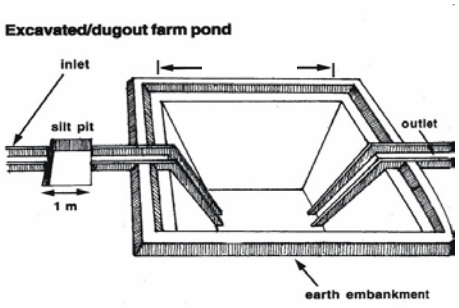
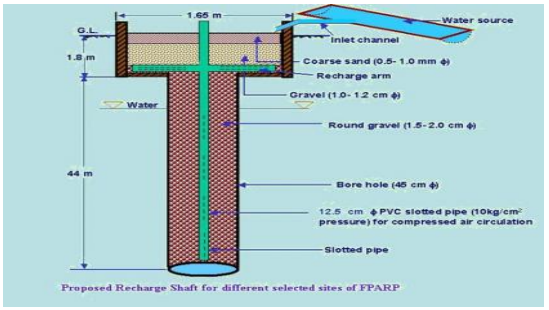
CENTRAL GROUND WATER BOARD

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





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

Western Region, Jaipur
April 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN BLOCK BALESAR, DISTRICT JODHPUR

Plan at a Glance

1.	**Area of the Balesar Block**	**1888.25 Sq.Km.**
2.	**Area identified for Artificial Recharge**	**1503.03 Sq.Km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**23.07 MCM**
	Annual Ground Water Draft	**50.33 MCM**
	Stage of Ground Water Development	**218.13 %**
4.	**Volume of water to be harnessed** **Volume of water available for recharge** **Volume of water available for conservation by other interventions**	**0.6414 MCM** **0.5409 MCM** **0.1005 MCM**
5.	**Volume of unsaturated aquifer zone available for recharge**	**1683.394 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures **Existing village pond with recharge shaft/ well** **Percolation tank** **Water Conservation** **Farm pond**	 **18 shafts in -- Nos. of existing village ponds** **-** **2 Nos.**
	Expected Annual GW recharge	**0.378 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.07 MCM**
	Total recharge/ saving of ground water	**0.448 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Water conservation measures Piezometer construction Operation and maintenance	**1.2306crore** 0.876 crore 0.2 crore 0.096crore 0.0586 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN BLOCK BALESAR, DISTRICT JODHPUR

1 INTRODUCTION

The demand of fresh water for agriculture, drinking and industrial uses etc. has significantly increased due to population growth and socio-economic development. As surface water resources in the State of Rajasthan are meagre, the dependability on ground water resources in the State has increased substantially. This has resulted in over exploitation of ground water resources vis a vis depletion of ground water levels in various parts of the State.

The **Balesar Block, district Jodhpur** 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 **218.13%.** In view of over exploitation of ground water resources in the block, ground water resources in the area are under continuous depletion. Thus there is urgent need for taking up suitable water management interventions based on integrated approach, which on one hand includes augmentation of ground water resources through appropriate techniques, and on the other hand requires the adoption of suitable water conservation measures, such as ensuring water use efficiency through creation of additional water storage facility, maintenance/ renovation of existing water bodies etc. Water awareness and capacity building of the stakeholders are also the important attributes of water management interventions as envisaged in the National Water Policy.

Artificial recharge to ground water is one of the most efficient, scientifically proven and cost effective technology to mitigate the problems of over exploitation of ground water resources. The technology serves as a means for restoring the depleted ground water storage, ameliorate the ground water quality problems and also enhance the sustainability of wells in the affected areas. A detailed knowledge of geology, hydrogeology, land use pattern, geomorphology and hydro-meteorological features are however, essential for selection of appropriate artificial recharge techniques as well as design and sites of ground water recharge structures.

As per directions of Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India and in pursuance to letter no 16-24/M(SML)/CGWB/ARP- OE Blocks/2015-6957, dated 13.7.2015 & 3.8.2015 & letter no 39(43)/TC/CHN/CGWB/2015-7929,dated 4.9.2015 from Central Headquarters, Central Ground Water Board, **the preparation of Artificial Recharge and Rainwater harvesting Plan for the Over exploited blocks in the State of Rajasthan has been taken up** on priority by the Western Region, Central Ground Water Board, Jaipur. Each Plan discusses the broad framework of ground water situation in the block, status of water availability (both surface and ground water), identification of feasible areas for interventions, feasibility of artificial recharge and other water conservation structures, their design considerations, numbers and cost estimates. The expected outcomes of the proposed interventions have also been elucidated in the report

The GIS layers used in the Plan include administrative (upto village level), Hydrogeology, Depth to Water level (pre and post monsoon), geomorphic, drainage, water bodies and the map of tentative locations of proposed interventions.

Methodology:

As per Ground Water Department, Government of Rajasthan direction the basin wise availability of surplus run off is calculated after taking into account 75 % dependability on the rain water for all uses. In furtherance, the sub basins with surplus run off available for recharge were taken into consideration. The block area falling in particular sub basin was taken into account and a proportionate area of the sub-basin draining the block was calculated. Based on this area of sub-basin draining the block, proportionate surplus run off, in the block by the sub basin, for recharge was calculated. Thus was calculated the final amount of surplus run off available for recharge in particular block by one particular sub-basin. The available run off was considered for Recharge through Recharge Shaft (@ 0.03 MCM) and Percolation tank (@ 0.2 MCM). If after allocating water for Recharge through Recharge Shaft, large amount of surface run off was left then the Water conservation through Farm Ponds, along with recharge through Percolation Tanks, was also taken into account. Besides the available run off the Average Water Level for the time span of ten years (Nov., 2005 to Nov. 2014) and the Decadal Water Level trend (Nov., 2005 to Nov. 2014) were also taken into account. The blocks showing average water level more than 5 m bgl and declining water level trend were considered suitable for Artificial Recharge Plan.

