2041	1640	98.40	5.40	93.00
30-08-2015	0.00	1.29	0.05	1966	1516	75.80	5.09	70.71
31-08-2015	0.00	1.21	0.08	1587	1422	113.76	4.38	109.38
01-09-2015	0.00	1.16	0.05	1422	1363	68.15	3.24	64.91
02-09-2015	55.00	2.00	0.04	4235	2722	108.88	6.29	102.59
03-09-2015	0.00	1.95	0.05	4129	2654	132.70	7.06	125.64
04-09-2015	0.00	1.90	0.05	4023	2587	129.35	7.06	122.29
05-09-2015	0.00	1.84	0.06	3896	2436	146.16	6.99	139.17
06-09-2015	0.00	1.78	0.06	3288	2336	140.16	6.70	133.46
07-09-2015	0.00	1.72	0.06	3204	2277	136.62	6.38	130.24
08-09-2015	0.00	1.67	0.05	3111	2211	110.55	6.66	103.89
09-09-2015	0.00	1.62	0.05	3018	2145	107.25	6.46	100.79
10-09-2015	0.00	1.56	0.06	2379	1989	119.34	5.29	114.05
11-09-2015	0.00	1.51	0.05	2300	1926	96.30	5.12	91.18
12-09-2015	0.00	1.47	0.04	2248	1885	75.40	5.54	69.86
13-09-2015	0.00	1.42	0.05	2163	1880	94.00	7.24	86.76
14-09-2015	0.00	1.38	0.04	2102	1758	70.32	6.52	63.80
15-09-2015	0.00	1.32	0.06	2011	1650	99.00	5.54	93.46
16-09-2015	0.00	1.27	0.05	1935	1492	74.60	6.16	68.44
17-09-2015	0.00	1.23	0.04	1615	1442	57.68	6.46	51.22
18-09-2015	8.00	1.20	0.03	1575	1410	42.30	4.24	38.06
19-09-2015	17.20	1.50	0.04	2284	1911	76.44	2.27	74.17
20-09-2015	0.00	1.46	0.04	2222	1884	75.36	1.32	74.04
21-09-2015	0.00	1.41	0.05	2148	1850	92.50	1.30	91.21
22-09-2015	3.60	1.37	0.04	2087	1745	69.80	2.57	67.23
23-09-2015	0.00	1.32	0.05	2011	1650	82.50	5.08	77.42
24-09-2015	0.00	1.28	0.04	1951	1505	60.20	4.21	55.99
25-09-2015	0.00	1.22	0.06	1601	1433	85.98	4.21	81.77
26-09-2015	0.00	1.18	0.04	1550	1387	55.48	3.98	51.50
27-09-2015	0.00	1.13	0.05	1482	1328	66.40	3.53	62.87
28-09-2015	0.00	1.08	0.05	1416	1238	61.90	3.99	57.91
29-09-2015	17.00	1.40	0.04	2132	1818	72.72	5.73	66.99
30-09-2015	0.00	1.36	0.04	2072	1715	68.60	5.40	63.20
01-10-2015	0.00	1.32	0.04	2011	1650	66.00	5.08	60.92
02-10-2015	0.00	1.28	0.04	1951	1505	60.20	5.37	54.83
03-10-2015	0.00	1.22	0.06	1601	1433	85.98	5.52	80.46
04-10-2015	0.00	1.18	0.04	1550	1387	55.48	5.83	49.65
05-10-2015	0.00	1.13	0.05	1482	1328	66.40	4.83	61.57
06-10-2015	0.00	1.08	0.05	1416	1238	61.90	5.11	56.79
07-10-2015	0.00	1.02	0.06	1013	1168	70.08	4.25	65.83

Date	Rainfall (mm)	Water Level (m)	Depletion/ Addition (m)	Volume of Storage (m^3)	Surface Area (m^2)	Volume of Depletion (m^3)	Volume of Actual Evaporation (m^3)	Net Recharge (m^3)
08-10-2015	0.00	0.97	0.05	963	1112	55.60	4.28	51.32
09-10-2015	0.00	0.93	0.04	923	1066	42.64	3.95	38.69
10-10-2015	0.00	0.87	0.06	864	997	59.82	3.14	56.68
11-10-2015	0.00	0.81	0.06	804	917	55.02	3.72	51.30
12-10-2015	0.00	0.77	0.04	735	742	29.68	2.55	27.13
13-10-2015	0.00	0.72	0.05	560	610	30.50	2.09	28.41
14-10-2015	0.00	0.65	0.07	539	469	32.83	1.41	31.42
15-10-2015	0.00	0.60	0.05	275	432	21.60	1.24	20.36
16-10-2015	0.00	0.54	0.06	256	358	21.48	1.28	20.20
17-10-2015	0.00	0.48	0.06	240	288	17.28	1.03	16.25
18-10-2015	0.00	0.41	0.07	205	246	17.22	0.91	16.31
19-10-2015	0.00	0.34	0.07	170	204	14.28	0.81	13.47
20-10-2015	0.00	0.27	0.07	135	162	11.34	0.64	10.70
21-10-2015	0.00	0.20	0.07	100	120	8.40	0.36	8.04
22-10-2015	0.00	0.13	0.07	84	78	5.46	0.21	5.25
23-10-2015	0.00	0.06	0.07	48	40	2.80	0.12	2.68
24-10-2015	0.00	0.00	0.07	0	0	0.00	0.00	0.00
25-10-2015	0.00	0.00	0.00	0	0	0.00	0.00	0.00
Total	**455.10**					**8314.50**	**412.22**	**7902.28**

