ORIGINAL RESEARCH PAPER

Economics

FACTOR ANALYSIS FOR REASONS FOR CONTAMINATION OF WATER IN RAMANAGARA DISTRICT

KEY WORDS: Water, Sanitation, Urbanization, Contamination and Factor Analysis

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ABSTRACT

The increased demand for water and scarcity of water is the central issue in provision of drinking water. The present paper examined the impact of urbanization on contamination of water in Ramanagara district of Karnataka. The study used primary data and The Principal Component Analysis for the analysis of data. It is found from the study that the reasons are identified in the order of their role in causing water contamination. Accordingly, factory effluent is the main reason which highly caused the water contamination followed by mining, sewage water and land acquisition. Hence, in the first place, factory effluent, mining, and sewage water and land acquisition are the strong reasons jointly caused the water contamination in Ramanagara district. In the second place, water management is the single reason caused the water contamination. The severity of the reasons identified under first component is very high. Accordingly, the water in the Ramanagara district is severely and jointly affected by factory effluent, mining, sewage water and land acquisition. Hence, the government has to bring stringent rules to protect the water and health of rural people.

INTRODUCTION:

Water is a social good and a common property. The increased demand for water and scarcity of water is the central issue in provision of drinking water. Water is the basic necessity of human being for consumption and production. Water is a cardinal element of existence (Walker, 1975). During 1970s compare to demand water was abundantly available at free of cost. Therefore it was treated as free good and there was no price paid for it (Mitchell & Kurak, 1976). The modernization, urbanization, industrialization and many more have increased demand for water and today there is relatively scarcity of water all over the world for ensuring the quality of life (Commission for the Environment, 1977). Scarcity of water has raised the question of efficient and equitable allocation and distribution. Then the pricing is an unavoidable intervention to protect the larger public interest and avoid externalities (Musgrave & Musgrave, 1973). Urbanization is one of reason for decreasing quality of drinking water in the nearby villages of main cities (Falk, Globisch, Angelmahr, Schade, & Schenk-Mathes, 2022). Bengaluru is a fast growing city. Urbanization of Bengaluru is having many negative impacts on the surrounded villages; decreasing quality of water is one among them. The present study examines the impact of urbanization on rural drinking water.

Review of Literature:

The availability and accessibility of water are the major issues. Cost of supply and pricing of water are important aspects of drinking water (Joseph, Wagner, & Gunnar, 2020). Provision of water supply by local governance is largely practiced and water is supplied as public good or merit good with public private partnership (Sears, et al., 1990). Supply of drinking water is also linked with availability of energy, budget provision and government policy (Mohamed, 2010). Availability, accessibility, affordability and adoptability are the major determinants of drinking water (Jaswal & Kanodia, 2018). Most of the previous works have studied the availability of water in urban and rural areas (Anand, 2003). Some the previous studies have examined the scarcity water particularly in urban area (Srikanth, 2009). The environmental issues of water also rarely found in the previous works (Manisha, 2006). The impacts of urbanization on rural drinking water are further limited (Ravichandran & Boopathi, 2002). Accordingly, the present paper on impact of urbanization on rural drinking water is valid and relevant at this point of time.

Methodology:

The study used primary data collected from rural villages of Ramanagara district. 384 random samples have taken for the study. The reasons for contamination of water have analyzed by using factor analysis. The major reasons jointly affected the quality of water are treated as factors. The factors considered for analysis of reasons for contamination are;

1. Sewage water,
2. Factory Effluents,
3. Mining,
4. Missing of lakes,
5. Land acquisition and
6. Water mismanagement.

The factor analysis has been used to identify the combination of factors (reasons), which contribute for contamination of water in Ramanagara district. The data collected by using 5 point Likert scale of 1 to 5. The opinions given by the respondents in the Likert scale are summarized and presented below;

RESULTS AND DISCUSSION:

The results of the present study are presented below;

