



Physiochemical parameters of Chambai dam district Karak, KP, Pakistan

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ABSTRACT

The research was carried out to summarize the Physiochemical parameters of water and soil samples from the Chambai dam of district Karak. The Physiochemical parameters include electrical conductivity, temperature; Total solid, pH, total dissolves solids, color, odor and elasticity of water and soil. The result of the present study makes obvious that all the Physiochemical parameter were found to be in permissible range and are non-harmful for culturing and growing fishes. Therefore, our study will give useful help or assistance to the water culturists and fisheries researchers to more improve the conditions of dam for fish growth, their reproduction and survival. Moreover, the information might also be valuable for determining the growth rate and productivity of fishes of that particular dam.

Key words: Physiochemical Properties of Water and Soil Chambai Dam For culturing and growing fishes

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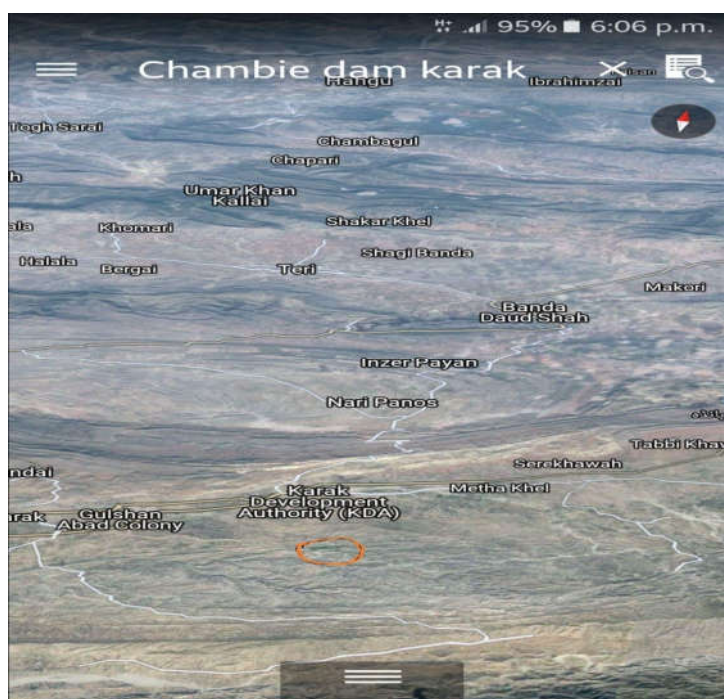
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INTRODUCTION

Karak is a district of the Khyber Pakhtunkhwa province of Pakistan. It is situated to the south of the district Kohat and on the north side of Bannu and Lakki Marwat districts. Many small dams had been built in the Karak district to store the rain water which is used for domestic and agriculture purposes. Chambai Dam is situated about 3 km from the south of the Karak development Authority (KDA) of district Karak. The dam is completely surrounded by mountain from Southern, East and Western sides. Chambai dam was completed in 2013. It has a total Catchment area about 800 canals. It is a Barany dam, and it completely depends upon rains for water. When the annual rain ratio is higher than it has the ability to store more and more water. If the water is increased from their normal level due to more rains, then it has a overflow pump through which this water are flowing toward the nearest fields and give much and much benefit to the farmers by increasing their crop production. The life inside the water is the most complicated and comprehensive ecology which is not easy to understand properly, Rather then water is the most essential source for the life in both land and also the life inside the water such as fishes and other invertebrates, etc. water is also the most important resource for the irrigation, domestic usage, agriculture or crop production, industrialization and fishery production as well. We know that water is the key aspect of the life of each living organism and the polluted water couldn't be used for that purpose that's why the Physiochemical analysis of water is much as necessary for the survival and proper growth and development. Therefore, the analysis shows the condition of water for fish production, agricultural purposes and for other uses [1]. Population of fishes completely relays upon the changing of Physiochemical features of their oceanic environment which assist in the survival of their life function and also the physiochemical features of water play a vital role in the maintenance of favorable environment. Along with the water soil is also an important factor which affect directly or indirectly the

life in the water and also their relationship with their environment [2-9]. Fishes are moved to the areas that are physiologically suitable for their Physiochemical environment [10-12]. Fishes are the major and the chief source of protein and for us, and it has an antidepressant characteristic, that's why it is easy to focus on their proper growth. Many researches are conducted on the Physiochemical parameters of water and soil and also their impact on the growth of these fishes, and that Physiochemical analysis also provide us information about the relationship of the different species of the fishes, and the effect of temperature, water salinity, and dissolved oxygen (DO) on their existence and survival [13,14]. The soil act as an organic filter because the waste material that is excreted by the fishes due to its heavy weight moved toward the bottom and the soil absorb it, and beside this these organic residue is assisting the salinity and also help to maintain the PH of aquatic ecosystem [15]. Therefore the present study was conducted for assessing the quality of water and soil of Chambai dam for proper growth and best survival of fishes with the help of some selected Physicochemical feature. The present study will provide useful information for observing the changes in the water and soil quality as a result of the dam's natural dynamics over time.