Annexure 7.1: Social Management Plan under RACP (Implementation strategy of 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 16 gram panchayat of watershed cluster Manoharthana. Major issues in the watershed cluster Manoharthana that emerged from the farmer and group consultations during field visit are summarized below.

i. Ensuring Targeting, Inclusion, Participation and Access of small and marginal farmers, tribal farmers, SC and women farmers to agrarian sources of info (Crop selection, water resource, organic farming, seeds, fertilisers, training, information, etc.), extension services and markets; requirement for the project to connect and include these gatherings at all stages;

j. Ensuring representation, inclusion and requirement for the project to connect and include these gatherings farmers, women farmers, tribal farmers and scheduled caste farmers in CACP preparation, farmer mobilization, and farmers' organisations; CACP planning to be founded on solid participatory procedures including every single essential stakeholders of RACP.

k. Ensuring equitable access of these socio-economic groups to project resources and benefits.

l. Dealing with traditional bias towards medium and large farmers with resources to influence project processes, farmer's institutions and benefit sharing norms; the requirement for customisation of project interventions to suit the needs of small and marginal farmers and women.

m. Promotion and strengthening of community based approaches and capacity building for farmer's mobilisation and resource use.

n. Inclusion and participation of Tribal and other vulnerable groups.

o. Inclusion and participation of women farmers in project institutions, interventions and benefits. Project interventions could increase gender imbalances and/or enhance the drudgery of women; these should be accompanied by other interventions that offset the

imbalance by reducing drudgery, or re-distribute work responsibilities between women and men; Ensuring that women are not further disempowered because of, nor do they get excluded from, promotion of market-oriented agriculture.

p. Addressing any potential adverse impacts from utilisation of common and Panchayat lands Land.

q. Avoiding social conflict over watershed work, natural resources and common lands. Addressing issues of inequitable sharing and unregulated use of water resources, conceptualising water as a common resource, while it continues to be used as a private good.

r. Safeguarding against elite capture. Given the widely varied social and economic stratification, the near absence of social solidarity that comes with traditional community institutions and the vast geographical spread observed in the villages of Rajasthan, the risks of project investments and benefits being cornered by the powerful few in the village run very high.

s. A case in point is the widespread encroachment and occupation of common lands (grazing lands), usually by the large farmers, for purposes of cultivation and grazing their cattle, with the goat-rearing families being forced to dispose off or cut down the size of their herds.

1.1 Field Consultant held - Key social issue of cluster

Major issues in the cluster that identified after consultation from the Sarpanch, PRIs and other groups like Women group, SC/ST groups, field NGOs, representative of PRIs etc. during field visit with, are summarized below:-

S.No.	Village(GP)	Date	Gram Pnachyat	Place	Finding during consultation
1	Baskhedi mewatiyan	15.07.2016	Baskhedi mewatiyan	Word panch	Surpanch
2	Ghadawli	15.07.2016	Baskhedi mewatiyan	Sh.Kanhiram ji	Farmer
3	Awalheda	16.07.2016	Awalheda	Rajivgandi sewa kevdra	Sachib
4	Guradi	55.07.2016	Awalheda	Sarpanch home	Surpanch
5	Bislai	16.07.2016	Awalheda	Sarpanch home	Sarpanch
6	Rupaheda	16.07.2016	Awalheda	Upsarpanch ke home	Sachib
7	Khakhra lodan	03.07.2016	Awalheda	Sarpanch home	Surpanch
8	Kandari	07.07.2016	Awalheda	Sarpanch home	Word panch
9	Manpasar	07.07.2016	Manpasar	Sh.Mangilal	Ward Panch
10	Maheshpura	19.07.2016	Manpasar	Sh.badrilal	Farmar
11	Goriyakheda	19.07.2016	Manpasar	Sarpanch home	Sarpanch
12	Piplodhi	30.07.2016	Manpasar	Sarpanch home	Sarpanch
13	Jhiri	31.07.2016	Manpasar	Sarpanch home	Surpanch
14	Kolukhedi kalan	31.07.2016	Kolukhedi kalan	Sarpanch home	Sarpanch home

