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Review on Water Supply Scheme for Rural Area

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Abstract: ***The study's main objective was to create a suitable water supply system. The main goals of water treatment for public supply are to obtain water from the best source possible and put it through a procedure that will provide water of excellent physical quality. Ensuring the water supply's long-term security. We have covered the design and calculation for the water delivery scheme utilizing CPHEEO regulations in this study. Python and Q-GIS software are used to obtain more precise data and calculations. Water shortages and fast urbanization have made it difficult for many towns to maintain a reliable and secure water supply. A water delivery system is required to overcome these obstacles. In this research, design and analysis of the fundamental parts of a water supply system such as the distribution system and regulation of drinking water quality.***
Keywords: CPHEEO, DSR, Jalyukt Shivar Abhiyan (JSA), water supply scheme, Q-GIS, Python, IPH, etc.

I. INTRODUCTION

Water is one of the essential requirements of humans, much like food, clothing and shelter. Humans use water for a variety of activities including drinking, washing clothing and kitchenware, cleaning and car washing. Depending on the business, small or large amounts of water are also utilized in practically in every sector. The primary function of water for humans is drinking out of all the purposes listed above. Water intended for drinking as certain unique physical and chemical characteristics that set it apart from water used for other reasons. All types of water are very beneficial to man giving him the comforts and pleasures in addition to his essential needs for survival. Water is necessary for all life. Providing water to all measure cities and rural regions is a significant task. Without water one can't envision as safe and clean environment. The provision of sufficient and clean water is essential for a healthy life style. The engineer designs a water supply network that will provide the population with water in accordance with its needs after determining how much is needed for the population's various purposes. A water supply system gathers, moves, purifies, store and distributes water from a source to consumers including private and government institutions, enterprises, industries and irrigation facilities. Access to clean water has emerged as a major issue worldwide particularly in rural areas.

II. PROBLEM IDENTIFICATION

Due to increasing population and fast urbanization, there is a severe problem of water shortages and it has made it difficult for many towns in terms of maintaining a reliable and secure water supply. Hence, a suitable water supply scheme is necessary to undermine these obstacles.

III.OBJECTIVES

1) To utilize the CPHEEO (Central Public Health and Environmental Engineering Organization) guidelines to design various components.
2) To estimate various works using Jivan Pradhikaran's DSR for Maharashtra.
3) To design suitable water supply scheme.
4) To achieve accurate and faster result using python.
5) To gather a raster image (using Q-GIS software) of a certain area and build a water supply plan based on the findings.

IV.LITERATURE REVIEWS

A rural water distribution system design for a rural location. A network for distributing water was created for this research with population projections out to 30 years. The most efficient water distribution system was designed using the heuristic programme BRANCH version 3.0. For the research region, an intermittent water supply has been developed, taking 100 lpcd water usage into account. The reservoir level, peak factor, available commercial pipe diameters, residual nodal pressure, flow velocity through the pipe, pipe material, and other constraints are taken into account while designing the economical diameter of the water supply distribution system. The Nava-Shihora region in the Indian state of Gujarat is the target market for the water supply distribution system. [1]

In India, water delivery is now anticipated as a community-based, demand-driven system, under which it is crucial to strengthen the local community's capacity to create and administer their own water supply system. One of the key substances needed by all parts to carry out the numerous life-sustaining tasks is drinking water. Water shortages and fast urbanization have made it difficult for many towns to maintain a reliable and secure water supply. A water delivery system is required to overcome these obstacles. The distribution system and drinking water quality control are two examples of the basic components of a water supply system that are analyzed and designed in this research. An eight-village cluster's water supply system is created with a 30-year population projection in mind. The use of digital GPS allows for the surveying of settlements. Using Bentley's WATERCAD programme, the water distribution network for the settlements is assessed and constructed. Systems for water distribution network delivery are made to provide each user with the right amount, quality, and pressure of water from a source. [2]