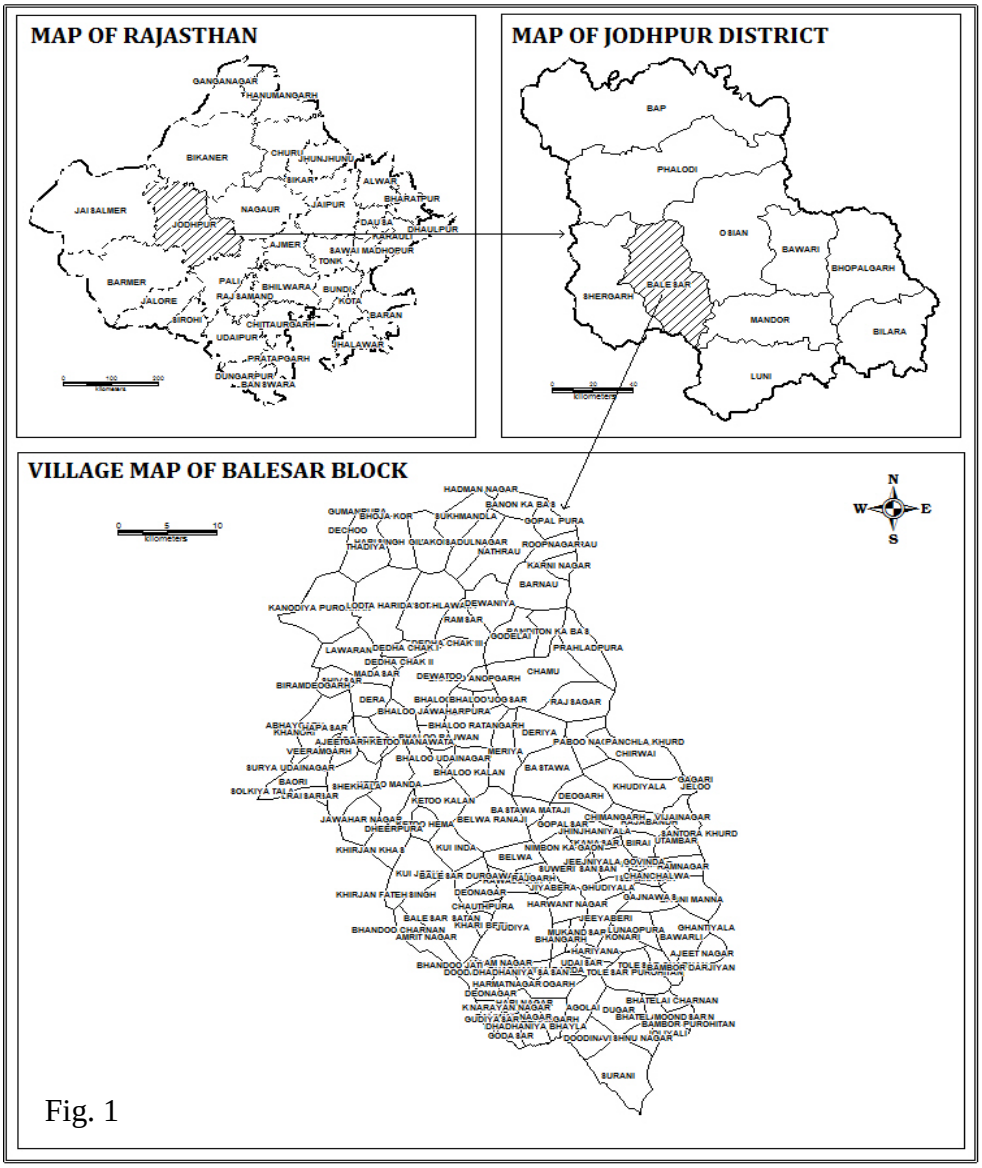
1.1 Location of the block

The Balesar Block covering an area of 1888.25 Sq. Km. falls in west central part of Jodhpur District and is located between North latitudes 26°12’ & 26°50’ and East longitudes 72°17’ & 72°46’. As per 2011 census, the total rural population of the Block is 234888 persons consisting of 123193 males & 111695 females and population density is 647 persons/ Sq. Km. Location map is shown in fig 1.

1.2 Source wise Irrigated Area

Out of total area of 1888.25 Sq.Km., an area of 258.51 (13.69%) falls under irrigation. The dug wells/ Tubewells are the only major source of irrigation in Balesar Block. There is no area that falls under canal & pond irrigation. The wells irrigate total 258.51 Sq.Km. area in this Block.

Fig: 1



1.3 Physiography & Drainage

Physiographically (Fig.2), the block is characterized by presence of sandy plains of aeolian origin, dune valley complexes, eolian plains. The minimum and maximum elevation of the block is165.8 m. amsl and 358.10 m. amsl, respectively.

There is no perennial & seasonal river flowing in this Block. The block does not fall under any river basin. The map showing drainage and water bodies in the Balesar block is shown in fig 3.

Fig: 2

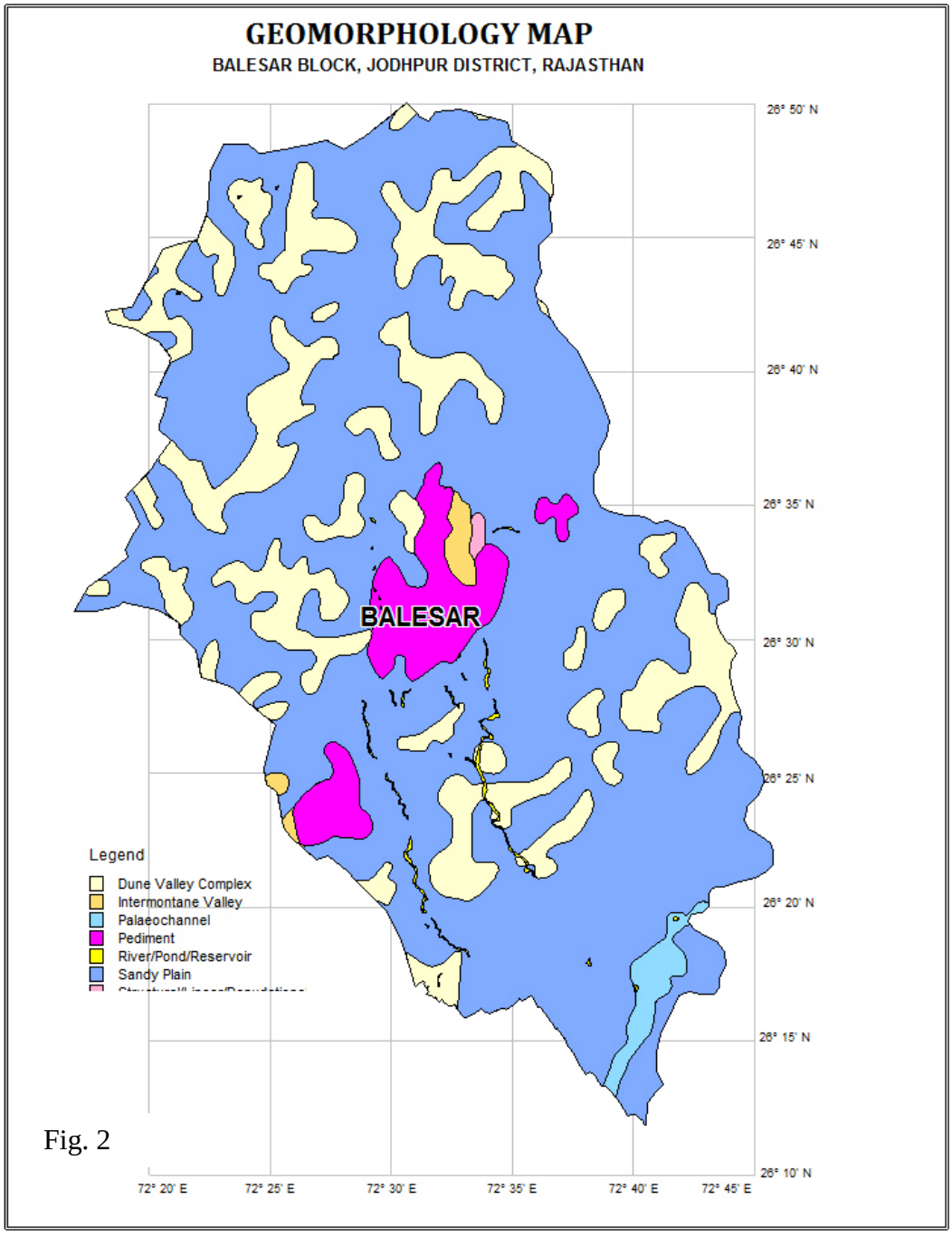

GEOMORPHOLOGY MAP
BALESAR BLOCK, JODHPUR DISTRICT, RAJASTHAN
BALESAR
26° 50' N
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
26° 20' N
26° 15' N
26° 10' N
72° 20' E
72° 25' E
72° 30' E
72° 35' E
72° 40' E
72° 45' E
Legend
Dune Valley Complex
Intermontane Valley
Palaeochannel
Pediment
River/Pond/Reservoir
Sandy Plain

