
Chapter 09: Summary

Chapter – 09**SUMMARY**

- The physico-chemical parameters were observed and the lowest air temperature is being recorded in November, 2014 (26.3 °C) and maximum (36.18 °C) in April, 2016 in 1st and 2nd annual cycle. The highest and lowest water temperature were (34.8 °C) in July, 2015 and 19.2 °C in December, 2015.
- The pH value fluctuated in between 6.5 to 8.1 in June, 2015 and January, 2016 respectively.
- The maximum and minimum values of transparency were being recorded in August, 2015 (269.25 cm) and July, 2015 (30.28 cm).
- The highest value of salinity was 0.372 ppt. in February, 2015 whereas lowest value (0.3 ppt.) in November, 2015.
- The DO value was maximum (12.2 mg/l) in April, 2015, and minimum (7.5 mg/l) in July, 2015.
- The free CO₂ varied from 3 mg/l to 8.56 mg/l in between May, 2015 to January, 2016.
- The lowest alkalinity value (41.71 mg/l) was in September, 2016 while highest value (86.22 mg/l) was in May, 2016.
- The total hardness showed lowest values of 62.22 mg/l in August, 2015 and highest value (183.26 mg/l) in August, 2016.
- Electrical conductivity value marked through highest reading (16.95 µmho/cm) in April, 2016 and lowest reading (11.6 µmho/cm) in March, 2015.
- The lowest chloride value was recorded in May, 2015 (32.65 mg/l)
While highest value (302.23 mg/l) was in June, 2016.
- The highest phosphate value (0.134 mg/l) was in July, 2015 and lowest value (0.02

mg/l) in March, 2015.

- The total inorganic nitrogen was maximum (2.27 mg/l) in October, 2015 and minimum (0.26 mg/l) in March, 2015.

The highest calcium value was recorded (46.16 mg/l) in November, 2015 and lowest value (19.18 mg/l) was in January, 2016. Magnesium content was detected with higher concentration (52.69 mg/l) in June, 2016 and lowest concentration (10.42 mg/l) was in November, 2015. Water level was highest (381.38 ft) in September, 2016 and it was lowest (288.68 ft) in May, 2015.

- The maximum value (45.52 cm) of photic depth was in July, 2016 and maximum value (218.6 cm) was in February, 2015 (1st and 2nd annual cycle).
- Six major groups like Rotifera, Copepoda, Cladocera, Protozoa, Ostracoda and Amphipoda represented the zooplankton population.
- Total seven classes of phytoplankton were recorded, like Chlorophyceae, Dinophyceae, Bacillariophyceae, Charophyceae, Tribophyceae, Cyanophyceae and Xanthophyceae comprising 25 species. To analyse the community structure of plankton population such as biodiversity index, dominance index, species richness these data had been displayed scientifically. The dominance of zooplankton was respectively: Rotifera > Cladocera > Copepoda > Protozoa > Ostracoda > Amphipoda. The maximum number of zooplankton was observed during winter and summer and minimum during monsoon and post-monsoon season. The maximum number of phytoplankton was observed during summer and minimum during the rainy season. In these ponds species richness was very high throughout the year. The dominance of phytoplankton were accordingly Chlorophyceae > Bacillariophyceae > Cyanophyceae > Charophycear > Dinophyceae > Tribophyceae > Xanthophyceae.

- The gastrosomatic index value gradually increased from monsoon to post-monsoon respectively whereas gradually decreased in winter and summer in case of *Heteropneustes fossilis*. The gonadosomatic index values of adult and young male was observed to be highest in summer to monsoon and lowest in post-monsoon to winter in both male and female specimens. The highest value in female than the male indicates that the female growth is faster than male during breeding period. Hepatosomatic index of young and adult male was observed to be highest in monsoon and winter and lowest in monsoon and post-monsoon. Similarly in female, it was highest in monsoon and post-monsoon and lowest in winter and summer. Condition factor (K) of young and adult male was observed to be highest in winter and lowest in monsoon and post-monsoon. In case of female (young and adult) it was highest in winter and lowest in summer and monsoon. The highest values of gastrosomatic index in post-monsoon and lowest in monsoon of young and adult male were recorded. Similarly, the values in young and adult female were observed to be highest in winter and post-monsoon and lowest in monsoon. The gastrosomatic index had gradually increased from monsoon to winter and decreased in summer to monsoon. Gonadosomatic index value attained its peak values in adult and young male that showed higher values in monsoon and summer and lowest being observed in summer and post-monsoon. Similarly in young and adult female fishes, they showed highest values in summer and lowest in winter and post-monsoon. The present study showed that gonadosomatic index increased as the increase of gonadal development. The hepatosomatic index shows increasing trend gradually from summer to post-monsoon and decreased from monsoon to summer. Hepatosomatic index is decreased as the body weight decreased and standard length. Condition factor (K) of adult and young male being observed highest in winter and lowest in monsoon whereas

adult and young female it was observed highest in winter and lowest in monsoon and post-monsoon. The present study showed that condition factor (K) in both male and female specimens exhibit a gradually decrease before spawning in monsoon. After spawning they started to increase. The gastro-somatic index of *Anabas testudineus* gets increased in monsoon and gets decreased from winter to summer. The present study showed that gonadosomatic index increased as the increasing of gonadal development. The gonadosomatic index increased in summer in female and decreased in winter. The hepatosomatic index value increased in winter in both male and female whereas it was decreasing in post-monsoon. The condition factor (K) in male was observed to be highest in winter and lowest in summer.

- The seasonal variations in percentage value of total protein in body muscles of selected fishes like *Heteropneustes fossilis*, *Clarias batrachus* and *Anabas testudineus* collected from ponds during November, 2014 to October, 2016 showed that a higher amount of protein was found to be present in three different fishes. This result interpreted of protein in fish that depended on season, sex and reproductive cycle. The protein content was highest (77.09%) and lowest in adult male (67.03%) in winter and also in young male (72.78%) and (69.68%) in post-monsoon and winter. The protein content was high and low in adult female (74.94%) and (67.34%) in summer and young female (73.42%) and (67.42%) in monsoon and winter. In *Heteropneustes fossilis* protein level increased from summer to monsoon and it decreased from post-monsoon to winter. During spawning, muscle protein started transfer into ovaries to meet energy requirement of fish. In *Clarias batrachus* protein level increased in November and started decreasing again in June and July. Protein normally increased from January to June and then started decreasing till December. Protein level of *Anabas testudineus* increased in monsoon in

adult and young male in winter and then decreased in adult male during post-monsoon whereas protein value decreased in young male in monsoon. Similarly in adult and young female they showed increased protein value in summer and decreased values in the same monsoon. The protein concentrations in body muscle of all the three species studied were changed according to the change of seasons. Thus environment plays the key role in the seasonal variations of muscle protein of fishes. Accordingly, gonadal development and stomach as well also obey the rule and regulation of nature. The protein contents in *Heteropneustes fossilis*, *Clarias batrachus* were highest in monsoon and lowest in winter and summer whereas in *Anabas testudineus* it was high in summer and low in monsoon in case of both male and female.