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The Study of the Groundwater Problem Is Particularly Relevant in the Alwar Region

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Abstract – Water covers all aspects of life. Access to clean water and sanitation can quickly turn problems into power - empower people during school and work, and contribute to improving the lives of women, children and families around the world. water has emerged as a strategically important resource due to its growing demand for agriculture, domestic and industrial use. its adequate and adequate provision is essential to provide stability in food production and social independence. Increased demand for water has encouraged the development of groundwater supply. Various development projects over the years have adversely affected the state of the groundwater system in government. There is a need for scientific planning in groundwater construction under a different hydrogeological environment and to change the effective methods of public participation in better groundwater management. groundwater systems, which will help meet the shortage of drinking water, improve irrigation facilities and stabilize water resources in the province.

Keywords : - Hydrogeology, Ground Water in Hardrock, Ground , Ground water in unconsolidated sediments, Water Level Status, Deep to Water Level - post Rain Time (Nov-2011), Seasonal Water Level Variations (May-Nov. 2011), Water Level Trend (2000-11), Groundwater Resources, Groundwater Development Status, Groundwater Management Strategy, Water Conservation and Charging Installation, Water Issues and Problems, Higher Awareness and Training Services And Suggestions.

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INTRODUCATION

Water has emerged as a strategically important resource due to its growing demand for agriculture, domestic and industrial use. its adequate and adequate provision is essential to provide stability in food production and social independence. Increased demand for water has encouraged the development of groundwater supply. Groundwater has emerged as a major source of irrigation water in areas where high irrigation (Canal) is insufficient or expensive. Groundwater is a potential source of change. It is a resource for the lake and is approved as a Treasure for all management.

Various development projects over the years have adversely affected the state of the groundwater system in government. There is a need for scientific planning in groundwater construction under a different hydrogeological environment and to change the effective methods of public participation in better groundwater management. In view of the emerging challenges in the province's groundwater sector there is an urgent need for comprehensive and accurate information on the various aspects of groundwater resources available at various hydrogeological sites through the process of systematic data collection, integration, data processing, analysis and synthesis. Therefore, aquifer mapping and learning area management is an hour requirement.

Course range: -

Aquifer Map can be understood as a scientific process in which a combination of geological, geophysical, hydrological & chemical fields and laboratory analysis is used to reveal the quantity, quality and stability of groundwater in aquifers. Aquifer mapping is expected to improve our understanding of the geological structure of the aquifer, its hydrologic features, the water level in the aquifer and how it changes over time and space and the potential for environmental and anthropogenic pollution affecting groundwater availability. The results of these studies will contribute significantly to resource management tools such as long-term aquifer monitoring network and groundwater flow models used by planners, policy makers and other stakeholders. Proper mapping of Aquifer can assist in the preparation, implementation, and monitoring of various interventions aimed at sustaining the long-term sustainability of our precious groundwater systems, which will help meet the shortage of drinking water, improved irrigation facilities and sustainable water resources in the province.

How and How It Works: -

Aquifer mapping is an attempt to integrate the field of geological, geophysical, hydrological & chemical and laboratory analysis and is used to highlight the quality, quantity and sustainability of aquifer groundwater. Under the National Aquifer Program, it is proposed to produce Aquifer Maps at a scale of 1: 50000, which aims to diversify the geometry of the aquifer, the performance of groundwater levels and the state of groundwater development in various aquifer systems to facilitate proper planning. Major tasks involved in this process include data integration, data identification, data acquisition and data processing of different aquifer layers. The flow chart is as follows

