

## **GEOGRAPHICAL ANALYSIS OF IMPACT ASSESSMENT OF GROUND WATER: TARANAGAR BLOCK, CHURU DISTRICT, RAJASTHAN**

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**Abstract:** *Our ancestors were very careful about the harvesting of rain-water and conservative use of ground water. But with the expansion of population volume and consequently enhanced use of ground water for drinking, industrial and irrigation purposes, the balance of ground water recharge and exploitation has lost its existence. The result has been reflected in the shape of drying-up of existing resources of ground water. Taranagar block is not an exception of these circumstances where ground water-table is depleting day by day and quality of ground water is deteriorating. The nature has blessed this earth with water, which is an essential requirement for the survival of human, cattle, and vegetation. Previous generations recognized the necessity of conserving nature resources. With the expansion of population volume and enhancement of development activities, use of ground water for various purposes has increased considerably affecting the ground water resources of the district profoundly. Consequently, the philosophy of extraction of ground water in a planned way and its use in a very conservative manner is taking a prime status in day to day discussions in India.*

**Key words:** Ground Water, Impact Assessment, Water Pricing, Water Demand, Water Uses

### **Introduction**

A scarce natural resource, water is fundamental to life, livelihood, food security and sustainable development. India has more than 18 percent of the world's population, but has only 4 percent of world's renewable water resources and 2.4 percent of world's land area. There are further limits on utilizable quantities of water owing to uneven distribution over time and space. Water is a prime natural resource, a basic human need and a precious asset of the State. Planning, Development, operation and maintenance of all water resources to support the growth of the state economy and the well-being of the population, in response to the growing need for drinking water, agricultural products, industrial production and electricity, a general improvement of living conditions and employment is of utmost importance. The ground water also plays an important role especially in agriculture and drinking water supply. The situation of ground water exploitation is also not satisfactory as in areas where surface irrigation is provided there is a tendency of not using ground water for agriculture which creates problem of water table rise and even water logging. On the contrary, in large areas of the State, ground water is being over exploited and the water table in some areas is going down even at the rate of 3 meter per year.

### **Study Area**

Taranagar Tehsil is situated in Churu District of Rajasthan State, India. It is located 48 km. towards North from District headquarters Churu. Taranagar is situated at 28° 41'N 75° 3'E, about 120 miles north-east of Bikaner. It has an average elevation of 232 meters. According to Census 2011 the population of tehsil is 2,11,831. There are 123 villages in the tehsil. The ground water is brackish but still people are using this water in their fields. Due to over exploitation the ground water gone very deep and the tehsil has been declared as dark zone block. The minimum and maximum temperature recorded in the district varies from 0.50<sup>0</sup> C to 49<sup>0</sup>C. Relative humidity is generally below 30 percent except during the brief south east monsoon period when the same rises up to 60 percent in the district the rainy season usually lasts from July to mid-September and the normal usual rainfall is only 320 mm/year.

## Objectives of Study

The main objectives of the study are two-fold: First it is to analyze the changes in water demand and second, to study the awareness and responsibility for the consumption of water by the society.

## Methodology

The study has been mainly based on primary data collected from 10 villages of Taranagar block in India. From each of the selected villages about 50 families have been surveyed and interviewed. Total 500 persons were interviewed to collect primary data. Some secondary data were also collected from Public Health & Engineering Department (PHED), Directorate of Statistical Abstracts Rajasthan and Ground Water Department.

## RESULTS AND DISCUSSION

### Occurrence of Ground Water

Drilling history of the bore-holes drilled during past years has revealed that ground water in the district generally occurs under semi-confined to confined conditions. Confinement of ground water is generally observed in the hard-rock area where water-table is comparatively deeper. Results of pumping tests conducted in these formations have also confirmed the absolute/partial confinement of water-table. However, occurrence of ground water under water-table conditions has also been observed in several village of the district. In alluvial formations, occurrence of perched water bodies above the zone of saturation have also been observed towards north-eastern part of the district in certain parts of Churu, Rajgarh and Taranagar blocks. These bodies have very limited ground water potential.

### Change in Ground Water Level

The world community is facing challenges of water level in certain areas due to over withdrawing and demands of ground water. Water security is our main moral duty in the present context. The term 'water security' was used at the World Water forum in The Hague in 2000 to underline the vulnerability of people and ecosystems to ever growing pressure on the world's limited water resources (World Water Council, 2000). Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in several areas. Awareness is now increasing regarding water and its importance but in general people misbehave when it comes to reducing wastage of water. The following table shows that about 65.6 percent people are aware that water level is changing very fast in this area due to over withdrawing of ground water. Though, water quality is not as per WHO standard. They are using water in agriculture and other domestic purposes. Whereas 25.6 percent people said that water level is not changing in this area. Because water is brackish and there is no use of water in any means. Apart from this 8.8 percent people indicated that they had no information of the change in ground water level. On an average about 60 percent of potable water is being drained as waste water, which is injustice for our mother earth. The details are given below.

