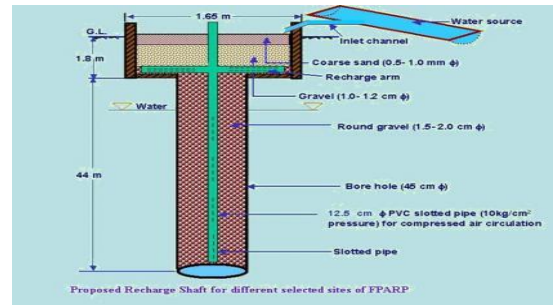
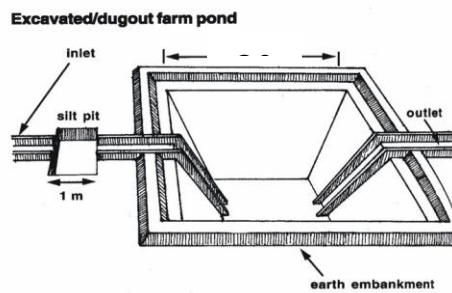




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF KATHUMAR
BLOCK, DISTRICT ALWAR, RAJASTHAN**

Western Region, Jaipur
October 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KATHUMAR BLOCK, DISTRICT ALWAR

Plan at a Glance

1.	Area of the Kathumar Block	569.99 Sq. Km.
2.	Area identified for Artificial Recharge	362.35 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	32.34 MCM
	Annual Ground Water Draft	100.46 MCM
	Stage of Ground Water Development	310.68 %
4.	Volume of water to be harnessed	2.266 MCM
	Volume of water available for recharge through RS	1.42 MCM
	Volume of water available for recharge through PT	-
5.	Volume of unsaturated aquifer zone available for recharge	956.60 MCM
6.	Total number of structures to be proposed	
	Recharge structures	41 shafts in 35 Nos. of existing village ponds
	Existing village pond with recharge shaft/ well	
	Percolation Tanks	-
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	1.14 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24
	Total recharge/ saving of ground water	1.38 MCM
7.	Estimated Cost	3.917 crore
	Artificial Recharge Plan	2.05 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.18 crore
	Operation and maintenance	0.187 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KATHUMAR BLOCK, DISTRICT ALWAR

Introduction

The **Kathumar Block, district Alwar** is one of the over exploited blocks of Rajasthan and is under severe stress, as evident from the stage of ground water development, which has attained an alarming level of **310.68%**.

Location of the block

The Kathumar Block of Alwar District covering an area of 569.99 sq. km. and falls in southern part of Alwar district. It is located between North latitudes 27°08' & 27°25' and East longitudes 76°50' & 77°14'.

Surface Water Availability

As per the studies carried out by Water Resources Department (WRD), Government of Rajasthan there is very little surplus water available for further development at 75% dependability. Based on the data made available from GWD, the surplus runoff available at 75% dependability level has been worked out for the zones as part of watershed within the block. The nature of aquifer (Alluvium/ Hard rock) is also considered while computing the number of Artificial Recharge structures feasible.

Accordingly about 2.266 MCM has been considered for recharge plan in the block. Optimum utilization of rainwater runoff depends on availability of land, feasible conditions, etc. Volume of Aquifer available for Artificial Recharge is given in **Table.1**

Supply Side Management

Feasible Artificial Recharge and Water Conservation Structures

About 0.035 mcm/year surplus has been considered for each recharge shaft and 0.2 mcm/year for percolation tank wherever feasible. The areas with shallow water level (<5m) have not been considered for construction of Artificial Recharge Structures

The number of Recharge Shaft are decided based on the number of suitable ponds available within the zone. If still some surplus remained unallocated, than few Percolation tanks are proposed at suitable locations. However, in some of the blocks entire available surplus cannot be utilized due to non availability of ponds for Recharge shaft or suitable location for Percolation tanks. Zone wise number of Recharge Structures proposed to be constructed is given in **Table 2**.

Table 1: Volume of Aquifer available for artificial recharge

District	Block	Area of Block (Sq.km.)	Potential area suitable for recharge (Sq.km.)	Type of Aquifer	Area feasible for artificial recharge (Sq km)	Sp Yield	Average DTW (mbgl) NOV 2013	Thickness of unsaturated zone 3 m below ground level (m)	Volume of sub surface storage space available for artificial recharge (MCM)
Alwar	Kathumar	569.99	362.35	SR	362.35	0.12	25.00	22.00	956.60

Table 2: Number of recharge structure

ZoneCode	Sub_Basin	Type of Aquifer	Zone-Area (sq. km.)	Total Surplus (mcm)	Water Level >5m	Feasible RS_Prop	Feasible PT_Prop
Banganga_Banganga_003_RJ0203_AL	Banganga	SR	126.383	0.069	Y	2	0
Banganga_Banganga_005_RJ0203_AL	Banganga	SR	0.298	0.001	Y	0	0
Banganga_Banganga_006_RJ0203_AL	Banganga	SR	44.226	0.146	Y	1	0
Banganga_Banganga_008_RJ0203_AL	Banganga	SR	38.865	0.169	Y	1	0
Banganga_Banganga_009_RJ0203_AL	Banganga	SR	222.977	1.399	Y	28	0
Banganga_Banganga_010_RJ0203_AL	Banganga	SR	82.359	0.162	Y	5	0
Banganga_Banganga_015_RJ0203_AL	Banganga	SR	1.951	0.000	Y	0	0
Banganga_Banganga_025_RJ0203_AL	Banganga	SR	57.067	0.320	Y	4	0
				2.266		41	0