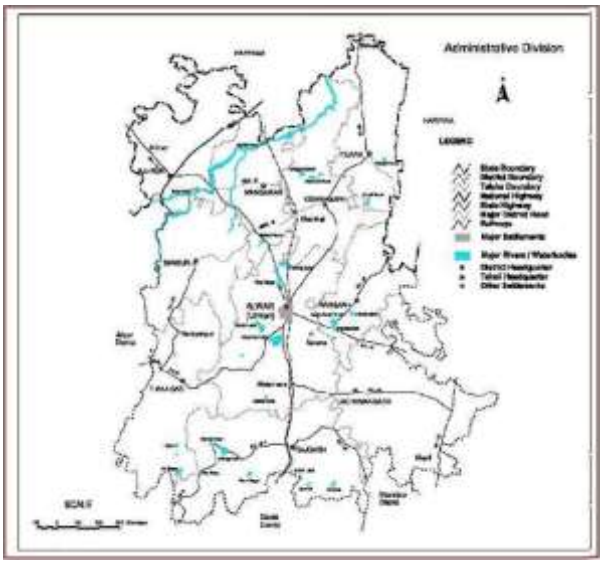
Location:-

The Alwar region is located in the northeastern part of Rajasthan and extends between latitude north 27 ° 03 'and 28 ° 14' and eastern length 76 ° 07 'and 77 ° 13'. It covers an area of 8720 sq. Km. Km. Its length from south to north is about 137 km and its width from east to west is about 110 km. The region occupies approximately 2.45% of the total area of the State.

As an administrator, the region is divided into 12 sections and 12 tehsils (Alwar Bansur, Behror, Kathumar, Kishangarh Bas, Kotkasim, Laxmangarh, Mandawar, Rajgarh, Ramgarh, Thanagaz and Tijara) and 14 blocks (Bansur, Behror, Kathumar, Kishangarh Bas, Kotkasim, Laxmangarh, Mandawar, Neemrana, Rajgarh, Ramgarh, Reni, Thanagaz, Tijara and Umrain) (Figure 1). The region has 2054 areas (including 2021 planned and 33 unhabited), 9 urban towns and 6 Municipalities.

According to the 2011 population, the district population is 3674179 including 1939026 (52.77%) male and 1735153 (47.23%) with a population of 438 / sq.km. The population in rural areas is 3019728 (82.19%) and 654451 (17.81%) in urban and gender groups with an average female population of 895 per 1000 men. Population growth in rural and urban areas between the 2011 to 2001 censuses was recorded at 15.30% and 33.54% respectively. A regional map showing taluka borders, taluka headquarters, visual features and locations of surveillance sources presented as

Fig. 1. Location & Administrative Map



Climate and Rainfall:

The climate of the region can be classified as arid. It is characterized by very hot summers and very cold winters and good rainfall during the southern and western seasons. In May and June, temperatures could rise to 47 Degree Evapotranspiration exposure rates are very high especially in May and June. The average annual rainfall of the region is 631mm. The monthly distribution of normal rainfall, actual and monthly rainfall during the 2010-2011 season is given in Tables 1 to 3 respectively (Commission rate of Agriculture, Govt. of Rajasthan, 2012).

Table 1: Month-wise Normal Rainfall of Alwar

District	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alwar	9.6	10.2	5.6	5.5	15.8	44.2	196.9	213.3	100.9	20.0	4.1	4.8	630.9

Table 2: District-wise actual rainfall during 2010-2011

District	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Alwar	40.4	214.2	272.5	233.0	3.6	21.8	4.5	0.0	44.0	0.0	0.0	21.0	855.0

Table 3: District-wise actual seasonal rainfall during 2010-2011

District	Annual Normal	June 10 - Sep 10	Oct 10 - Dec 10	Jan 11 - Feb 11	March 11 - May 11	Total (Jun 10 to May 11)
Alwar	630.9	760.1	29.9	44.0	21.0	855.0

(Source: Rajasthan Agricultural Statistics at a Glance, 2010-2011)

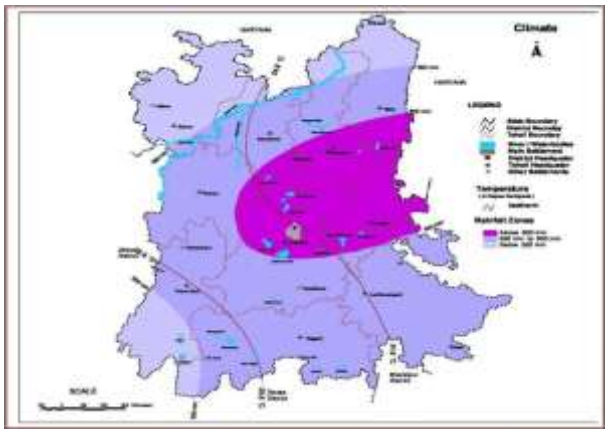


Fig. 2. Climate and Rainfall

OBJECTIVES

The following objectives have been considered for study.