**Table 01: Change in Ground Water Level**

Response	No. of Persons	Percent
Yes	328	65.6
No	128	25.6
No Response	44	8.8
Total	500	100

Source: Field Survey

### Water Quality

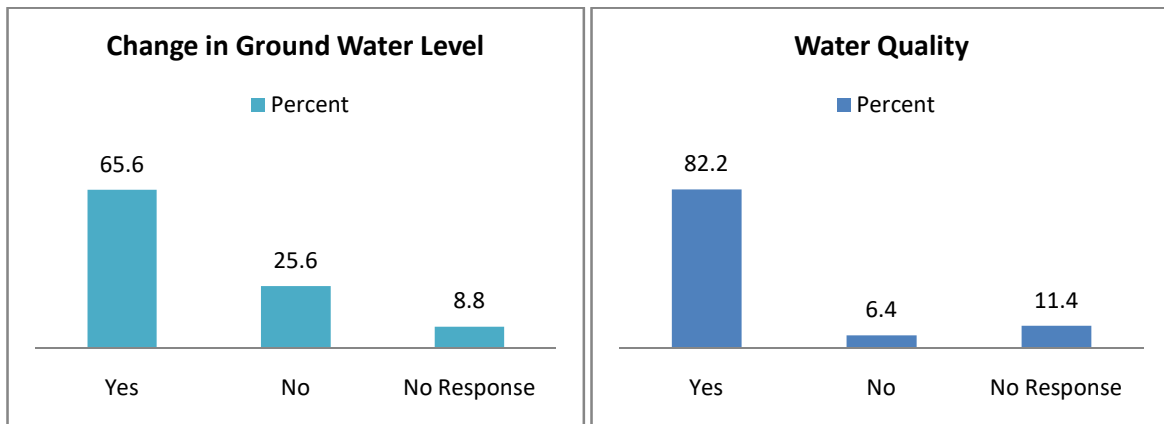
The quality of water is directly related with human and animal health. If the water quality is not as per standard the mantle and physical problems will occur. The fluoride contents are very high almost in villages of the study area. The average nitrate concentration is 185 mg/L. It shows that nitrate concentration is very high in this block. The hardness of water is also very high. The ground water quality in the study area is very low. The following table shows the response from the people regarding water quality. About 82.2 percent respondents believe that water quality in

this area is not as per standard. About 6.4 percent reported that water quality is not an issue in this area. Whereas 11.4 percent respondents reported that they don't have any idea related to water quality issues in this area.

**Table 02: Water Quality**

Response	No. of Persons	Percent
Yes	411	82.2
No	32	6.4
No Response	57	11.4
Total	500	100

Source: Field Survey



### Change in Water Demand

Large parts of India have already become water stressed. Rapid growth in demand for water due to population growth, urbanization and changing lifestyle pose serious challenges to water security. Issues related to water governance have not been addressed adequately. On an average based on field observation and survey, about 60 percent of drinking water has drained every day due to bad practices of uses of water and lack of water importance. This has resulted in increased water demand. Ultimately it leads water shortage not only in one block but in also in every parts of the country. The respondents reported that there is no control or penalty imposed by government to misuse the water. Some of the respondents indicated that they were not motivated to conserve rainwater. The results also showed that most people are dependent on the government system to handle all matters pertaining to the use of water, despite their knowledge of the importance of water to their everyday life.

