



## Study of Physico-Chemical and Biological Features of Junamara, Karkari, Shundarkoi, Moichatol, Chatrodoria Beels, in Katigorah, Cachar, Assam.

### KEYWORDS

Beels, Water quality, Physico-chemical parameters, seasonal variations.

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**ABSTRACT** *In the present study an attempt has been made on physico-chemical and biological characteristics of five beels (wetlands) of west Cachar. The study was carried out from September 2015 to June 2016. Monthly details have been collected and were represented seasonally along with standard deviation. Different parameters were taken such as Rainfall, Humidity, Atmospheric and water temperature(WT), Secchi disc Transparency(SDT), pH, Electrical Conductivity, Total Dissolved solids, Dissolved oxygen (DO), Total alkalinity(TA), Biodiversity (Fish, Planktons, etc.) The results revealed that a slight variation occurs in certain physico-chemical and biological parameters due to the surface run-off and other excessive human activities.*

### INTRODUCTION

**"Wetlands are the high water saturated lands, alive with water either seasonal or annual."** Wetlands are basically 'wet-lands' where the soil is saturated with water for sometime during the year. (Kar et al., 1996, 1996, 2000, 2010). In Assam, and in adjoining Tripura and Bangladesh, 3 kinds of wetlands are generally found. They are locally called as *Beel, Haor, & Anua*. (Kar, 2007):

'*Beel*': Perennial wetlands which contain water throughout the year. Kar (2010), Hazarika (2013).

The Physical Chemical and Biological parameters of a water body shows its status, potential, productivity etc. The analysis of the Physical, Chemical as well as biological properties of five beels of West Katigorah is being reported for the first time through this study.

### MATERIAL AND METHODS

**Physical, Chemical parameters:** The physico-chemical parameters have been studied with the help of precision equipments and by following standard procedures: (APHA, 2006).

**Biological parameters:** The fishes were sampled by following standard procedures using cast net, gill net, drag net etc of required dimensions and meshes (Jayaram, 1981, 1999, 2010; Dey, 1981; Kar, 2007) and identified after standard literature and keys (Day, 1878, 1889; Menon, 1974, 1999; Jayaram, 1981, 1999; Sen, 1982; Sen, 1985; Vishwanath, 2000, 2002; Dey, 1973; Dutta Munshi and Srivastava, 1998; Talwar and Jhingran, 1991; Kar, 2007; Kar and Sen 2007).

The limno-plankton would be sampled by following standard procedures (Welsch 1948; Lagler et. al., 1978; Dey, 1981; Kar, 2007, 2013), and would be analysed after standard literature and keys (Ward and Whipple, 1955; Pennak, 1953; Michael and Sharma, 1988)

**The study sites:** The five beels occupies about 15 ha of the district Cachar. Karkori beel is neighbouring to Junamara beel located at Tikarburangah about 5 km away from Kalain town, at coordinate 24°55'N-24°60'N latitude and 92°52' E -92°54'E longitude. The Junamara beel is con-

nected with a water channel known as Junarkhal. The Junarkhal is linked with a sub river Modhua which is ultimately linked with Barak river via Tinnar khal & Nowagang. Thus Junamara is an open beel, on the other hand the Karkori beel was linked with Kalain river (dead river) in previous days but as the river is no more live river thus its disconnected and now it's a closed beel, but during rainy seasons it becomes linked with water level of Junamara beel.

The Shundarkori and Moichatol beels are located at Baraitoli pt-iv at west Katigorah, 10 km away from Kalain town. These two beels are adjoining to each other, at coordinate between 24°92'N latitude and 92°57'E longitude. These beels are located at foot plain of Dighabar Tea state. The Moichatol beel is linked with a water channel Barakhal, thus the Moichatol beel is an open beel. On the other hand the Sundar kori is linked seasonally with Moichatol via Moikhuri (Khuri: a temporary water body in rainy season). These two beels become united during FSL along with Javdha hawar.

The Chatrodoria beel is located at Niz Laverpute Pt-ii, near to Indo-bangla border, which is about 15 km away from Kalain, between coordinate 24°95'N latitude and 92°48' E longitude. The beel is directly connected with the Surma river via two water channels, one channel is linked at North corner and another is via west site of the beel, which are blocked periodically for keeping the inflow and restricting the fish to migrate to the river. During dry period the link becomes disconnected as the water level of river as well as beel lowers and thus the beel is an open beel.