1. To study causes of groundwater depletion.
2. To study differentiate the groundwater and rainwater.
3. To suggest possible measures for improving groundwater level.

HYPOTHESIS

The following hypothesis is being examined or tested through an analysis of facts in this paper.

1. Due to population growth groundwater level is decreasing.
2. Water stress exists in the study area for extended periods irrespective of the time of the year.

Data Availability:-

Various water related data. Water quality, testing, aquifer boundaries, quality, resources and more done by CGWB to date have been used in the local aquifer mapping system and the same consistent data for the World Water Department, Government. of Rajasthan is deliberately compiled. CGWB assessed the willingness of aquifer geometry and aquifer parameters to determine aquifer quality through the construction of 54 test springs, six holes and 30 piezometers in the region as of March 2016. Groundwater water monitoring was conducted at 37 stations standalone / various hydrogeolgical hydrograph settings to detect changes in water level over time and location and groundwater quality.

To reduce the data gap, fixed data available for GWD groundwater, Govt. of Rajasthan was compiled and used to create an aquifer map. Data for 86 holes has been compiled. Estimates of groundwater resources were made in collaboration with GWD, Govt. of Rajasthan and was approved by the State Level Coordinating Committee under the chairmanship of the Secretary General (PHED & GWD), Government. kaRajasthan.

Hydrogeology: -

The Alwar region is heavily covered with rocks of Delhi Super Group with small areas under the Bilwara Super Group and Post Delhi Intrusives in areas under Quaternary alluvium. A map showing hydrogeological features is shown in Figure: - 3 Groundwater availability in the region is largely controlled by geographical features, physical features and geological features present in the geological make-up. Groundwater in the area arises under confined conditions in phreatic areas, low confined conditions in deep areas and rocky sections.

Ground Water in Hardrocks

Groundwater occurs under excavated conditions in spaced sections with joints, fractures and plains of structural weaknesses found in hard rocks. In the region solid rocks are divided into granite, gneiss, schist of the Bilwara Super group and quartzite, crude limestone, phyllite, granite and pegmatite of Delhi Super Group. The flow of groundwater in these rocks is controlled by the environment, the openness of the size and the continuity of the joints and the cracks in it. It does not form an important structure for carrying water other than broken and broken quartzite in areas. Sources on solid rock usually produce 50 to 70 m3 / day for all types of rocks. Schist, phyllite and its variants form very bad aquifers bringing 10 to 30 m3 / day of hydydyddown.

Broken quartzite found in Karoli and Kala Pahar produces between 80 to 200 m3 / day. Excavated mineral springs limestone crystals around Bairawas and Kushalgarh produce 80 to 100 m3 / day reduction of 4 to 5 m in the limited area. Sources limiting cavernous limestone near Fatehpur produce 200 m3 / day for a reduction of less than -9 m.

Ground water in unconsolidated sediments

About 60% of the region's area is covered by Quaternary remains above solid rock. Groundwater occurs under conditions of underwater in shallow rivers and under conditions that are slightly enclosed in a deep aquifer, which is a large body of water.

Production of open irrigation wells (2 to 4 m wide), distance between 40 and 300 m3 / day with a drag of 1 to 6m. The yield of the springs mainly depends on the aquifer content and to a certain extent in the depth of the springs. Borehole boreholes are the most common drainage structures used for irrigation. Resource production in the area around Kot kasim,

Tijara, Bindusi and Tapukra varies from 10 to 45 m3 / hour.