Recharge Shaft

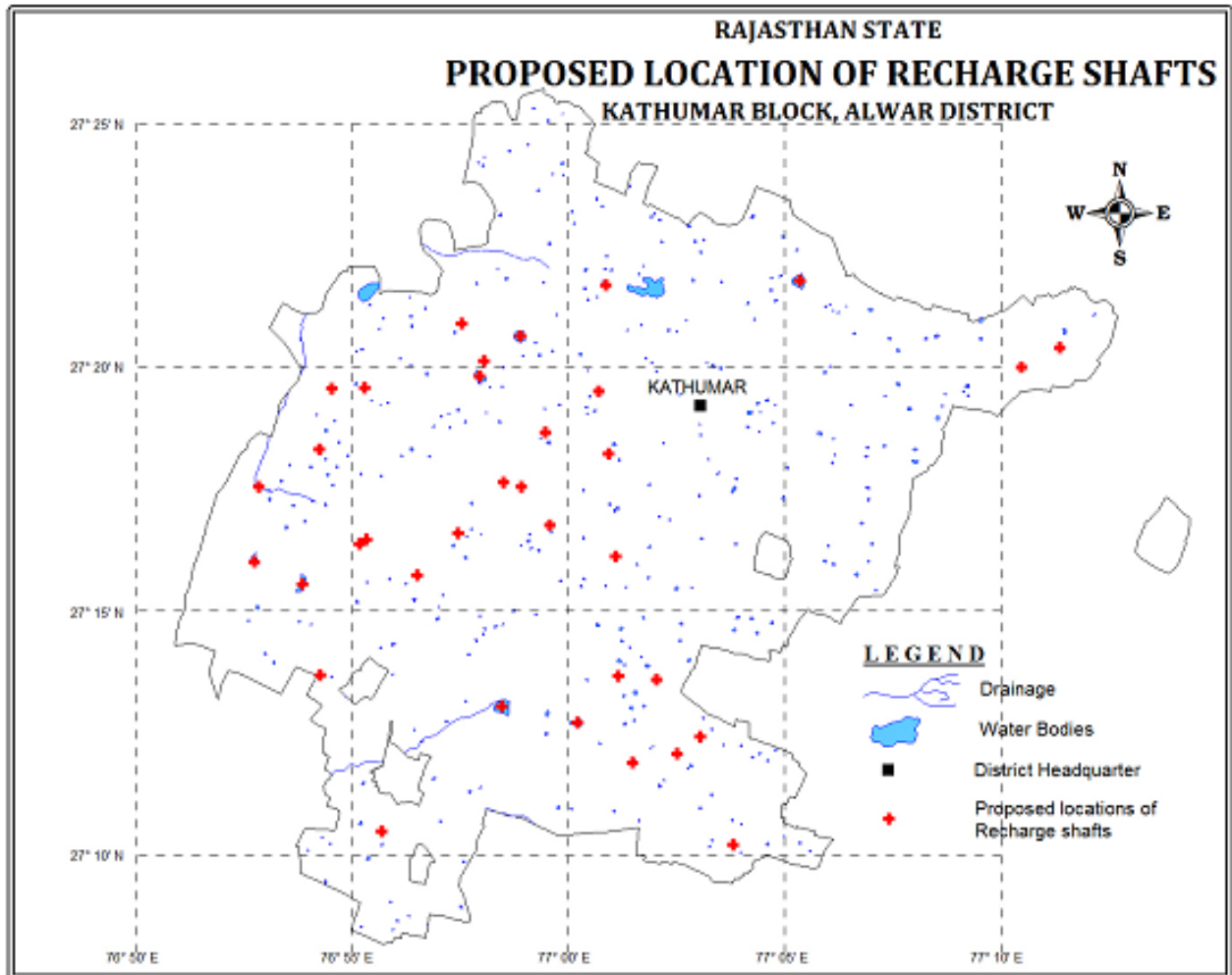
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

