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Groundwater Management: A Case Study of District Shopian

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ABASTRACT

Water is a natural resource and a blessing present on the earth. It is the water that makes our planet special as it is responsible for the existence of all forms of life. The water may be present on the earth's surface, in the atmosphere or below the earth's surface. The water present below the earth's surface is called as groundwater. Groundwater water has attained a great attention in present day life as the surface water bodies are getting polluted day by day due to various activities. But the overexploitation of groundwater has led to the decline in the quantity of groundwater. Thus, the need of the hour is the proper management of groundwater resources for sustainable development. The present day study focus on the groundwater management plan in district Shopian base on parameters like Groundwater potential of area, quality, artificial recharge site etc.

Keywords: Groundwater management; Groundwater potential; district Shopian

INTRODUCTION

Groundwater management is a process that aims at the sustainability of groundwater to benefit each and every stakeholder involved in its usage. Its assessment and development is essential for ensuring sustainable water supplies to domestic, agricultural and industrial sectors along with the ecosystems. With the ever growing usage of groundwater throughout the globe along with the lack of management of groundwater basins, there is a continuing need to manage this prime resource efficiently so as to ensure sustainable groundwater development. The recent concept of water management says that surface water and groundwater are integrated resources, and hence they should be managed together. This concept must be employed in practice for efficient water resources management at a local, regional or national scale.

Groundwater management comprises planning, implementation, and operation necessary to deliver safe and reliable groundwater supplies. This demands groundwater management at a basin scale. Groundwater management objectives normally emphasis on aquifer yield, recharge, and water quality(i.e., groundwater quantity and quality) as well as on socio-economic, legal, and political factors. After the suitable assessment of available water resources in a basin and the preparation of alternative management plans, action decisions can be made by concerned government or public agencies. The formal groundwater management tactics, though generally more important for large-scale development, can also be applied to smaller-scale projects or even individual well projects (Roscoe Moss Company, 1990).

Proper management of groundwater basin deals with renewability of the groundwater resource and its practical utilization. The concept of safe yield is one of the earliest approaches to analysing groundwater yields which is associated with the amount of groundwater supply that a water user can depend upon (Todd, 1980; Fetter, 1994; Schwartz and Zhang, 2003). Safe yield is described as the ratio of groundwater withdrawal from a basin for consumptive use over an indefinite period of time that can be maintained without producing negative effects on groundwater quantity, quality or environment. The objective of the safe yield is to achieve a 'long-term balance' (e.g., annual) between groundwater use and groundwater recharge in a basin so as to avoid groundwater depletion. The safe-yield goal is not to prevent pumping and use of groundwater, rather to limit pumping to the amount of groundwater that can be securely withdrawn each year. A few rules of thumb regarding safe yield are (Schwartz and Zhang, 2003): (i) the annual extraction of groundwater should not exceed the average annual recharge, (ii) the extraction of groundwater should not lower the groundwater level so that the permissible cost of pumping is exceeded (i.e., pumping becomes uneconomical), (iii) groundwater pumping should not lead to an unwanted deterioration in the quality of groundwater due to influx of contaminants, and (iv) groundwater pumping should not result in land subsidence. Even though the idea of 'safe yield' is widely used as a groundwater management tool, it has been criticized by some groundwater experts for not taking surface water into consideration.

Materials and Methods

1.1 Study area

District Shopian was previously known as 'Sheen-e-van' meaning 'forest of snow'. Frederic Drew, a famous traveller and geologist gave it the name "SHAHPAYAN" meaning 'Royal Stay'. Shupain was one out of six Wazarat Headquarters in Kashmir from 1872-1892 A.D. The district possesses a geographical area of about 612 sq. kms including 229 villages and has a population of 2.66 lac as per census 2011. The district falls in Survey of India toposheet nos. 43K/13,43K/14 and O/1 and is located between 33°29' to 33°50' North latitude and 74°32' to 75°5' East longitude with an average elevation of 3042 meters amsl. The location map of the study area is shown in figure 1.1 below. It is situated towards southwest of summer capital of J&K state, Srinagar, at a distance of 51 km. The district shopian has Budgoam in northeast, District Pulwama in north, District Anantnag in east and District Kulgoam in southwest. The mighty Pir Panjal Range separates district Shupain from District Rajouri and Poonch.District Shupain is connected with its neighboring Districts and other places of Kashmir Valley by all-weather motorable roads. The district has the privilege of having the "Holy Relic" of Prophet Mohammad (SAW) at Khankah Pinjoor.