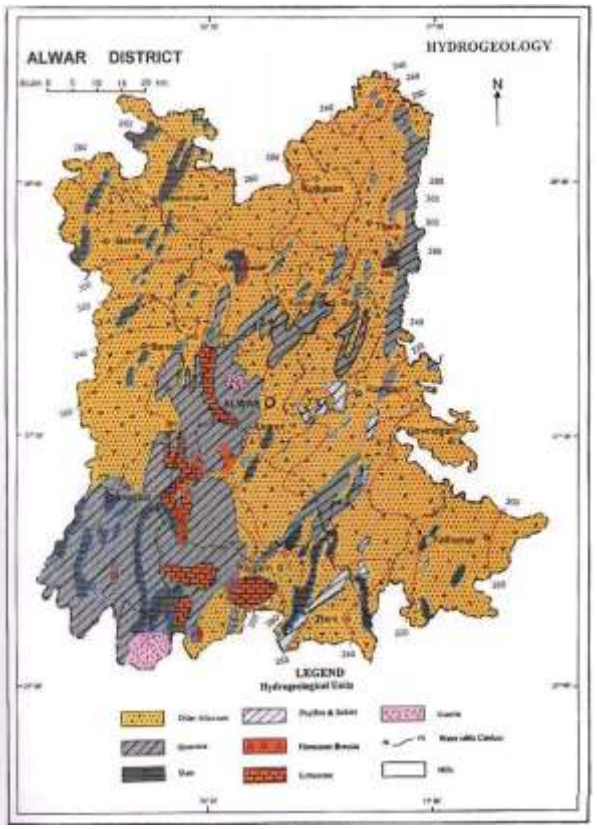


Fig. 3. Hydrogeology

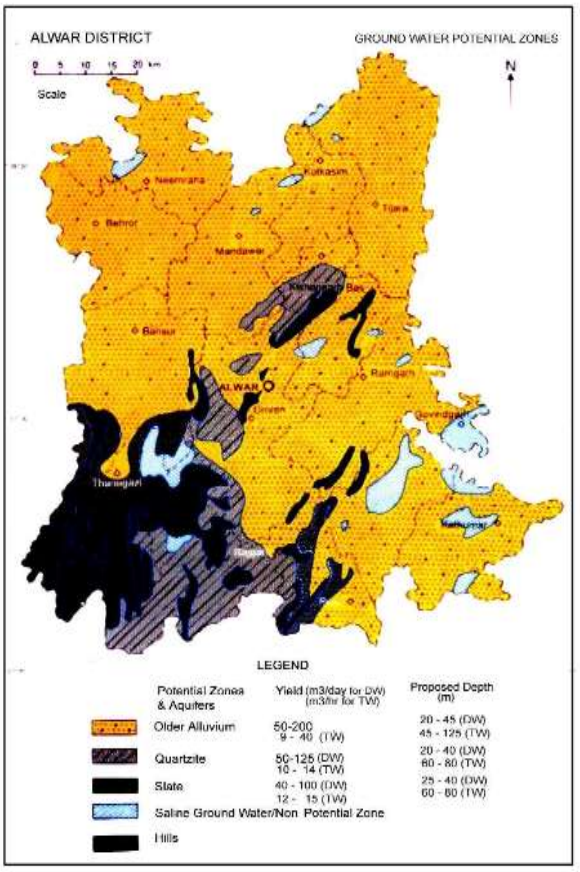


Fig. 4. Ground water potential zones

In Sabi river basin, the yield of dug cum bore wells ranges from 100 to 300 m^3/day for a small drawdown and these sustain pumping for more than 10 or 12 hours continuously. Dug cum bore wells around Bansur yield between 500 & 800 m^3/day. Ground water potential zones in the district are depicted in Fig. 4.

Water Level Status

The Central Ground Water Board regularly monitors National Hydrograph Network Stations (NHNS) in the Alwar region, four times a year ie January, May (Premonsoon), August and November (Postmonsoon).

Depth of Water Level - Pre-Rain (May 2011)

Depth of water level varies depending on the location, water pipe, bed rock, soil structure etc. In May, 2011, shallow water depths of less than 10m were observed in parts of the Rajgarh, Tijara and Laxmangarh (Govindgarh (Govindgarh) blocks and a water level of 40m is seen in the Belor and Nimrana blocks. 40 m bgl (Figure 5).

