

DEVELOPMENT OF HOUSEHOLD TREATMENT SYSTEM FOR NARMADA RIVER (BHARUCH) WATER

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ABSTRACT

Water is the Most Important Component for Life. Narmada River is the largest river in Gujarat and is the lifeline of the Gujarat. Water quality of Narmada near Bharuch is very Turbid (Turbidity = 160) as shown in this study. The water as such cannot be directly used by people. Also there is very less fresh water lake in villages an downstream of Bharuch. Therefore a line of Treatment is required for providing clean potable water to Individual Households living on bank of Narmada. The line of Treatment consists of use of coagulant for turbidity removal, sand filter for suspended solid removal and chlorine tablets as disinfection. In this study we found out that optimum does for (Narmada River water) coagulant alum is 6mg/L. Filter provided is sand and brick based with Sand: Brick ratio used as 60: 40. Also chlorination does of 2mg/L is to be provided. Further cost of this treatment was also analysed and found out to be approximately 1Rs/KL.

1. INTRODUCTION

Water is one of the most significant resources on planet earth. It is the life saver of all living thing on earth. In spite of the fact that this is broadly recognized, pollution of water resources is a common occurrence. Specifically, consumable water has turned out to be greatly affected, and in numerous occasions has lost its unique quality. During the last few decades, the growth of world population as well as industrial uprising has caused serious environmental pollution.

The requirement for great drinking water is one of the most difficult issues of our times, at the same time just little learning exists on the effect of these mixes on ecosystems, animals, and man. Solid access to perfect and clean water is viewed as a standout one of the most fundamental humanitarian objectives, and remains a major global challenge worldwide test for the 21st century. Around the world, somewhere in the range of 780 million individuals still need access to enhanced drinking water sources.¹

1.1 RIVER WATER QUALITY

Rivers are the most important fresh water resource for human, social, economic and political development has, in the past, been largely related to the availability and distribution of fresh water in the river system. Rivers are a major source for drinking water supply. Important quality consideration for drinking water is the suspended solid (SS) content, the chemical composition and the bacteriological quality.²

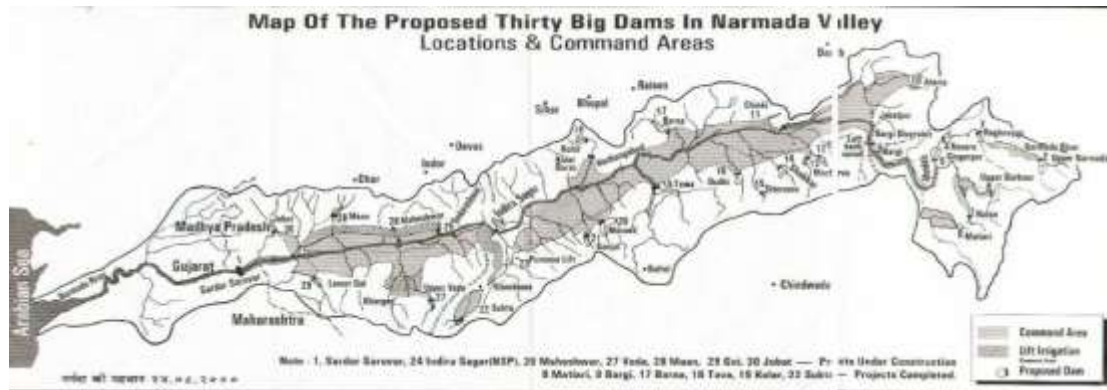
The major sources of SS in river are

- I. Products of mainland rocks and soil disintegration.
- II. The autonomous material which is framed inside the water body and which normally comes about because of the creation of green growth promotion
- III. Precipitation of minerals, generally calcite.
- IV. The most prominent amongst these is mechanical erosion of rocks and soils which result from the combined effects various erosion agents, i.e. running water, wind, temperature, chemical weathering, moving ice and mass movement of materials on slope.³

1.2 OVERVIEW OF NARMADA RIVER

The Narmada River also called the Rewa. It is the 5th Longest in the Indian sub-continent. It is also called the Life line of Madhya Pradesh and Gujarat. Narmada River is started from Narmada Kund, Amarkantak in Madhya Pradesh and converges into the Arabian Sea close Gujarat after travelling a distance of 1312 km. The Narmada is one of the most popular Rivers of India. It makes the conventional border between South India and North India. The river runs toward the west for a range of 1,312 km (815.2 miles) preceding coursing through the Gulf of Khambat (Cambey) into the Arabian Sea, at a separation of 18.6 miles or 30 km west of the Bharuch city in Gujarat. Otherwise called Rewa. During the British govern, the river was known as the Narbada or Nerbudda.

The Narmada River Valley's water resources potential was recognized by the British in the early 1900s. The Central Waterways, Irrigation and Navigation Commission first proposed damming the Narmada river for the purposes of irrigation between 1945 and 1946. However, disputes between Madhya Pradesh, Maharashtra, Gujarat and Rajasthan concerning the sharing of development costs and the dams' resources stalled damming plans until 1969. In 1969, the NWDT was formed and by 1979, the NWDT had allocated shares of water and power between the four states.