Table 3: Tentative locations of village for village pond with recharge shaft

S.No.	Village	Long	Lat	Watershed	No of Shafts	Unit cost (Rs in lac)	Total cost (Rs in lac)
1	Tasai	77.089	27.363	Banganga_Banganga_003_RJ0203_AL	1	5.00	5.00
2	Sonkh	77.189	27.340	Banganga_Banganga_003_RJ0203_AL	1	5.00	5.00
3	Bisli	77.014	27.361	Banganga_Banganga_006_RJ0203_AL	1	5.00	5.00
4	Bhadeera	77.175	27.333	Banganga_Banganga_008_RJ0203_AL	1	5.00	5.00
5	Makreta	76.921	27.326	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
6	Kemla	76.909	27.326	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
7	Nahar Khohra	76.904	27.305	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
8	Kantwari	76.919	27.273	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
9	Kantwari	76.922	27.275	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
10	Jagru	76.881	27.292	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
11	Jatwara	76.879	27.267	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
12	Jatwara	76.897	27.259	Banganga_Banganga_009_RJ0203_AL	3	5.00	15.00
13	Dayothana	76.957	27.277	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
14	Bhanokhar	76.942	27.262	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
15	Badsu	76.904	27.228	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
16	Jadla	76.959	27.348	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
17	Ballupura Ramgarh	76.967	27.336	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
18	Noorpur	76.981	27.344	Banganga_Banganga_009_RJ0203_AL	3	5.00	15.00
19	Ballupura Ramgarh	76.966	27.330	Banganga_Banganga_009_RJ0203_AL	3	5.00	15.00
20	Bhojpura	77.012	27.325	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
21	Sundana	76.991	27.311	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
22	Khera Meda	77.016	27.304	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
23	Baseth	76.975	27.294	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
24	Baseth	76.982	27.292	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
25	Nooniya	76.993	27.279	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
26	Mangolaki	77.018	27.269	Banganga_Banganga_009_RJ0203_AL	1	5.00	5.00
27	Khera Tarf Kalyanpura	76.928	27.175	Banganga_Banganga_010_RJ0203_AL	1	5.00	5.00
28	Peepal Khera	76.974	27.217	Banganga_Banganga_010_RJ0203_AL	1	5.00	5.00
29	Preetampura	77.003	27.212	Banganga_Banganga_010_RJ0203_AL	1	5.00	5.00
30	Badangarhi	77.019	27.228	Banganga_Banganga_010_RJ0203_AL	1	5.00	5.00
31	Badangarhi	77.034	27.227	Banganga_Banganga_010_RJ0203_AL	1	5.00	5.00
32	Kherli (M)	77.025	27.198	Banganga_Banganga_025_RJ0203_AL	1	5.00	5.00
33	Kherli (M)	77.042	27.201	Banganga_Banganga_025_RJ0203_AL	1	5.00	5.00
34	Sahajpura (Rural)	77.051	27.207	Banganga_Banganga_025_RJ0203_AL	1	5.00	5.00
35	Bahrampura	77.063	27.170	Banganga_Banganga_025_RJ0203_AL	1	5.00	5.00
				Total	41		205

Figure 1: Showing Tentative location of the Recharge Shaft



Demand Side Management

Efficient Irrigation:

In Flood/ furrow irrigation method more than 50% of applied water is wasted through seepage to deeper levels, local inundation causes loss through evaporation and it leaches out the nutrients from the plants. While through drip and sprinkler irrigation method, wastage through irrigation losses could be minimized. Ground water usage can be minimized drastically by using HDPE pipes. Initially the scheme can be proposed to be started in 300 ha area, which is worst affected showing deepest water level and declining trends. The area is to be finalized based on land holdings, willingness of farmers and No Objection certificate from the land owner.

Impact Assessment and Monitoring

Assessment of impact of the artificial recharge schemes implemented is essential to assess the efficacy of structures constructed. It helps in identification of cost-effective recharge mechanisms for optimal recharge into the ground water system. It also helps to make necessary modifications in site selection, design and construction of structures in future.

It is proposed to construct 30 piezometers, at suitable locations for monitoring of water levels, in the vicinity of proposed recharge structure.

Revival, Repair of Water Bodies

The existing ponds and tanks with time loose their storage capacity as well as the natural ground water recharge through these water bodies has also become negligible due to siltation and encroachment by farmers for agriculture purposes. There are several such villages where ponds/ tanks are in dilapidated condition. These existing village tanks, which are normally silted and damaged, can be modified to serve as recharge structure in case these are suitably located to serve as percolation tanks. Through desilting, coupled with providing proper waste weir, the village tanks can be converted into recharge structure.

Financial Outlay of the Plan

The total estimated cost of the Plan is Rs. 3.917 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 5 & 6. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 5: Cost of the recharge structures

Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)	Cost of Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost of Sprinkler irrigation in Rs (Unit cost 0.005 cr/ha)
Soft rock – 2.05	-	1.50

Table 6: Tentative cost of different activities

Feasible Artificial Recharge & Water Conservation structures/ activities	Tentative Design	Quantity (in nos. or area in ha)	Rainwater harvested (mcm) or No. of sprinklers (/ha)	Tentative unit cost (in Rs lakh)	Total tentative cost (in Rs lakh)	Expected Annual GW recharge/ conservation (mcm) @ 0.8 mcm/structure
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12” with filter pit	41	1.42	5	205	1.14
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	-	-	-	-	-
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			355	1.38
Impact assessment & Monitoring						
Piezometer	50 – 80 m	30		0.6	18	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					18.65	
TOTAL					391.65	1.38

Note: Type, number and cost of structure may vary according to site after ground verification