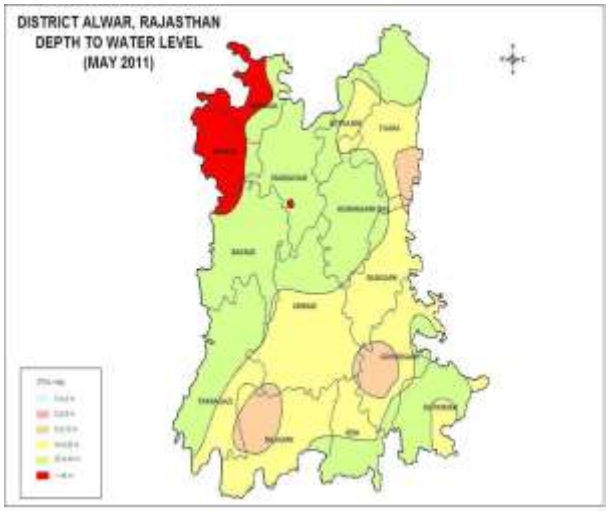


Fig. 5. Depth to Water Level during pre-monsoon (May), 2011)

Deep to Water Level - post Rain Time (Nov-2011)

In November, 2011, water depths of less than 10m were identified in parts of the Rajgarh, Laxmangarh (Govindgarh) blocks and water depths of more than 40m can be seen in the Behror and Nemrana blocks. For the most part the depth of the region to the water level varied from 10 to 40 m bgl (Figure 6).

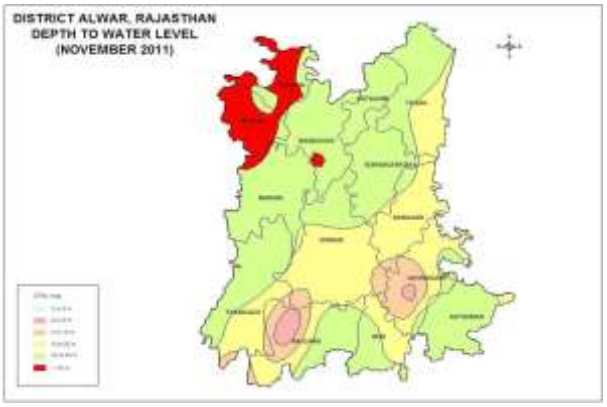


Figure 6. Depth of Water Level in the Post-Rain Time (November, 2011)

Seasonal Water Level Variations (May-Nov. 2011)

Seasonal fluctuations in water levels from Pre (May) - and Post (November) - Monsoon, 2011 indicate an increase in water levels during the rainy season in most parts of the region (Figure 7). Flexibility map changes also show that in key parts of the blocks in Tijara, Kotkasim, Rajgarh and Reni, a decrease in water level of more than four meters has been observed between pre- and post-rain fluctuations.

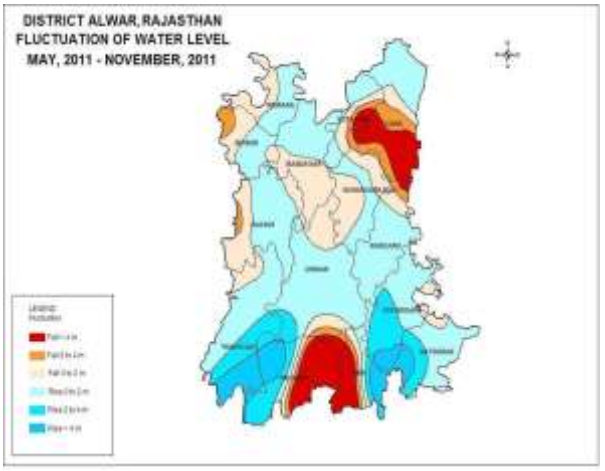


Fig. 7. Water level fluctuation (May – Nov. 2011)

Water Level Trend (2000-11) :-

Analysis of pre-rainwater data (2002 - 2011) shows that groundwater in most parts of the region has decreased by 25cm / year (Figure 8). A decrease of 25 to 50cm / year is also recorded in the northwestern part of the Nimrana block. An increase in practice of up to 25cm / year has been observed in the southern part of the Rajgarh, Reni and Thanagazi, Umrain, Laxmangarh and Kathumarblocks districts.

