
“STUDY OF SEASONAL VARIATIONS IN THE PHYSIO-CHEMICAL FACTORS AND THEIR IMPACT ON FISH FAUNA WITH ENHANCEMENT STRATEGY OF FISH PRODUCTIVITY IN KHADRA RIVER.”

Prof.Dr Rajeew Kumar Sharma

Assistant Professor, S. B. S. S College,

Dept. Of Zoology

A constituent unit of L. N. Mithila University Darbhanga, Bihar.

Abstract

The aim of present study is to analysis the study of seasonal variation in the physio-chemical factors and their impact on fish fauna in Khadra river. The Khadra river has full of water bodies such as Chauras, ditches and ponds. The khadra river is habited of rich micro - macro living forms including insects, Mollusca, prawn, crabs, fishes and floating vegetation and submerged Phytoplankton which attract the many water residing birds to nest every year and over millions of migratory birds visit during winter from distant temperate regions of India and abroad. These water bodies harbor rich aquatic fauna and flora constituting foodchain. This study is based on primary and secondary survey by sources of data. The suitable statistical analysis have been applied to make the presentation realistic and successful.

Keywords: seasonal variation physio-chemical factors, Khadra river, statistical.

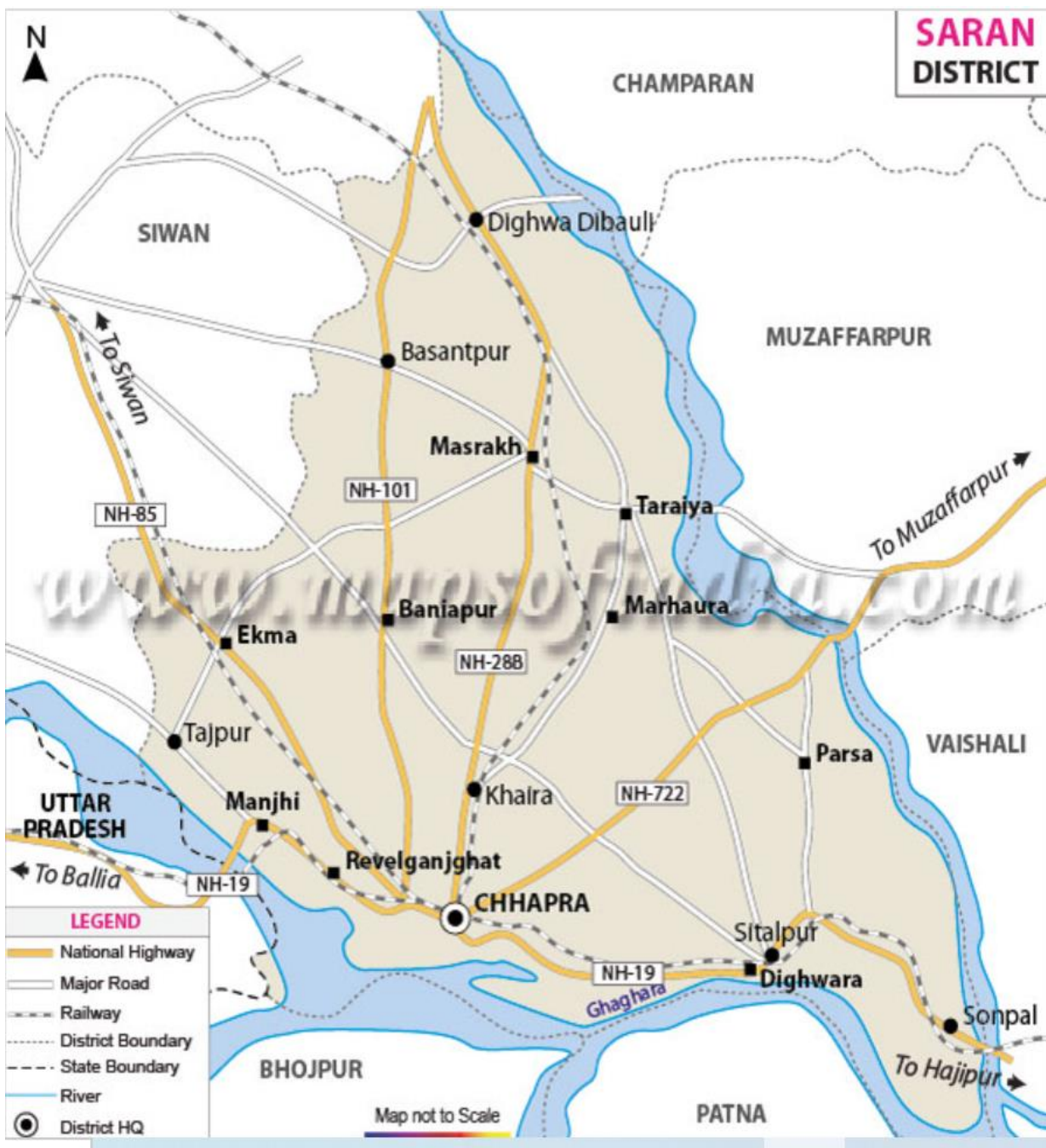
Introduction:-

The Khadra river is situated at about 37 Km North of Chapra town (Saran district of Bihar,India). It located at the east of Tarariya (as assembly constituency of Chapra, Saran.) it is surrounded by the Gandak from east side, the west and south by

Mahi river while North surrounded by the main tributary the Ghoghari river. The Khadra river is divided into two main unequal parts one with present Khadra river. i.e. Chhoti Khadra and other big part is called Barki Khadra named by the local people. The river Khadra have full of water during summerseason i.e. Perennial having sizeable volume of water during winter and more in rainy season.

The Khadra river is habited of rich micro-macro living forms including insects, Mollusca, prawn, crabs, fishes and floating vegetation and submerged phytoplankton which attract the manywater residing birds to nest every year and over millions of migratory birds visit during winter from distant temperate regions of India and abroad.

