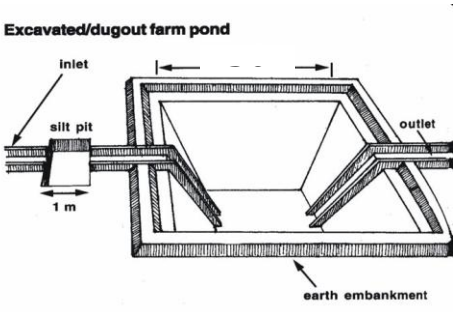
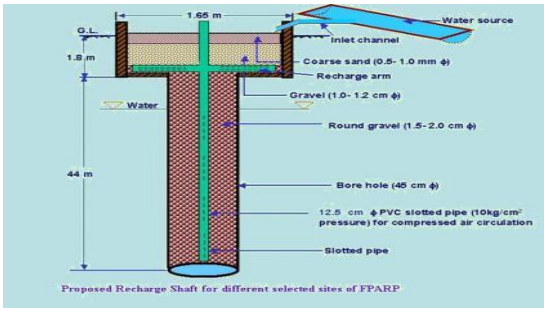
CENTRAL GROUND WATER BOARD

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





ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF JALORE BLOCK, DISTRICT JALORE, RAJASTHAN

Western Region, Jaipur
January 2017

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

Plan at a Glance

1.	**Area of the Jalore Block**	**1049.05 sq. km.**
2.	**Area identified for Artificial Recharge**	**834.37 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**42.85 MCM**
	Annual Ground Water Draft	**57.57 MCM**
	Stage of Ground Water Development	**134.36%**
4.	**Volume of water to be harnessed** **Volume of water available for recharge through RS** **Volume of water available for recharge through PT**	**1.956 MCM** **1.614 MCM** **-**
5.	**Volume of unsaturated aquifer zone available for recharge**	**1597.985 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation Tanks Sprinkler Irrigation	**47 shafts in 47 Nos. of existing village ponds** **--** **300 ha**
	Expected Annual GW recharge	**1.291 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.24**
	Total recharge/ saving of ground water	**1.531 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Sprinkler Irrigation Piezometer construction Operation and maintenance	**4.232 crore** 2.35 crore 1.50 crore 0.18 crore 0.202 crore

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

Introduction

The **Jalore Block, district Jalore** 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 **134.36%.** 834.37 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Jalore Block of Jalore District covering an area of 1049.05 Sq. Km. falls in northern part of Jalore District and is located between North latitudes 25°1' & 25°32' and East longitudes 72°26' & 72°49'.

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 1.956 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 is 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)
JALORE	**JALORE**	1049.05	834.37	SR	834.37	0.080	26.94	23.94	1597.985

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
Luni_Jawai_014_RJ1903_AL	Jawai	SR	282.091	0.895	Y	26	0
Luni_Khari_029_RJ1903_AL	Khari	SR	176.549	0.264	Y	8	0
Luni_Khari_030_RJ1903_AL	Khari	SR	472.199	0.465	Y	13	0
Luni_Khari_031_RJ1903_AL	Khari	SR	4.041	0.013	N	0	0
Luni_Luni_066_RJ1903_AL	Luni	SR	112.135	0.316	Y	0	0
Luni_Mithari_085_RJ1903_AL	Mithari	SR	2.682	0.003	Y	0	0
				1.956		**47**	**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.