Figure 8. Prevalence of precipitation water level (2002-2011)

Groundwater Resources

The Central Ground Water Board and the Department of Groundwater, the Government of Rajasthan equally estimate the groundwater resources of the Alwar region based on the GEC-97 process. The same is presented in Table 4. Groundwater resources and groundwater net availability in the region are estimated at 869.51 mcm and 794.82 mcm respectively. The annual groundwater management framework for the region is estimated to be 1323.87 mcm for the total groundwater development phase by 167%. At Behror, Kotkasim and Reni block, the groundwater development stage exceeds 200%. All blocks in the

region are overused. Table 4: Block wise Ground Water Resources (March 2009).

Block	Total Annual Ground Water Recharge	Net Annual Ground Water Availability	Gross Ground Water Draft For Irrigation	Gross Ground Water Draft For Dom. & Ind. Use	Gross Ground Water Draft For All Uses	Stage of G.W. Development	Category
	(mcm)	(mcm)	(mcm)	(mcm)	(mcm)	(%)	
Behror	44.7197	40.2477	92.8122	7.9526	100.7648	250	OE
Bansur	83.2123	74.8911	121.3080	4.4822	125.7902	168	OE
Kathumar	54.6763	49.2087	82.4850	4.0460	86.5310	176	OE
Kishangarh	68.1011	64.4866	90.6240	7.3018	97.9258	152	OE
Kotkasim	46.7175	44.3816	87.0150	4.0752	91.0902	205	OE
Laxmangarh	89.1768	84.7180	81.9300	2.9456	84.8756	100	OE
Mandawar	75.5847	68.0262	123.9060	3.6190	127.5250	187	OE
Neemrana	41.5470	37.3923	59.8830	4.8060	64.6890	173	OE
Ragarh	35.47	33.2298	50.4030	4.8731	55.2761	166	OE
Ramgarh	78.2819	70.4537	108.1860	4.3753	112.5613	160	OE
Reni	19.40	18.4335	40.3890	2.1283	42.5173	231	OE
Thanagazi	56.39	50.7467	53.0070	5.1020	58.1090	115	OE
Tijara	82.0111	73.8100	117.0150	7.2533	124.2683	168	OE
Umrain	94.2200	84.7980	122.8650	29.0825	151.9475	179	OE
TOTAL	869.5087	794.8239	1231.8282	92.0445	1323.8727	167	OE

Groundwater Development Status:-

The regional groundwater development rate is 167% from 31.03.2009. All blocks have a water development stage of less than 100% ranging from 100% (Laxmangarh block) to 250% (Block block) and these are classified as Overexploited.

Groundwater availability in the region is estimated at 795 mcm. The draft for all uses is 1324 mcm. Of these 1232 mcm is used for irrigation and 92 mcm is used for industrial / domestic needs. There are currently 89,363 wells and boreholes / watering tubes and 1024 tubewells, 17,599 hand pumps and 2687 stolen wells for domestic and industrial use. Rainfall in the region is a major source of groundwater regeneration. Due to reduced rainfall and increased groundwater retention rates groundwater levels are declining. As a result, groundwater levels are also declining. High salt is seen in the blocks of Laxmangarh, Kotkasim and Ramgarh.

Groundwater Management Strategy:-

Due to population pressures and improved living standards, the demand for clean water for agriculture and domestic use has grown exponentially. Since groundwater is only available for a limited period of time the groundwater retraction has increased dramatically. The surface layer of groundwater is also declining every year. The recycling process is a way to restore depleted water storage, reduce quality degradation and restore the functionality of many underground drainage structures.

Groundwater Development:-

The level of groundwater development in all blocks in the region has exceeded 100%, indicating that the magnitude of groundwater development is already depleted in all blocks and blocks are classified as "Overused". There is no room for continued development in the region through irrigation or industrial use. However, the experimental drill can be inserted into the test area to measure aquifer boundaries. There is a need to regulate and control the development of groundwater in all blocks in the region. Behror block was notified on 2/12/2006 by Ground Water Regulation and Development by the Central Ground Water Authority.

