

Developing Approaches to Supply the Potable Water in Water Scarce Area: Case of Karwi (Chitrakoot Dham) Chitrakoot up, Bundelkhand, India

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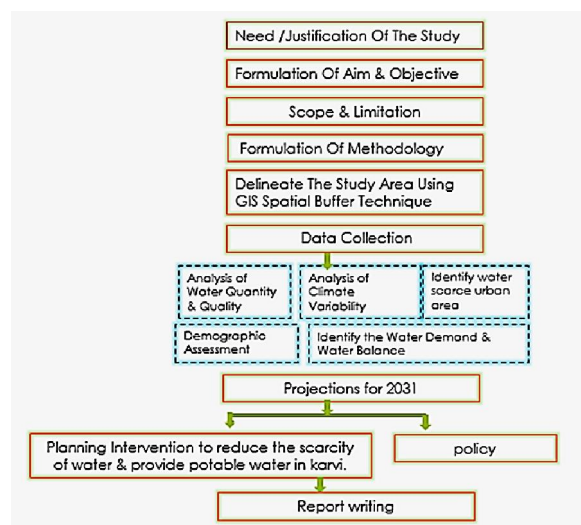
Abstract: Chitrakoot Dham, is a city in Chitrakoot district in the state of Uttar Pradesh, India. It is located in the Bundelkhand region and is culturally, historically, religiously, and archaeologically significant. Chitrakoot is Lord Rama's Karma Bhoomi. Lord Rama was exiled in Chitrakoot for 11 years. Chitrakoot is a holy city with many temples. It is linked to Chitrakoot, a town in Madhya Pradesh's Satna district. I researched Karwi's water supply system to determine water consumption, supply, and gaps. Investigate the various parameters of the potable water supply system and make planning proposals to build an effective water supply system and close the water supply demand gap in Karwi (Chitrakoot Dham).

Keywords: Potable Water, Water Demand, Water Gap, Potable Water Supply Network, Climate Vulnerability

I. INTRODUCTION

On September 4, 1998 a new district called Chhatrapati Shahu Ji Maharaj Nagar was formed in Uttar Pradesh by separating Banda district. Chitrakoot means "Hill of Many Wonders." Chitrakoot is located in the northern Vindhya Range of Himalayas. It is divided into 25 wards. It is particularly vulnerable to heat waves and water scarcity. Inadequate groundwater recharge in this region due to rocky topography, high runoff of rains, and over-exploitation have resulted in groundwater depletion. It is related with the historical Ramayana epic since this is where Lord Rama, Sita, and Lakshmana spent their 11-year exile. The aim of this paper is to Identify Issues and Challenges Of potable Water Supply System in Karwi (Chitrakoot Dham) and provide recommendations for an adequate and effective water supply in order to fulfil SDG 6.

1.1 Methodology



II. REVIEW OF DESIGN PARAMETERS FOR POTABLE WATER SUPPLY IN AN AREA

“The water which is safe for drinking without any risk of health problems is called potable water.” Potable water encompasses water used for drinking, cooking and personal hygiene.

2.1 Potable Water Supply Solution

To estimate future water demand and supply, hydrological models are being integrated to perform precipitation forecasts and reservoir optimisation. The variables necessary for potable water supply in Karwi Chitrakoot Dham planning are:

- Water availability
- Infrastructure for water supply
- Potential climate change scenarios
- Population expansion

2.2. Sources Of Potable Water Have Further Three Parameters:

- Within the premises
- Near the premises
- Away from the premises

2.3. Coverage Of Potable Water Supply

- Water supply through house connection, public tap, well with hand pump & tankers.
- Per capita water supply. (average in India =135 LPCD)
- Continuity of water supply.
- Water supply quality & quantity.
- Frequency of water supply.

2.4. Major Findings Related To Water Supply In Karwi.

- Primary Source of drinking water in Karwi.
- % of Urban Households covered with piped water supply.
- % of Urban HHs who have sole access to the primary supply of drinking water
- % of Urban HHs with adequate drinking water from a primary source all year.
- % of Urban HHs that have on-site drinking water facilities.