Map: showing the location of Chambai dam

MATERIAL AND METHODS

Study area: The present study is conducted on Chambai dam, which is situated about 3 km from the south of the Karak development Authority(KDA) of district Karak, and about 2 KM to the east of the Chambai village of district Karak, KPK, Pakistan. And the exact location of the dam is clearly shown in the above given Map.

Sampling:

Six samples of water and soil were collected from different locations that is starting up point, middle point and the end up point at Chambai dam. All the three water Samples were collected in properly washed plastic bottles, while soil samples were collected near the bottom of dam and then placed in airtight polyethylene bags for further analysis by using the methodology followed Rehman *et al* [16].

Physiochemical Characteristics:

All the Physiochemical features such as total dissolve solids (TDS), Electrical conductivity (EC), Temperature, Total solid (TS), PH, color, odor and elasticity of water and soil samples were collected from the different locations of the Chambai dam were analyzed and observed. Features like electrical conductivity, color, odor and Temperature were detected and determine at the sampling sites, while for further analysis the samples were carried to the laboratory.

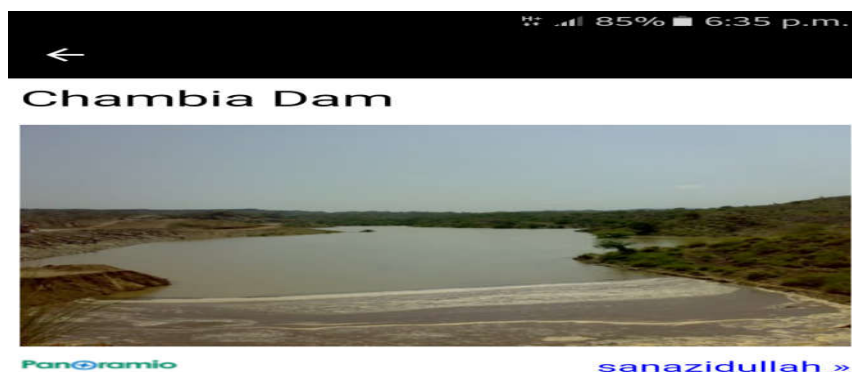


Fig 1: An overview of chambai dam

Temperature:

Temperature is one of the important factors because it affects the life directly, both in land and inside the water. The physiological behavior of the organism which lives in a particular ecosystem is depending upon the temperature of that region. Furthermore, it is easy to determine the temperature of the dam because it assists to understand the behavior of the living organism in the water. For the temperature measurement APHA method was followed [17-18].

Hydrogen ion concentration:

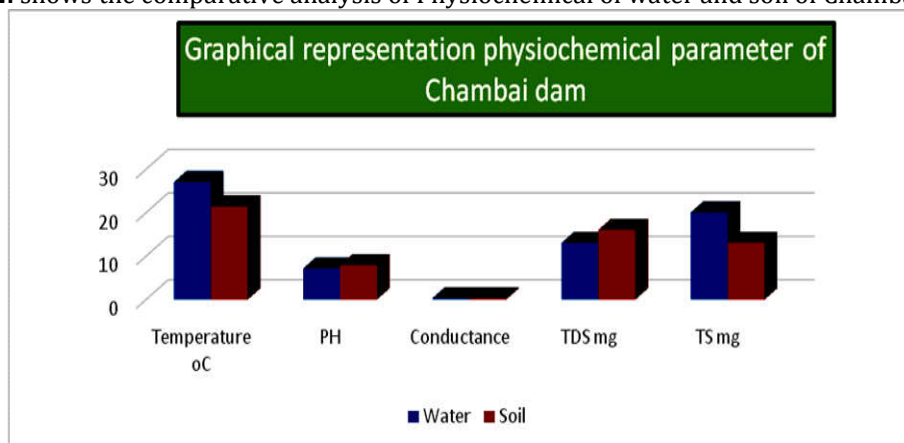
Electrical *Jenway* pH meter Model no 3020 was used for the measurement of hydrogen ion concentration (PH) of water and soil samples. The analysis was carried out according to the method which was previously used by Torimiro *et al* [19].

Electric Conductivity (EC) and Total Dissolved Solids:

The Electrical conductivity of all the three samples of water and that of soil was analyzed by Conductivity meter JENWAY model no.4520.. Conductivity meter was, calibrated by 0.1 KCl (potassium chloride) solutions and washed with distill water and dried before dipped into each sample of water and soil to avoid the inaccuracy. The same method was used for the TDS measurement.

RESULT**Table1; Showing the Physiochemical parameter of Chambai dam**

Samples	Temperature	PH	Conductance $\mu\text{S}/\text{ml}$	TDS mg/100ml	TS mg/100ml	Color	Odor	Elasticity
Water	27° C	7.1	0.26	13 mg	20 mg	Greenish	Spongy	non elastic
Soil	21.4° C	7.87	0.25	16 mg	13 mg	Brown red	Odorless	elastic

Fig;2: shows the comparative analysis of Physiochemical of water and soil of Chambai dam**DISCUSSION**

All the physiochemical parameters such as Temperature, Electrical conductivity, Total dissolved solid (TDS) , TS, Color, Oder, and Elasticity of water and soil of the Chambai dam of District Karak, KPK, Pakistan is showing in the Table 1 and the Fig 2.