Water Conservation and Charging Installation:-

Irrigation in this area is mainly done by groundwater namely wells and bone springs. The irrigation capacity created by the irrigation project has a low level of being low rainfall and high level of elevation. Cuts, tanks and test pools are water storage structures on top of these and these structures add energy to fill the bodies of water during the rainy season. Rainwater during the rainy season can be used for regeneration by various techniques found in hard rock areas. In hard rock areas nala bunding and anicuts, dug wells, percolation tanks etc. they are usable structures that can be used to regenerate groundwater.

In a larger area following renewal strategies can be used.

- Up / horizontal rainwater harvesting site for regeneration in urban and industrial water.
- Domestic water runs / floods rainwater by digging wells and a percolation tank in rural areas
- Construction of refill beams with gabian structures in Nalas.
- Recharge with good drilling / percolation hole in the agricultural sector
- However, prospects for re-use in hard rock areas are less promising. Therefore, the combined use of surface and groundwater should be considered. In such a case the combined land supply with groundwater for irrigation is much more reliable than in the case of small aquifer conservation, and it is highly comparable to the supply of surface water only.

The difficulty of the artificial refill option is combined with the following problems:

- An area experiencing severe water shortages and even domestic consumption, it is an urban area in the west, located part of the Aravali range. A water source where it is present throughout the small stem and part of the need is met by springs in solid rock, usually of poor drainage. For all practical purposes, artificial refill in this area may not be successful.
- The southeastern aquifer, south and east of the extinct Ruparail course, forms a salinity, similar to that in central Banganga in the east and south. Although replenishment of areas upstream of the lake may delay the process of degradation and control the expansion of the

area to the west, it will not change the basic situation. In other words, any recycled fresh water that reaches this area will be amazed.

► In Sabi village a refilling system with small streams spread out will be the best and most effective solution for an undisclosed canals network

► reducing local effects, such as water quality reductions, and ensuring the distribution of recycled water to the aquifer throughout the wider area.

► In the CGWA program, some of the industries in Bari, Chopanki, Kushkera, MIA, Neemrana etc. have adopted a renewal program by repairing / removing silk / increasing the reservoir capacity of village ponds to make water available to man, livestock and biological needs.

Water Issues and Problems:-

Water timing data (pre monsoon 2002-2011) showed a decrease in water trend in most parts of the region. All blocks fall under the Overseas category, which requires the control and control of groundwater extraction by blocking information and prioritizing restrictions on the construction of groundwater drainage structures except in critical circumstances.

The blocks in Laxmangarh and Kotkasim are affected by the salinity problem of groundwater. In addition many areas in the region have a problem with fluoride contamination in groundwater.

Higher Awareness and Training Services:-

The Central Ground Water Board is organizing Awareness Programs in various parts of the state to educate local people about the status of groundwater and the need for water conservation and rainwater harvesting. Another Mass Awareness Program was organized at Behror during 2001-2002. In addition, 3 Water Management Training Programs were conducted in 2003-04, 2004-05 and 2011-12 in Alwar, Behror and Nemrana respectively.

SUGGESTIONS:

√ Water drafts on the floor are very high in blocks. The groundwater development rate in the region has reached 167% due to indiscriminate use. It must be controlled by preventing further development.

√ The revitalization of the traditional Baori rainwater harvesting system, open wells, tanks etc. to conserve rainwater for daily use will reduce groundwater recycling.

√ A rainwater harvesting awareness program will be useful to monitor water decline and efficient use.

√ To replace the uneven terrain of rock solid rock water harvesting systems or clay dams, irrigation canals in appropriate areas can be built to store rainwater. This will increase the replenishment of groundwater which eventually produces fruit growth.

√ Modern agricultural management practices must be adopted and fully utilized in the water resource

√ Plants that need high water should not be discouraged. Appropriate agricultural extension services should be provided to farmers so that they can look for other less expensive aquatic plants.

CONCLUSION

Water timing data showed a decrease in water trend in most parts of Alwar district. All of these blocks fall under the Overseas category, which requires the control and control of groundwater extraction by blocking information and prioritizing restrictions on the construction of underground drainage structures without significant offenses. By increasing groundwater levels in the Alwar region it is necessary to create water storage facilities, rehabilitation of old buildings, water development, water negotiations and water harvesting activities should be done for transformers through schmes of various departments and activities should be carried out with public participation.

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