Fig. 2

Fig: 3

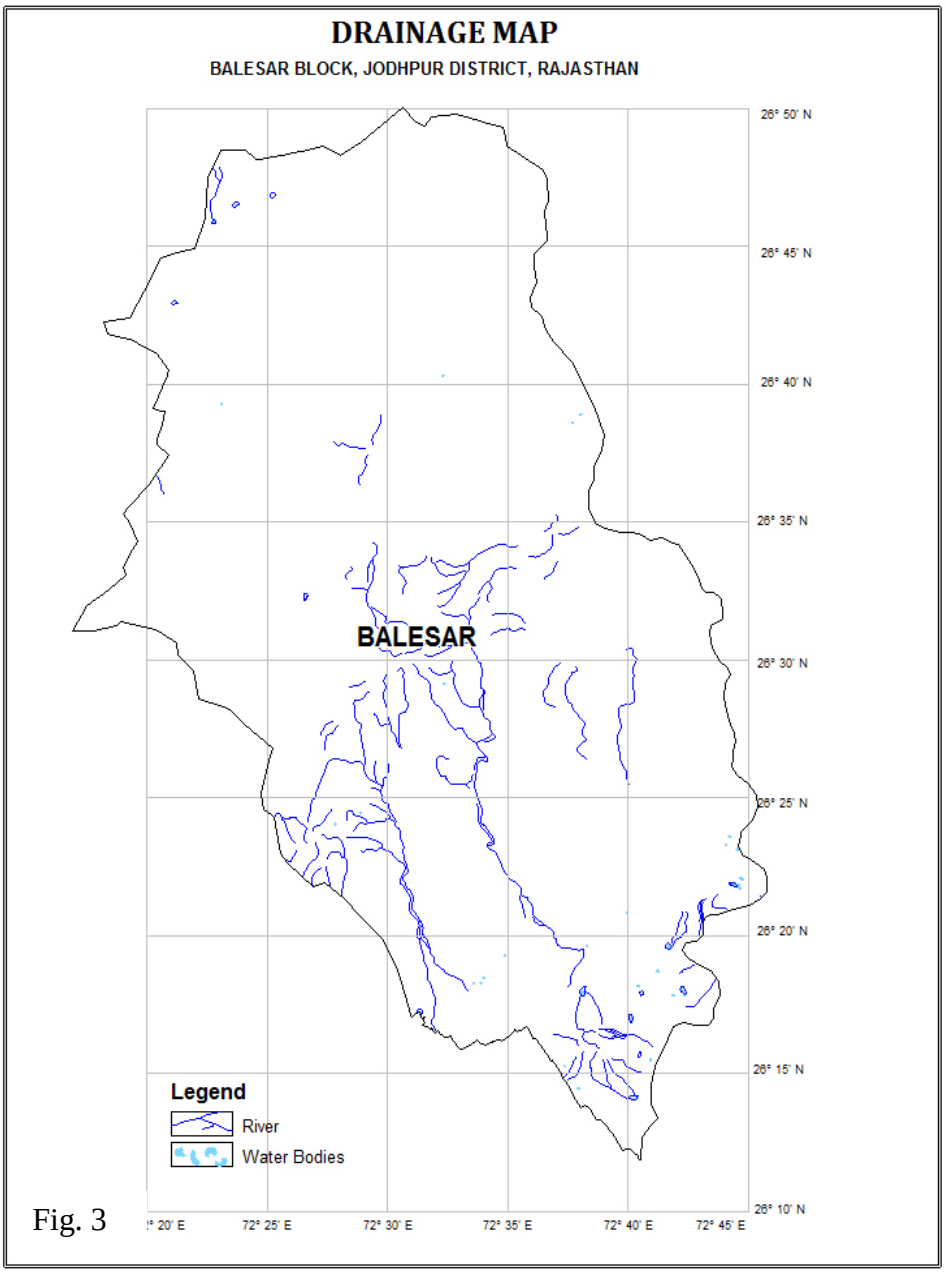

DRAINAGE MAP
BALESAR BLOCK, JODHPUR DISTRICT, RAJASTHAN
BALESAR
Legend
River
Water Bodies
26° 50' N
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
26° 20' N
26° 15' N
26° 10' N
72° 25' E
72° 30' E
72° 35' E
72° 40' E
72° 45' E

Fig. 3

1.4 Rainfall

The climate of the block is semi arid. The Normal annual rainfall of block is 256.71mm. Failure of rains has observed several times. The available data of rainfall indicates that larger part of annual rainfall is received through SW monsoon during July to September. In March, there is transition to summers. The summer months of April to June are the hottest months and temperature upto 48°C is reached. From end of June to September, south western monsoon is received. The months of July and August are the wettest months, receiving about 70% of total annual rainfall. Winter season starts from November and lasts upto February. Average temperature during these months remains between 15° to 18°C, however from end of December to mid January, temperature remains in the range of 5° to 10°C.

1.5 Hydrogeology of the Area

Nagaur & Jodhpur Sandstone and Quaternary alluvium are the major aquifers in the block. Sandstones are generally hard and compact layered rocks with intermittent shale and clay layers. Softer and friable sandstone layers and patches do occur in these formations making it a good yielding aquifer tapped by open wells and bore wells. Sandstone is fine to medium grained, sometimes coarse to gritty and friable. In such formations, friable and soft nature often leads to formation of small cavities in saturated zones. This makes it a very good aquifer forming chief source of ground water in the area. A large number of light to medium duty bore wells have been constructed in such areas for irrigation and water supply purposes. Ground water in sandstone occurs under unconfined to semi-confined conditions. The unconsolidated Quaternary sediments comprising of alluvium, valley fills and aeolian sands also form important aquifers in some parts. These sediments occur as thin blanket over the older sediments. Out of total geographical area of 1878.25 Sq. Km, an area of 1503.03 Sq. Km. (80.02%) forms aquifer system (potential zone) in the block. In general yield of wells tapping Quaternary alluvium aquifers varies from 0.23 to 1.16 lps depending on the thickness of saturated granular zones and yield of the wells tapping sandstone ranges from 0.35 to 2.08 lps. The map showing aquifer system in the Balesar block is shown in **Fig. 4**

Fig: 4

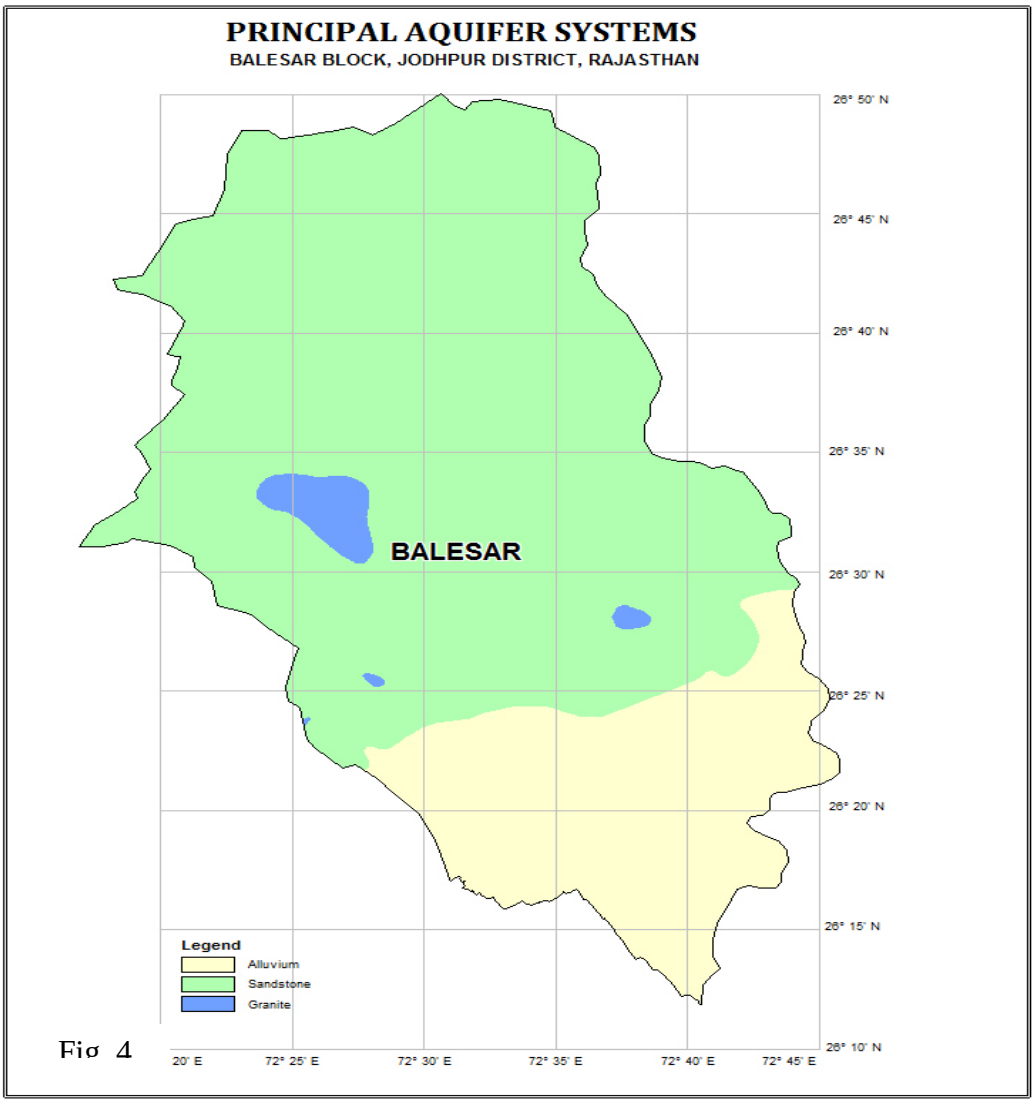


Fig 4

Ground Water Level

As per Average decadal depth to water level (from November, 2005 to November, 2014), the block majorly falls in water level range 20 - 50 m bgl range from west to east. **(Fig 5)**

The average decadal depth to water level is 26.34 m bgl for Pre monsoon & 26.73 m bgl for Post monsoon. According to depth to water level map of May 2014, the water level

ranges between 20 to 40 mbgl in northern half and 10 to 20 mbgl in southern half. Depth to water level maps for May 2014 & November 2014 is shown in **fig 6 & 7**.