2.0 Types of Filter Media Use

Filtration process will be performed to find out the performance of different Filter media like:

- Bricks
- Sand

All are used as in Individual form as well as in different combinations.

3.0 METHODOLOGY

1. Coagulation and flocculation
2. Jar test
3. Filtration

4.0 Specification of Experimental setup

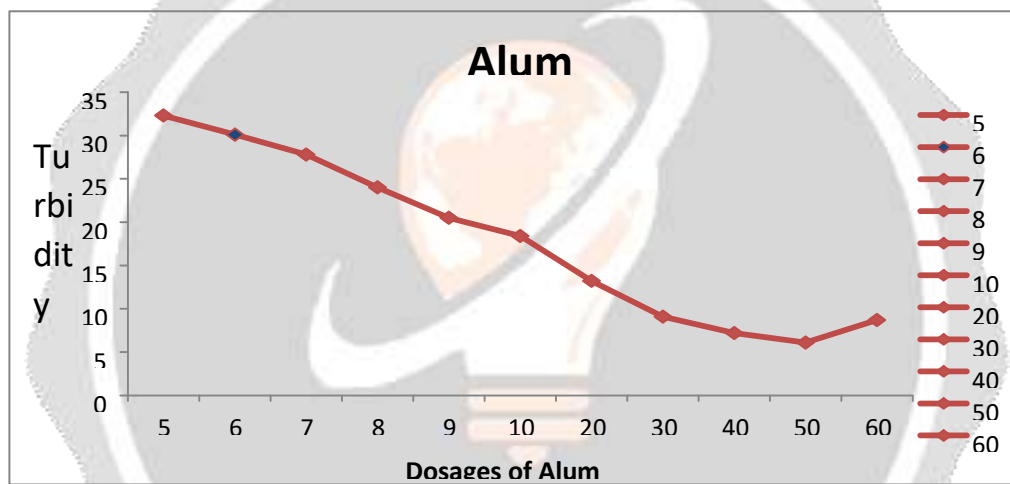
<i>Item</i>	<i>Size</i>
<i>Raw Water Tank</i>	<i>10 litre</i>
<i>Filter Tank</i>	
<i>Free board</i>	<i>10cm</i>
<i>Surface area of filter tank</i>	<i>20 *20cm</i>
<i>Volume of media</i>	<i>0.16m³</i>
<i>Size of sand media</i>	<i>600 micron to 4.75mm</i>
<i>Size of brick media</i>	<i>5 to 20mm</i>
<i>Collection tank</i>	<i>12 litre</i>
<i>Hydraulics</i>	
<i>Flow types</i>	<i>Vertical</i>
<i>Mode of operation</i>	<i>Batch</i>