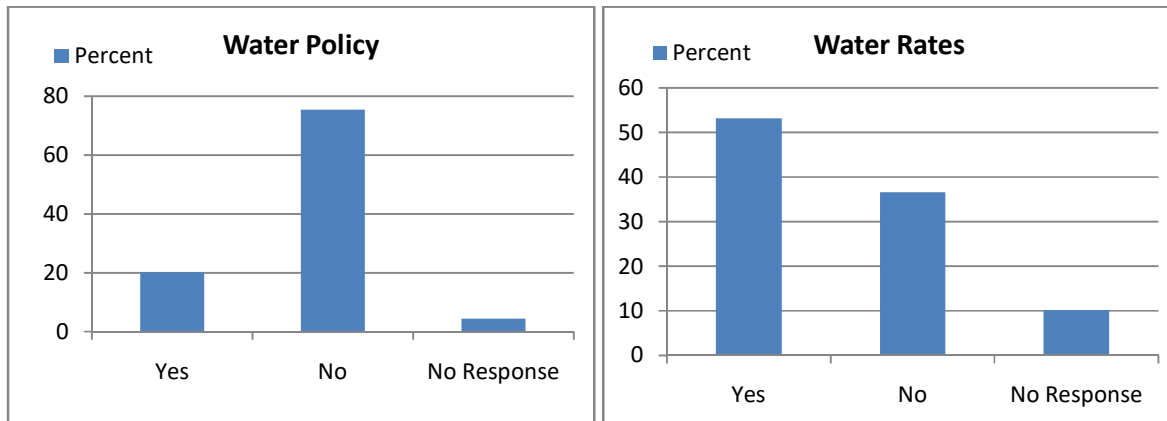
### Water Policy

The overwhelming interest of the State is to bring, by physical and managerial measures, as much of the potentially available resources into beneficial use as is physically and economically feasible. The State's policy documents stipulates that water resources development planning shall aim at assuring accelerated growth by contributing to the State's economic and social advancement, and improving the general social and economic conditions of the population, while keeping the environmental and ecological balance. The awareness level regarding water policy in the study area is very low. Only 20.2 percent respondent reported that they know about the water policy. Whereas 75.4 percent respondents are unaware of the water policy. This exposes the gaps in knowledge and understanding of the need for a water policy and adherence to such and related policies. Government should also popularize the policy objectives to raise water conservation and its importance. The details are given below.

**Table 03: Water Policy**

Response	No. of Persons	Percent
Yes	101	20.2
No	377	75.4
No Response	22	4.4
Total	500	100

Source: Field Survey



### Water Rates

It was evidenced in the study that water rates shall be so decided that it conveys the scarcity value of water to users and foster the motivation for economy in water usage. Rates shall be gradually increased to cover the annual maintenance and operation charges and part of the fixed costs to assure undisturbed and timely supply of water. Due to this huge non-revenue water, operation and maintenance cost recovery through user charges is hardly 50 percent. It leads heavy losses to government. The revenue from water does not cover the maintenance expenses. The following table shows that 53.2 percent respondents are agreed that water rates are quite good. But 36.6 percent respondents emphasized that rates of water should be revised as per use of water. It should not be flat rate for all users. Whereas 10.2 percent did not provide any answer.

**Table 04: Water Rates**

Response	No. of Persons	Percent
Yes	266	53.2
No	183	36.6
No Response	51	10.2
Total	500	100

Source: Field Survey

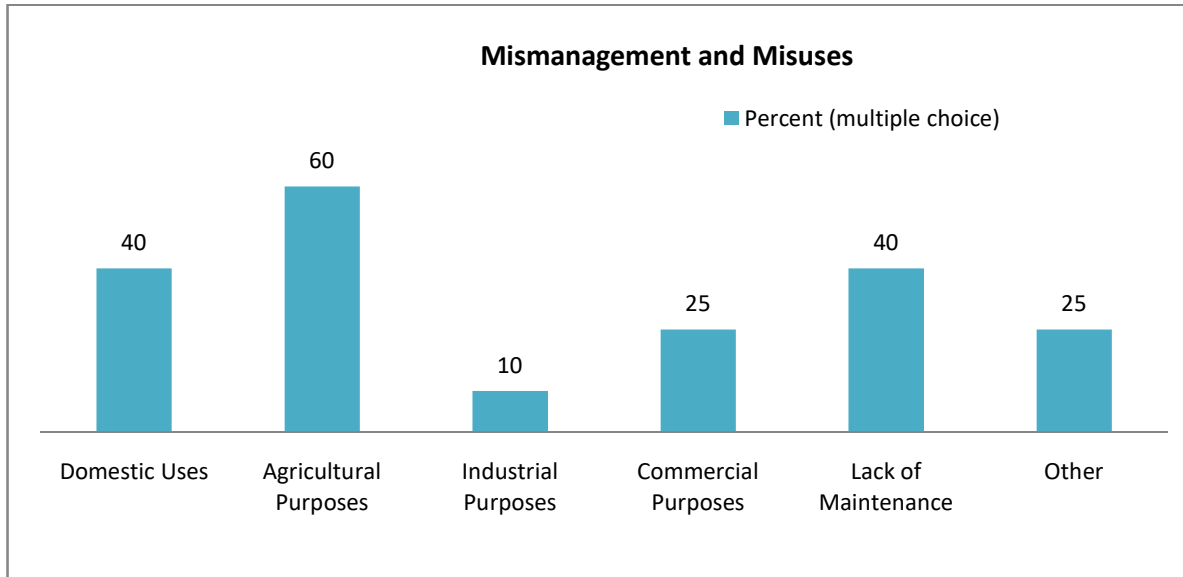
### Mismanagement and Misuses

There is mismanagement and misuses through leakage because of lack of maintenance, poor quality infrastructure, lack of public participation and lack of sufficient and timely budget etc. Due to flexible policy implementation water mismanagement and misuses are very high. It was observed from the study that there was a low consciousness about the overall scarcity and economic value of water, which results in its wastage and inefficient use. About 40 percent of the respondents reported that due to lack of awareness 40 percent water misused in domestic sector, 60 percent in agriculture sector, 10 percent in industrial sector, 25 percent in commercial sector, 40 percent due to lack of proper and timely maintenance and 25 percent in other activities. In short, we can argue that almost mismanagement and misuses are high in every sector. The results are given in the table below.