It is relevant in this regard to mention that the local people inhabited near by the river are mostly fisherman. Whose livelihood is based on this river but they get less knowledge & help from fishery department of state government or any other co-operative society of fish culture regarding how to rear fishes. The present work has great significance to take up the present problem to raise the productivity of fishes including the economy and livelihood conducive to the poor people residing in that locality of Khadra river. Since, no work has been done on biology and bio diversities of this river and has been neglected till date.



Review of Literature

Freshwater originate from atmospheric precipitation, which includes extremely variable quantities of many inorganic and organic substance. Once precipitation falls on the earth it may become runoff and flows over soils and rock it, dissolves the various substance and become highly mineralized. The degree of mineralization depends upon the time of contact between water and the composition and vegetated arias it dissolves various the organic compound. Finally, water in reach to the a lentic and lotic environment with a varied amount of inorganic and organic substance. Beside this biological progress also alter the composition of water through the uptake of ions or gases or through the release metabolite.

Sometimes biological possess are considered as responsible factor for regulating the concentration of many substances thus the rates of photo-synthesis and respiration are mainly responsible for dissolved oxygen and carbon dioxide in natural in water further many organic compounds are synthesized by living organisms of water. Water quality is also affected by dissolved and suspended matter due to presence of silt, organic and other allochthones materials besides the leaching of excesses the agricultural chemical into the surface water. Furthermore, since surface water is often used for the disposal of human waste, municipal sewage and other effluents, the inorganic and organic elements introduced into the water may affected delicately the balanced functional systems.

In general, the natural water in never use, contain extremely varied substance this making measurement of physico- chemical variables as a significance part in many research problems relating to freshwater biology. The basic chemistry of freshwater has already been discussed in detail by Welch (1952), Hutchinson (1957), Rutner (1963), Golterman (1975, 78), Boyed (1979), Wetzel (1982), Goldman and Horne (1983).

