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Ground Water Quality Assessment in Dhule District (MS)

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Abstract: -

India, being an agricultural country, its economic development is linked with agriculture. The major limiting factor for agriculture is water. Main part of the district is motivated by Deccan Trap Basalt. The progress potential of ground water in Deccan Trap Basalt is low to medium in parts of Sakri, Sindkheda and Dhule talukas and ground water in these areas can be established through dugwells and dug-cum-bored wells and borewells. Average Rainfall 512 mm. Geology Alluvium 7% and Decan Trap 93%. Ground water has special significance for agricultural expansion in the district. The ground water growth in some parts of the district has reached a critical stage resultant in decline of ground water levels over a period of time. A number of water conservation structures in the form of check dams, percolation tanks, and Keti weirs have already been built in the district. Such areas are observed in almost entire district as seen from post monsoon water level situation. Ground water present level 8.31 ground water level for Dhule district was 8.31 meters below ground level. Though dhule district ground water level fluctuated considerably in recent years.

Keywords: *Rock system, River systems, Basaltic rock, Ground water quality. Water management and water conservation.*

Introduction: -

India is a developing country with a vast territory, complex topography, varied climate and a large population. Frequent floods, drought and unstable agricultural production have always been a serious problem. A growing population and consequent need for increase in food production requiring increasing area of agricultural fields and irrigation are resulting in over use of water. Its severity also causes shortage of gervais bound water. In water scarce areas, there is an increased dependence on ground water.

Study Area: -

Dhule district, formerly known as west Khandesh is located in northern part of Maharashtra State. It is bounded between north latitude 20°38' to 21°61' and east longitude 73°50' to 75°11'. The district is bounded by Nandurbar district in the north west, Nashik district in south and Jalgaon district in east. It is included in survey of India Toposheet No. 46 G, H, L, K and O. The district headquarters is located at Dhule town. For administrative convenience, the district is divided in 4 tahsils viz, Dhue, Sakri, Shirpur, Shindkheda. The district has a geographical area of 8061 sq. km. out of which 2088 sq.km. is covered by forest, whereas cultivable area is 4864 sq. km. and net sown area is 4310 sq. km. Agriculture is the main occupation of the people. The major part of the district comes under Tapi basin. The population of Dhule district is

2,048,781 persons and the population density is 254.16 persons/sq.km. as per the 2011 census.

Objective: - 1. To Assess the ground water quality of district.
2. To Discuss the ground water level in the study region.

Methodology-

The ground water sample has been collected from ground water board and more information collected from collectorate office. internet sources also used for present study. The essential secondary data has been collected from the includes numerical outward and ground water data available at groundwater Survey and development agency.

