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Assessment of Kaliasote Dam Water Quality for Irrigation Purpose in Bhopal Area

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Abstract: Present learn is to assess the reasonableness of stream for water system, the substance qualities of Kaliasote dam water of region Bhopal (M.P). Water tests from five stations K1, K2,K3,K4 and K5 of Kaliasote dam are gathered and dissected for pH, electrical conductivity (EC), complete broke down solids (TDS), Na+, K+, Ca2+ and Mg2+. To fathom the water quality and utilitarian pieces of dam water, substance records like percent sodium, Sodium Adsorption Ratio (SAR), Wilcox layout were resolved subject to the precise results. According to the EC and SAR check that all models have low sodium percent and can be utilized for drinking reason. As shown by Wilcox graph the Kaliasote dam water kept to one class C2S1of water type. All the models fall in the order of brilliant if there ought to emerge an event of SAR tally of water test and are well inside the sensible quality for water framework water. Kaliasote water may be used for water framework reason.

Key words: Sodium Absorption Ratio, Irrigation suitability, Magnesium hazard, Salinity hazard, Alkali hazard.

1. INTRODUCTION

Water of dam is the strong water resource for human usage, agribusiness and similarly with respect to present day vocations. As brisk weariness of water supplies happens in light of people improvement and industrialization. In India due to over use and expulsion of waste the water idea of many water bodies gets rotted. Dam water is regularly utilized for water framework reason, so it is expected to evaluate the compound bit of water for its usage. Further, it is possible to understand the change in quality due to shake water participation (suffering) or any sort of anthropogenic effect (Todd 1980, Kelly 1940). Water quality examination is critical for incredible organization and use of water as fundamental resource. In this manner water quality watching (substance, physical, and normal constituents) is as noteworthy as assessing it's sum. There are different proportions of water quality similarly as standard systems for declaring and differentiating eventual outcomes of water assessment and that depends on its optimal use (Babiker, 2007). Noteworthy substance segments including Na+, K+, Ca2+, and Mg2+ accept a basic capacity in requesting and assessing water quality. In this examination hydro-engineered assessment of the Kaliasote stream water was driven by separating water tests reliant on these parts. Kaliasote dam is a respectable wellspring of water for different consumption's, has now experienced quality corruption due to growing people, making industrialization and provincial activities. The objective of present examination was to study substance formation of Kaliasote water and its suitability for different uses (for instance local, water framework and drinking purposes).

2. RELATED WORK

2.1 Study Area

Bhopal territory is arranged in the central bit of MP, India. Bhopal zone is arranged in Madhya Pradesh at 23°15′N Latitude and longitude 77°25′E longitude and has a stature of 550/600 meters above sea level. The city has different necessities of water for its use in ventures, water framework, drinking and pisciculture. The principle harvests are oats (wheat, grain, corn), and vegetable advancement which are penetrated on the examination area. The Kaliyasot Dam reliant on Kaliyasot River for instance a feeder of stream Betwa. Kaliyasot Dam is organized at Bhopal, it is masterminded at 23012"3' N scope and 770 24"29' E longitude. The kaliyasot gracefully is limit vault near Chuna Bhatti Village. For present examination five site at study districts have been picked of the dams.

2.2 Sampling and Analytical Procedure

In order to consider the quality assortment of dam water in the examination zone water tests have been assembled for season of a year (November and October 2018). A total of 5 instances of water in the examination region were accumulated from testing stations Kaliasote dam from K1, K2, K3, K4, and K5 assessing station. The model insurance and analyzing techniques were according to the nineteenth form of the Standard Methods of (APHA. 1995). The accumulated models were analyzed for noteworthy particles, for instance, $Ca2+$, $Mg2+$, $Na+$, and $K+$. Limits, for instance, pH and electrical conductivity (EC) were assessed in the field.. Various limits were examined in the exploration office. To analyze the idea of water, the got substance data was surveyed the extent that its sensibility for local, cultivating and drinking purposes. The indicative data not only can be used for the game plan of water for utilitarian purposes yet also for deciding various components on which the substance characteristics of water depend (Sadashivaiah et al., 2008).