Fig: 5

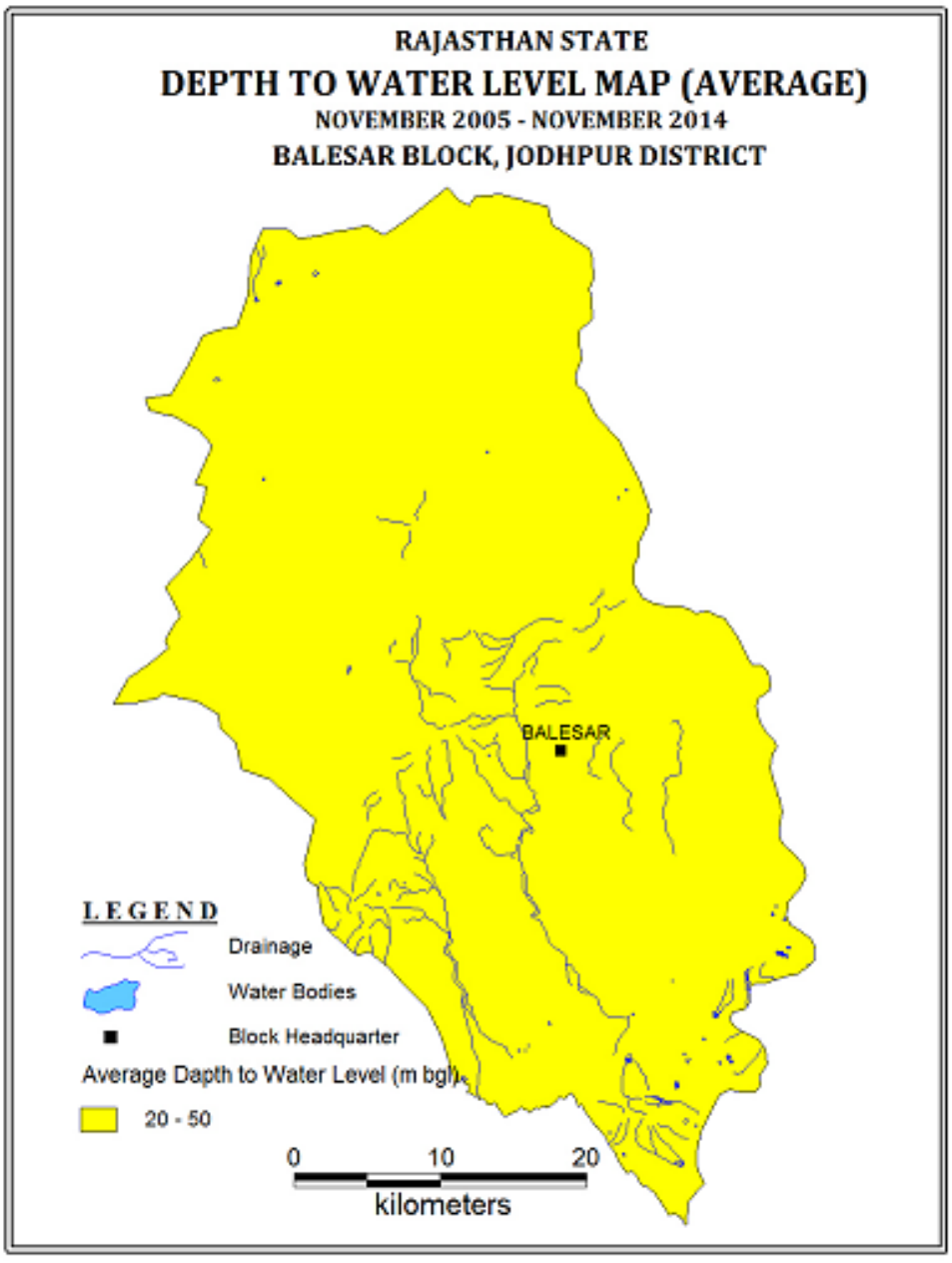


Fig: 6

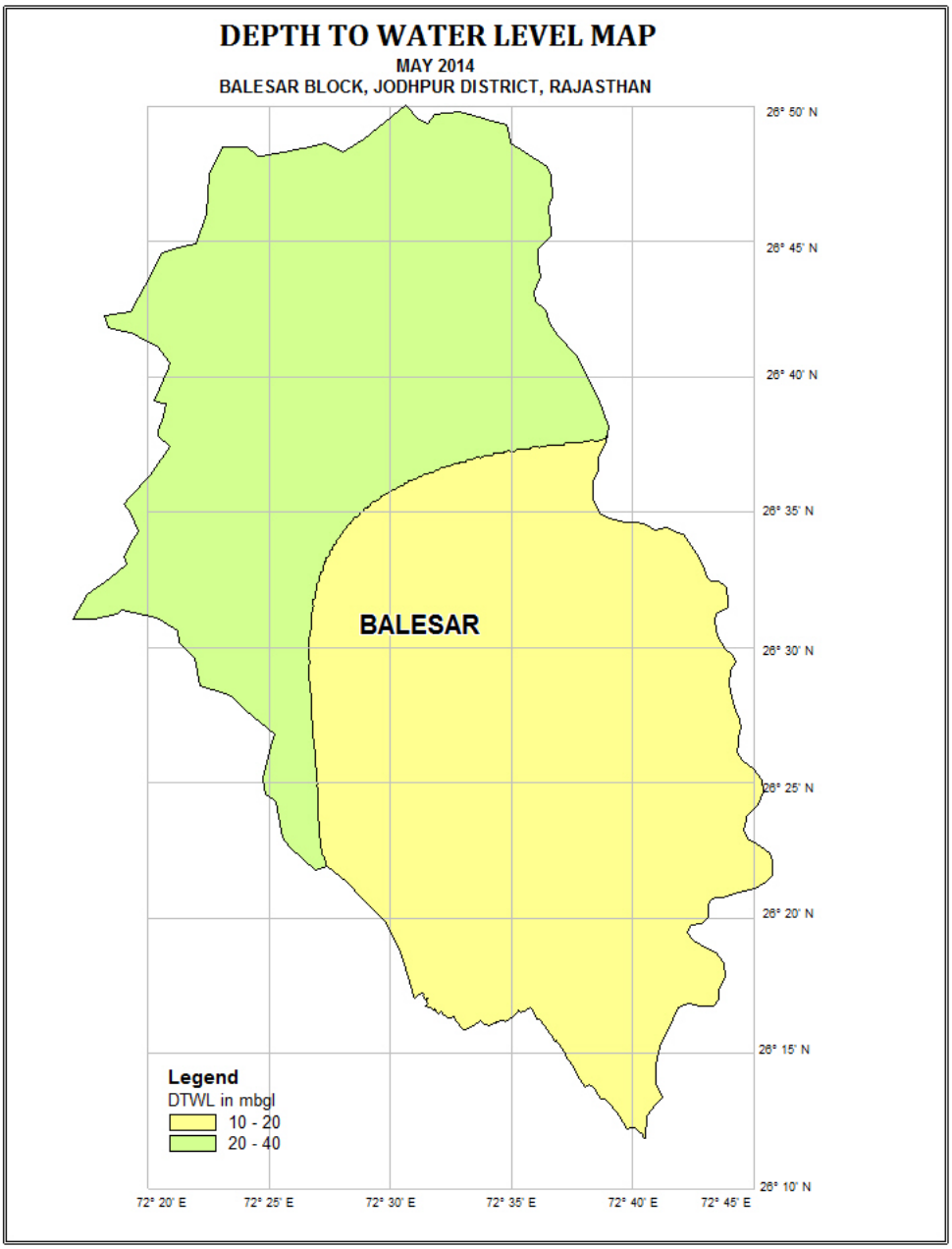
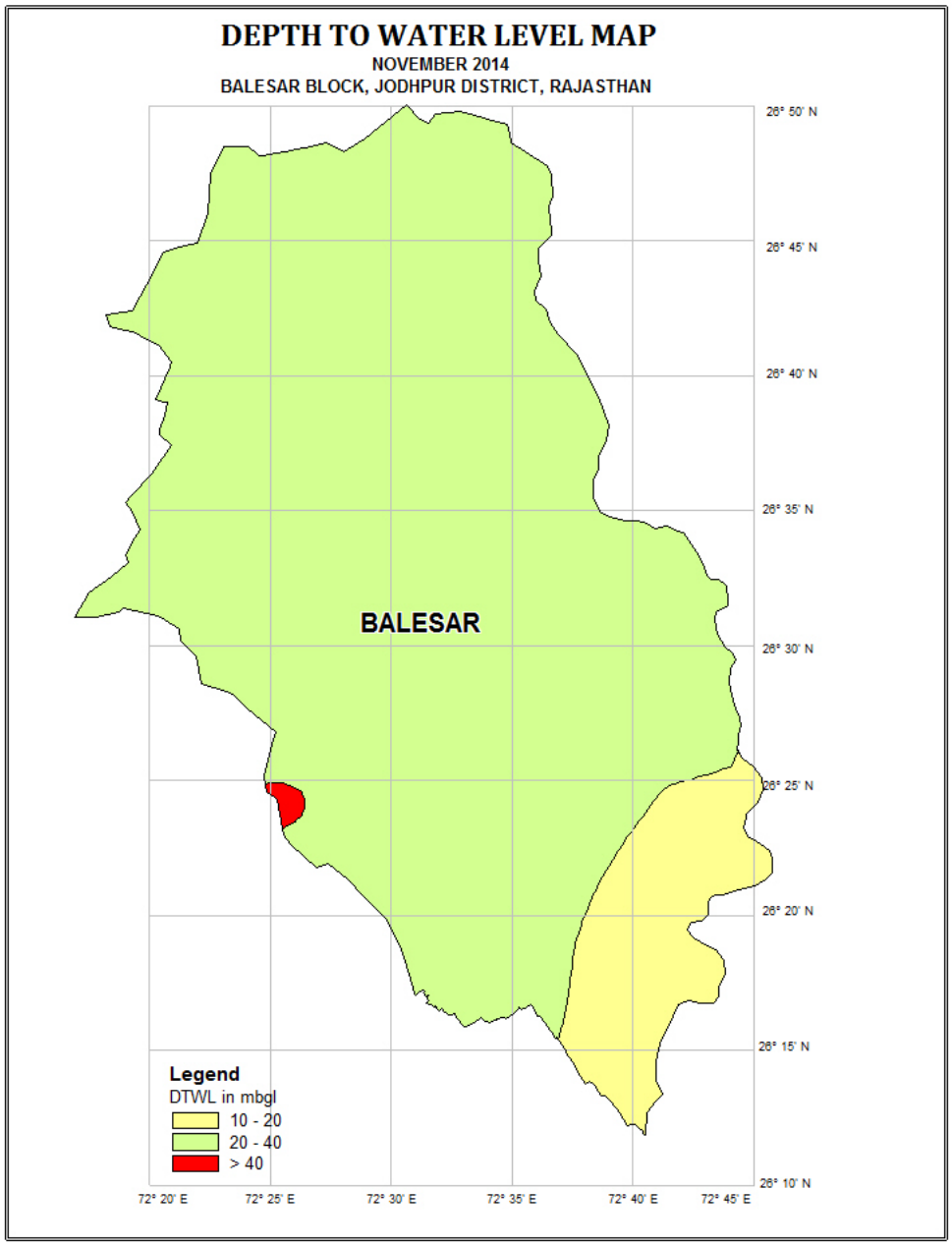

DEPTH TO WATER LEVEL MAP
MAY 2014
BALESAR BLOCK, JODHPUR DISTRICT, RAJASTHAN
BALESAR
26° 50' N
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
26° 20' N
26° 15' N
26° 10' N
72° 20' E
72° 25' E
72° 30' E
