

“Study of Supe Watershed in Purandar Tehsil a Case Study from Upper Reaches of Karha Basin”

Sachin J. Yadav¹, Rakesh Kumar², Dr. Abhay B. Shelar³, Dr. Sunil Bhimrao Thakare⁴

¹Assistant Professor in Department of Civil Engineering of Anantrao Pawar College of Engineering & Research,

Assistant Professor in Department of Civil Engineering of Anantrao Pawar College of Engineering & Research

Assistant Professor & Head of Department of Civil Engineering of Anantrao Pawar College of Engineering & Research,

Principal of Anantrao Pawar College of Engineering & Research, Pune.

Expert Guidance: Dr. P.D. Sabale in Environmental Archaeology of Deccan College, Pune-411006.

Article Info

Page Number: 12849 - 12853

Publication Issue:

Vol 71 No. 4 (2022)

Abstract

Saswad is located 29 kilometers from Pune and is situated in N18°23'20'' and E074°04'08.8'' geocoordinate. Southern part of Saswad town comes under severe chronic drought prone region of Maharashtra. Supe stream is a right side tributary of Karha which located in Purander hill ranges, in western Pune region. The ground water supplies have been replenished using a variety of techniques. Therefore, it is intended to use specific biological and engineering techniques to assist this additional runoff be directed to ground water storage. The most peculiar aspect of this work is that, if such engineering methods are created and widely used in remote areas, it will spare thousands of villages across the nation from experiencing drought and tanker water deliveries.

Several strategies have been implemented at the Shivdara tributary of the Karha river to replenish ground water resources, but it has been discovered that these strategies are ineffective in some places. The demand for water for domestic and agricultural use is rising quickly in the Karha River watershed region, but water supplies are also being rapidly depleted as a result of population growth and drought conditions. Large amounts of rainwater are being diverted in an effort to replenish groundwater supplies and satisfy demand. More actions are being taken to successfully recharge the ground water using watershed management strategies.

The geographic information system (GIS) is a crucial instrument for managing and planning watersheds. Drainage networks, topography, and water flow paths can all be readily located for GIS mapping.

Key Words: replenished, peculiar aspect, geographic information system (GIS), Drainage networks, topography, watershed management strategies.

Article History

Article Received: 15 September 2022

Revised: 25 October 2022

Accepted: 14 November 2022

Publication: 21 December 2022

1. Introduction

The hydro-geological area unit known as a watershed is where rainwater originates and empties into a singular outlet. Small streams carry the rainwater that descends on the mountains as they descend. Numerous such streams combine to create larger streams, which combine to create rivulets, which combine to create waterways, and so forth. Similar to how the smallest water-retention structure, known as a bund, eventually joins to create a check weir. Numerous check weirs connect to check dams, large water saving structures that connect to earthen structures. Further it connects to nala bund. The Watershed refers to the complete area that, at a specific moment in its flow, supplies water to a stream, rivulet, or river. Water is scarce in Maharashtra every year as a result of irregular

rains. There are times when an area is subject to heavy rainfall, which causes excessive soil erosion caused by heavy flow from high land to low land. Due to the great intensity of runoff, groundwater recharge is very low.

Land and water are the two fundamental components needed for the growth of agriculture and drinking water resources. Indian agriculture is much more reliant on the monsoon as a result of the country's rapid population growth, urbanization, industrialization, and agricultural area, which has led to a steep incline in water demand. However, due to insufficient rainfall over the past three to four years, people have begun turning to underground water as a substitute supply without considering how to recharge it, which has caused the ground water table to sink by 100 to 200 meters below the surface. The major component of the Indian economy is rainfall. Even though the monsoons affect the majority of India, various regions experience varying amounts of rain, from heavy to sparse. The spread of rainfall varies significantly across regions and over time.



Fig :-1 Actual Site of Tributary

2. Study Area:

The upper reaches of Karha River in Purandar tehsil of Pune district is a part of present study. Supe stream having fan-shaped catchment area, which selected for our case study, of present watershed study. Over the past few decades, the level of groundwater has been steadily declining, which has also caused a draught-like situation in this area. The watershed in remote areas is now also more susceptible to contamination of both surface and ground water. The overuse of pesticides in Agriculture, the development of cities above them, and the disposal of human waste. The greatest illustration of this is the current Karha steam. The groundwater has been noted, the level in this area is continuously declining due to less rainfall and mismanagement of water. This watershed as compare to the others is covering sizable area but showing some issues. Therefore it's priority level is selected for the project work stream channel.



Fig -2: Topography of Karha River

3. Environment

This region has a semi-arid climate that gets very parched during the summer. Additionally, it has caused draught-like circumstances in the summers for the past few years. The volume of the ground water has drastically decreased due to evaporation .

4. Geomorphology

The deccan trap basalt formed by tremendous outburst of volcanic energy in upper cretaceous to euocymperate that is before 65 lakh years ago. This flood basalt due to its eruption it developes a central western part of India in the shield ground by the deposit of highly fluidy basic lavas. Such tables ground are characterized by some landforms of high land (denunded hills includes mesa and butte like feature) & low grounds (include valleys, river valleys & depressed land covered with water bodies).



Fig -3: Geomorphology of Tributary.