Water supply system design for rural areas. It is vital to provide the abundance with a steady flow of water through the planned system of pipe in order to satisfy the water demand of the continuously expanding population. The information provided by the IPH (Irrigation and Public Health Department) department, the common characteristics of the region, such as the population of the region, the demand for water, the need for pumps, the distribution network, and water tanks, are crucial for the effective design of the water distribution system. A water distribution system provides a settlement with potable water that may be used for both drinking and healthy purposes. The collection, transmission, purification, and distribution phases of the distribution system are the primary ones. It comprises planning the layout of pipelines, designing valves and couplings, estimating head losses, and projecting the future population using a variety of techniques. [3]

Droughts have always affected Maharashtra. The state of Maharashtra has seen catastrophic agricultural production and productivity losses as a result of the drought, which has lasted for four years running. Jalyukt Shivar Abhiyan is a new initiative the Maharashtra government has initiated to make the state drought-free by 2019. The JSA suggests a framework for calculating the water balance at the village level, which involves estimating agriculture water needs and drinking water stress, among other things. JSA emphasizes the importance of public engagement as one of the main goals and encourages integration and cooperation between various government programs and agencies during the planning and implementation phases. Every year, the initiative hopes to eliminate water scarcity from 5000 communities. With a focus on creating watersheds, raising groundwater levels, decentralizing and cleaning up water sources, and expanding the area irrigated, this transition has been made feasible. We chose the Aurangabad district for this investigation. The study's primary goal is to evaluate the caliber of CNBs in the Aurangabad area. [4]

In Maharashtra, the third-largest state in India, over 58% of people live in rural areas and rely heavily on agriculture for a living. The Maharashtra government announced a comprehensive water conservation initiative called Jalyukt Shivar Abhiyan in response to a number of adverse externalities of water scarcity (JSA). By conducting a theoretical assessment of the various water conservation activities carried out under JSA in three villages in Purandar taluka in Pune district and also a few works in accordance with Shirpur pattern in Dhule district, Maharashtra, India, the methodology adopted in this study was used to determine the strengths and weaknesses of JSA.

The review of JSA revealed both JSA's strengths and limitations, including technical flaws found in the preparation and execution of these works. In communities afflicted by drought, it was also observed that there was little public knowledge of JSA, which had a negative impact on both community engagement and participation. It is stated that these advantages and disadvantages might be utilized to modify JSA's structure and policy in order to strengthen the scheme's efficacy, as well as to boost local engagement in groundwater recharge and water conservation initiatives. [5]

One of a person's fundamental necessities is water. Humans use water for a variety of activities, including drinking, washing clothing and household items, cleaning, and car washing. Depending on the business, small or large amounts of water are also utilized in practically every sector. Providing water to all major cities and rural regions is a significant task. The hamlet of Bhugaon is located 20 kilometers from the city of Pune; yet, thanks to excellent transportation options and close by industrial regions, urbanization is growing in the town's gaothan and Wadies. Because the percolation well that is currently available, which is situated along the manas lake bank, is insufficient, the current scheme in Bhugaon, which has one division where water is to be supplied, is unable to meet the demand for water at this time. There isn't any piped water at the moment. Taken from the best source that is currently accessible and processed to guarantee acceptable physical quality, water is the main goal of water treatment for public delivery. ensuring the long-term security of drinking water in rural India. Plan for providing water to all Wadies. A severe water deficit has been seen as a result of population growth. A consistent and dependable water supply will be provided by this plan to the population group it was intended for. Suitable software, including Bentley Water Gem and Microsoft Excel, is used to design the water supply scheme. [6]

V. METHODOLOGY

To determine the lengths and altitudes of headworks rising mains, reservoirs, and the distribution system, a survey of the planned water supply plan was conducted. Using the CPHEEO (Central Public Health and Environmental Engineering Organization) guidelines to design various components. Estimating various works using Jivan Pradhikaran's DSR for Maharashtra. Preparing maintenance and rehabilitation budgets and calculating operating plan costs.

To design water supply system, one should focus on following components:

1) Source,
2) Pumping Machinery,
3) Storage tank,
4) Distribution network &
5) Rising main.

At first, there is one important parameter to be calculated and that is demand. To find demand, we have to forecast population of the proposed region for a proposed year. Each person needs water for various purposes such as drinking, washing clothes, etc. According to Jal Jivan Mission every person should get 55 LPCD. So, the population in proposed year multiplied by 55 LPCD gives the water demand.