The Physical Chemical and biological parameters are studied on those five beels from September 2015 to May 2016, the total observation and study was done by visiting the field in every month. Sample were collected from the field randomly for various laboratory experimental analysis of parameters

### RESULT:

The variations of physico-chemical parameters of Junamara beel, Korkori beel, Moichatol beel, Shundarkori beel and Chatrodoria beel (wetland) is depicted in the table 1, 2.

Katigorah, under district Cachar, Assam receives typical

monsoon rains. The south-west monsoon rains starts from the third week of June and they continue up to the middle of September. The zone receives during this period about 180 cm of rainfall on the average. This constitutes about 80% of the average rainfall while the remaining 20% come in the form of occasional rains in January. A table showing the climatic condition of the study site (Katigorah) of year 2015-2016 is shown in table 2

**Temperature:** The mean air temperature was highest in month April, May, June (monsoon) ( $34 \pm 1.15$ ) and lowest ( $10 \pm 1.69$ ) in winter.

**Dissolved oxygen:** The mean value of DO was maximum ( $12 \pm 1.5$ ) in winter season and minimum ( $6 \pm 1.5$ ) in monsoon.

**FCO<sub>2</sub>:** In the present study, the maximum ( $2.1 \pm 0.5$ ) and minimum ( $0.8 \pm 0.5$ ) value of free CO<sub>2</sub> was recorded in the monsoon and winter season respectively. Lower level of free CO<sub>2</sub> during winter is mainly due to high photosynthetic activity utilizing free CO<sub>2</sub>.

**Alkalinity:** Total alkalinity is imparted by presence of bicarbonate, carbonate and hydroxide and less frequently in wetland by borate, silicate and phosphate. The CO<sub>2</sub>-HCO<sub>3</sub><sup>-</sup>-CO<sub>3</sub><sup>2-</sup> equilibrium system is the major buffering mechanism in freshwater. It varies from 160-203 mg/l.

**pH:** The PH of the those beels ( $5 \pm 0.25$ ) during monsoon which was turned to neutral range ( $7.0 \pm 0.5$ ) during winter. Higher pH value is normally associated with the high photosynthetic activity in water. Hujare(2008). The lowering of pH in monsoon may be due to higher runoff from the adjacent catchment area which is having slightly acidic soil.

**Biological parameters:** The biological parameters such as diversity of fish and Zooplanktons as in Table no. A total of 51 fish species belonging to 34 genera are recorded in the five beels, on the other hand 40 genera of zooplanktons, under three groups, ie, Cladocera, Copepoda, Rotifera are recorded in five beels

## DISCUSSION:

**Junamara Beel:** The physical, chemical characters within the permissible limit. It is an open beel the diversity of fish in the beel is very rich. 21 species of fish and 24 genera of zooplanktons are identified during the study. This beel occupies 2.5 ha area in FSL and during dry season the water level decreases, and observed DSL is 0.99 ha. The average depth during the study period is recorded as 2.8 m.

**Karkari beel:** During study and analysis on Karkari beel, pH was found 6.2 in average, The maximum value is observed during winter i.e. from month Nov- Jan,  $6.8 \pm 1.5$ . Temperature plays an important role in maintaining all the parameters stable for life. Dissolved oxygen is maximum during winter seasons, average DO is  $9.4 \text{ mg/l} \pm 1.5$  Turbidity is maximum during rainy seasons, as the water level is maximum, the average recorded turbidity is 101 cm, the turbidity is measured with succhi disc. Free carbon dioxide in water body recorded maximum of  $12 \text{ mg/l} \pm 0.5$  and minimum of  $6 \pm 0.5 \text{ mg/l}$ . This is within the permissible limit for healthy condition of water body.

The biological components ie, planktons and fish diversity is studied, 27 fish species belonging to 22 genera, & 23 genera of zooplanktons are recorded.

**The Moichatol beel:** The average depth of the beel is 3.8 m, occupying an area of 2.3 hectare during FSL and during DSL the area decreases to 1.4 hectare and thus links with the water level of neighbouring Shundarkuri beel. During study and analysis on Moichatol beel, pH was found 6.05 in average, The maximum value is observed during winter i.e. from month Nov- Jan,  $7.2 \pm 1.5$ , and minimum was recorded 5.2 during March. Temperature plays an important role in maintaining all the parameters stable for life. Dissolved oxygen is maximum during winter seasons, average DO is  $9.25 \text{ mg/l} \pm 1.5$  Turbidity is maximum during rainy seasons, as the water level is maximum, the average recorded turbidity is 0.91 m, the turbidity is measured with succhi disc. Free carbon dioxide in water body recorded maximum of  $13 \text{ mg/l} \pm 0.5$  and minimum of  $3 \pm 0.5 \text{ mg/l}$ .