S.No.	Village(GP)	Date	Gram Pnachyat	Place	Finding during consultation
15	Chandpura bhilan	01.08.2016	Chandpura bhilan	Sh.Ghisu singh	Ward Panch
16	Garboliya	24.07.2016	Garboliya	Sh.Narender	Ward Panch
17	Bisankheda	01.08.2016	Garboliya	Farmer Group	Farmar
18	Ankhkhedi	23.08.2016	Garboliya	Farmer	Farmar
19	Manyakhedi	23.08.2016	Garboliya	Sarpanch home	Surpanch
20	Pahadpura	16.07.2016	Garboliya	Rajivgandi sewa kevdra	Word panch
21	Bhawanipura	15.08.2016	Garboliya	Group meeting farmer	Farmar
22	Aakoliya	16.08.2016	Garboliya	Ward Panch	Ward Panch
23	Chandpura kasba	11.07.2016	Garboliya	Atal sewa kendra	Word panch
24	Brijipura	11.07.2016	Garboliya	Ward Panch	Ward Panch
25	Chhitodi	17.08.2016	Dangipura	Chitodi farmar meeting	Farmer
26	Madanpura	18.08.2016	Khatakhedi	Farmer Meeting	Farmer
27	Todri jagannath	19.08.2016	Todri jagannath	Atal sewa kendra	Surpanch
28	Todra	11.07.2016	Todri jagannath	Atal sewa kendra	Word panch
29	Baldevpura	19.08.2016	Todri jagannath	Atal sewa kendra	Surpanch
30	Gangahoni	02.07.2016	Kolukhedi maliyan	Sh.Jagdish	Farmer
31	Semlihaat	26.08.2016	Semlihat	Atal sewa kendra	Farmar
32	borkhandi	22.08.2016	Semlihat	Atal sewa kendra	Farmar
33	chittoda	22.08.2016	Semlihat	Atal sewa kendra	Farmar
34	Chodliya	06.08.2016	Semlihat	Atal sewa kendra	Farmar
35	Tajpuriya	09.08.2016	Semlihat	Atal sewa kendra	Farmar
36	Patti	09.08.2016	Samrol	Ward Panch	Ward Panch
37	Patwa	11.08.2016	Samrol	School	Word panch
38	samrol	11.08.2016	Samrol	Sarpanch home	Sarpanch
39	Junapani	13.07.2016	Samrol	School Ground	Sarpanch
40	Lodhipura	13.08.2016	Baneth	School Ground	Word panch
41	Chandipur	3.08.2016	Chandipur	Ragvander ke ghar	Sachib
42	pacheta	24.08.2016	Kherkheda	school	Surpanch
43	Mawasa	16.07.2016	Kherkheda	Rajivgandi sewa kevdra	Word panch
44	tandi	24.07.2016	Kherkheda	Atal sewa kendra	Farmar
45	Barubhe	14.07.2016	Shorti	Barubhe farmar meeting	Farmar

Agriculture:-

1. Almost all the households in of Manoharthana cluster are in the trap of indebtedness because of the substantial amount of loan ranging from 10000/- to 50000/- for the purchase of agriculture inputs and meeting the household needs. Widespread indebtedness of farmers also reported due to costs incurred on agricultural inputs including water resources.

2. Problem of access to credit by small and marginal farmers.
3. Lack of timely supply of agriculture inputs including seed and fertilizers.
4. Farmers feel that RACP will provide employment to agricultural labour and this will decrease migration from project villages.
5. Marginalization of small and marginal farmers in technologies and investments, training and capacity building.

Gender

1. 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.
2. Very low coverage of women in extension programs (to training, decision making, exposure visits, markets & enterprises).
3. Women are not recognized as farmers in their own right.

Tribals

1. Agricultural inputs such as seeds and fertilizers are distributed by concerned department but people have no proper knowledge of use of the inputs.
2. In tribal areas women are able to attend mixed group meetings along with men, but are not able to interact freely.
3. Adoption of practices by women will be better if some of the trainings are conducted with women only.

Livestock & pasturelands

1. Lack of breed improvement and livestock health care services.
2. Goat purchasers use weighing scales for ascertaining weight of goats.

Markets

1. Small farmers lack information about market prices.
2. If farmers are not satisfied by the auction price offered, they cannot afford to take back the produce and have to sell at lower than MSP price.

Institutions

1. Outreach of extension services very low in villages.
2. Community based organizations (multi task groups, multi task group goat groups, ground water management committees, women's groups) should be integrated into the Farmer Producer Companies that will be facilitated in the RACP. This will also help in coordinating management of different ecosystems in the village/Panchayat.

Water resources:-

1. Inequity in the use and distribution of water is scattered
2. The conflicts among water users resulting from collective efforts at establishing more efficient water usage norms.
3. There is an issue of exclusion of women and marginal/small farmers from project investments and other benefits.