Besides some notable contribution on physico- chemical characteristic of freshwater were made by Owens (1965) who worked on the dissolved oxygen in freshwater system. The relationship between land and water chemistry was demonstrated by Killing and Ohle (1964). Few physico- chemical studies of a comparative nature have been undertaken on the freshwater ecosystem in Texas (Young et al 1972).

The factors that control salinity composition and concentration of suspended solid have been discussed by Gibbs (1967) Cassey and Newton (1972, 78) observed the relationship streams but water flow and alkalinity in some southern England. Detailed discussion of the calcium bicarbonate system was explained by Kemp (1971) while Gills (1972) suggested that chloride concentration increased mainly from the rain water in various water bodies.

In India since the pioneering works of Prasad (1916) many authors have engaged themselves in studying the hydrological conditions of many freshwater ponds and tanks. The valuable contributions has been made by Pruthi (1933), Ganpati (1940), Gonzalves and Joshi (1946), Alikuhni et al (1955), Das and Srivastva (1956, 1969) George (1961, 62, 66) Rai (1964). Zafer (1967). Sahni and Sinha (1969) Munwar (1967) Zutshi

and Vass(1973). Mishra and Yadav (1978). Jana et. Al.(1982). Munshi and Ray (1992) Pandey (2002). Belsare (2004) Mukhgie (2007) Solannke et. Al.(2007)

But, the data on physio - Chemical dynamics is still very scant and very little is know behavior of basic elements in Indiawaters. (pandey and singh1981).

Additional attempts have been made recently on the study of Physio - chemical characteristics of lentic environment by Quadari and Mustafa (1984) who studied the physio - chemical condition of a typical wetland of Kashmir Saha and Pandit (1985) observed that the different hydro chemical parameters were found to be closely associate to each other in a tropical pond. Khan and Khan (1985) noticed that mild fluctuation of various physio- chemical parameter of Sheikha jheel at Aligargh. Roy (2004) observed fluctuation of physio - chemical parameters of Kawaz lake Bihar. Ojha and Pandey (2009) studies the physio - chemical analysis of Bahiya wetland Chapra

Pandey and Singh (2012), studied the variation of physio - chemical parameters of Mahendranath pond Saran Bihar.

Materials & Methods

Water sample from two sites were collected at fortnightly intervals from October 2019 to September 2020 from subsurface observing all parameters necessary as specified in standard methods (APHA 1985) and the analysis was done on the site and upon arrival at the laboratory. The physical and chemical parameters that were mentioned in the field were the following, water temperature, transparency, PH dissolved oxygen, free carbon dioxide, carbonate and bicarbonate alkalinities. The remaining Parameters were determining in the laboratory within 24 hours using the sample collected and stored in plastic containers.

A brief description is as follows

The water temperature was measured with an ordinary Mercury thermometer with an accuracy of 0.1 centigrade. The transparency was recorded as the depth upon which a Sachi`s disc was visible when lowered in water or was taken out of water PH was measured by using a battery operated single electrored potable Ph meter (Toshryol model cl – 47) The conductivity was determine by a conductivity meter (systronix model 30c-i) The dissolved oxygen was determined by modified wrinklens method (Welch, 1952, Odum,1971) The free carbon dioxide and total alkalinity were obtained by titrating the sample against 0.1N hydrochloride acid and N/44 sodium hydroxide using methyl orange and phenolphthalein indicators respectively. some methods are also adopted for the analysis of the physio- chemical parameter in the field as well in the laboratory are summarized briefly in the Table1.

Table1: Methodology employed for the analysis of the physio- chemical parameters of water.