72° 35' E
72° 40' E
72° 45' E
Legend
DTWL in mbgl
10 - 20
20 - 40

Fig: 7

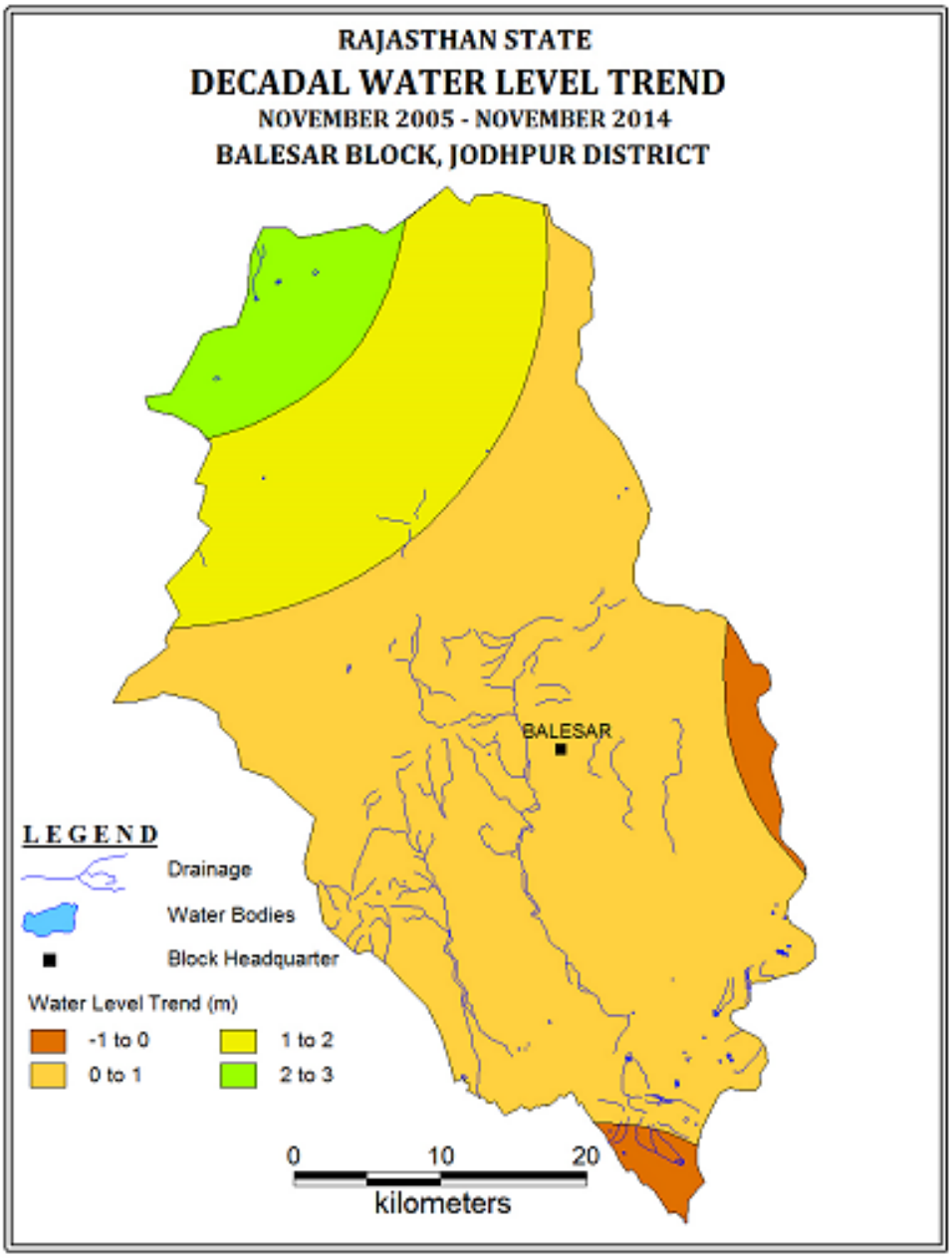


Water Level Trend:

All the hydrographs are showing declining water level trends over last 10 years. Water level trend shows average decline of 0.51 m/year during pre monsoon and 0.50 m/year during post monsoon has been observed.