The population of a village or town must be determined once the design period has been established. The population of a village relies on variables including births, deaths, migration, and annexation. Future village growth will mostly depend on commerce expansion, industry development, and the surrounding countryside. Mine discoveries and railway station building may result in rapid population increase, sluggish population growth, stable circumstances, or even population loss. Because the expected village would expand more or less along similar lines, it is preferable to analyse the evolution of previous comparable villages that have grown under similar conditions in order to estimate population growth.

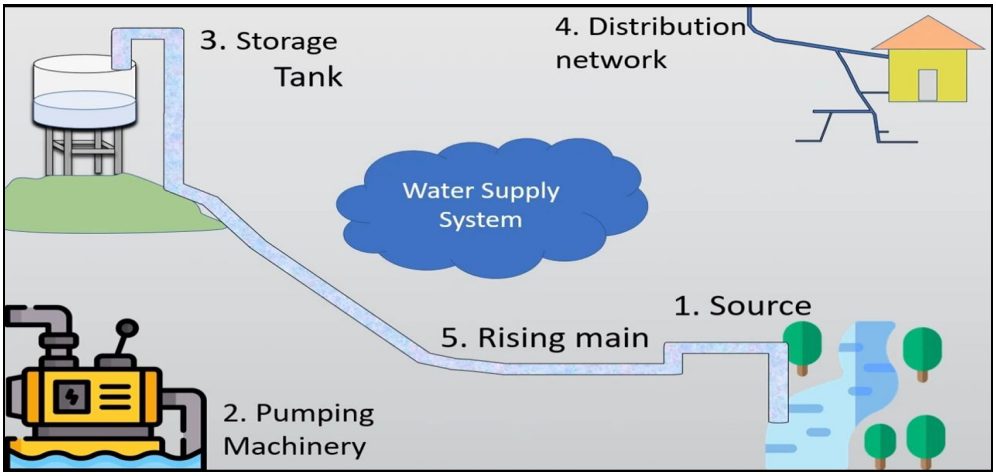
The following are the primary methods used for population forecasting:

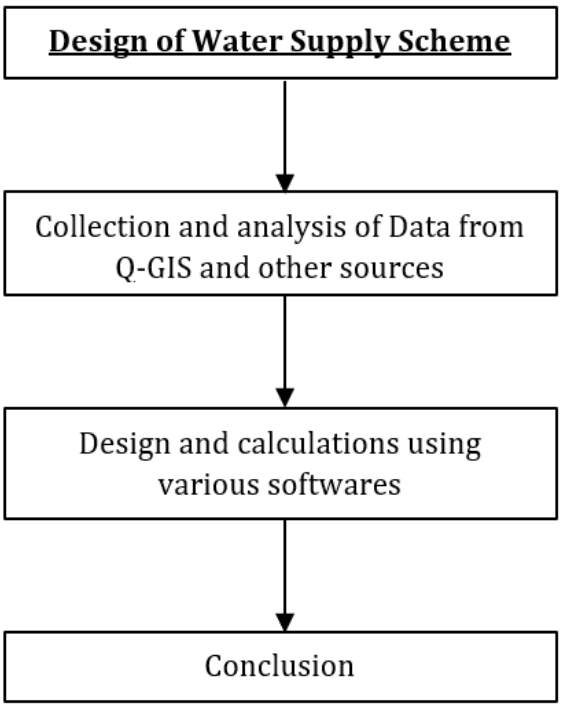
a) Arithmetical Increase Method
b) Geometrical Increase Method
c) Incremental Increase Method

A. Water Demand

Water needs at different stages are calculated based on the adopted population at various stages calculated as above. according to the Ministry of Drinking Water and Sanitation's most recent Strategic Plan, water is needed at different stages. According to the Government of India's JJM Guidelines, the per capita supply is 55 LPCD: Additionally, it is suggested that an additional 4% of raw water be transported to the water treatment plant to account for WTP loss.

