

ASSESSMENT OF WATER QUALITY OF KHUGA RIVER

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Abstract

The Present works focus on physico-chemical and biological analysis of water carried out at the river over a stretch of 20.5km. Temperature, transparency, pH, dissolved oxygen, biological oxygen demand, carbon-di-oxide, chloride, total alkalinity, acidity, calcium hardness, NO₂ and NO₃ etc. increased slightly from the origin to the end of the river in the valley. This increase in the parameters was the result of human activities. A total of fifteen species of fishes, seven groups of aquatic insects and two classes of annelids were recorded from the river. The present study reveals that the water quality is favourable for fishes and other aquatic life but level of contamination is increasing slightly, so it is the need of the hour to survey, monitoring to conserve the river system.

Keywords: *Physico-chemical, parameters, Khuga River, Aquatic life.*

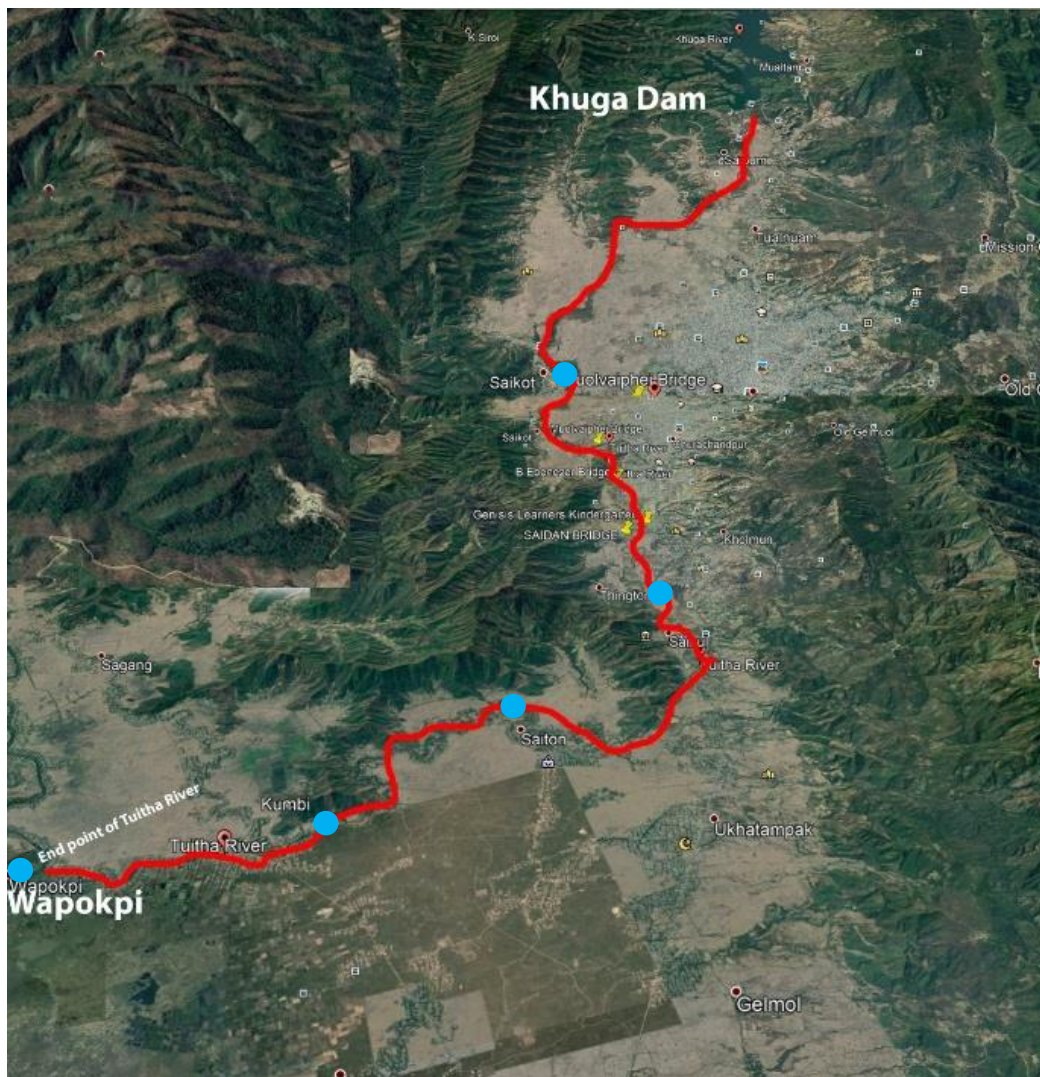
Introduction:

Fresh water has been of great importance to human being and other organisms of environment for sustenance of life and maintaining the balance of nature, hence “water is the life blood of the earth” River are becoming very important resources throughout the world as they meet the basic requirement of life. Human being use water for various purposes like, agriculture, hydropower, municipal drinking supplies, fisheries and recreational use but having put severe strain on the river result in deterioration of its quality. It discharges of domestic waste industrial and agricultural wastes, application of pesticides by farmers. Rapid development of science and technology, man has violated the rules that has made with nature. Pollution of water, air, and marine environment due to industrial and other wastes is one of the major problems facing the developed and developing countries like India.

Almost all major rivers in India are facing acute water pollution. In recent years becoming polluted due to rapid industrial growth, fast urbanization and other man made activities leading to deterioration of water quality and jeopardizing the survival of aquatic life. The degree of pollution can be estimated either from physical and chemical characteristics of water or from biochemical characteristics of water. The present study try to focus biochemical estimates and their taxonomic composition along with chemical assesment of the Khuga river. This river is one of the important feeder of Manipur river starts from Singhat of Churachandpur district and ends at Wapokpi near Ithai barrage, Bishnupur District with the length of about 67km from its start to end.

Materials and Methods:

The present study on the Khuga river stretch of 20.5km was selected and five sampling stations 1. Saikot, 2. Thingtom, 3. Saiton, 4. Kumbi & 5. Wapokpi were established. Samplings at interval of every



month we done from May to December, 2017 in PVC and BOD bottle for

Location Map of Study Area

chemical analysis. Physical analysis of water was done on sampling site-itself. The samples were brought to the laboratory in chilled condition. The physico-chemical characteristics of water were estimated by standard procedure (APHA, 1992). The fishes were collected from study sites with the help of local fishermen by using different fishing technique. Collected fishes were analysed after (Shrestha. J, 1985) and (Vishwanath, 2002), while aquatic insects were analysed after Ward and Wipple, 1965.

Result and Discussions:

Temperature of water varied from 14 – 30°C (Table-I) and Transparency varied from 10-43cm. pH ranged between the 6.5-8.0 DO varied from 4 – 10.2gm/L while BOD ranged between 1.5 – 4.10mg/L. Free Carbondioxide varied from 3 – 8mg/L. Increasing free carbondioxide may result in the increasing of alkalinity Bhargava *etal* (2005). Chloride content range 3.0-15.2mg/L. Accordng to WHO maximum limit for chloride is 500mg/L the value observed in present study is below this permissible limit. The total alkalinity ranged 38 – 90mg/L. Analogous variation in alkalinity was reported by Goel *etal* (1985) whereas total hardness Ca⁺⁺ content was recorded 16 – 40mg/L. Generally 20mg/L Calcium hardness is considered efficient for fish culture according to Lind (1974). Nitrite and Nitrate content in the water varied from 0.02 – 0.14mg/L and 0.09 – 0.33mg/L respectively, the result is supported by Devi *etal* (2003) along with 15 species of fish (Table – 3).

Aquatic life depends on Physico-chemical parameters of water. Fish and other aquatic fauna in Khuga river were found to be distributed but influenced by combination of several physical, chemical and biological factors. The river bed with muddy soil and sandy substrate and growing vegetation showed a good diversity of aquatic fauna comprising fifteen species of fish and seven group of aquatic insects and one class of annelids were collected. Muddy soil substrate in the river showed a dominance of *puntius* species most of the sampling sites which are indicators of organic pollution particularly at site 4 and 5. Most of the water sample in rainy season was moderately soft while water in winter and sumer are found moderately hard.

Khuga river water are considered to play a vital role in ensuring social and economic development. The focussing data on physico-chemical characteristics revealed that the water of different parameters are favourable for fishes as recorded below the acceptable limit. However, it is always advisable to drink after proper boiling and filtration. Due to urbinization, river received sewage, domestic waste, and over fishing into the river is the main source of pollution.