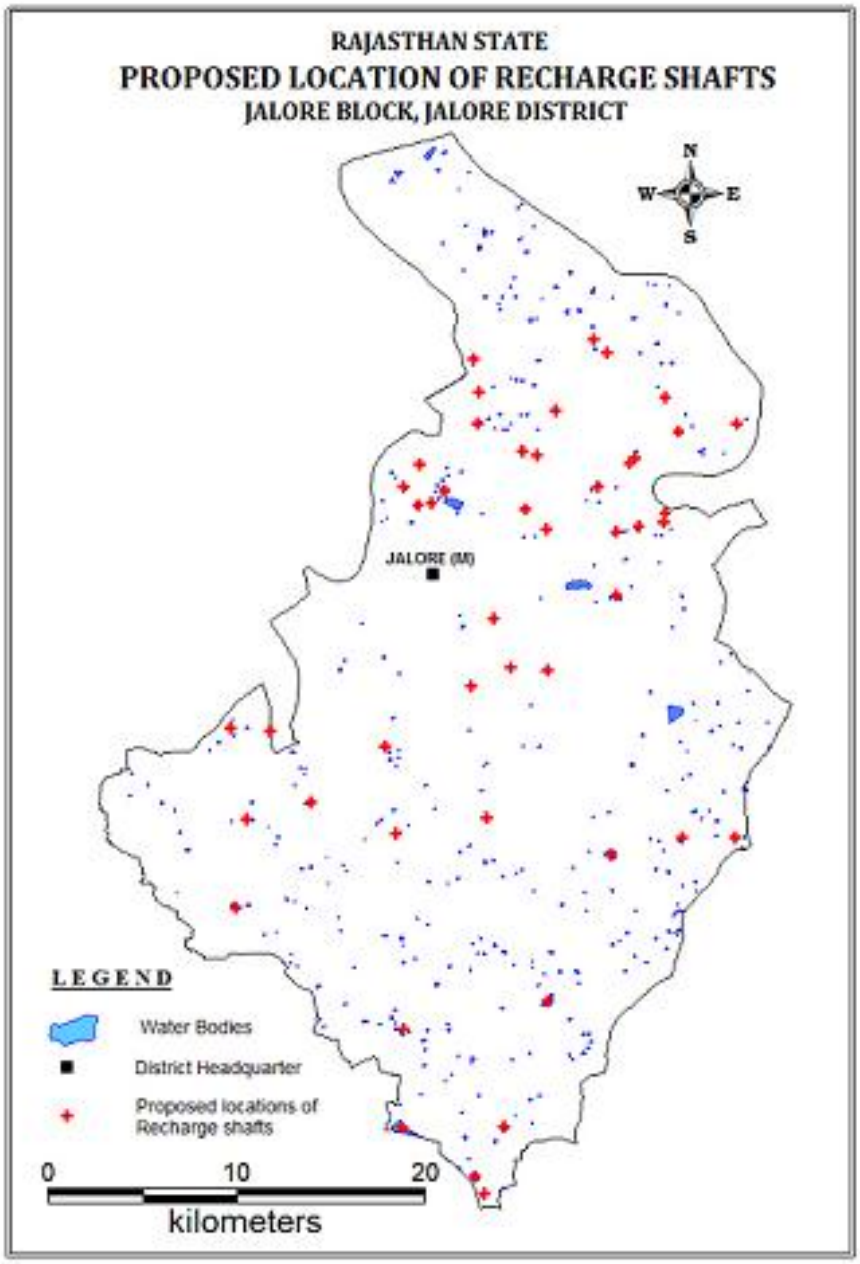
. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

