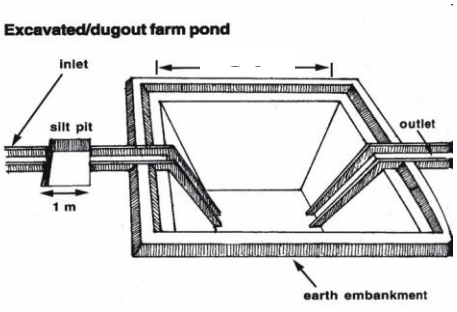
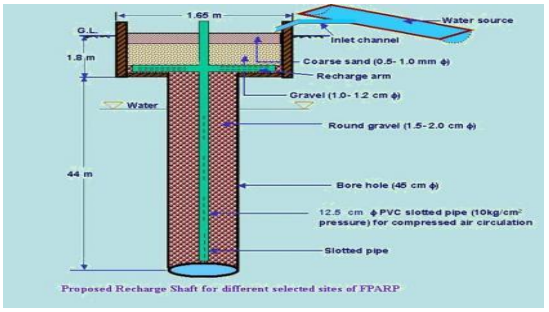
CENTRAL GROUND WATER BOARD

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





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

Western Region, Jaipur
January 2017

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

Plan at a Glance

1.	**Area of the Sayla Block**	**1488.43 sq. km.**
2.	**Area identified for Artificial Recharge**	**1372.25 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**55.73 MCM**
	Annual Ground Water Draft	**204.41 MCM**
	Stage of Ground Water Development	**366.76%**
4.	**Volume of water to be harnessed** **Volume of water available for recharge through RS** **Volume of water available for recharge through PT**	**1.749 MCM** **1.715 MCM** **-**
5.	**Volume of unsaturated aquifer zone available for recharge**	**4130.473 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation Tanks Sprinkler Irrigation	**49 shafts in 49 Nos. of existing village ponds** **--** **300 ha**
	Expected Annual GW recharge	**1.40 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.24**
	Total recharge/ saving of ground water	**1.64 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Sprinkler Irrigation Piezometer construction Operation and maintenance	**4.337 crore** 2.45 crore 1.50 crore 0.18 crore 0.207 crore

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

Introduction

The **Sayla 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 **366.76%.** 1372.25 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Sayla Block of Jalore District covering an area of 1488.43 Sq. Km. falls in north-central part of Jalore District and is located between North latitudes 25°08' & 25°32' and East longitudes 71°58' & 72°38'.

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 1.749 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	**SAYLA**	1488.43	1372.25	SR	1372.25	0.070	46	43	4130.473

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_Bandi_001_RJ1908_AL	Bandi	SR	23.741	0.005	Y	0	0
Luni_Jawai_014_RJ1908_AL	Jawai	SR	385.916	1.225	Y	35	0
Luni_Khari_029_RJ1908_AL	Khari	SR	145.610	0.218	Y	6	0
Luni_Khari_030_RJ1908_AL	Khari	SR	17.376	0.017	N	0	0
Luni_Luni_066_RJ1908_AL	Luni	SR	19.650	0.055	Y	1	0
Luni_Luni_077_RJ1908_AL	Luni	SR	384.823	0.229	Y	7	0
Luni_Sukri (Sayala)_094_RJ1908_AL	Sukri (Sayala)	SR	500.807	0.000	Y	0	0
				1.749		**49**	**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.