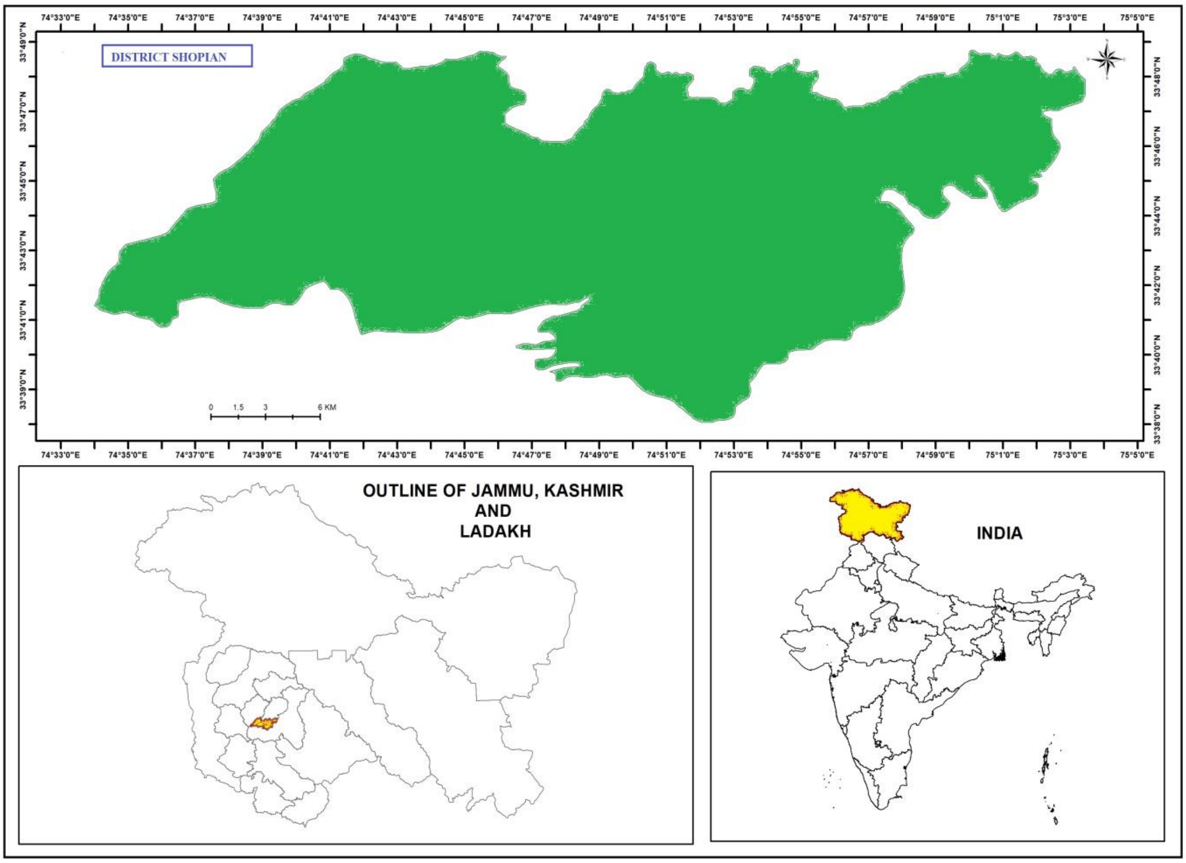

Fig 1.1 Location map of district Shopian

1.2 Methodology

In the present study after isolation of groundwater potential zones, artificial recharge zones and groundwater quality assessment in the study area, the following prioritization and ranking was given to all seven tehsils namely. Bargugh, Chitragam, Hermain,Keller, Keegam, Shopian and Zainapora based on groundwater availability, rainfall, groundwater quality and population. The tehsil map of the district is given in the figure 1.2 below. After area prioritization was carried out, the suitable artificial recharge structures were recommended for proper management of groundwater resources in the study area. Based on the range of values each region acquired (table 1.1) the locations were classified into deficient areas, moderate areas and optimum areas..Based upon the importance and intensity of these parameters towards groundwater management, these are ranked into high, moderate and poor and weightages assigned are 3, 2, and 1 respectively (Table 1.1). Table 1.2 shows the classification based on range value of selected study areas. Finally, based upon the cumulative weightage the locations are classified as optimum areas, moderate areas and deficient areas.