1.2 Findings of PRA in cluster area

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

a. All Project villages are connected with NH-12,local Route.
b. The villagers identified the existing infrastructure on the maps and also indicated their choice for creating new infrastructure for watershed development (anicut, naadis and rainwater harvesting structures) which would provide additional water for agriculture, thus enhancing potential for additional income for the inhabitants of these villages. Entire Project Area is Rain-fed and agriculture is majorly dependent on rains there.
c. Project Area has been receiving 80-90 cm average amount of rainfall for last two- years resulting. not availability of water in ,Anicut, MPT, etc and substantial amount of agriculture production.
d. Watershed in the most parts of the Project Area is gets dried after six-seven months of rains.
e. Few villages under the Project Area Agriculture and animal husbandry are the main source of livelihood for majority of population residing. Most of the villages are located in vicinity of approx. 25-30 kms of Manoharthana.
f. It was discovered during PRA exercise after discussion with PRIs member that pasture land is essential activity. It's required to be developed because of fodder scarcity in the project area, but the large area of pasture land is under encroachment therefore, only 15-20 % area is available for the development of pasture.
g. The villagers indicated their choice for the location for the proposed infrastructure (Anicut, MPT, farm pond, anicut, water harvesting structures etc.) on the resource map. Based on this input information regarding proposed watershed interventions is provided in this report incorporating stakeholders' recommendations.

Social mobilization strategy

The consultations with participant are followed by / carried out through Information, Education and Communication (IEC) activities like display board, pamphlet distribution and awareness campaign with school children on activities and benefits for preparing of CACP under RACP. The detail of IEC activities are given as bellow in table.

S.N.	Name of Activities	Target	Achieve
1	Display Board at GP/Village Level	10	10
2	Kala Jattha and Puppet shows at the village Level	48	48
3	Pamphlet Distribution	20000	20000
4	RACP Awareness Rallies of School Children	26	26
5	Flex Stand	8	8
6	Slogan Writing	220	220

Cluster Specific Findings of IEC

a. Information Education and communication (IEC) enlighten the communities in the Manoharthana cluster though school rallies, nukkad natak, pamphlet distribution, flexe stand and display boards.
b. All widows with goats and sheep get to know about their benefits from the project under the livestock component.
c. The overall impact of these interventions make farmers and communities to get inquires about the project

d. Higher income from market-oriented agriculture and market advisory services information was collected by the communities.
e. Communities are aware about RACP Project and they anticipated in it.
f. Ensured community participation for their better livelihood
g. Poor and vulnerable households (SC, ST, BPL, marginal farmers, landless, women headed households, non title holders, sharecroppers, agriculture labour etc) are benefitted for any livelihood assistance provided by RACP are encouraged and they inquired about the Project.

2. Socioeconomic Profile (based on CACP baseline data)

Project Area covers an area of 9660 hectare (ha) comprising eleven (16) Gram Panchayat and Fourty seven village- (47) villages. The Cluster village has 8225 Households in which 21967 are males while 21161 are females as per field survey by NGOs. In the cluster scheduled caste is 3983 and scheduled tribe are 8988 people. The cluster also has 2130 BPL households and landless people 492 cultivated are of BPL farmar is 25.9%.

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 village 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.

Total Population

Male	Female	Total	SC	ST
21967	**21161**	**43128**	**3983**	**8988**

Household Details

BPL household	Land Less	Small Farmer	Marginal Farmer	Large Farmer	Total household	SC household	ST household
1	**2**	**3**	**4**	**5**	**6=(2 to 5)**	**7**	**8**
2130	492	2861	4136	736	5225	3983	8988
25.9%	5.98%	34.78%	50.29%	8.95	100.00%	9.23%	20.84%

(Source of data from F-NGOs)

Category wise Cultivated Area in Manoharthana 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 5807 ha and the total households in the cluster are 8225.

The data as a annexure 2.3 that about 91% farmers are marginal, small, landless & BPL farmers. Only about 8.95% farmers are large in Manoharthana cluster. Out of the total cultivated irrigated area, about 32.41% area is with large farmers. Similarly, 60.86% cultivated rainfed area is either with marginal, small or BPL farmers. Out of the total cultivated area, 41.31% total cultivated area is belongs to OBC category farmers followed by Schedule Caste, General and Schedule Tribe farmers.

The total irrigated area is only 39.14% of the total cultivated area and out of it 50.36% irrigated area is with small farmers followed by large, marginal & BPL farmers. The rainfed area is 60.86% and out of it 49.32% area belongs to small farmers followed by large, marginal and BPL farmers. Out of the total area, the area 41.31% belongs to OBC followed by ST, ST & General farmers.

3. Beneficiary Targeting and Social Inclusion

Ensuring Targeting, Inclusion, Participation and Access of small and marginal farmers, tribal farmers, SC/ST 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. Benificiary targeting of SC is approx 7% ST 15% candidate should be covered.

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. Benificiaries selection as per target of SC 7% and ST 15% and remaining target coved in OBC. Since most of these will not be on a saturation basis, the targeting and beneficiary selection criteria for all the categories of private assets will prioritise selection of small and marginal farmers, from scheduled caste, scheduled tribe, women headed and other vulnerable households highlighted in the social assessment of the CACP.