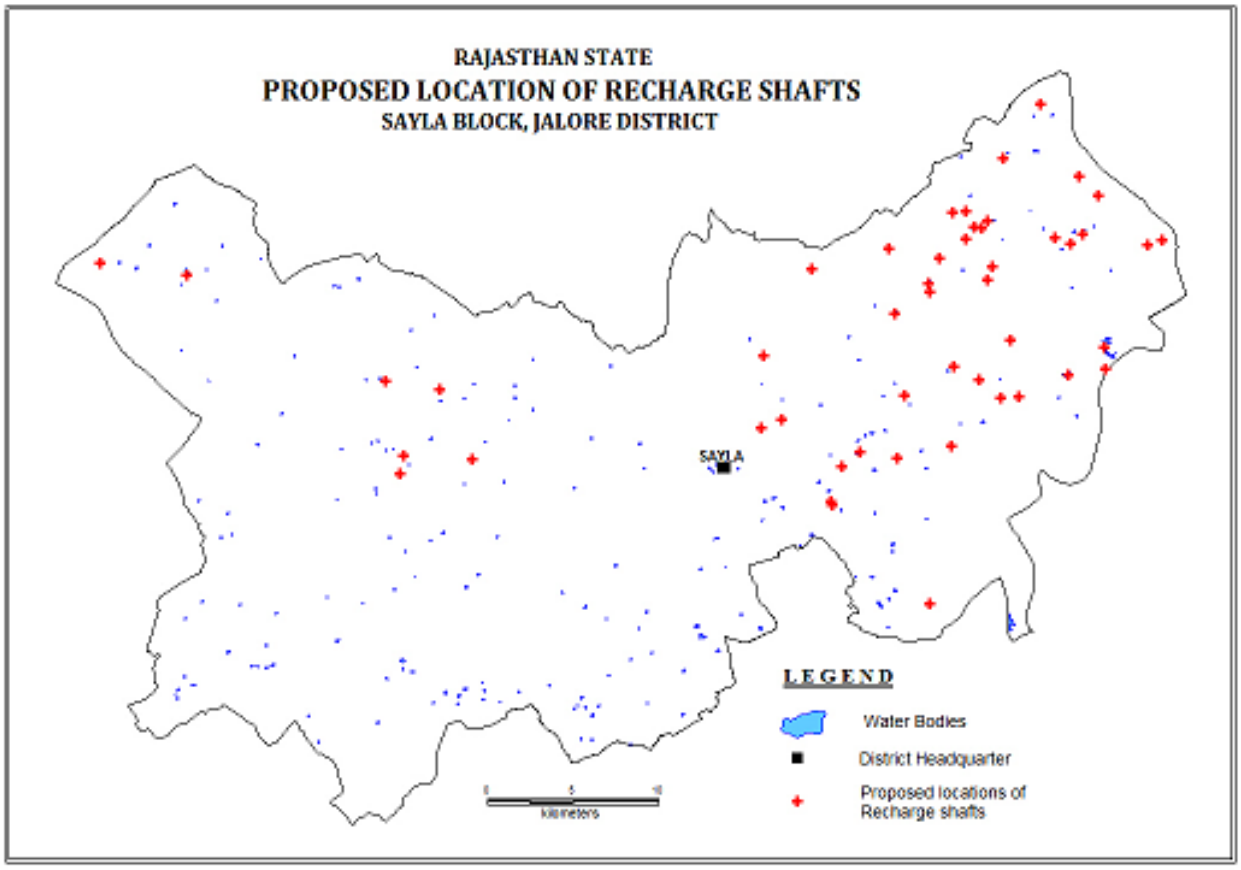
. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