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	Sarupura	72.635	25.421	Luni_Jawai_014_RJ1903_AL	1	5	5
2	Chak Samatipura	72.637	25.405	Luni_Jawai_014_RJ1903_AL	1	5	5
3	Samati Pura	72.637	25.391	Luni_Jawai_014_RJ1903_AL	1	5	5
4	Dechhoo	72.678	25.396	Luni_Jawai_014_RJ1903_AL	1	5	5
5	Meethri	72.698	25.431	Luni_Jawai_014_RJ1903_AL	1	5	5
6	Meethri	72.706	25.424	Luni_Jawai_014_RJ1903_AL	1	5	5
7	Samooja	72.736	25.403	Luni_Jawai_014_RJ1903_AL	1	5	5
8	Samooja	72.743	25.386	Luni_Jawai_014_RJ1903_AL	1	5	5
9	Bagotra	72.774	25.390	Luni_Jawai_014_RJ1903_AL	1	5	5
10	Maheshpura	72.660	25.377	Luni_Jawai_014_RJ1903_AL	1	5	5
11	Maheshpura	72.669	25.375	Luni_Jawai_014_RJ1903_AL	1	5	5
12	Water Body	72.662	25.350	Luni_Jawai_014_RJ1903_AL	1	5	5
13	Leta	72.673	25.340	Luni_Jawai_014_RJ1903_AL	1	5	5
14	Sankarna	72.701	25.360	Luni_Jawai_014_RJ1903_AL	1	5	5
15	Godan	72.717	25.371	Luni_Jawai_014_RJ1903_AL	1	5	5
16	Kaniwara	72.710	25.339	Luni_Jawai_014_RJ1903_AL	1	5	5
17	Godan	72.720	25.374	Luni_Jawai_014_RJ1903_AL	1	5	5
18	Oon	72.735	25.343	Luni_Jawai_014_RJ1903_AL	1	5	5
19	Oon	72.736	25.347	Luni_Jawai_014_RJ1903_AL	1	5	5
20	Kaniwara	72.722	25.341	Luni_Jawai_014_RJ1903_AL	1	5	5
21	Jalor 'B' (Rural)	72.607	25.370	Luni_Jawai_014_RJ1903_AL	1	5	5
22	Jalor (M)	72.598	25.360	Luni_Jawai_014_RJ1903_AL	1	5	5
23	Jalor (M)	72.606	25.351	Luni_Jawai_014_RJ1903_AL	1	5	5
24	Jalor (M)	72.613	25.352	Luni_Jawai_014_RJ1903_AL	1	5	5
25	Jalor (M)	72.620	25.358	Luni_Jawai_014_RJ1903_AL	1	5	5
26	Rajanwari	72.710	25.308	Luni_Jawai_014_RJ1903_AL	1	5	5
27	Jalor (M)	72.645	25.297	Luni_Khari_029_RJ1903_AL	1	5	5
28	Dhawala	72.655	25.273	Luni_Khari_029_RJ1903_AL	1	5	5
29	Dhawala	72.674	25.272	Luni_Khari_029_RJ1903_AL	1	5	5
30	Jalor (M)	72.633	25.265	Luni_Khari_029_RJ1903_AL	1	5	5
31	Dakatara	72.527	25.243	Luni_Khari_029_RJ1903_AL	1	5	5
32	Dakatara	72.507	25.245	Luni_Khari_029_RJ1903_AL	1	5	5
33	Santhoo	72.549	25.209	Luni_Khari_029_RJ1903_AL	1	5	5
34	Dhanpur	72.588	25.236	Luni_Khari_029_RJ1903_AL	1	5	5
35	Choora	72.515	25.201	Luni_Khari_030_RJ1903_AL	1	5	5
36	Digaon	72.642	25.202	Luni_Khari_030_RJ1903_AL	1	5	5
37	Bagra	72.594	25.194	Luni_Khari_030_RJ1903_AL	1	5	5
38	Bhetala	72.707	25.184	Luni_Khari_030_RJ1903_AL	1	5	5
39	Takhtpura	72.745	25.192	Luni_Khari_030_RJ1903_AL	1	5	5
40	Medanichla	72.773	25.192	Luni_Khari_030_RJ1903_AL	1	5	5
41	Noon	72.510	25.159	Luni_Khari_030_RJ1903_AL	1	5	5

42	Beebalsar	72.598	25.101	Luni_Khari_030_RJ1903_AL	1	5	5
43	Siyana	72.674	25.114	Luni_Khari_030_RJ1903_AL	1	5	5
44	Sumergarh	72.597	25.054	Luni_Khari_030_RJ1903_AL	1	5	5
45	Siwna	72.651	25.054	Luni_Khari_030_RJ1903_AL	1	5	5
46	Siwna	72.636	25.030	Luni_Khari_030_RJ1903_AL	1	5	5
47	Siwna	72.641	25.022	Luni_Khari_030_RJ1903_AL	1	5	5
					47		**235**

Fig: 1: Tentative location of 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 loses 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. 4.232 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 4 & 5. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 4: 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 – 2.35	-	1.50

Table 5: 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	47	1.614	5	235	1.291
	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			**385**	**1.531**
Impact assessment & Monitoring						
Piezometer	50 – 80 m	30		0.6	18	
Impact assessment will be carried out by implementing agency						
O & M - 5% of total cost of the scheme					20.15	
TOTAL					**423.15**	**1.531**

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