5. Gender and Women's Empowerment

During and before CACP planning, FGDs were conducted among different women groups where the anticipated benefits of the project were shared among them. It was also ensured that women from every group (caste/religion) should participate in such meetings with support of Female outreach workers viz. Anganwari Worker, Asha Sahyogini, and 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 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 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 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, 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 tribal population is 3.12.in Manoharthana Cluster.

7. Social Impact Mitigation Plan under RACP (Implementation strategy of Manoharthana cluster)

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
1	Water Shed	Contour Bund/Field bund	Private Land	Inequity in the use and distribution of water. The risk of conflicts among water users resulting from collective efforts at	Exposure visits of farmers to water scarce areas use of water to more managed and equitable resource-sharing arrangement.
		Ramp cum waste weir (5m)	Private Land		
		SSB (CD)	Private Land		
		Nadi 100 mt ht. 3 mt	Private Land		
		Nadi 120 mt ht. 3 mt	Common Land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		Agro Forestry	Private Land	establishing more efficient water usage norms. The risk of exclusion of women and marginal/small farmers from project investments and other benefits	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
		Pasture Development	Common Land		
		MM Structure 15mt. (Stone)	Common Land		
		MM Structure 18mt. (Stone)	Common Land		
		MM Structure 21mt. (DWCMS)	Common Land		
		MPT 60 mtr.	Common Land		
		Diversion Channel 900 mtr	Common Land		
		S.G.T. (1000 Nos.)	Common Land		
		Deep CCT (100 Nos.)	Common Land		
2	Agriculture	Mini Sprinkler based techniques for Field Crops	Own land	The risk of exclude in farmer selection specially women and SC for benefit distribution Risk of resource-farmers being further indebted to moneylenders. Increased perishability, and challenges in marketability of produce	Ensuring for benefit for SC and Women on basis of cluster population parentage. Facilitate for market oriented agriculture comprising high-value and high-risk crops. Promote establishment of grain banks with exclusive membership of farmers.
		Sprinkler Irrigation System	Own land		
		Pipeline for Piped Conveyance of Irrigation water			
		Soil Testing			
		Demonstrations on Production Technologies for Value Chain crops to bridge gap	Own land		
		Demonstrations on Farm Mechanization and PHM technologies	Own land		
		Demonstrations on Forage / Fodder integrated with Chaff cutter	Own land		
		Promotion to Seed Production	Own land		
		Promotion to Adaption Support	Own land		
		Innovative Activities / INM / IPM	Own land		
3	Horticulture	Fruit Cultivation	Own land	The risk of exclusion of women and SC farmers from	Farmer selection process through MTG discussion Identification of
		Vegetable Cultivation	Own land		
		Solar Pump	Own land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
		Program		project investments and other benefits. Risk of livelihood security due to Increasing marketability produce.	women household headed, and SC farmers, and their prioritized inclusion in all project benefits
		Post-Harvest Management	Own land		
		Horticulture Mechanization	Own land		
		Green house	Own land		
4	Animal Husbandry	Buck Distribution	Not applicable	The risk of exclude poorest women of SC, 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 SC 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.
		Goat Distribution	Not applicable		
		Azolla Demonstration	Own Land		
		Chaff Cutter Distribution	Not applicable		
		Feed Supplement	Not applicable		
		Rural Technology Canters (RTCs)	To be finalized		
		Feeding & Water Trough	Not applicable		
		Goat House	Own land		
		Weighing Scale	Not applicable		
		Travis Installation In Project Villages	Not applicable		
		Integrated Livestock Center	Common Land		
5	Market & value chain	FPC	Proposed Gram panchayat land	It is expected that sufficient land would be available with the Gram Panchayat for establishment and/or construction of common use facilities proposed under the project. Loss of control of women over farm production with commercialization-on and	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. A screening format for all land-based
		FCSC	Proposed Gram panchayat land		

S.N	Major Activity	Sub Activity	GP/common/ private/other land	Social Impact	Mitigation
				formalization of markets – further disempowerment of women in the household economy	interventions is also appended. Form and strengthen exclusive women farmers' groups for collective enterprise development.
6	Farmers' organization and capacity building	Formation of MTGs	Not applicable	Risk of exclude of women/SC/BPL farmer in MTGs	Priority of memberships & leadership of women/SC/BPL farmer in MTGs/WUAs/FPC All household data collection of cluster area. Equitable distribution of project benefits between women and men of categories wise percentage
		Formation of FPC	Not applicable	Risk of exclude of Women/SC/BPL farmer in MTGs	
		Socio economic Data collection	Not applicable	Risk of exclude of Women/SC/BPL farmer in MTGs	
		Identification of Beneficiary	Not applicable	Risk of exclude of women, SC/BPL from beneficiary selection for Project activities	
		Capacity building & Training	Not applicable	Risk of exclusion of women from training for technological interventions	

8. Grievance Redress

The Grievance Redress Mechanism (GRM)are developing at three tier level (first, second and third level). The first, second and third level recognized as followed village, district and PMU level. The grievance redressal registers are maintained at all three tier level for received grievance under project activities.

First tier-Grievance mechanismoperating and grievance register maintain by community organizer at village level with participation of MTGs leader.