Table 1: Descriptive Statistics for Reasons in Ramanagara District

Factors	Mean	Std. Deviation	Analysis N
Sewage Water	4.06	1.443	400
Factory Effluents	4.28	1.172	400
Mining	4.39	1.179	400
Missing of Lakes	4.09	1.879	400
Land Acquisition	4.14	1.129	400
Water Mismanagement	3.00	1.819	400
Average	3.99	1.44	400
Co-efficient of Variation CV = 35.98 %			

Source: Primary Data

The average scores for reasons for contamination given by the respondents are presented above. The standard deviation and CV are also computed to know the consistency in the opinion about the reasons for contamination. The average score for reasons for contamination of water is 3.99 and the coefficient of variance in the average opinions is 35.98 percent. The respondents have given highest score to mining.

The correlation coefficients for reasons to contamination of water in Ramanagara district are estimated and found that the diagonals are the unit matrix and given solutions for factor analysis.

Table 2: KMO and Bartlett's Test for Diseases

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.762	
Bartlett's Test of Sphericity	Approx. Chi-Square	1766.973
	df	15
	Sig.	.000

Source: Primary Data

The Kaiser-Mayer-Olkin (KMO) and Bartlett's tests were used to identify the adequacy of sample data for factors analysis to identify the joint reasons for contamination of water in Ramanagara district. The KMO value is 0.762 and it is greater than 0.5. Hence, sample data used for factor analysis are adequate to identify the reasons jointly causing quality of water. The chi-square test value is 1766.973 and it is significant at one percent level. Therefore, there are strong relations among the reasons for contamination used for present factor analysis.

The total Eigen value extracted for each component and the percentage of variation explained by each component for reasons have estimated together, 2 components have explained 78.811 percent of variation in total variation. Accordingly, only 2 components explained 78.811 percent of reasons for water contamination in Ramanagara district.

Identification of Reasons under Components:

Using the Principal Component Analysis (PCA) and rotated component matrix the reasons are identified under each component for which the extraction value is 0.7. For the factor loading, the extraction value of 0.7 is sufficient.

Table 3: Rotated Component Matrix to Identify the Reasons in Ramanagara District

Rotated Component Matrix		
Reasons	Component	
	1	2
Factory Effluents	.948	
Mining	.912	
Sewage Water	.815	
Land Acquisition	.763	
Water Management		.933
Missing of Lakes	-	-
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		

Source: Primary Data

The reasons which significantly contributed for the contamination of water are identified using PCA. Out of 6 reasons, 5 reasons are identified under 2 components. Four reasons are identified under component one and one reason is identified under the component two. The reasons are identified in the order of their role in causing water contamination. Accordingly, factory effluent is the main reason which highly caused the water contamination followed by mining, sewage water and land acquisition. Hence, in the first place, factory effluent, mining, and sewage water and land acquisition are the strong reasons jointly caused the water contamination in Ramanagara district. In the second place, water management is the single reason caused the water contamination. The severity of the reasons identified under first component is very high. The reason identified under second component is relatively less problematic compared to first component. Accordingly, the water in the Ramanagara district is severely and jointly affected by factory effluent, mining, sewage water and land acquisition.

CONCLUSION:

The present paper examined the reasons for water contamination in Ramanagara district. Factory effluent, mining, sewage water, land acquisition, water management and missing of lakes are reasons assumed to be identified as major reasons for water contamination in Ramanagara district. The study found that the reasons are identified in the order of their role in causing water contamination. Accordingly, factory effluent is the main reason which highly caused the water contamination followed by mining, sewage water and land acquisition. Hence, in the first place, factory effluent, mining, and sewage water and land acquisition are the strong reasons jointly caused the water contamination in Ramanagara district. In the second place, water management is the single reason caused the water contamination. The severity of the reasons identified under first component is very high. Accordingly, the water in the Ramanagara district is severely and jointly affected by factory effluent, mining, sewage water and land acquisition.

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