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Table – 1

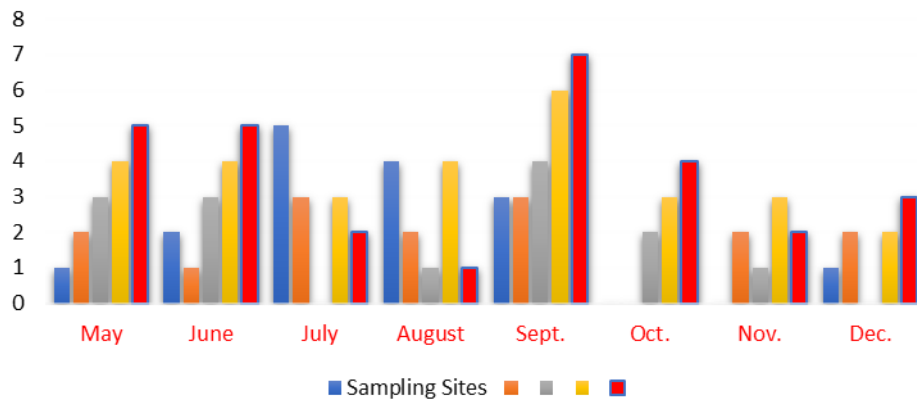
Parameters	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Temp °C	25.1±2.5	26.5±1.2	23.8±2.0	24±2.0	25±2.1	17.2±1.1	13.6±1.5	12.8±1.6
Transp. (cm)	20.3±1.7	22.1±6.5	23.5±6.2	20.8±6.2	16. ±2.1	-	-	-
pH	7.0±0.1	6.8±5.6	7.2±0.1	7.2±0	7.5±0	6.8±0.04	7.8±0.6	7.0±0.6
D.O (mg/L)	6.5±1.3	6.0±1.3	6.4±0.9	6.8±0.8	6.0±0.2	8.5±1.0	9.1±0.7	8.7±1.2
BOD (mg/L)	2.6±1.2	2.5±1.3	2.6±1.5	2.8±0.9	2.0±0.7	3.1±1.8	3.3±2.2	3.5±1.2
Total alkalinity	40.7±21.5	42.5±15.5	66.5±14.0	58.1±22.4	60.2±1.6	57.6±18	58.1±15.0	59.2±2.1
Acidity	14.0±1.1	9.6±1.5	9±3.2	10.5±1.0	9.5±1	14.2±4.0	15.6±6.4	16.2±1.6
CO ₂	12.3±0.7	8.5±1.0	6.8±2.3	7.3±0.8	8.1±0.9	13.0±3.1	14.0±0	14.2±4.8
Chloride	5.3±1.3	5.2±1.2	4.8±1.8	10.6±1.0	10.7±1.1	9.0±1.1	11.7±1.3	12.5±1.2
Total Hardness	27.8±2.6	28.0±2.3	30.2±20	36.01±20.1	38.0±28.1	37.2±30.1	35.6±15.6	33.0±3
Calcium	7.4±0.8	8.2±1.6	10.6±1.5	9.2±6.7	8.26±4.3	12.4±8.2	10.6±3.3	8.26±2
Nitrite	0.07±0.02	0.08±0.02	0.6±0.03	0.01±0.16	0.01±0.16	0.01±0.14	0.01±0.13	0.02±15.2
Nitrate	0.01±0.01	0.09±0.03	0.06±0.05	0.09±0.04	0.09±0.06	0.08±0.04	0.06±0.14	0.13±0.17

DISTRIBUTION OF FISHES DURING THE INVESTIGATION PERIOD

Table - 2

Months	Sampling Sites					total
	1	2	3	4	5	
May	1	2	3	4	5	19
June	2	1	3	4	5	15
July	5	3	-	3	2	13
August	4	2	1	4	1	12
Sept.	3	3	4	6	7	23
Oct.	-	-	2	3	4	9
Nov.	-	2	1	3	2	8
Dec.	1	2	-	2	3	8
total	18	15	16	28	30	170