3. RESULTS AND DISCUSSION

3.1 Water Quality Assessment

A water examination in water hydrology is done to get information regarding the water quality for its usage. The water quality may yield information about the conditions through which the water has streamed (Janardhana Raju, 2007).The physico-engineered assessment of water is never truly water fittingness to different usages subject to different compound documents. In this paper, evaluation of the suitability for water framework and local usage was surveyed by taking a gander at the hydro-engineered limits of kaliasote dam water with the supported detail of World Health Organization (WHO, 2004).The pH assessments of the water change some place in the scope of 7.1 and 7.9, exhibiting insignificantly stomach settling agent to solvent nature of water. According to the WHO, the extent of appealing pH assessments of water supported for drinking expectations is 6.5 – 9.2 (WHO, 2004). There are no water tests with pH regards outside of the appealing scopes. The EC and gathering of TDS is inside the permissible farthest reaches of 1500 μ mhos/cm and 1000 mg/l, independently, in all the instances of kaliasote dam. Beyond what many would consider possible for sodium center in drinking water is 200 mg/l. A higher sodium confirmation may cause hypertension, friendly heart sicknesses and kidney issues (A.K. Singh, 2008). Groupings of sodium are inside the embraced farthest reaches of 200 mg/l in all the examined water tests.

3.2 Suitability for Irrigation Use

The water quality appraisal in the region of study is done to choose its fittingness for agrarian purposes. The sensibility of water for water framework is reliant upon the ramifications for the mineral constituents of the water on both the plant and the soil. A high salt substance is dangerous as it can limit improvement of plants really, by restricting the taking up of water through modification of osmotic cycles. Furthermore salts may hurt plant advancement artificially by the effects of harmful substances upon metabolic cycles. Pungency, Sodicity and toxicity generally ought to be considered for evaluation of the fitting idea of groundwater for water framework (Todd 1980, Shainberg and Oster, 1976). Limits, for instance, EC, percent sodium, magnesium danger and sodium adsorption extent (SAR) were used to assess the sensibility of water for water framework purposes.

3.2.1 Salinity Hazard

Overabundance salt in water expands the osmotic weight of the dirt arrangement that can bring about a physiological dry spell condition. Despite the fact that the field seems to have a lot of dampness, the plants shrink in light of the fact that deficient water is consumed by the roots to supplant that lost from happening. At that point complete solvent salt substance of water system water for the most part is estimated either by deciding its electrical conductivity (EC), announced as micromhos per centimeter. The conductivity estimations of Kaliasote water went from 251 to 330μmhos/cm. The variety in EC is principally ascribed to geochemical arrangement and anthropological exercises winning in this district. Typically, water system water with an EC of < 700 μ mhos/cm makes practically zero danger most yields while EC > 3000 μ mhos/cm may restrict their development (Tijani, 1996). The watched mean estimations of conductivity of Kaliasote at K1 is 270μ mhos/cm, K2 is 271μmhos/cm, K3 is 271μmhos/cm, K4 is 269 and at K5 is 271μmhos/cm. In light of the US Salinity Laboratory order (1954) (see Figure 3) the saltiness risk for water tests of Kaliasote is named mid-range quality. All the examples fall in the medium saltiness danger classification (C2).Water that falls in the medium saltiness peril class (C2) can be utilized as a rule with no uncommon practices for saltiness control.

3.2.2 Alkali Hazard

As sodium contributes legitimately to the absolute saltiness and its high in water influence a portion of the physical properties of soil. A high salt substance (high EC) in water prompts development of saline soil, and high sodium content (SAR) cause changes in assimilation of water by underlying foundations of plants. Water system with Na improved water brings about particle trade responses for example take-up of Na+ and arrival of Ca2+ and Mg2+ particles. This causes soil totals to scatter, diminishing its penetrability (Tijani, 1994). The sodium or antacid danger in the utilization of water for water system is controlled by the accompanying equation:

Sodium Adsorption Ratio (SAR) = Na/√ (Ca + Mg)/2 Ions in the condition are communicated in miliequivalent per liter. There is a noteworthy connection between's SAR estimations of water system water and the degree to which sodium is consumed by the dirts. High SAR esteem water prompts a breakdown in the physical structure of the dirt brought about by extreme measures of colloidal consumed sodium. This breakdown brings about the scattering of soil earth that makes the dirt become hard and minimal when dry and progressively impenetrable to water entrance because of scattering and growing when wet. Fine-finished soils, those high in earth, are particularly dependent upon this activity. The determined estimation of SAR in the examination territory goes from 0.5-4.7meqL-1 in water. The mean estimation of SAR for Kaliasote dam at K1 is 2.8meqL-1, K2 is 2.7meqL-1, K3 is 2.7meqL-1, K4is 2.6meqL-1and K5 is 2.7meqL-1, The SAR esteems plotted on the US saltiness chart as alkalinity danger shows that soluble base or sodium peril for water tests of Kaliasote dam can named low saltiness (S1).As per the Richard (1954) characterization dependent on SAR esteems (Table 2), all the examples are phenomenal class since none of the examples surpassed the estimation of SAR = 10.

3.2.3 Magnesium Hazard

In spite of the fact that calcium and magnesium particles are basic for plant development however they may related with soil accumulation and friability. Water contains calcium and magnesium fixation higher than 10meq/L (200 mg/l) can't be utilized in farming. In the considered region the centralization of calcium and magnesium were not surpassing 200 mg/in all water tests K1,K2,K3,K4 and K5 of Kalisote separately. Another marker can be utilized to determine the magnesium danger (MH) is proposed by Szabolcs and Darab (1964) for water system water as following equation:

Magnesium Hazard (MH) = Mg/(Mg + Ca) × 100

In the event that this rate danger was under 50, at that point the water was protected and reasonable for water system. The watched mean qualities for Kaliasote dam examining station K1 is 27.3%, K2 is 26.9%, K3 is 26.4%, K4 is 26.5, and K5 is 26.4 From the determined worth, the magnesium peril esteems are well appropriate for its water system use.

3.2.4 Sodium Content

In water system waters the sodium content is likewise communicated as percent sodium or solvent sodium rate (%Na) and can be resolved utilizing the accompanying condition:

%Na = Na + K/(Ca + Mg + Na + K) × 100

Where, all ionic fixations are communicated in plant counterparts per liter. High level of sodium particle concerning calcium, magnesium and sodium particles in water system water, causes deflocculating and impeding of soil porousness (Singh, 2008). The mean estimation of Na% was seen at kaliasote examining station at K1 is 15.2, K2 is 15.4, K3 is 14.9, K4 is 15.4 and K5 is 15.1. It is seen that all examples have low sodium percent and are reasonable for water system purposes.

4. WATER CLASSIFICATION

So as to arrange the dam water tests for water system utilizes two graphs for example the US saltiness graph (1954) and the Wilcox characterization outline (1955) have been utilized (see Figure 1). In US saltiness outline, electrical conductivity (EC) is taken as saltiness peril and sodium adsorption proportion (SAR) as alkalinity danger. The EC esteem for Kaliasote dam water EC esteems shifts from 270 to 271μmhos cm-1 and SAR esteem differs from 2.7 to 2.8. The plot of mean of information of examining station K1to K5 on the US saltiness graph shows that the water tests were found generally limited in class of water type; i.e., C2-S1. Because of low sodium and medium saltiness water of C2-S1 class can be utilized for water system on practically all dirts with little peril of sodium issue, if a moderate measure of filtering happens. The sodium rate (%Na) in the region ranges somewhere in the range of 7.1 and 24.6%. As indicated by Wilcox chart the Kaliasote dam water bound to two classes C2S1of water type. All the examples falls in the classification of amazing to great and great to passable quality and might be utilized for water system purposes.

5. CONCLUSION

Water tests from kaliasote dam have been assessed for their compound organization and reasonableness for water system employments. In view of TDS, all water tests are appropriate for drinking purposes. The saltiness peril for water of dam is named medium saltiness. Soluble base risk likewise is grouped from low danger to extremely high. From the determined worth, the magnesium danger esteems range between 24.9 to 29.2% and can be delegated reasonable for water system use. The qualities for the percent sodium for Kaliasote water range from 7.2 – 24.6%. It is seen that all examples have low sodium percent and can be used for drinking reason. As per Wilcox graph the Kaliasote dam water kept to C2S1of water type. All the examples falls in the classification of incredible to great and great to reasonable quality and might be utilized for water system purposes.

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