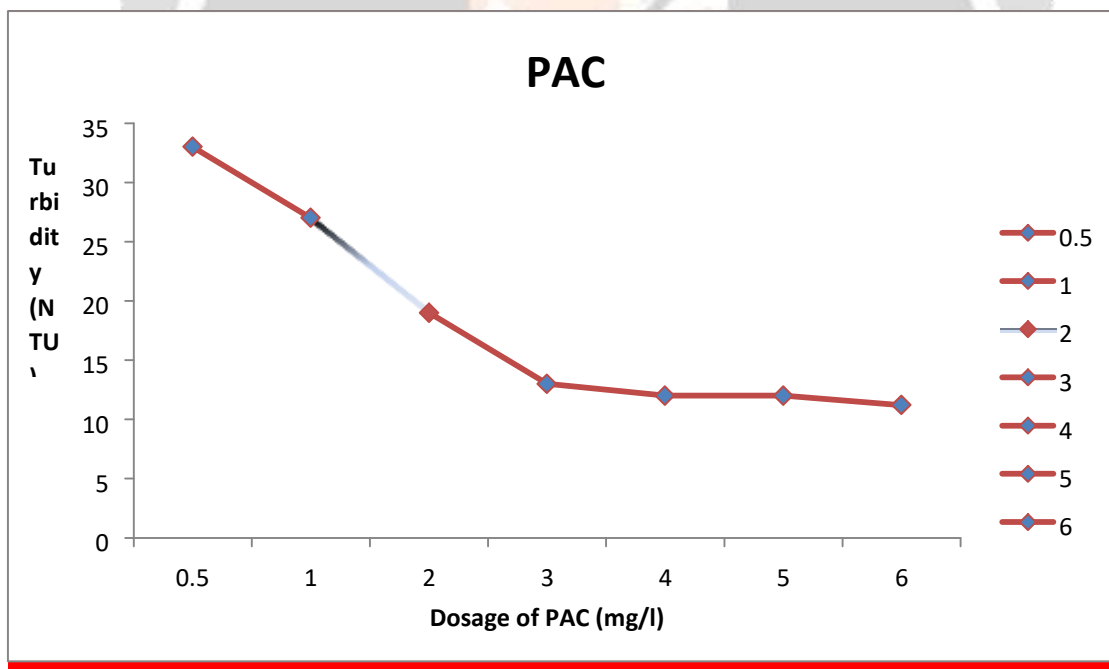
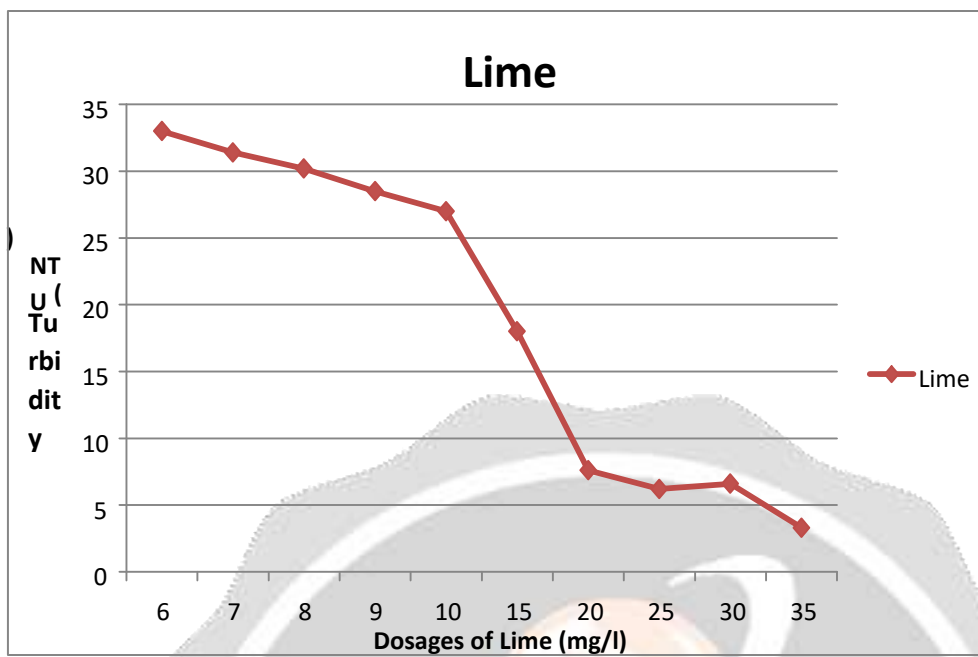
4.1 Characteristic Of Narmada River Sample

S.N.	PARAMETERS	UNITS	RESULTS	TEST METHOD
1.	<i>pH</i>	---	7.48	(APHA 22nd Ed.,2012,4500H+B)
2.	<i>Turbidity</i>	<i>NTU</i>	160	-----
3.	<i>TDS</i>	<i>mg/l</i>	130	APHA 22nd Ed.,2012,2540C)
4.	<i>TSS</i>	<i>mg/l</i>	127	(APHA 22nd Ed.,2012,2540D)
5.	<i>Temperature</i>	^o C	28 ^o	-----
6.	<i>DO</i>	<i>mg/l</i>	7.6	IS 3025(PART 44) 1993Amd.01
7.	<i>BOD(5 day)</i>	<i>mg/l</i>	1.7	IS 3025(PART 44) 1993Amd.01

4.2 Results of Jar Test

- *pH = 8.18*
- *200 RPM for 2 minutes*
- *20 RPM for 20 minutes*
- *Settling Time = 30 minutes*
- *Sample Volume = 500 ml*
- *1% solution of Aluminum potassium sulphate*
- *1% solution of Lime*
- *1% solution of Poly aluminum chloride*





4.3 Filtration Results

Turbidity Removal after Filtration by 1:1 (Sand:Brick)

Sr. no.	Flow Measurement (Liter/minute)	Initial Turbidity (NTU)	Final Turbidity (NTU)	% Turbidity Removal
1.	0.5	30	1.90	93.66
2.	1.0	30	3.30	89.00
3.	1.5	30	3.90	87.00
4.	2.0	30	4.50	85.00
5.	2.5	30	5.00	83.33
6.	3.0	30	5.70	81.02

5.0 CONCLUSIONS

In this Study, Line of Three Treatments is suggested for treatment of Narmada water as household treatment method.

- *Coagulation or chemical dosing for Turbidity removal using alum whose optimum dosing is found to be 6mg/L.*
- *Two media sand filter using sand and brick media as filtering medium for suspended solid removal.*
The following combination of sand and brick were used;
Ratio of Sand: brick = 50: 50
Ratio of Sand: Brick = 60:40
Ratio of Sand: Brick = 70:30
Out of which sand: bricks =60:40 combinations are found to be the best for suspended solid removal.
- *Chlorination for disinfection using chlorine tablets for which optimum dosing of chlorination is suggested to be 2mg/L.*

Also the operating cost for this treatment is found to be approximately 1Rs/kl.

6. REFERENCES

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