2.5. Planning Of Water Supply System In India.

POPULATION FORECAST	DESIGN PERIOD	PLANT SITTING	WATER QUALITY	WATER QUANTITY	PER CAPITA SUPPLY
Demographic projection	Storage by dam (50 year)	Topography ,soil condition & physical hazard should be taken into consideration	Water conservation	Increasing the water availability & supply demand mgmt.	Basic need – domestic
Arithmetic increase method	Infiltration work (30 year)		Optimal use of available water resources		
Incremental increase method	Pump house (30 year)	The plant must be built above high water mark to prevent damage due to flooding	Prevention & control of wastage of water	Rain water harvesting	Factor affecting consumption – size of study area ,characteristic of population living ,climatic condition.
Geometrical increase method	Water treatment unit 15 year		Effective demand management	Reducing UFW	
	Distribution system 30 yr.			Metering	
	Clear water reservoir 15 yr.				

Source : Manual and Water Supply and Treatment – 1999, MoUD, GoI

Source: Author, Manual 1999 MoUD, GoI

III. ASSESSING KARWI POTABLE WATER SUPPLY

3.1. Existing Scenario of Water Supply System

Rajaghat has an intake well with a capacity of 18 MLD. The Patha jal kal yojana water treatment facility in Karwi has a capacity of 18 MLD and is located in Patha. The distance between the input well and the water treatment plant is 800

meters. Raw water is drawn from the intake well and processed in the water treatment facility.

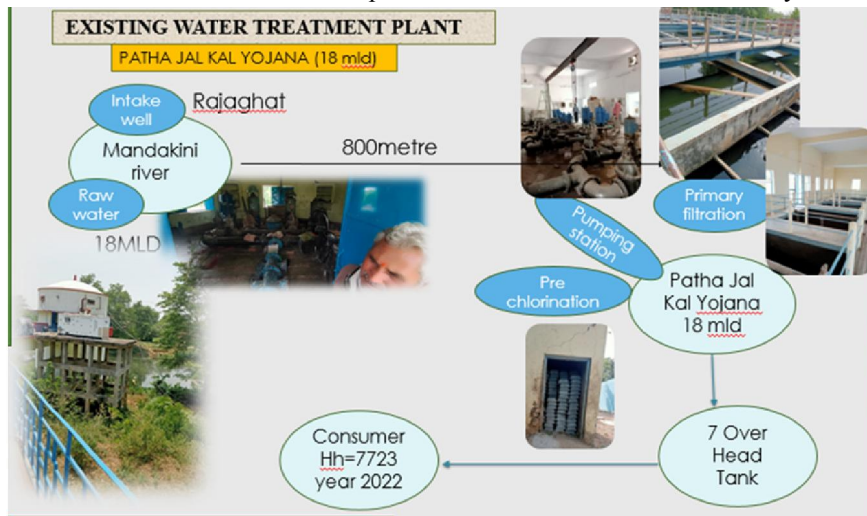


Figure 1 Existing water treatment plant

Primary Survey For Ground Study & Interview With Stake Holder along with institutions have been carried out to analysis in-depth situation of portable water supply in the region.

Inferences from analysis and primary survey:

- In urban areas, 56.6% of drinking water sources are located on the premises.
- 16.2 % location of drinking water source are away from it.
- 70-90 % drinking water source with in premises are in Ward no 12 , 13 , 15 , 17 , 18, 19 ,20 , 22 ,23, 24 ,25.
- Ward no 4, 11 drinking water source location are away from them.
- Ward no 14 have 50%within premises & 50% drinking water sources away from premises.
- Ward no 2,3,9 have drinking water location nearby premises
- No Water Connection ,No Pipeline = Ward No 19 , Ward 14 Pt Deen Dayal Nagar,Mulayam Nagar, Add on areas by nagarPalika
- Rain Water Drain Out Toward East Direction Extreme Climate Evaporate Store Water.
- Lack of awareness About Rain Water Harvesting.
- 67% Extraction of Ground Water (39% Hand Pump+ 17% Bore Well+ 11%tubewell).
- Nitrate, a naturally occurring contaminant, is above recommended levels in ground water.
- Inadequate Groundwater Recharge In This Region Due To Rocky Terrain, High Runoff Of Rainwater And Over-exploitation

Swot Analysis

STRENGTH:

- Mandakini river flow from Satna towards Yamuna.
- It's a Religious place.
- Climate adaptive nature of peoples.

WEAKNESS:

- Lack of awareness about rain water harvesting.
- Rocky surface so limited water recharge.
- Water pressure of water supply is very low.
- Poor governance in some areas.
- No rainwater harvesting.