Second tier-Grievance received through web application, hand on and toll free number and redress by Grievance Redressal Cell (GRC) which headed
by cluster representative of PRIs/ZilaParisad with DPMU coordination.

Third tier– GRM monitor through web application, toll free number, forward by DPMU by state level GRC which headed by project director.

9. Key Social Indicators

The key social indicators are given below in table:-

Major activity	Sub activity	Social indicators
Water resource	The project will carry out rehabilitation and modernization of Field bunding ,Dug out pound	Focus will be on improved management of rehabilitated FIELD BUNDING networks through UGs/MTG/CBOs 7% and 15% of MTGs, UG, FPCs members and leaders from SC,ST, small, marginal and women farmers

Major activity	Sub activity	Social indicators
		7% and 15% of trainees from SC,ST, small, marginal and women farmers
Agriculture	Soil testing, Demonstrations ,PHM technologies, Seed Demo, Seed Production	Increase in farm production and productivity as a result of improved seed management and cultivation practices. 07% of SC, 15% of ST, 34% small and 50% marginal and women farmers as beneficiaries of individually targeted assets/services and demo activities % of MTGs, WUA, FPCs members and leaders from 07% of SC, 15% of ST, 34% small and 50% marginal and women farmers 7% and 15% of trainees from SC,ST, small, marginal and women farmers
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. 7% and 15% of SC, ST, small and marginal and women farmers as beneficiaries of individually targeted assets/services and demo activities 7% and 15% of MTGs, WUA, FPCs members and leaders from SC,ST, small, marginal and women farmers 7% and 15% of trainees from SC,ST, small, marginal and women farmers
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 farmers with goats will stand to benefit from project interventions under the livestock component. The overall impact of these interventions will be a rise in income from goat rearing.
Markets and value chains	Agri-Business Promotion Facility (ABPF) Pre-Investment Advisory Support Market Infrastructure and Agribusiness Support	Higher income from market-oriented agriculture and market advisory services is the expected outcome of this component. Formation of producers' companies will lead to an increase in farmers' bargaining capacity and help in collective procurement of quality agriculture inputs. 7% and 15% of FPCs members and leaders from SC,ST, small, marginal and women farmers 7% and 15% of trainees from SC,ST, small, marginal and women farmers

Annexure 7.2 Environment Management Plan (EMP)

D

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	Use of seeds of good quality that are pests & disease free determines crop performance		% 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**
			disease infected leading to pest attack and crop loss or increased use of chemical pesticides	to a large extent. Therefore, Seeds when purchased 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	% 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		agents /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:- and 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. Water should be passed through a			

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**
				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 and more water is		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 and ecological services.			

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**
		extracted.		• 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 Use of antibiotics as growth promoters (eg: tylosin, quinolone, tetracycline,		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 &		% of farmers who received awareness on banned medicines and ill effects of	

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**
		gentamicin, amantadine) may lead to side effects on human heath.		Cosmetics Act 1940 by The Ministry of Health and Family Welfare, India Use of antibiotics and growth promoters should be strictly prohibited.		antibiotics and growth promoters.	
	Goat shade and Manure Management	Congested and improperly maintained sheds may result in quick outbreak of diseases. 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.		The sheds must have enough space and ventilation equipped with feed and water troughs and facilities for manure and urine collection.. 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 Use of plastic for packaging may lead to issue of solid waste disposal. Exposure to noise and dust pollution may result in occupational health hazards among the		• 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.		% 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**
		workers. Use of energy from renewable sources will encourage high emissions.		A .Membrane applications 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 occurs and no			

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.		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			

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**
				dust source (as required) shall be 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	Provision	Relevance to RACP Project
Air (Prevention and Control of Pollution) Act 1981	Setting air quality standards, procedures for consent to operate enterprises, penalties etc. Consent should be taken to establish and operate. All processing units should obtain consents from the State pollution Control Board or establishment and operation. The procedures are different for Green, Orange and Red category industries.	Applicable to, processing activities (dal mills, rice mills fish/poultry feed manufacture etc. All processing units will obtain the consents as applicable (
The Water (Prevention and Control of Pollution) Act Amended: 1988	Laying down the permissible limits/ standards of pollutants likely to be emitted, collection of samples of effluent and analysis and provisions for penalties. Effluent treatment may be required in certain food processing units.	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. The Project will ensure the effluent treatment wherever applicable.
The Biological Diversity Act, 2002 G.S.R.261 (E), [15/04/2004] - Biological Diversity Rules, 2004	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.	The project envisages maintaining the biodiversity through selection of locally suitable crop cultivars. At the same time the project will enhance crop productivity through sustainable natural resource management.
Forest (Conservation) Act, 1980 (With Amendments made in 1988) Forest (Conservation) Rules, 2003 (With Amendments made in 2004)	Necessary Clearance should be obtained from Forest Dept or Revenue Department for trees cutting and plantation..	Applicable to the project where agriculture or Any construction of common facilities are promoted near forest areas or canal works
The Wild Life (Protection) Act, 1972	,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.	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. Eg: Desert National Park in Jaisalmer.