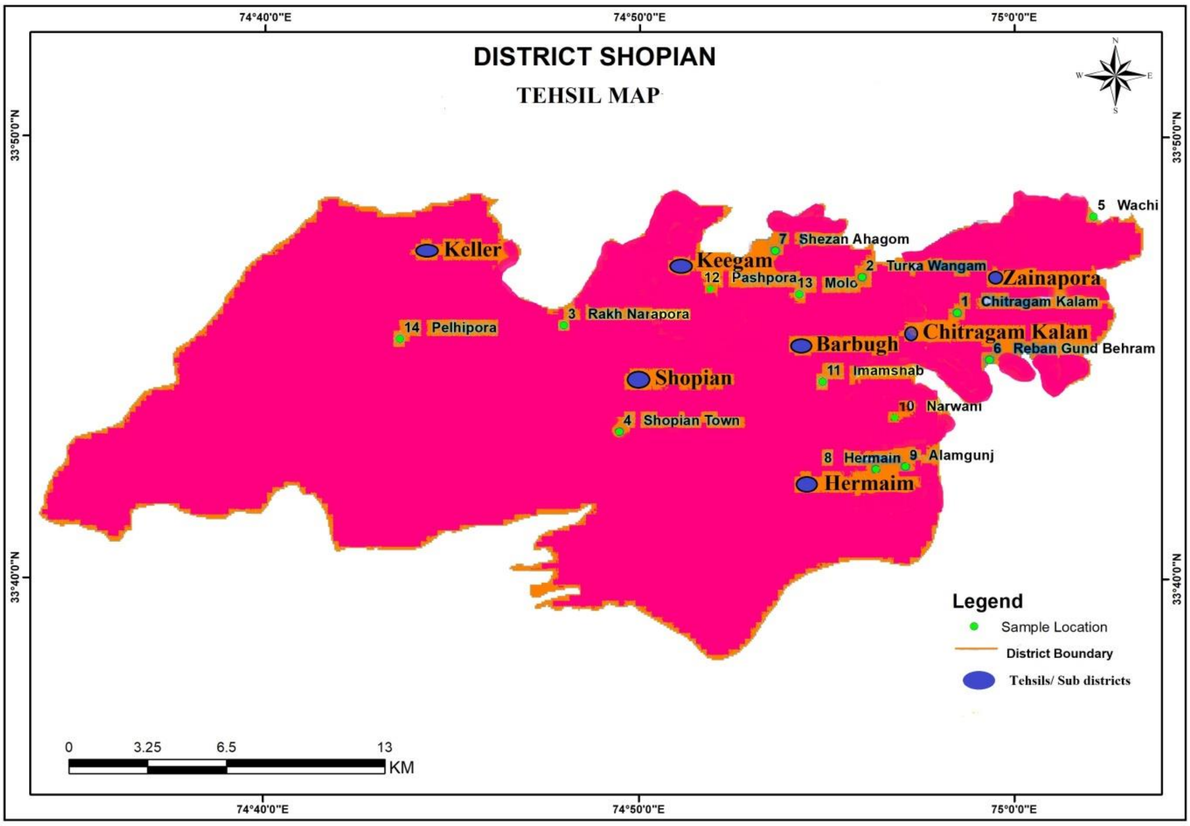

Fig. 1.2 Tehsil (Sub district) Map of district Shopian

Table 1.1 Prioritization table of selected study areas

Name Of the Location	Rainfall	Groundwater Potential	Artificial Recharge	Ground Water Quality	Population	Prioritization
Barbugh Tehsil	Moderate (2)	Moderate (2)	Moderate (2)	Good (3)	Moderate (2)	**11**
Chitragam Tehsil	Moderate (2)	Poor (1)	High (3)	Poor (1)	Moderate (2)	**9**
Hermain Tehsil	High (3)	Poor (1)	Moderate (2)	Good (3)	Moderate (2)	**11**
Keegam Tehsil	Moderate (2)	Good (3)	Moderate (2)	Moderate (2)	Moderate (2)	**11**
Keller Tehsil	High (3)	Moderate (2)	Moderate (2)	Poor (1)	Moderate (2)	**10**
Shopian Tehsil	High (3)	Moderate (2)	Moderate (2)	Good (3)	High (3)	**13**
Zainapora Tehsil	Moderate (2)	Moderate (2)	High (3)	Poor (1)	Moderate (2)	**10**

Table 1.2 Classification based on range value of selected areas

S.NO.	CATEGORY	RANGE	LOCATION COVERED
1.	**High**	13-15	Shopian tehsil
2.	**Moderate**	10-12	Zainapora tehsil, Keller tehsil, Keegam tehsil, Harmain Tehsil and Barbugh tehsil
3.	**Low**	6-9	Chitragam Tehsil

Results and Discussion

The entire study area was divided into three main Categories and based on the Boolean Logic Principles artificial recharge structures were recommended for study sites. The three main identified categories and the areas falling under these zones are as :

- **Optimum Area**

It is the area having the priority ranks ranging from 13-15, which shows that all the four parameters are in high category ranking. The Shopian tehsil of the study area falls in this category. The management in these areas requires less as they possess good total potential as compared to others. However, care should be taken keeping in view various parameters to maintain the optimum level for long term sustainable development.

- **Moderate Areas**

The priority ranks in these areas ranges from 10-12. The areas like Zainapora tehsil, Keller tehsil, Keegam tehsil, Harmain tehsil and Barbugh tehsil of the study area falls in this category. These areas require more attention in order to bring them to optimum level for sustainable development.

- ➢ For these areas, conservative measures such as check dams, percolation tanks, recharge pits, contour bunding and Farm ponds may be constructed at suitable places.