- Erratic rainfall.
- Human-induced environmental issues such as encroached/polluted water tanks

THREAT

- Water level is declining 98%.
- 67 % submersible pump used.
- Extraction of water at a high level.
- All rainwater drains out of the slope to the east..
- Because of the rapid rise in temperature, the reserve surface water evaporates.
- River water becomes stagnant and filthy throughout the months of May and June..
- Insufficient potable water for the karvi users.
- The water pressure is low.

OPPORTUNITY

- Pipe line is executed.
- Surrounded by mountain.

IV. CONCLUSIONS AND RECOMMENDATIONS

Developing approaches to supply the potable water in urban, scarce area of Chitrakoot Dham. To accomplish the following, combine the management of storm water, waste water, and water supply.

- Water conservation.
- Everyone has access to reliable and safe domestic water.
- Reusing waste water for other non-potable uses and aiding in surface water body contamination
- Recharging groundwater levels through storm water management.

4.1 Storm Water Management

S.N.	ISSUES	STRATEGIES & PROPOSAL
1	Increased pollution of river Mandakini	Cleaning of major drains frequently that fall into Mandakini Riv
2	Depleting ground water level. (Ground water level=93.85)	<ul style="list-style-type: none"> ➤ The approaches listed below can be utilised to recharge ground water level in the Karwi. 1. Detention basin at lodhwada. 2. Rejuvenation of existing 6 Retention pond. 3. Bio filtration 4. Rooftop rain water harvesting

Potable Water Supply Management

S.N.	ISSUES	STRATEGIES & PROPOSAL
1	Water supply coverage (42%)	<ul style="list-style-type: none"> Fill up the void in the current water supply network w connections in exposed pockets.
2	No water supply line in these areas Deen Dayal , Kashiram nagar ,Ahmadganj , Lodhwada , Tulsi nagar	<ul style="list-style-type: none"> Layout of water supply pipeline. Renovation of ageing water and pipes works with auto and SCADA facility Construction of two new O.H.Ts (capacity 1550 MLD).
3	To increase the reliability of water supply in Karwi.	<ul style="list-style-type: none"> In Karwi, a water supply grid system could be develop water works and pumping stations interconnected.
4	Water quality assurance	<ul style="list-style-type: none"> In the water treatment procedure, conventional coag is substituted by PAC (Poly Aluminium Chloride). Online Water Quality Monitoring System:-
5	Alternative raw water source	<ul style="list-style-type: none"> Intake well at Rajapur, Yamuna River. Water treatment plant at Pahari Bujurg.
6	Reduce Non-Profit Water	<ul style="list-style-type: none"> Leakage Detection and Repair Using an Appropriate Le Mapping System 100 % implementation of Water Metering Replacement of outdated pipes (clogged, sluice valves

Waste Water Management

S.N.	ISSUE	STRATEGIES & PROPOSAL
1	No sewer line in whole Karwi.	Augment Sewer Infrastructure and Connection to 100% in the Karwi.
2		Propose STP cum FSTP at Ranipur Bhatt (10 MLD).
3	Waste Water Reuse in Parks	Replace the use of ground water with treated wastewater in park and gardens 16 Parks

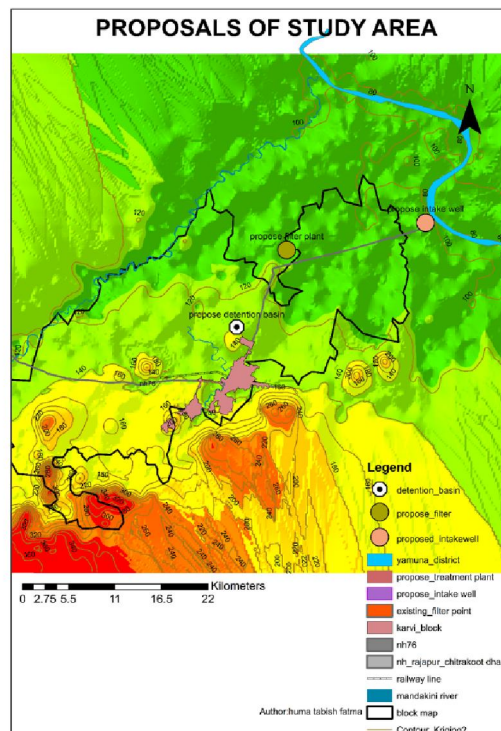


Figure 2 Proposal for study area

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