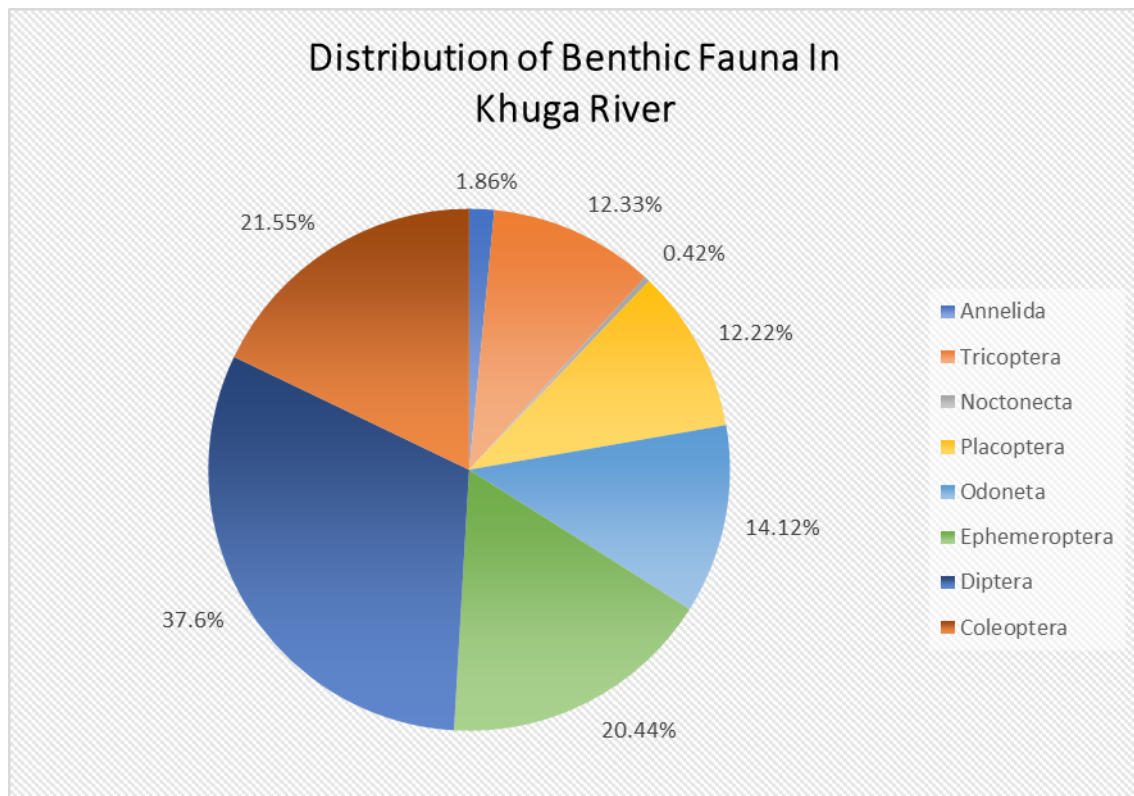
DISTRIBUTION OF FISHES DURING THE INVESTIGATION



CHECK LIST OF COLLECTED FISHES FROM KHUGRA RIVER DURING THE STUDY PERIODS. MAY TO DECEMBER, 2017

Table – 3

Scientific Name	Local Name	Family
<i>Hypophthalmichthys molitrix</i> (Val)	Silver Carp	Cyprinidae
<i>Ctenopharyngodon Idella</i> (Ham.Buch)	Napichabi	Cyprinidae
<i>Cyprinus carpio</i> (Linnaeus)	Puklaobi	Cyprinidae
<i>Puntius chola</i> (Ham. Buch)	Phabounga	Cyprinidae
<i>Puntius sophore</i> (Ham. Buch)	Phabounga	Cyprinidae
<i>Puntius ticto</i> (Ham, Buch)	Phabounga	Cyprinidae
<i>Berilius bendelensis</i> (Ham. Buch)	Ngawa	Cyprinidae
<i>Esomus denricus</i> (Ham. Buch)	Ngasang	Cyprinidae
<i>Rasbora rasbora</i> (Ham. Buch)	Nunga	Cyprinidae
<i>Colisa fasciatus</i> (Scheider)	Phetin	Belontiidae
<i>Channa punctatus</i> (Bloch)	Ngamu bogra	Channidae
<i>Lepidocephalus guntea</i> (Ham. Buch)	Ngakrijou	Cobitidae
<i>Heteropneustes fossilis</i> (Bloch)	Ngachik	Heteropneutidae
<i>Metacembalus armetus</i> (Lecepede)	Ngaril arangba	Metacembelidae
<i>Ompok bimacutatus</i> (Bloch)	Ngaten	Sisoridae



Conclusion:

The Physico-chemical and biological characteristics found in the study area revealed that further systematic and routine analysis is required for monitoring water quality in river, Local Club organisations, NGO, Panchayat, Zilla Parishad and Block level should be involved with seriously to conserve the river water and the effluent must be properly treated and unauthorized letting out of these effluent in the surface water bodies should be firmly checked.

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