B. Methodology Flow Chart





VI. CONCLUSION

Given the numerous water crises occurring worldwide, we may infer from this research that rural communities need to have access to water delivery schemes. The Conservation of Water Act should be supported by several groups, and GWP
should be implemented as well. We may produce a raster image of a certain area with the aid of QGIS software, and then use that to determine where the water supply system should be built. Python software must be used for the design computation of the water supply scheme.

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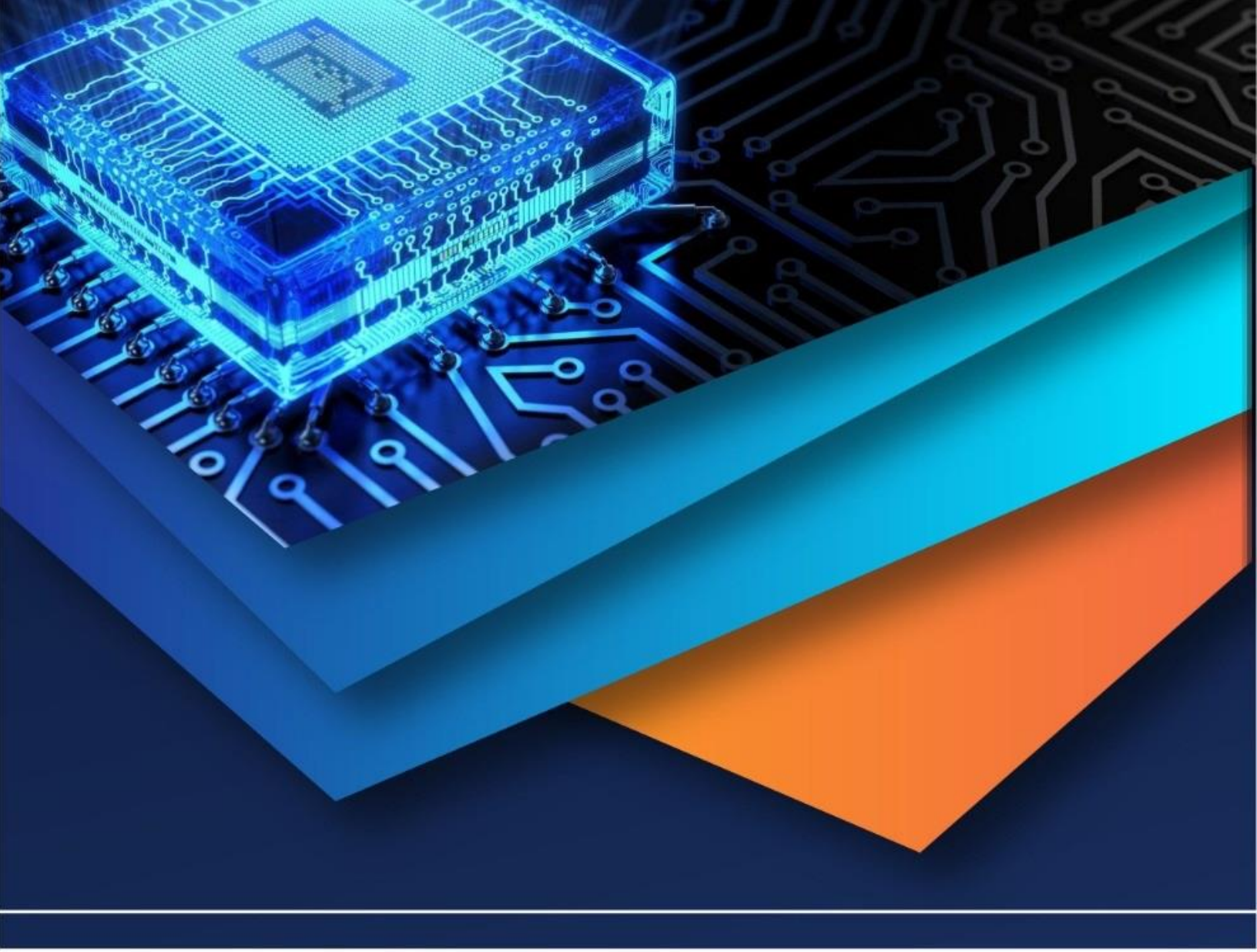

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