The biological components ie, planktons and fish diversity is studied, 28 genera of zooplanktons & 42 fish species belonging to 30 genera, are recorded.

**The Shundarkori beel:** The physical & chemical properties of Shundarkuri beel shows good status of beel, pH was found 6.1 in average, The maximum value is observed during winter i.e. from month Nov- Jan,  $7.2 \pm 1.5$ , and minimum was recorded 5.0 during March. Temperature plays an important role in maintaining all the parameters stable for life. Dissolved oxygen is maximum during winter seasons, average DO is  $9.5 \text{ mg/l} \pm 1.5$  Turbidity is maximum during rainy seasons, as the water level is maximum, the average recorded turbidity is 0.81 m, the turbidity is measured with succhi disc. Free carbon dioxide in water body recorded maximum of  $12 \text{ mg/l} \pm 0.5$  and minimum of  $3 \pm 0.5 \text{ mg/l}$ .

**The Chatrodoria beel:** The average depth of the beel is 3.8 m, occupying an area of 2.3 hectare during FSL and during DSL the area decreases to 1.4 hectare. During study and analysis, pH was found 6.05 in average, The maximum value is observed during winter i.e. from month Nov- Jan,  $7.2 \pm 1.5$ , and minimum was recorded 5.2 during March. Temperature plays an important role in maintaining all the parameters stable for life. Dissolved oxygen is maximum during winter seasons, average DO is  $9.25 \text{ mg/l} \pm 1.5$  Turbidity is maximum during rainy seasons, as the water level is maximum, the average recorded turbidity is 0.91 m, the turbidity is measured with succhi disc. Free carbon dioxide in water body recorded maximum of  $13 \text{ mg/l} \pm 0.5$  and minimum of  $3 \pm 0.5 \text{ mg/l}$ .

The biological components ie, planktons and fish diversity is studied, 49 fish species belonging to 33 genera & 31 genera of zooplanktons, under three groups, ie, Cladocera, Copepoda, Rotifera are recorded.

By studying five beels 51 fish species belonging to 34 genera are recorded. The fish species are

*Colisa fasciatus* (Schneider), *Colisa lalia* (Hamilton), *Colisa sota* (Hamilton), *Mystus corsula* (Hamilton), *Mystus tengara* (Hamilton), *Mystus vittatus* (Bloch), *Rasbora daniconius* (Hamilton), *Colisa fasciatus* (Schneider) *Colisa lalia* (Hamilton), *Colisa sota* (Hamilton), *Parambassis baculis* (Hamilton), *Parambassis ranga* (Hamilton), *Chanda nama* (Hamilton), *Badis badis* (Hamilton), *Securicula gora* (Hamilton), *Nandus nandus* (Hamilton), *Glossogobius giuris* (Hamilton), *Anabas testudineus* (Bloch), *Puntius chola*, *Puntius conchoniensis*, *Macrognathus aral* (Bloch and Schneider), *Macrognathus pancalus* (Hamilton), *Clarias Ba-*

*trachus* (Linnaeus), *Heteropneustes fossilis*(Bloch),*Ompok bimaculatus*(Bloch), *Wallago attu* (Bloch and Schneider), *Botia dario* (Hamilton), *Lepidocephalichthys guntea* (Hamilton), *Labeo gonius* (Hamilton), *Labeo calbasu*(Hamilton) ,*Labeo nandina*(Hamilton) ,*Labeo rohita*(Hamilton), *Catla catla* (Hamilton), *Cirrhinus mrigala*(Hamilton) ,*Cirrhinus reba* (Hamilton), *Gudusia chapra* (Hamilton), *Chitala chitala*(Hamilton), *Notopterus notopterus* (Pallas), *Amblypharyngodon mola* (Hamilton), *Macrognathus aral* (Bloch and Schneider),*Mastacembelus armatus* (Lace'pe'de), *Salmostoma bacaila* (Hamilton) *Channa punctatus* (Bloch), *Channa orientalis* (Schneider), *Channa marulius* (Hamilton), *Xenentodon cancila*(Hamilton) ,*Ailia coila* (Hamilton), *Chanda nama* (Hamilton )*Clupisoma atherinoides* (Hamilton), *Clupisoma garua*(Hamilton), *Glossogobius giurus* (Hamilton).