As per the Decadal Water level trend (from November, 2005 to November, 2014), the declining trend is visible in the block. The fall in the range of 0 to 1, 1 to 2 and 2 to 3 m/ year in ground water level is prevalent in the block. The map of Decadal Water Level Trend is shown in **fig. 8**

Fig: 8



1.6 Subsurface Hydrogeology

As inferred from borehole data of the Balesar Block; Sandstone & Quaternary alluvium form the aquifers. The depth of drilling ranges from 11.60 to 203.10 mbgl and the average discharge ranges from 0.03 to 21.67 lps. The quality of water has 2 major problems, i.e., Salinity & Fluoride.

1.7 Dynamic Ground Water Resource

The Ground water Resources for the block are given in Table 1, as per 31.03.2011 Ground Water Resource Assessment. The Net Ground water Availability of Block is 2307.49 ham and Annual Ground water draft is 5033.42 ham. Due to this excessive draft over recharge, stage of Ground water development has reached 218.30%.

Table 1: Ground Water Availability, Utilization and Stage of Development Block Balesar, District Jodhpur

Natural Discharge During Non Monsoon Period	256.39 ham
Net Ground Water Availability	2307.49 ham
Annual Ground Water Draft	5033.42 ham
Net Ground water Availability for Future Irrigation Use	0 ham
Stage of Ground Water Development	218.30%
Source: Ground Water Resource Assessment 31.03.2011	

Need for artificial recharge and water conservation plan

The present artificial recharge and water conservation Plan aims to mitigate the problems of continuous decline in water levels over the area through techniques of artificial recharge utilizing surplus rainwater based on scientific manner for optimal results. The broad scope of the recharge plan is as follows:

- Establishing efficacy of integrated approach through various artificial recharge and water conservation techniques. Intervention is proposed in cluster mode basis wherever feasible to have a better impact.
- Enhancing water use efficiency for controlling excessive ground water draft, especially for irrigation purposes.
- Ensuring sustainability of ground water abstraction structures and improvement in quality of ground water.

Surface water availability

As per the studies carried out by Water Resources Department, Govt of Rajasthan there is hardly any surplus water available for further development at 75% dependability. However, after taking into account the availability of source water in the basins of Rivers flowing in the State proportionate amount of surplus runoff available in particular block by particular sub basin was calculated.

Accordingly about 0.6414 MCM has been considered for recharge plan in the block. Optimum utilization of rainwater runoff depends on availability of land, feasible conditions, etc. Surface water availability, allocation and number of structures are presented in table 2.

Table 2: Source water for artificial recharge and number of recharge structure

District	District code	Block	Block code	Area of Block (Sq.km.)	Potential area suitable for recharge (Sq.km.)	Type of Aquifer	Area feasible for artificial recharge (Sq km)	Sp Yield
JODHPUR	RJ22	**BALESAR**	RJ2201	1888.25	1503.03	hard rock	1503.03	0.040

Table 2: (contd.): Source water for artificial recharge and number of recharge structure

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)	Sub Basin	Surplus available in the block (in Mm3)	Surplus water used in Recharge Shaft (RS)	No. of RS (0.03 MCM/RS)	Remaining Surplus water for Farm Pond (FP)	No. of FP (0.05 MCM/ FP)
31	28	1683.394	Luni	0.0309	0.0309	1	-	-
				0.6105	0.51	17	0.1005	2
				0.6414	**0.5409**	**18**	**0.1005**	**2**

Feasible Artificial Recharge and water conservation structures

A wide spectrum of techniques is in vougue, which are being implemented to recharge the ground water reservoir, conserve the utilizable rainfall and enhance the water use efficiency. Based on prevailing field conditions, out of total block area of 1888.25 sq km practically 1503.03 sq km area is feasible for implementing recharge measures. Based on available information about the area such as ground water scenario, hydrogeology, hydrology, topography, rainfall pattern, drainage, soil cover, utilizable rainfall etc. scope for various interventions has been studied and assessment of suitable areas, tentative design and costs of structures has been worked out in the present plan.

Identification of feasible areas

Balesar block is having ground water level about 40m below ground level and as per dynamic ground water resource estimation, the block is over exploited with stage of ground water development at 159.06 %. The Balesar block is feasible for recharge due to presence of permeable zone above water table, favorable land slope and availability of water from rainfall.
Generally the Artificial recharge structures suitable in this type of area are Check dams/ Anicuts/ Percolation tanks and Recharge Shafts/ Recharge wells. Since the ground water levels are quite deep in the block, the structures like ani-cuts and Check dams are not suitable and also their construction is regulated. Considering these aspect the proposal for Recharge Shaft/ Recharge wells have been firmed up in the present Plan as the most suitable structures in Balesar block.

Details of Ground Water Recharge Measures

1. Existing Village Pond with recharge shaft/wells

Almost all the villages in the State of Rajasthan have one or two village ponds & other ponds. With time, these ponds get silted & hardly any water percolates downward. Also, any excess water coming into the pond goes away as a run off due to limited storage capacity. This surplus runoff can very well be utilized for recharging the ground water and also for enhancing conservation of water that can be further used for irrigation, thereby saving ground water withdrawal. Since natural recharge from these ponds is limited due to siltation and ground water levels are deep, the most effective ground water structure considered under the Plan is Recharge Shaft/ Recharge well constructed within the pond itself.

The above mentioned recharge well has been designed in a manner that maximum surplus water would likely to be utilized for recharge as well as sufficient water is retained in the pond for local use.
The model design of recharge well has been worked out in consultation with Ground Water Department, Government of Rajasthan and presented in Fig 9a & 9b. The major features required are:

1. The well should have sufficient diameter for recharge- 10 to 12 inch diameter well with bottom screen/ opening just above the highest ground water level.
2. The well should have screen/ opening at the top, which should be at least 1.5m above the bed level of the pond.
3. The upper opening should be surrounded with filter pack comprising graded filter media of medium, coarse sand & gravel, so that the Recharge well does not get silted.

The opening for inflow to the well has been proposed at 1.5m above Bed level of pond. This is necessary to ensure that the pond retains sufficient water for use by local consumers. However, this may necessitate further deepening of pond itself so that the pond is 3-4 m deep. A Single well as discussed above would be suitable for a pond upto

area of about 5ha. Therefore, more number of such Recharge wells is envisaged for larger ponds.

Criteria for number of shafts

Village ponds having area <1 ha and > 25 ha has not been considered for construction of recharge shafts, one recharge shaft is proposed for pond area between 1 to 5 ha; 2 for 5 to 7.5 ha, 3 for 7.5 to 10 and 4 shafts for >10 ha.