Tests	Methods	References
Hydrogen ion concentration (PH)	Lovibond comparator using Universal indicator Confirmed by PH meter (Elico Model Li- i0T) in the laboratory.	APHA
Calcium	EDTA titrimetric method	APHA1985
Magnesium	EDTA tirimetric method	APHA 1985
Nitrate	Cadmium reduction method (transmittace at 250 Mnm)	APHA 1985
Chloride Cl-	Argentometric Method	APHA 1985
Phosphate Po4 – p	Molybdate Method Transmittance at 690 Mhm	APHA 1985
Dissolved organic Method (DOM)	Oxygen consumed from per magnate Theriault (1931)	Jhingram et al (1969)
Biochemical Oxygen demand (BOD)		APHA 1985

Phytoplankton

Five sample were taken with a Meyers water sample of one liter capacity from each site at fortnightly intervals. The collected samples of water were stored in large polyethylene bottles. One liter of mixed water samples from each site was the fixed in logos solution, out of which 100ml was allowed to settle for 2 days in a measuring cylinder.

The settle concentration was concentration was counted on Sedgwick after plankton counting cell and was then computed using the fowling formula.

$$ni = (a1000) / L$$

Where,

ni = Number of Phytoplankton per liter of water

A= average number of phytoplankton per counting unit.

C = volume of concentration phytoplankton

L= volume of original water samples in liters.

Table: 2 Some common Phytoplankton found in the lentic ecosystem at the study area.

Class	Characters	Species
1 Bacillariophyceae	Cell wall consists of two halves which are identical silicified wall known as frustules may be circular (radial Symmetry) or boat shaped Bilateral symmetry.	Cyclotella sp, synedra ulna, Fragillaria sp, Nischaiaso, Naviculasp. Rhopoladia sp, surirellasp, Melosira granulated
2 Chlorophyceae	Large well defined group of algae which are motile in their vegetative state last chloroplast pale to deep grass- green	Clostridium sp, Tetradron sp, Nephrocitiumsp, Crucigenia Sp, TetrastrumSp
3 Cyanophyceae	Absence of distinct and organized chloroplast, with a diffuse blue green pigments. Some have trichomes or heterocyst.	Acrocysties sp, Oscillatoria sp, Raphidiopsis sp, Arthrospira sp, Spirulina sp.
4 Euglenophyceae	Mostly unicellular flagellates . depression or pit near the cell ap	Euglena sp , Phacus sp.

Zooplankton

Zooplankton were sampled at fortnightly intervals. Zooplankton were collected from each lentic site by using No – 25 (Mesh Size 64) plankton net made of bolting silk. Fifty liters of water from different places of the body was filtered through the plankton net. The plankton filtered was present in 4% formalin and analysis was made using Sedgewick after plankton counting cell (IM Capacity). The identification of the Zooplankton was carried out following Ward and Whipped (1963) and Needham and Needham (1978). All organisms were counted and computed by using the formula.

$$n_i = (a, 1000)/L$$

Where,

n_i = number of plankton

a = the mean number of concentration of Zooplankton per counting unit.

c = volume of Concentrated plankton

L = volume of sample of water sieved i.e. 30 liters.

Table: 3 Some common Zooplankton found in the lentic ecosystem at the study area.

Phylum	Species.	Species
1 Rotifera	Asplanchna Sp	Cyclotella sp, synedra ulna, Fragillaria sp, Nischaiaso, Naviculasp. Rhopoladia sp, surirellasp, Melosira granulated
2 Chlorophyceae	Large well defined group of algae which are motile in their vegetative state last chloroplast pale to deep grass- green	Clostridium sp, Tetradron sp, Nephrocitiumsp, Crucigenia Sp, TetrastrumSp
3 Cyanophyceae	Absence of distinct and organized chloroplast, with a diffuse blue green pigments. Some have trichomes or heterocyst.	Acrocysties sp, Oscillatoria sp, Raphidiopsis sp, Arthrospira sp, Spirulina sp.