Relevant Acts/Rules	Provision	Relevance to RACP Project
The Insecticides Act. 1968 Amendment: Insecticides (Amendment) Act, 1977 World Bank Operational Policy on Pest Management OP/BP 4.09	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.	Applicable to agricultural activities. Mitigation measures taken care in Pest Management Plan • Purchase, stock, sale, distribution or exhibition of the following pesticides will not be supported: pesticides classified in Class Ia, Ib and II of WHO classification;
The Fertilizer (Control) Order, 1985	Registration is required for selling fertilizer at any place as wholesale dealer or retail dealer.	Applicable to POs in cases where stocking and sale of fertilisers may happen
The Seeds Act 1966, The Seeds Rules 1968	No person shall, himself or by any other person on his behalf, carry on the business of selling, keeping for sale, offering to sell, bartering or otherwise supplying any seed of any notified kind or variety, unless- (a) such seed is identifiable as to its kind or variety; (b) such seed conforms to the minimum limits of germination and purity specified under clause (a) of section 6; (c) the container of such seed bears in the prescribed manner, the mark or label containing the correct particulars thereof, specified under clause (b) of section 6; and (d)he complies with such other requirements as may be prescribed.	Relevant to the project where seed production is proposed. The project will follow the necessary provisions under Seed Act – labelling requirements, germination and purity etc.
Bio-Medical Waste(Management & Handling) Rules, 1998	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.	The bio medical waste will be treated and disposed safely or sent to the near by collection facility.
Rajasthan Soil and Water Conservation Acts, 1964	provide for the conservation and improvement of soil and water resources at cluster	Applicable to water harvesting & storage structures on arable and non-arable land
National Environment Policy 2006 Rajasthan State Environment Policy, 2010	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.	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

Relevant Acts/Rules	Provision	Relevance to RACP Project
State Water Policy 2010 The Rajasthan Regulation and Control of The development and Management of Ground Water Bill, 2006	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.	Optimization of water resources exploitation and raising the level of reliability of supplies through conjunctive use of surface and ground water.
National Policy for Farmers 2007	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.	The project envisages improvement of the land productivity and income of farmers in a sustainable manner.
State Policy for promotion of agro-Processing and Agri-business, 2010	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.	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.

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 2nd Year a refresher course after preparation of Audit Report	On-field demonstrations, Case Studies, Group Exercises.
State Level Training of Trainers (Demand Driven)		Three (if Required)	3rd year onwards on assessment of requirement through the environment audit	
District Level training Workshops	• DPMU /DLIC • NGO (entire team) • Representatives of Cluster level /GP level / Village level Community Institutions • Representative of FPC including CEO	One in each of the districts every year in district where there are interventions	1st year before interventions are initiated and thereafter each year after completion of audit.	Field Demonstrations, lectures, group discussions, case studies
Community Level Training Workshops	• All Community Institutions Leaders • FPC Board Members	One in each of the districts every year in district where there are interventions	1st year before interventions are initiated and thereafter each year after completion of audit.	Field demonstration, group exercises, lectures

Tier-wise Suggested Training Content

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	2 hrs as a part of larger induction training at the launch of RACP
State Level Training (Training workshops for trainers)	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. institutional arrangements for implementing EMP	3 days including 1 day of field visit to apply in EMP for sample project interventions
State Level ToT (Demand Driven)	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMP process, institutional arrangements for implementing EMP	As per need
District Level training workshops	Project activities and environmental impacts EMP to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMP process, institutional arrangements for implementing EMP	5 days including 3 days for field visit to understand environmental issues and apply in EMP to understand IPM and INM in action. etc.
Community level training workshop	Project activities and environmental impacts EG to be presented thematically as Agriculture, Water Management, Livestock, Input Storage, etc. EMF process, institutional arrangements for implementing EMF	5 days including 3 days for field visit to understand environmental issues and apply in EMP to understand Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) in action etc.

Training required on activities wise for implantation of Environment Management Plan (EMP) as per Environment Management Safeguard (EMSF) guidelines under RACP as follows:-

Intervention	Activity	Reference of Environment guideline(EG) as per EMSF
Demonstration packing of practices for higher production of selected crops	Crop Selection	EG Agri 1
	Seed Selection	EG Agri 2
	Soil Health & Nutrient Management	EG Agri 3
	Pest & Disease Management	EG Agri 4
	Water use Management	EG Agri 6
	Storage & Handling of Agri-inputs	EG Agri 5
	Water harvesting	EG water 7.1

Intervention	Activity	Reference of Environment guideline(EG) as per EMSF
Water Supply Augmentation	structures	
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
4	Rent for other training facilities (Class-room, LCD, etc.)	1	1	1	15000	day	15000
5	Travel for participants	40	1	40	300	Person	12000
6	Miscellaneous						
	Total	Eight numbers of two days training including one day field visit will be carried out in a year.					86,000*8=6,88,000/-
	Grand Total						7,05,000/-

Information, Education and Communication (IEC) & capacity building Strategy and it tentative budget for implementation of Environment Management Plan (EMP) at cluster

Introduction:-

Information, Education and Communication (IEC) is a process of working with individuals, communities, societies and policy & decision makers to develop communication strategies to promote positive behaviours which are appropriate to their Culture& Social/Community behaviours. IEC combine all suitable strategies, approaches and methods that enable individuals, families, groups, organizations and communities to play active role in achieving, protecting and sustaining the desired behavioural change.

