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**Research Paper**

# Determination of pH of the water of Dhanauti River of East Champaran, Bihar (India)

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**Abstract:** Hydrogen ion concentration or pH is indicative of the fertility or potential productivity of water body. The present paper deals with the determination of pH of water of Dhanauti River of East Champaran District of Bihar due to its immense role in fish productivity. The water of Dhanauti River was recorded to be alkaline in nature and pH value of its water was found to be in the range of 7.4 to 8.5 at both sampling sites during the study period of one year (January-December, 2010). Minimum value of pH was found to be 7.5 in the month of January while the maximum pH was found to be 8.5 in the month of July at site 1 (Singhia Hiwan) while at Raghunathpur Bank (site 2), the range of pH was noted to be highest in the month of July and August (8.2) and minimum value of pH was found to be 7.4 in the month of May during the study period.

**Keywords:** Hydrogen Ion Concentration, pH, Productivity, River, Lotic, Dhanauti, Motihari, East Champaran.

## INTRODUCTION:

Water is a major requirement for aquaculture.In a water sample, a low pH indicates a high concentration of hydrogen ions while a high pH indicates a low concentration. pH of water influences the metabolism of all organisms living in it. Water may be neutral (pH=7), or acidic (less than pH 7) and alkaline (pH= 7-14) (Khanna and Singh, 2006). Generally, neutral or slightly alkaline water (pH 7-8) is more productive and suitable for fish culture while water having pH below 5 and above 9 is not suitable (Khanna and Singh 2006). pH is generally influenced to a greater extent by the presence of $CO_2$(Welch, 1952). Hutchinson (1957) suggested that the water reaction is the highly productive in culture pond which is slightly alkaline as the pH ranged between 7.2 and 8.0. Thus, the pH of the water is indicative of its fertility or potential productivity and a slight alkaline reaction is of great help in the conversion of organic matter into assimilable substance such as ammonia and nitrates (i.e., mineralization) (Banerjee, 1967).

Dhanauti River is one of the prime lotic water body of East Champaran district of Bihar. It is a tributary of Sikrahana River. Dhanauti is a perennial, narrow and highly serpentine river flowing through the district of East Champaran in west to east direction.

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Dhanautiwas formerly a branch of the Lalbegi and is 113 miles long and ultimately confluences into Sikrahana River near Sitakund, Pipra, East Champaran (Hunter, 1877). The water of this river is generally utilized for the irrigation and fish culture practices in its different stretches by the people of the district of East Champaran, Bihar.

## MATERIALS AND METHODS:

The pH of river water was determined on spot at two pre-selected sampling sites by the help of pH (BDH) paper every month during the study period i.e., January-December 2010. One flap of pH paper was taken out and was immersed in sample water collected from Dhanauti River and after a few minutes it was taken out. The change of colour was compared with the colour chart of the pH. It was further verified in the laboratory by pH meter. Geo-Coordinates were recorded with the help of an imported GPS.

## RESULT AND DISCUSSION:

pH or hydrogen ion concentration is one of the most important environmental factor as every aquatic organism has its own pH range of tolerance. Acidic water having low pH is not suitable for aquatic flora and fauna to survive. Alikunhi (1957) reported acidic water below pH 6.0 as much less productive as alkaline waters and concluded that the fishes in such medium often got diseased. The geo-coordinates (latitude and longitude) of both sampling sitesare enumerated in table 1. The collected data of pH of both sampling sites are listed in table 2 whereas the minimum, maximum and average pH of both sampling sites are depicted in table 3.

The water of Dhanauti River was recorded to be alkaline in nature and pH of its water was found to be in the range of 7.4 to 8.5 at both selected sampling sites (banks).

At water sampling site 1 or Singhia Hiwan Bank (latitude 26.66611°N and longitude 84.89318°E), the minimum value of pH was found to be 7.5 in the month of January while the maximum pH was found to be 8.5 in the month of July during the study period. It shows an increasing trend from January to July while decreasing trend from August to December (table 2). At site 2, Raghunathpur Bank (latitude 26.65148°N and longitude 84.88566°E), the range of pH was noted to be highest in the month of July and August (8.2) exhibiting double peaks and was followed by September (8.1), October (8.0) and June (8.0). The minimum value of pH was found to be 7.4 in the month of May during the study period. The average pH value of water sample of both sites were recorded 7.8 during the study period (table 3).

Das (1961) correlated higher pH with denser phytoplankton and lesser zooplankton while Saha, et. al., (1971) and Nassar and Munshi(1974) did not observe any distinct relationship between pH variation and phytoplankton. Pahwa and Mehrotra (1966) observed pH ranging between 7.4 and 8.3 in Ganga River at Allahabad.

In the present investigation, the pH values as recorded from both sampling sites (table 1) were found to be in the range of 7.4 to 8.5 which is indicative of slight to moderate alkaline in nature. Higher pH was noted during rainy season and minimum during the winter season.

**Table 1: Latitude and Longitude of both sampling sites of River Dhanauti.**

| SN | Water Sampling Site | Latitude | Longitude |
|---|---|---|---|
| 1 | Singhia Hiwan Ghat (Bank) (Near Chati Mai Temple) | 26.66611°N | 84.89318°E |
| 2 | Raghunathpur Ghat (Bank) | 26.65148°N | 84.88566°E |

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**Table 2: Observed pH values at both sampling Sites of River Dhanauti during the study period.**

| Month | Sample Collection Site 1 Singhia Hiwan Bank | Sample Collection Site 2 Raghunathpur Bank |
|---|---|---|
| January | 7.5 | 7.7 |
| February | 7.6 | 7.8 |
| March | 7.7 | 7.8 |
| April | 8.0 | 7.6 |
| May | 8.0 | 7.4 |
| June | 8.0 | 8.0 |
| July | 8.5 | 8.2 |
| August | 8.0 | 8.2 |
| September | 8.0 | 8.1 |
| October | 7.8 | 8.0 |
| November | 7.8 | 7.5 |
| December | 7.6 | 7.7 |

**Table 3: Minimum, maximum and average pH of Water Collected from River Dhanauti during the study period**

| pH of Observed Sample of Water | Site 1 (Singhia Hiwan Bank) | Site 2 (Raghunathpur Bank) |
|---|---|---|
| Minimum pH | 7.5 | 7.4 |
| Maximum pH | 8.5 | 8.2 |
| Average pH | 7.8 | 7.8 |

## CONCLUSION:

Thus, from the above discussions, it is clear that the pH of water of Dhanauti River collected from both sampling site (banks) were found to be alkaline in nature during the study period, which is ideal for living organisms to thrive successfully. The pH range was greatly associated with the growth and reproduction of river biota. Hence, the Dhanauti River may be placed under the category of productive river.

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