- ➢ Measures together with artificial recharge in these areas may increase the groundwater quality and quantity.
- ➢ The afforestation programmes may be intensively taken up in these areas through public awareness. The government and nongovernment agencies should work together to bring these to these areas to optimum level for sustainable development.

- **Deficient Areas**

These areas possess priority ranking ranging from 6-9. The Chitragam tehsil of the study area falls in this category. These areas require high attention to bring them to the optimum level for sustainable development. The water sources from optimum areas may be diverted to these areas to improve the water scenario (surface and groundwater) for sustainable development.

Based upon the criteria set by Boolean logic principle the following recommendations for artificial structures as conservation measures in the moderate and deficient areas of the study area have been suggested as shown in table .1.3.

Table.1.3 Recommended Groundwater Recharge Structures in moderate and deficient areas of the study area

S.No.	Proposed Control Measures	Proposed Area
1.	Percolation Tanks, Roof Top Rain Water Harvesting, Contour Bunds	Tehsil Keller, Keegam, and Hermain
2.	Check Dams and Percolation Tanks	**Tehsil Zainapora and Chitragam**
3.	Recharge-Cum-Discharge Wells and check dams	**Tehsil Barbugh and Zainapora**

Conclusions

The present day study revealed that in the district Shopian the Chitragam tehsil of the study area falls in the deficient area category having priority ranking in between 6-9. These areas require high attention to bring them to the optimum level for sustainable development. The water sources from optimum areas may be diverted to these areas to improve the water scenario (surface and groundwater) for sustainable development. The areas like Zainapora tehsil, Keller tehsil, Keegam tehsil, Hermain tehsil and Barbugh tehsil of the study area falls in moderate area category that also needs attention to bring them to the optimum category. All the tehsils of the Shopian district requires special attention with regards to groundwater management for sustainable development.

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