IEC plays a pivotal role in creating awareness, mobilizing people, and making development process participatory through advocacy and by sharing knowledge, skills and techniques with the people. It is also critical for bringing about transparency in implementation of programmes at the field level and for promoting the concept of accountability and social audit. There are various techniques of communication, which include mass communication as well as inter personal communication. There are no any fixed formulae and the techniques mobilize and ensuring participatory development .It varies from place to place, according to their specific problems, cultures and social setup.

Strategy for the IEC, Public awareness & Capacity Development.

Principles of strategy for IEC and Public awareness are based on the downward dissemination theory and Convergence theory for the message dissemination, Behaviour change and capacity development on environment management Plan (EMP) of activities under RACP.

Followings strategies shall be adopted at the Implementations level.

- IEC strategy has been prepared; to generate awareness amongst the stakeholders for achieving the objectives of the Rajasthan Agricultural Competitiveness Project (RACP). It is essential to use all type of communication mediums such as Inter Personnel Communication (IPC), Print media, electronic media, outdoor media and folk media. Extensive publicity and designing and printing of IEC material will be undertaken to disseminate the designated communication issues.

- IEC activities taken up in the action plan are telecast and broadcast of issues through electronic media, publication of public appeals in print and extensive use of social media, In addition to this orientation workshops, trainings, designing and printing of IEC material like posters, banners, flex, booklets, leaflets, flip chart and other material, etc will be undertaken.

- The major focus has been given to the grass root level interpersonal activities. The interpersonal communication will help in clearing the doubts of audience and take instant action. The advantage of this medium is that the messages can be communicated to the target audience who are not adequately educated.

- Greater emphasis has been given to grass root level activities whereas some activities have been taken for environment building and positioning the programme in proper perspective across all stakeholders.

The details are follows:-

i. New media
    - Bulk SMS
    - U –tube and face book
    - What's up messages
ii. Reminder Media

- Wall Paintings
- Slogans
- Hoardings

iii. Inter Personal Communication (IPC)

- Workshop
- Exhibition
- Community rally
- Youth Rally
- Women Rally
- Rally by School Students
- Door to door visits
- Nukkad Natak
- Essay and drawing competitions
- Quiz competitions
- PRA
- SHG, Water User Association, MTG, FPCs

iv. Print media

- Printing of IEC materials (Poster, banners, flex, Signboards on the buses, folders at bus stands, Mandi, street etc.

Template for IEC activities

IEC required on activities wise for implantation of Environment Management Plan (EMP) as per Environment Management Safeguard (EMSF) guidelines under RACP as follows:-

Stakeholders	Content of Information as per activity wise under RACP	Reference of Environment guideline(EG) as per EMSF	Methods to convey the Information (Methodology)	Responsibility
House holds	Crop Selection, Seed Selection, Soil Health & Nutrient Management, Pest & Disease Management, Water use Management, Storage & Handling of Agri-inputs, Water Harvesting Recharge & Storage Structures Farmer Producer company(FPCs), Establishing Food Processing Units and Construction of Warehouse/ Food processing Unit	EG Agri 1,2,3,4,5,6 EG water 7-1 EG common 11-2 EG producer organisation 12-1 EG common 10-1	IPC with Poster, Leaflet, Brochure	Line Departments and NGOs
Community			Hoarding and workshops of Town leader and IPC at Community level with town leaders and NGOs as community participation. Lecture Series Exhibitions, Panel Discussion and Group meeting.	
Mass level			Print Media, Electronics Media, Poster, Hoardings, Use of Public Transport and Workshop at village level of Govt. officers and public Representation.	

Tentative Cost Estimation for the IEC & Capacity development activities at Cluster and village level on yearly basis.

SN	Detail of activity	Unit	Unit cost	Estimation Cost	Remarks
1	Workshop at clusters and village level	5	10,000	50,000	One day workshop in village having population more than 500
2	Installation of Hording	10	1000	10,000	Hording Size 8 ft*5ft
3	Community Rally	5	2000	10,000	rally in village having population more than 500
4	Youth rally	5	2000	10,000	Rally in village having population more than 500
5	Women rally	5	2000	10,000	Rally in village having population more than 500
6	Rally by school student	5	2000	10,000	Rally in village having population more than 500 with the participation of all school.
7	Essay and drawing competition	10	1500	15,000	Sensitization of school children

SN	Detail of activity	Unit	Unit cost	Estimation Cost	Remarks
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.