Fig 9a

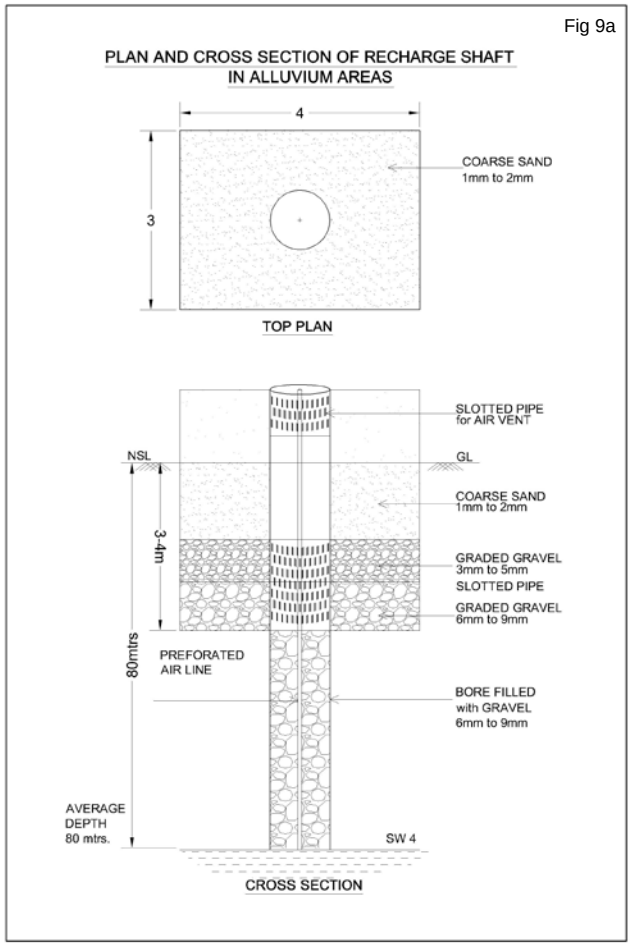
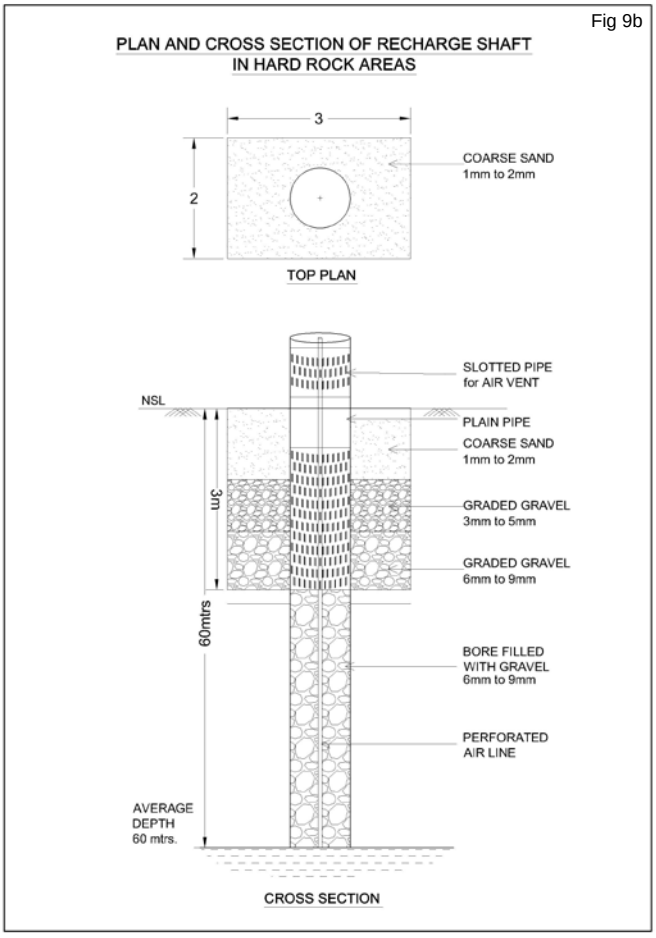


Fig 9b

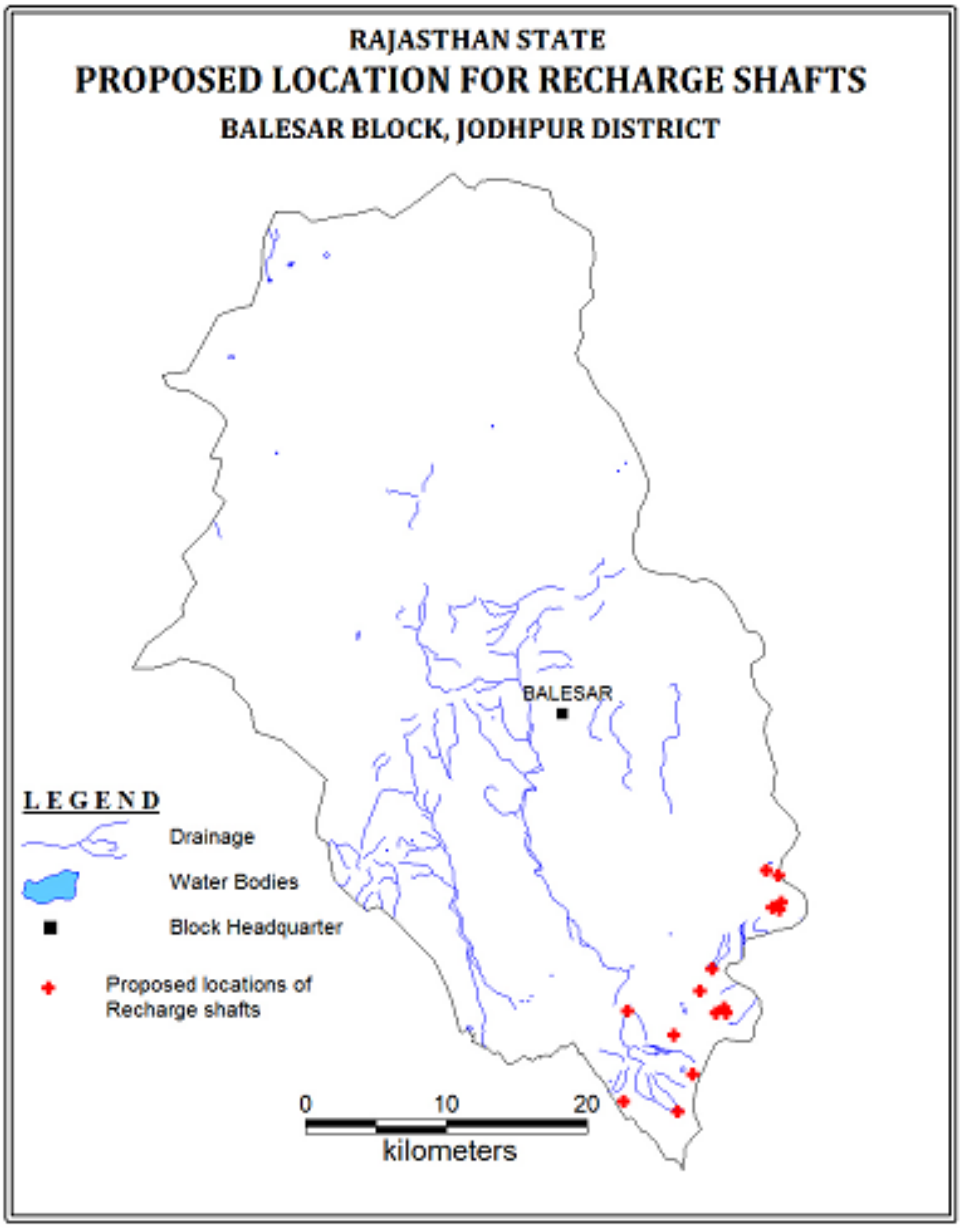


The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 10 and Table 3. The plan proposes construction of 18 recharges shafts/ wells in 15 identified existing village ponds at an estimated cost of 0.876 lacs.

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

S.N	Village	Long	Lat	Pond Area (Ha)	No of Shaft	Formation	Unit cost (Rs in lac)	Cost of Shaft (Rs in lac)
1	Bawarli	72.734	26.388	1.781	1	Soft rock	5	5
2	Bawarli	72.742	26.385	2.022	1	Soft rock	5	5
3	Ajeet Nagar	72.745	26.368	2.734	1	Soft rock	5	5
4	Ajeet Nagar	72.738	26.365	5.332	2	Soft rock	5	10
5	Ajeet Nagar	72.743	26.363	5.985	2	Soft rock	5	10
6	Bhatelai Purohitan	72.698	26.297	1.774	1	Soft rock	5	5
7	Bhatelai Purohitan	72.705	26.298	1.777	1	Soft rock	5	5
8	Moondsar	72.704	26.301	1.275	1	Soft rock	5	5
9	Vishnu Nagar	72.668	26.283	3.492	1	Soft rock	5	5
10	Tolesar Purohitan	72.695	26.326	5.279	2	Soft rock	5	10
11	Bhatelai Purohitan	72.687	26.312	1.615	1	Soft rock	5	5
12	Dugar	72.635	26.299	4.322	1	Hard rock	2.6	2.6
13	Surani	72.682	26.258	1.428	1	Soft rock	5	5
14	Surani	72.671	26.234	3.871	1	Soft rock	5	5
15	Surani	72.632	26.241	1.430	1	Soft rock	5	5
					18			87.6

Fig: 10


RAJASTHAN STATE
PROPOSED LOCATION FOR RECHARGE SHAFTS
BALESAR BLOCK, JODHPUR DISTRICT
BALESAR
LEGEND
Drainage
Water Bodies
Block Headquarter
Proposed locations of Recharge shafts
0
10
20
kilometers

Conservation Measures

As mentioned earlier the present Plan occurs on integrated approach of interventions, which includes both recharge measures as well as conservation of water while the recharge interventions have been discussed. The proposed conservation measures discussed below includes conservation of farm ponds, revival, repair of existing water bodies, etc.