5. Hydrological Study

To understand the quality of the water in drinking point of view and determine whether any anthropogenic factors are influencing the ground water, certain tests were carried out on samples collected from 10 wells in accordance with the stream. The wells that were ultimately chosen came from both sides of the stream channel. The primary goal of the study is to determine whether the water is drinkable or contaminated by various dissolved minerals and chemicals that will have an impact on the health of people living in the watershed area.

6. Material And Method

A. Watershed Study :

Supe watershed is connected to the saswad town to it's western side & the stream is flowing nearly east – west . Due to the various important issues present in this small watershed, a detail ground

survey has been carried out to understand the landscape character, density – drainage frequency, slope, lithology, visitations, land- used & land – cover. In this very important aspect of this project is document available, soil and water conservation structures and based on that to decide their efficiency and deficiency as well as their workability as per the surface and ground water recharge is considered. By considering all the important above points the some total existing soil and water conservation structure in basin were studied very well.

B. Sampling

1) To analyze the quality of water is also one of the important objective of this project. Dugwell, borewell, water recharge structures and from channel also. Therefore the available sources of ground water were explored in the watershed and samples were collected from these sources

2) Ten wells along the Kanher creek make up the sampling sites. Samples were gathered after the monsoon season, and data was acquired through conversations with the owners. In order to ensure that the sample chosen for analysis acts as a representative sample, samples were collected in 1L plastic bottles. The samples that were thus obtained were carefully carried to the laboratory and examined in accordance with best practices.

C. Lab Analysis

As previously mentioned, groundwater was examined for physiochemical and biological parameters after being made aware of the significance of studying the behavior of groundwater that was drawn from wells upstream and downstream.

D. Physiochemical Analysis

At the actual sampling location, the samples' temperature was recorded.

Physiochemical parameters, first

1) pH

The majority of the samples were discovered to be alkaline in nature.

2) Turbidity

The recommended number for turbidity in drinking water according to Bureau of Indian Standard (BIS) (1991) is 5 NTU.

3) Thermostat

The samples were taken at a temperature between 24.4 and 31.1 °C.

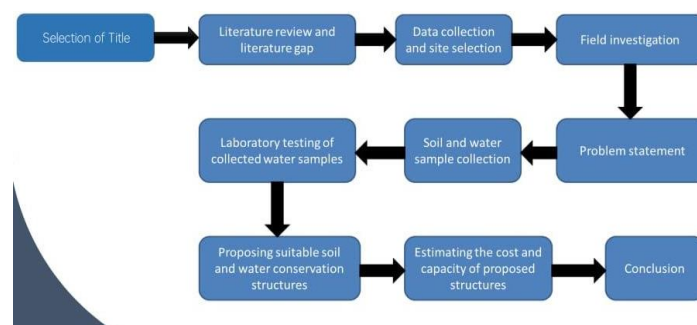


Fig 4:- flowchart of methodology to be followed

Physiochemical Parameters			
Sr. No.	Tests	Readings	Permissible value
1.	Temperature	23	
2.	Odour	Bad Odour	Odourless
3.	Ph	8.4	6.5-8.2
4.	Turbidity (NTU)	6	5
5.	Total Alkalinity	710 mg/lit	600mg/lit
6.	Total Hardness	440mg/lit	>310mg/lit

7. Results And Discussions

The quality of collected sample from surface water (stream, channels, water conservation structures etc.) and ground water sources such as (dugwell, borewell etc.) were tested. The result clearly shows that the present water is crossing the pH and it is less turbid and odour less. While the result of chemical properties clearly shows that this water is under the limit of alkalinity and hardness. In conclusion, the water is not heavily contaminate but it is slightly polluted by a anthropogenic activities formed in source region.

References

- [1] Bhavana N. Umrikar (2017). "Applied water Science" 7(5), 2231-2243.
- [2] Chaitanya Pande_(2021). "International journal of river basin management" 19(1), 45-53.
- [3] Dhabliya, D. (2021d). Examine Several Time Stamping Systems and Analyse their Advantages and Disadvantages. International Journal of Engineering Research, 1(2), 01–05.
- [4] Dhabliya, D., & Others. (2021). An Integrated Optimization Model for Plant Diseases Prediction with Machine Learning Model. Machine Learning Applications in Engineering Education and Management, 1(2), 21–26.
- [5] Rabanal, N., & Dhabliya, D. (2022). Designing Architecture of Embedded System Design using HDL Method. Acta Energetica, (02), 52–58.
- [6] Chaitanya B. Pande (2020). "Environment development and sustainability" 22(5), 4867-4887
- [7] Dr.P.B.Sabale (2018). "Watershed development using GIS and remote sensing for water budgeting" e-ISSN: 2359-0056
- [8] Kathryn M. Koczot, John C. Risley (2021). "Water resources planning and management" 111,no. 2.
- [9] P.P.Choudhari (2018). "Geology, Ecology and Landscapes" 2(4), 256-267.
- [10] Sandipan Das, Abhay Varade (2021). "Geostatics and geospatial technologies for groundwaterresources in India" 97-118.
- [11] Sharayu S. Pujari (2017). "International journal for research in applied science and engineering technology" 5(1), 219-221.
- [12] S.Tanavade (2015). "International journal of science and research (USR).
- [13] Y.P.Badhe, T.Shelar (2019). "Journal of Geomatics" 12(2), 146-257.