**Table 05: Mismanagement and Misuses**

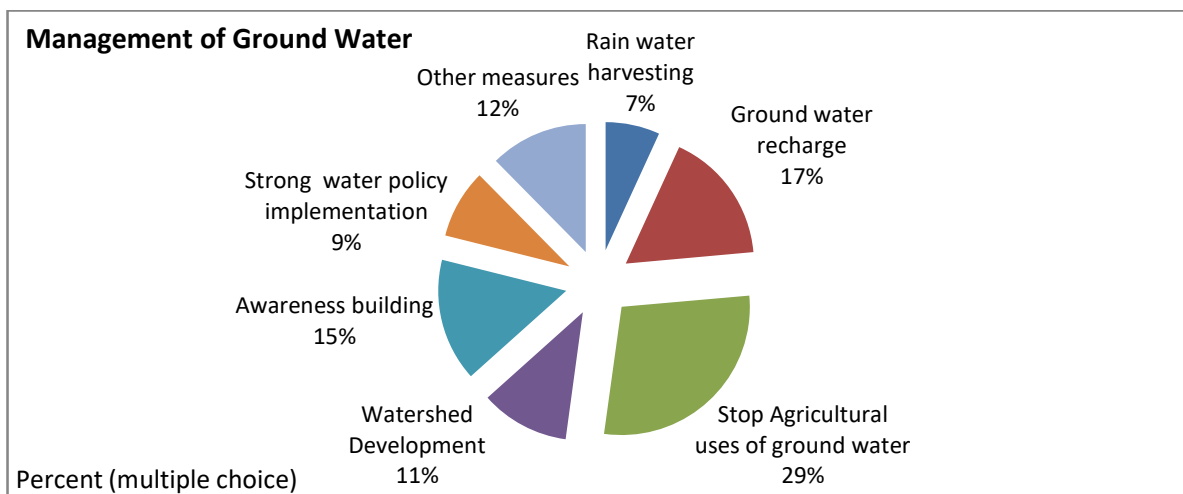
Category	Percent (multiple choice)
Domestic Uses	40
Agricultural Purposes	60
Industrial Purposes	10
Commercial Purposes	25
Lack of Maintenance	40
Other	25

Source: Field Survey



**Management of Ground Water**

The respondents also reported that water level can be changed in long term after adoption of some economically-viable and ecologically sustainable measures. For this, sound ground water recharging techniques will have to be used. The respondents reported that better management can increase the water level in the study area. About 11 percent respondents reported that through rain water the management of ground water can be improved. Regarding the other categories, 27 percent suggested ground water recharge while 46 percent were on the halting of agricultural uses of ground water and 18 percent were on watershed development. The full results are given in the table below.



**Table 06: Management of Ground Water**

Category	Percent (multiple choice)
Rain water harvesting	11
Ground water recharge	27
Stop Agricultural uses of ground water	46
Watershed Development	18
Awareness building	25
Strong water policy implementation	14
Other measures	20

**Conclusion**

Over the past quarter century, global water problems have escalated. This study has shown that the water problem situation in Taranagar block will worsen if not addressed as a matter of urgency. The people who reside in this area should be made acquainted with the worseness of the existing situation, especially the adoption of appropriate methods of conservative use, and the collective future planning of existing resources of ground water. The study also showed that poor recharging of aquifers and excessive extraction of ground water are the two main factors, which cause the water problem in the study area. The first factor is beyond the control of human efforts, while the second factor can be minimized through collective efforts. In this regard, a Master plan of water management and budgeting should be prepared at village level.

To address these challenges governments, International organizations, NGOs, private sector companies etc. should make contributions to build capacities in multiple water emerging issues. In addition, political leaders, professionals, academicians, policy makers, students and others will require an understanding of water resources to save the mankind. The study recommends that each and every member of the society should be taught about the conservative use and to stop the wastage of water in their routine activities. In the area of agriculture, along with sprinkler-system of irrigation, irrigation drip-system should also be adopted on large scale to minimize the requirement of irrigation water. Rain-water should be stored in each and every house so that it can be used for domestic purpose reducing consumption of ground water. Aquifers should be recharged by preventing flowing rainwater by constructing appropriate recharge structures.

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