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	Ummedabad	72.387	25.382	Luni_Jawai_014_RJ1908_AL	1	5	5
2	Otwala	72.385	25.344	Luni_Jawai_014_RJ1908_AL	1	5	5
3	Otwala	72.397	25.349	Luni_Jawai_014_RJ1908_AL	1	5	5
4	Alasan	72.432	25.324	Luni_Jawai_014_RJ1908_AL	1	5	5
5	Ummedabad	72.468	25.361	Luni_Jawai_014_RJ1908_AL	1	5	5
6	Keshwana	72.497	25.376	Luni_Jawai_014_RJ1908_AL	1	5	5
7	Keshwana	72.511	25.369	Luni_Jawai_014_RJ1908_AL	1	5	5
8	Firozpura	72.524	25.360	Luni_Jawai_014_RJ1908_AL	1	5	5
9	Firozpura	72.534	25.360	Luni_Jawai_014_RJ1908_AL	1	5	5
10	Khanpur	72.584	25.387	Luni_Jawai_014_RJ1908_AL	1	5	5
11	Sanphara	72.563	25.372	Luni_Jawai_014_RJ1908_AL	1	5	5
12	Khanpur	72.585	25.375	Luni_Jawai_014_RJ1908_AL	1	5	5
13	Sanphara	72.529	25.390	Luni_Jawai_014_RJ1908_AL	1	5	5
14	Elana	72.414	25.428	Luni_Jawai_014_RJ1908_AL	1	5	5
15	Nimblana	72.459	25.438	Luni_Jawai_014_RJ1908_AL	1	5	5
16	Ratunja	72.488	25.433	Luni_Jawai_014_RJ1908_AL	1	5	5
17	Dangara	72.482	25.420	Luni_Jawai_014_RJ1908_AL	1	5	5
18	Dangara	72.483	25.415	Luni_Jawai_014_RJ1908_AL	1	5	5
19	Elana	72.463	25.404	Luni_Jawai_014_RJ1908_AL	1	5	5
20	Mandwala	72.516	25.422	Luni_Jawai_014_RJ1908_AL	1	5	5
21	Mandwala	72.519	25.429	Luni_Jawai_014_RJ1908_AL	1	5	5
22	Thalunda	72.496	25.457	Luni_Jawai_014_RJ1908_AL	1	5	5
23	Thalunda	72.504	25.458	Luni_Jawai_014_RJ1908_AL	1	5	5
24	Thalunda	72.503	25.443	Luni_Jawai_014_RJ1908_AL	1	5	5
25	Thalunda	72.508	25.449	Luni_Jawai_014_RJ1908_AL	1	5	5
26	Anwloj	72.513	25.449	Luni_Jawai_014_RJ1908_AL	1	5	5
27	Anwloj	72.516	25.453	Luni_Jawai_014_RJ1908_AL	1	5	5
28	Bishangarh	72.555	25.444	Luni_Jawai_014_RJ1908_AL	1	5	5
29	Bishangarh	72.564	25.441	Luni_Jawai_014_RJ1908_AL	1	5	5
30	Bishangarh	72.571	25.446	Luni_Jawai_014_RJ1908_AL	1	5	5
31	Mudi	72.609	25.440	Luni_Jawai_014_RJ1908_AL	1	5	5
32	Mudi	72.617	25.443	Luni_Jawai_014_RJ1908_AL	1	5	5
33	Balwara	72.569	25.476	Luni_Jawai_014_RJ1908_AL	1	5	5
34	Narsana	72.580	25.466	Luni_Jawai_014_RJ1908_AL	1	5	5
35	Basan	72.525	25.485	Luni_Jawai_014_RJ1908_AL	1	5	5
36	Alasan	72.442	25.332	Luni_Khari_029_RJ1908_AL	1	5	5
37	Alasan	72.463	25.329	Luni_Khari_029_RJ1908_AL	1	5	5
38	Keshwana	72.495	25.335	Luni_Khari_029_RJ1908_AL	1	5	5
39	Rewatra	72.425	25.306	Luni_Khari_029_RJ1908_AL	1	5	5
40	Rewatra	72.426	25.304	Luni_Khari_029_RJ1908_AL	1	5	5
41	Sayla	72.482	25.252	Luni_Khari_029_RJ1908_AL	1	5	5

42	Balwara	72.547	25.514	Luni_Luni_066_RJ1908_AL	1	5	5
43	Khari	72.002	25.431	Luni_Luni_077_RJ1908_AL	1	5	5
44	Sirana	72.052	25.424	Luni_Luni_077_RJ1908_AL	1	5	5
45	Jeeyana	72.168	25.369	Luni_Luni_077_RJ1908_AL	1	5	5
46	Jeeyana	72.198	25.365	Luni_Luni_077_RJ1908_AL	1	5	5
47	Taliyana	72.178	25.330	Luni_Luni_077_RJ1908_AL	1	5	5
48	Taliyana	72.175	25.320	Luni_Luni_077_RJ1908_AL	1	5	5
49	Babtara	72.217	25.328	Luni_Luni_077_RJ1908_AL	1	5	5
				Total	49		245

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. 4.337 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 – 2.45	-	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	49	1.715	5	245	1.40
	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			**395**	**1.64**
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					20.65	
TOTAL					**433.65**	**1.64**

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