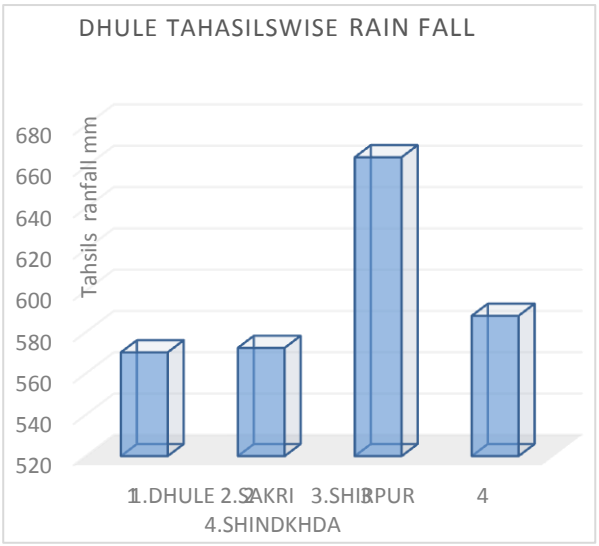
Climate and Rainfall-

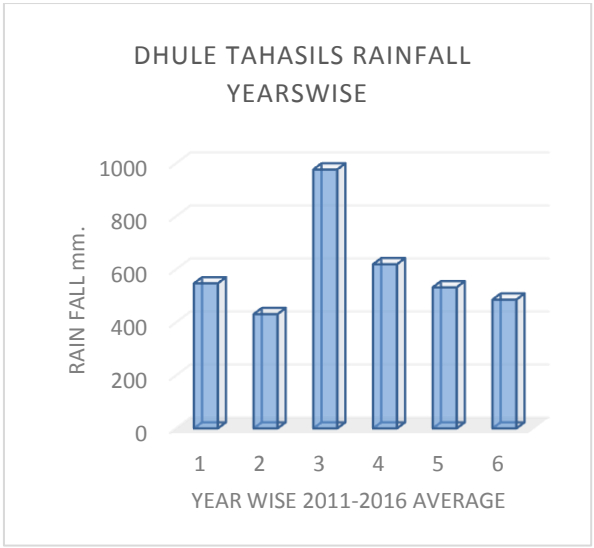
The Climate of the district is considered by a hot summer and general dryness throughout the year except during the south-west monsoon season ex- June to September. The daily mean minimum temperature was 16°C and mean maximum temperature was 45°C. The annual average rain falls in mm ranges from 499 to 864. The decadal average of annual rainfall is identified to be lowest in Dhule tahsil (589 mm) and highest Shirpur tahsil (875 mm). It is the minimum in the central parts of the district around Dhule and Sakri and Sindkhed and increases northwards and westwards. The study of negative departures of the annual rainfall over normal reveals that western and southern parts of the district experienced moderate and severe drought situations for more than 20% of years. Hence these parts occupying parts of Sakri and Dhule tahsils can be characterized as drought area. Climate of the district is hot and dry with average annual rainfall of 512 mm. Maximum temperature is 45 c and minimum temperature is 7 c. Out of 4 tahasils Shindkheda, Dhule and Sakri are comes under drought prone areas.

Table 1 - Rainfall Scenario: - Annual Rainfall Data (2011-2016) Rainfall in MM

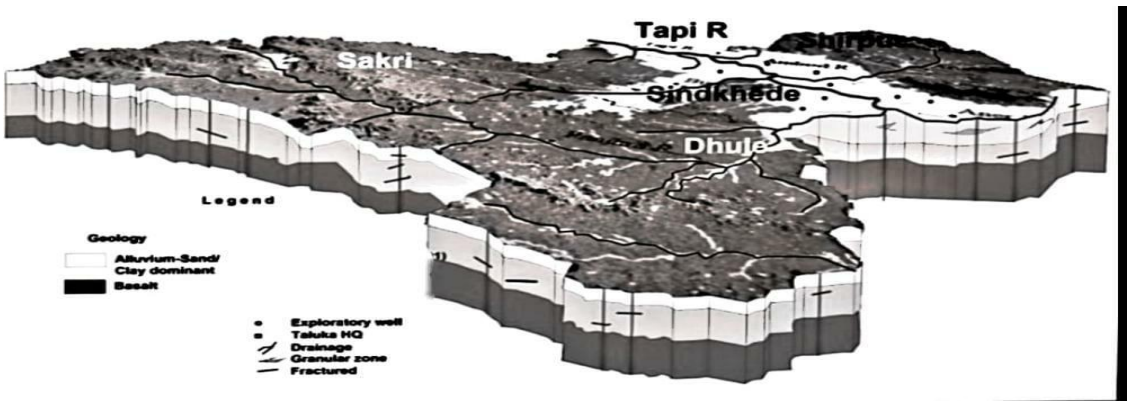
Tahsils/Year	Dhule	Sakri	Shirpur	Shindkheda	Average
2011	500	546	610	533	547.25
2012	467.3	281	433	543	431.075
2013	842.9	969.5	1122.1	973	976.875
2014	597.7	566.6	768.8	544.7	619.45
2015	512	491.5	555.2	571.1	532.45
2016	501.5	579.8	499	362.7	485.75
Average	Average	570.233	572.4	664.683	587.917

Source: www.agri.mah.nic.in





Source: Compiled by Researcher.



Source: -CGWB, CR, Nagpur

Geographically and geomorphologically district is divided into 3 divisions that are as follows. Northern Mountain ranges (Satpuda mountain ranges) Central plain alluvium area (Tapi alluvium) South-West hilly area (Satamala mountain) Main Basin - Dhule district is a part of Tapi Basin, which flows from East to west. Sub-Basin - In district Panjhara, Aner, Burai, Arunavati and Gomati are tributaries of Tapi flows mostly towards north. Mountain Ranges - Due north of district Satpuda mountain ranges are present and towards southwest Satmala and offshoot of Western Ghats are presents.