Color, Odor and Elasticity:

We generally defined the color of an object by the Wavelength of the visible light that is reflected by that particular object. According to the previous work the Pale color, light greenish and greenish color is best

or suitable for the growth of the fishes [20]. The Dark brown color is lethal for fish culture and that cause mortality, where the light green color is relatively good for fish culture and that of dark green color is not ideal for fish culture, and more importantly the clear or transparent water is not productive for a fish culture [21]. The green, bluish green and brown, green colors of water are the sign or clear indications that enormous number or abundance population of phytoplankton is present in the water. These planktons are act is a direct food for the herbivorous fishes and its also responsible for the oxygen due to which the depletion of oxygenation is completely removed, and this is best for the fish growth and survival [22]. Oder of the water directly affects the aesthetic and the recreational water and also the taste of the fish live in the water. When the sewage of industrial water and also that of the agricultural waste withdrawn or discharge into the water and by the decomposition process of microbes in the bottom sediment they release toxic gases in the water which produced the odor in the water and soil. Elasticity of the water and soil is too much necessary in the swimming of fishes, if the soil is non elastic it causes severe injuries to the fishes which may be leading to its death. The color, Odor and elasticity of water and soil are illustrated in the Table 1 and Fig 2 comparatively.

Temperature:

Temperature is one of the most important factors that directly affect the life in the water. The temperature is considered to be the most essential parameter for all the metabolic activities of the organism lived inside the water, and also considered a significant biological factor [23]. The fish is a cold blooded animal so the metabolism, growth, survival and the rate of reproductive activities of fishes directly depends upon the temperature of the water. The optimum temperature for the growth and survival is 26-32° C[24]. In the current study, the temperature of water samples of Chambai dam is close to the 27° C and that of soil sample about 21.4° C was recorded which is shown in Table 1 and Fig 2. Thus the result of the current study concluded that the Temperature analysis was found to be sufficient and favorable for the fish growth and survival. The current result was an agreement with anonymous [25].

Hydrogen ion concentration (PH):

In natural water such as streams, lakes and rivers all the chemical, physical and biological processes may depend upon the change In PH value. For example, in natural water the surface charge of colloid and their ability to coagulate ions is completely depend upon the solubility of these dissolved ions and PH of the water. In most natural fresh water lakes, streams and rivers the PH valve ranges about 6.5 -7.5, and according to the WHO the PH range is about 6.5-8.5 is favorable for the fish growth and survival [26]. PH of soil and water samples collected from Chambai dam is within the permissible range. Generally the PH range in between the 7 to 8.5 is not only favorable for fish survival, but also suitable for the biological productivity of fishes. While the fish in the water whose PH value is about 4.0 to 6.5 or 9.0 to 11.0much in stressed conditions. And the fish's death occurs in the water having PH valve is lesser than 4.0 or greater than 11.0 [27]. The PH of all the three samples of water was 7.1 and that of soil were 7.87so from the present study it was concluded that the PH of the water and soil of chambai dam is favorable for the fish survival and growth.

Electrical conductivity:

Electrical conductivity (EC) is an expression that shows the ability of water solution to carry electric field. Electrical conductivity inside an aquatic ecosystem is an important element. Because the fresh water ecosystem supports the many abundant aquatic life, that's why it should have the conductivity range from 15 to 500µs/ml. Fishes are too much sensitive to this valve of electrical conductivity, the osmotic pressure exerted on the fish cellular membrane are very much and strictly related to the electrical conductivity of water. The increase or decrease amount of electrical conductivity from the above range is the sigh that the water is not suitable for certain species of fishes and some macro invertebrates [28]. The most important thing to know that the conductivity has not much effect on the growth of the fishes as much as the other physiochemical parameters do.In the present study the Electrical conductivity calculated for water sample in chambai dam were 0.26 µs And that for the soil sample were 0.25 µs Hence, it is concluded that the electrical conductivity for both water and soil samples of Chambai dam was in the desired range, and favorable for the fish growth and survival.

Total Dissolved Solids (TDS).

To measure or determine the total amount of dissolved salt in water sample it is a simple process. The normal total dissolved solid is from 5 to 1000mg/L and that of the water from 500 to 1000mg/L, according to the WHO and BIS permissible range. The total dissolved solid of soil sample were 13 mg and that of the water sample were 16 mg which is also favorable for drinking purposes. As the TDS valve of both soil and water sample of chambai dam were in the range of less salinity zone, Therefore, the TDS valve of Chambai dam is favorable for the fish growth and survival.

CONCLUSION

The present study was conducted because the growth survival and the breeding of fishes depend upon the physical and chemical quality of water and up to some extent on soil such as Temperature, TDS, TS, Electrical conductivity, PH, odor, Color and elasticity etc. From the physiochemical analysis of chambai dam we concluded that all the physiochemical parameters are in the permissible range. Hence, from the present study we concluded that the chambai dam water and soil is suitable for the fish growth, survival and breeding.

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