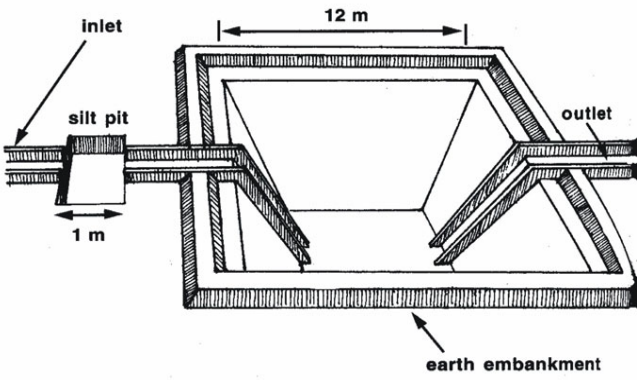
A. Farm Ponds

A farm pond is a large hole dug out in the earth, usually square or rectangular in shape, which harvests rainwater and stores it for future use. It has an inlet to regulate inflow and an outlet to discharge excess water. The pond is surrounded by a small bund, which prevents erosion on the banks of the pond. The size and depth depend on the amount of land available, the type of soil, the farmer's water requirements, the cost of excavation, and the possible uses of the excavated earth. Water from the farm pond is conveyed to the fields manually, by pumping, or by both methods. Pictorial diagram of farm pond is shown in fig 11.

Advantages of Farm Ponds

- They provide water to start growing crops, without waiting for rain to fall.
- They provide irrigation water during dry spells between rainfalls. This increases the yield, the number of crops in one year, and the diversity of crops that can be grown.
- Bunds can be used to raise vegetables and fruit trees, thus supplying the farm household with an additional source of income and of nutritious food.
- Farmers are able to apply adequate farm inputs and perform farming operations at the appropriate time, thus increasing their productivity and their confidence in farming.
- They check soil erosion and minimize siltation of waterways and reservoirs.
- They supplies water for domestic purposes and livestock
- They promote fish rearing.
- They recharge the ground water.
- They improve drainage.
- The excavated earth has a very high value and can be used to enrich soil in the fields, levelling land, and constructing farm roads

Excavated/dugout farm pond Fig 11



It is proposed to construct 2 farm ponds as per the specification of Govt. of Rajasthan (30 x 30 x 1.5 m). These farm ponds can accommodate about 0.1005 MCM of runoff rainfall considering 3 fillings. Farm ponds can be constructed in the village at feasible location. Dimension of the farm pond depends on land holdings.

B. Revival, repair of water bodies

The existing ponds and tanks in 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.

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. The monitoring system should be designed judiciously to monitor impact of these structures individually as well as collectively. Demarcation of the zone of influence of the artificial recharge structure is one of the main objectives of monitoring.

It is proposed to utilize the existing data available with the Government of Rajasthan and CGWB baseline data. For assessment of the impact of proposed measures additional data will be generated by construction of the piezometer at suitable and strategic sites.

It is proposed to construct 16 piezometer, at suitable locations for monitoring of water levels, in the vicinity of proposed recharge structure. The depth of the piezometer may vary from 60 to 80 mbgl. This will help in assessing the impact of the project implementation.

Since the implantation of the Plan involves institutional framework, it is proposed to constitute State Level Technical Coordination Committee (SLTCC) and District Level Technical Coordination Committee (DLTCC) for proper monitoring and review of the implementation of the Plan.

Financial Outlay of the Plan

The total estimated cost of the Plan is 1.2306 cr, which includes Rs 0.876 cr for ground water recharge activities, Rs 0.2 cr (Farm ponds), 0.096 cr for ground water monitoring (Piezometer construction) and Rs 0.0586 cr towards operation and maintenance

charges. The tentative cost estimates of the various activities of the Plan are shown in Table 4 & 5.

The tentative cost for different activities is given in table 5. The unit rates are as followed by the Govt. of Rajasthan (BSR). The total estimated cost of the project is **Rs 1.2306 Crores**.

Table 4: Cost of the recharge structures

Cost of Farm Pond in Rs (Unit cost Rs 0.1 cr)	Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)
0.2	Hard rock -0.876

Table 5: Tentative cost of different activities

Feasible Artificial Recharge & Water Conservation structures/ activities	**Tentative Design**	**Quantity (in nos. or area in sq. m)**	**Rainwater harvested (mcm)**	**Tentative unit cost (in Rs lakh)**	**Total tentative cost (in Rs lakh)**	**Expected Annual GW recharge/ conservation (mcm)**
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12" with filter pit	17	0.51	5	85	0.357
	Hard rock: Depth –60m, Dia 10-12"with filter pit	1	0.030	2.6	2.6	0.021
Sub total					87.6	0.378
Water Conservation Activities						
Farm Pond (3 fillings)	(30 m x 30m x 1.5 m) 900 sq.m or 0.1 ha	2	0.1005	10	20	0.07
Impact assessment & Monitoring						
Piezometer	Up to 80 m bgl	16		0.6	9.6	
Impact assessment will be carried out by implemneting agency						
O & M - 5% of total cost of the scheme					5.86	
TOTAL					**123.06**	

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

Time Schedule

The project is to be implemented in two years, however impact assessment will be carried out for five years**.** A time schedule for different activities is given in table 6.

Table 6: Time Schedule

Steps	1st phase	2th Phase	3rd Phase	4th Phase	5th Phase	6th Phase	7th Phase	8th Phase
Constitution of State Level Technical Coordination Committee (SLTCC) and District Level Technical Coordination Committee (DLTCC)								
Arranging meeting of SLTCC for provision available under the scheme, request to implementing agencies for submission of DPR Scrutiny, recommendations & approval of AR Projects / Schemes in DLTCC & SLTCC Forwarding the DPR to Central Ground Water Board (CHQ), New Delhi for approval and issuing of sanction from the Ministry Meeting of TCC(CHQ) and release of sanction of funds								
Construction of artificial recharge structures & Monitoring of water levels in the area locally								
Completion and Utilisation certificate								
Impact Assessment and submission of report								

Expected Benefits or outcome of the Plan

Ground water recharge and water conservation Plan of Balesar block, Jodhpur envisages gainful utilization of 0.378 MCM of surplus monsoon runoff for recharging of depleted aquifer system. Besides this, the proposed intervention would also lead to reduction of pre-existing ground water draft by 0.07 MCM annually through construction of farm ponds.

With the additional recharge and water conservation interventions as proposed in the Plan, it is anticipated that with enhanced recharge and reduction in ground water draft, the stage of ground water development will reduce to 214.32% from the existing 218.13%. The projected status of ground water resources and utilization scenario is presented in table 7.

Table 7: Projected Status of Groundwater Resource & Utilization

Net G.W. Availability (Ham)	Additional Recharge from RWH & conservation (mcm)	Total Net G.W. Availability after intervention (mcm)	Existing G.W Draft for all purpose (mcm)	Saving of Ground water through projects (mcm)	Net GW draft after interventions (mcm)	Present stage of G.W. development (%)	Projected stage of G.W. Dev. (in %)
23.0749	0.378	23.4529	50.3342	0.07	50.2642	218.13	214.32

- The implementation of the project would result in additional recharge. The other tangible/ non-tangible benefits of the project are:

- Recharging the ground water will help in arresting the rapid decline in ground water resources and will also ensure improvement in quality of ground water by way of dilution.
- Proposed structures and measures will also enhance the ground water potential and would ensure sustainability of ground water resources.
- Surface runoff water stored or harnessed can be used as supplemental irrigational resources and will reduce the stress on the ground water.
- Besides, it will also help in reducing the amount and spate of storm water being drained by river and controlling soil erosion.