**The recorded zooplanktons are:** *Diaphanosoma sp*, *Scapholeberis sp**Sida sp*, *Simocephalus sp*, *Macrothrix sp*, *Chydorus sp*, *Ceriodaphnia sp*, *Bosmina sp*, *Bosminopsis sp*, *Alona sp*, *Alonella sp*, *Daphnia sp*, *Moinodaphnia sp*, *Moina sp*, *Mesocyclops sp*, *Thermocyclops sp*, *Neodiaptomus sp*, *Heliodiaptomus sp*, *Brachionus sp*, *Polyarthra sp*, *Platyonus sp*, *Lecane sp*, *Lepadella sp*, *Keratella sp*, *Anuraeopsis sp*, *Asplanchna sp*, *Ascomorpha sp*, *Testudinella sp*, *Cephalodella sp*, *Mytilina sp*, *Macrochaetus sp*,*Trichocerca sp*, *Horaella sp*, *Pompholyx sp*, *Colurella sp*, *Conochilus sp*, *Filinia sp*, *Scaridium sp*, *Platyias sp*.

**CONCLUSION**

The monthly as well as seasonal variation of physico-chemical parameters of the five beels of west Katigorah, providing an almost vivid picture of ecological status and their conditions. Overall water quality studied was found within the permissible limit for biological components

This study may be helpful in optimum utilization and sustainable management of the wetland. Deweeding should be practiced at regular intervals to control the nutrients level and silt deposition.The draining system of the tea garden area should be improved so that the waste products from the gardens and also various pesticides does not able to link with the beel water. These wetlands supports enormous diversity of fresh water fish and also provide scope for intensification of culture based fishery technology.

**ACKNOWLEDGEMENT**

The authors gratefully acknowledge the kind help received from the villagers in the field.

Name of beel	pH	DO mg/l	Alkalinity mg/l	FCO2 mg/l	Turbidity (NTU)
Karkori beel	6.5	8.4	160	1.3	36.2
Jonamara beel	6.3	7.4	163	1.4	41.8
Moi-chatal beel	6.1	9.3	183	8.2	34.5
Shundarkori beel	6.1	8.75	196	9.6	46.1
Chatrodoria beel	6.6	9.2	203	8.2	56.7

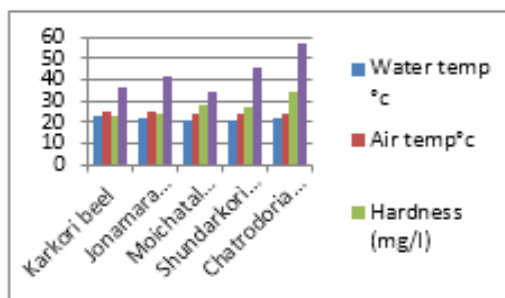
Table no:1 Physico-chemical characters

Name of beel	Water temp °c	Air temp °c	Hardness (mg/l)
Karkori beel	22.5	25	22.5
Jonamara beel	22	24.8	24
Moichatal beel	20.5	23.7	28.3
Shundarkori beel	21	24	26.7
Chatrodoria beel	21.7	24.4	34.1

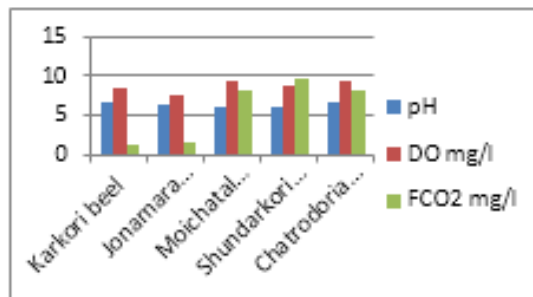
Table no:2 Physico-chemical characters

Name of beel	Fish diversity	Zooplankton diversity
Karkori beel	27	23
Jonamara beel	30	25
Moichatal beel	42	28
Shundarkori beel	46	27
Chatrodoria beel	49	31

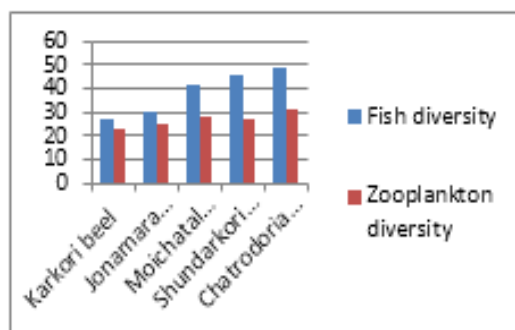
Table no:3 biological parameters



Graphical presentation 2: physico-chemical parameters



Graphical presentation 3: physico-chemical parameters



Graphical presentation 3: biological parameters

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