4 Euglenophyceae	Mostly unicellular flagellates . depression or pit near the cell apex	Euglena sp , Phacus sp.
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Fish collection

Fishes are cold blooded vertebrates which breath by means of pharyngeal gills, propelling and balancing themselves by mean of fins the fishes were collected from the khadra river, with the help of different standard fishing net by local fisher man . the systematic position on the collected fish studied. The scheme of classification adapted here was according to Leo. S. Berg (1947).

The present research study is an effort to prepare a catalogue of fishes found in the Khadra River. A classified list of the fishes along with their Hindi names and population is given below which given the Table: 4 The fish collection was done by the help of Hapha and Dragnet. It was taken after the maturation of fish species which are already given in the table.

Table.4 Fish Collection of khadra river

Sl.			Scientific Name	Local Name	Popular
1	Order - cypriniformes	1	<i>Catla catea (Ham)</i>	Catla	P
	Suborderr - Cyprinoidei	2	<i>Cirrhimus mirgala (Ham)</i>	Naini	C
	Family-Cyprinidae	3	<i>Cirrhimus reba (Ham)</i>	Rewa	F
		4	<i>Labeo catbasu (Ham)</i>	Basari	F
		5	<i>Labeo rohita (Ham)</i>	Rohu	C
		6	<i>Labco goniis (Ham)</i>	Kursa	F
		7	<i>Oxygaster bacaille (Ham)</i>	Chalhwa	F
		8	<i>Puntius sarena (Ham)</i>	Darahi	F
		9	<i>Puntius sophore (Ham)</i>	Pothia	P
2	Order- Clupeiformes	10	<i>Notopterrus chitala (Ham)</i>	Moya	F
	Suborder- Notopteroidae	11	<i>Notoptenes nototerus (Ham)</i>	Bhuna	F
	Famly-Notopteridae				
3	Order-Siluriformers				
	Family-Bgridae	12	<i>Mystus vittatus (B1)</i>	Tengra	C
	Family-Siluridae	13	<i>Wallao attu b (B and Sohn)</i>	Boyari	R
	Family-Clariidae	14	<i>Clarias batrachus (linn)</i>	Mangur	F
	Family-Heteropneustidae	15	<i>Heteropneustes fossilis(B1)</i>	Tengra	C
4	Order- Beoniformes				
	Family-Belonidae	16	<i>Xenetodon cancila(Ham)</i>	Kauwa	R
5	Order-Ophiocephaliformes	17	<i>Channa striatus(B1)</i>	Sauri	P
	Family-Optiocephalidae	18	<i>Channa punctatus(Ham)</i>	Garai	P
6	Order-Symbranchiformes				

food. Thus it is reported as omnivores and considered as bottom feeder.

After reviewing the available literature it is clear that no substance work has done an freshwater ecology in relation to Pisc- culture in Bihar it is absolutely true for khadra river hence it is desirable to undertake the present project to substantiate the gap of literature of one hand in relation to further research and other hand to explore the maximum probability to enhance the per capital income of local people in relation to uplift the economic condition in general and pisc- culture in particular without harming Eco balance of the water body.

Conclusion

Therefore, growth and survival to fish is totally depended on the physical and chemical quality of water and some extent on the soil and sediment of aquatic bottom. Water, soil and sediment qualities can be determined by the studies of variables i.e. Temperature, PH, electric conductivity, total dissolved solids, elasticity, colour and odour, etc.

Most fish kills disease outbreaks, poor growth, poor feed conversion efficiency and similar management problems are directly correlate to poor water quality.

So from present study, it was concluded that all selected parameters of this river were found to be in permissible range for fish growth and survival, except the electrical conductivity and TDS values of water and soil of Khadra river were needful to improvement in future through excavation of ground soil, also this river has no hard materials like small rocks fencing to slopes and periphyton vegetation at side to facilitate natural habitat to egg hatching and juveniles for growth. Hence the present work will provide useful assistance to physio chemical analysis of water and soil and their impact on the fish growth and survival

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