Chapter - 9
CONCLUDING REMARKS

Inland waters and freshwater biodiversity constitute a valuable natural resource in economic, cultural, aesthetic, scientific and educational terms. However, almost all the freshwater ecosystems of the world are under-pressure and are experiencing declines in biodiversity far greater than those in the most affected terrestrial ecosystems. If trends in human demands for water remain unaltered and species losses continue at current rates, the opportunity to conserve much of the remaining biodiversity will vanish shortly. Hence, there is a growing need and international concern about water and conservation issues. In view of the rapid and extended degradation systems, it is essential not only to document diversity but also to understand the biophysical and chemical processes sustaining it. Hence the present study was attempted to analyse the physio-chemical and biological variables with special reference to bacteria and algae in two perennial lakes but with two different sources of water supply in Villupuram District of Tamil Nadu.

Analysis of the physicochemical variables reveals that both the systems recorded variations that were well within the limits required for aquaculture, especially for the culture of carps. Further, based on the classification of aquatic systems with special reference to pH as derived by Saxena (2012), both the systems can be categorised as productive. However, based on the classification of Rawson (1966) with reference to electrical conductivity, both the systems come under the category ‘eutrophic’. One of the reasons for this is probably due to the presence of large amount of nutrients especially phosphates in both the systems. In
addition, a comparison of the oxidizable organic matter and nitrogenous organic matter reveals that Mugaiyur lake recorded higher levels than Tirukoilur lake. This could probably be the reason why Mugaiyur lake may be considered as more eutrophic than Tirukoilur lake. With regard to bacterial diversity, Mugaiyur lake recorded a total of 22 species belonging to 16 genera while Tirukoilur lake recorded 28 species belonging to 18 genera. A comparison of bacterial species in both the systems showed similarities as well as uniqueness. Thus seven species were common to both the systems, while one was unique to Mugaiyur lake and four to Tirukoilur lake. However, the systems recorded the presence of *Vibrio, Aeromonas, E. coli, Enterobacter* etc., which probably indicates microbial pollution. Combating these potentially hazardous microbes will require immediate alternates if such systems are to be used for mankind.

Enumeration of algae in both the systems revealed the presence of Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae. While Mugaiyur lake recorded 11 species of Cyanophyceae Tirukoilur lake recorded 14 species. On the other hand, Mugaiyur lake recorded 19 species of Chlorophyceae while Tirukoilur lake, 24 species. With regard to Bacillariophyceae, Mugaiyur lake recorded 12 species while Tirukoilur lake, 14 species. However, Mugaiyur lake recorded eight Euglenophyceae species while Tirukoilur lake recorded 11 species. Thus Tirukoilur lake had higher algal diversity when compared to the Mugaiyur lake. These differences could be due to the differences in local climate conditions, nutrient availability as well as the nature of bottom deposits. Nevertheless, a percentage composition reveals that
both the systems were dominated by Cyanophyceae > Bacillariophyceae > Chlorophyceae > Euglenophyceae.

Experimental studies to assess the presence of chitinolytic bacteria revealed the presence of eight species in Tirukoilur lake and 12 species in Mugaiyur lake. However, the composition was not the same as one system was dominated by *Pseudomonas* and the other by *Aeromonas*. Nevertheless, the presence of these bacteria clearly suggests that they play a significant role in chitin decomposition.

Enumeration of enteric bacteria revealed the presence of 15 species belonging to 11 genera. Among these, *E. coli* and *P. aeruginosa* contributed the most. The presence of a large number of enteric bacteria including pathogenic species reveals the need for following strict hygienic measures during handling and processing of fish in these systems. Studies on the antimicrobial activities of certain freshwater algae and bacteria also yielded positive results. Among the water soluble and methanol soluble extracts, the methanol soluble extract had a higher inhibitory effect on microbes. The present study clearly indicates that both the systems can be used for the betterment of mankind. However, it appears that each system is unique to itself and hence each and every system needs to be assessed thoroughly before they can be used for mankind. The presence of beneficial organisms in both the systems suggests that they can be used for synthesising / decomposing materials. However, the presence of certain pathogens in these systems also suggests the need to take precautions before embarking on programmes related to betterment of man.