1. Research Area Ground Water Administration Strategy: -Ground water has special significance for agricultural development in the district. The ground water development in some parts of the district has reached a critical stage resulting in decline of ground water levels over a period of time. Thus, there is a need to adopt an integrated approach of development of ground water resources dovetailed with ground water augmentation to provide sustainability to ground water development.

2. Water Conservation and Artificial Recharge: -A number of water conservation structures in the form of check dams, percolation tanks, and Keti weirs have already been constructed in the district. In Basaltic area, the artificial recharge structures feasible are check dams, gully plugs, percolation tanks, nalla bunds, etc. The structures like gully plugs, contour bunds are most favourable in the hilly areas, occurring in the central part of the district. Existing dubwells can also be used for artificial recharge, however, the source water should be properly filtered before being put in the wells. The artificial recharge structures suitable for alluvial areas are percolation tanks and recharge wells/shafts. These sites need to be located where the hydrogeological conditions are favourable. Ex. where sufficient thickness of desaturated/unsaturated aquifer exists and water levels are more than 5 m deep. Such areas are observed in almost entire district as seen from postmonsoon water level scenario.

Ground Water Related Issues and Problems: -

The drought area has been observed in western and southern parts of the district occupying parts of Sakri and Dhule talukas. The moderate to deeper water levels of 10 to 20 m and falling water level trends are observed in most parts of the district, occupying Dhule and Shirpur tahsils and eastern parts of Sindkheda and parts of Sakri tahsil s. Thus, artificial recharge and water conservation structures needs to be prioritised in these areas. Almost 54.55% of wells monitored hasbeen affected by the high concentration of nitrate in ground water. The total hardness is beyond permissible limit. Fluoride concentration is found to be within maximum permissible limit. Overall, the ground water quality scenario of the wells monitored in the district is not bright. Thus, all the wells used for water supply should be first analysed for nitrate and fluoride contents and if the contents are found beyond permissible limits, then the ground water may be used for other than drinking purpose. Adequate sanitary protection to the wells may be provided to control the nitrate contamination.

Recommendations: -

1. The scope exists for construction of suitable artificial recharge structures in the district.
2. The structures recommended for the hilly- Deccan Trap Basalt area in the central part are contour bunds, gully plugs, nala bunds and check dams. For other basaltic areas, the nala bunds, check dams suggested.
3. The existing dugwells may also be used for artificial recharge of ground water provided source water is free of silt and dissolved impurities.
4. Major part of the district is underlain by Deccan Trap Basalt, where only dugwells are the most feasible structures for ground water development.
5. The sites for borewells need to be selected only after proper scientific investigation. Borewells generally tap deeper fractures, which may not be sustainable. Besides, the borewells should only be used for drinking water supply and not for irrigation.
6. The overall stage of ground water development for the district is at less than halfway stage ex-48.68 % thus there is a scope for further development of ground water resources particularly in Shirpur, Sakri and Sindkheda tahsils.

However, the ground water development needs to be 14 carried out with proper care and planning, since in these areas falling water level trends are observed.

7. The stage of ground water development has already reached about 62% in Dhule tahsil, hence future ground water development is not recommended without adhering to the precautionary measures i.e., artificial recharge to augment the ground water resources and adoption of ground water management practices in the tahsil.
8. In Alluvial area of the district, percolation tanks and recharge wells/shafts are suggested.
9. The existing village ponds/tanks need to be rejuvenated to act both as water conservation and artificial recharge structures.
10. Ground water quality is harmfully affected by nitrate uncleanness in 54.55 % samples in May 2011. Thus, all the wells used for water supply should be first analysed for nitrate. And those are found beyond permissible limits may be used for purposes other than drinking. Satisfactory sanitary protection to the wells may be provided to control the nitrate adulteration.

Summary: -

A change in water resources provides an index for measuring the phases of agricultural development in study region. Water is a finite resource, its overall manages mentioned the conservation is of utmost importance. It can be accomplished by lessening utilization, reprocessing and rain water harvesting. Within the study area there is moderate possible of water availability. The sustainable use of the water resources also depends upon the recharge of ground water. Research Area drinking water has to be supplied to some villages in most of the districts of the state by tanker or bullock cart. Since it is necessary to solve the drinking water problem of such villages permanently, the government started implementation of ambitious water conservation program from 1992-93.

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