CHAPTER 6

SUMMARY

A study on the fresh water algae from sixteen waterfalls of eight district of Tamil Nadu covering both Eastern and Western Ghats of India was under taken. Based on the geographical position the entire study area was clustered into four zones (Zones I, II, III & IV) wherein each zone comprises of two districts and four waterfalls.

Out of sixteen collection sites twelve sites were documented with algal diversity for the first time, i.e. seventy five percentage of sampled locations studied for the first time.

They are Zone I – Law’s Falls and Moyar Falls; Zone II – Kutladampatti Falls, Chinna Suruli Falls, Kumbakarai Falls and Sokkanalai Falls, Zone III – Chinna Mangalam Falls, Koraiyaaru Falls and Nallur Falls and Zone IV - Megam Falls, Periyaar Falls and Sirukalur Falls.

A total number of 40 – 50 samples were collected from each waterfalls. The present study shows richness of algal population in the waterfalls. It was recorded with 69 genera and 191 species of five classes namely Cyanophyceae, Chlorophyceae Bacillariophyceae, Euglenophyceae and Rhodophyceae.
Zones I, III and IV was recorded with four classes (Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae) wherein Zone II were recorded with five classes (Cyanophyceae, Chlorophyceae, Bacillariophyceae, Euglenophyceae and Rhodophyceae).

The zones II, III, and IV was dominated by the members of Chlorophyceae whereas zone I was dominated by Bacillariophyceae.

The order of dominance in each zone was given below,

**Zone I**

Bacillariophyceae > Chlorophyceae > Cyanophyceae > Euglenophyceae.

**Zone II**

Chlorophyceae > Bacillariophyceae > Cyanophyceae > Euglenophyceae > Rhodophyceae.

**Zone III**

Chlorophyceae > Cyanophyceae > Bacillariophyceae > Euglenophyceae.

**Zone IV**

Chlorophyceae > Bacillariophyceae > Cyanophyceae > Euglenophyceae.
A total number of ten orders namely Chroococcales and Nostocales of Cyanophyceae; Volvocales, Chlorococcales, Ulotrichales and Conjugales, of Chlorophyceae; Centrales and Pennales of Bacillariophyceae; Euglenales of Euglenophyceae and Acrochaetiales of Rhodophyceae were recorded in this study.

Among that Pennales was found to be dominant order with 55 species followed by order Chlorococcales with 32 species and order Nostocales with 29 species. Order Acrochaetiales of Rhodophyceae were found only in Zone II and Volvocales of Chlorophyceae in Zone I and IV only. Whereas all other orders were found in all the four zones.

Maximum number of 84 species were recorded from Zone II. It is also interesting to note that, the only Rhodophycean member was recorded in this zone. Zone IV was recorded with 71 species, Zone I with 63 species and Zone III with 55 species.

The genera found in all the zones are, Cyanophyceae – Aphanothece, Gleocapsa, Lyngbya, Oscillatoria, Phormidium, Anabaena and Nostoc; Chlorophyceae – Scenedesmus, Oedogonium, Spirogyra, Closterium and Cosmarium; Bacillariophyceae – Navicula, Pinnularia, Amphora and Cymbella and Euglenophyceae – Euglena.

The genera were found only in Zone I are Cyanophyceae – Microcystis; Chlorophyceae – Gonium and Westella and Bacillariophyceae –
**Gramatophora** and **Gyrosigma**. The genera documented only in Zone II are Cyanophyceae – **Merismopedia** and **Arthospira**; Chlorophyceae – **Chlorella**, **Ankistrodesmus** and **Crucigenia**; Euglenophyceae – **Astasia** and Rhodophyceae – **Audouinella**.

The genera were observed only in Zone III are Chlorophyceae – **Oocystaenium** and Bacillariophyceae – **Neidium**. The genera recorded only in Zone IV are Chlorophyceae – **Pandorina**, **Oocystis** and **Hydrodictyon** and Bacillariophyceae – **Stauroneis**.

Diversity indices such as Simpson, Shannon – Wiener and Evenness were employed in this study to calculate level of species abundance, richness and evenness. The results shows moderate in all aspects in all the zones.

Six cyanobacteria **Non – Heterocystous Filamentous**: **Lyngbya confervoides**, **Oscillatoria curviceps** and **Phormidium ambiguum**, **Heterocystous Filamentous**: **Anabaena doliolum**, **Nostoc calcicola** and **Nostoc linckia** were isolated and cultured in optimum conditions.

Among six strains two isolates **Oscillatoria curviceps** (Non – Heterocystous Filamentous) and **Nostoc calcicola** (Heterocystous Filamentous) were selected for pot experiment based on their growth (Chlorophyll a content) studies.
The pot experiment has been carried out in *Amaranthus* with the two selected cyanobacterial strains, Farm Yard manure and Urea. The result reveals that cyanobacterial treated plants were shows better growth than control, Farm Yard manure and Urea. It was also observed that treatment of cyanobacteria (*Nostoc calcicola*) with Farm Yard manure shows better shoot length in *Amaranthus*.

On the basis of the Physico – Chemical parameters assessment of the water quality has been done. In the present study the appearance was found to be clear in all water falls except four falls namely Law’s Falls and Moyar Falls of Nilgiris district, Nallur Falls in Salem district and Bheeman Falls of Thiruvannamalai district. Water samples from all the sixteen water falls are found odorless.

In this study electrical conductivity, total dissolved solids, ambient temperature and was found maximum amount in Megam Falls of Villupuram district. Turbidity, water temperature, BOD, and COD was found maximum in Nallur Falls (Salem), Kutladampatti Falls (Madurai), Kovai Kutralam (Coimbatore) and Chinna Suruli Falls (Theni) respectively. Whereas highest value of pH was found in both Megam Falls (Villupuram) and Kutladampatti Falls (Madurai).

Maximum amount of calcium in Sirukalur Falls (Villupuram); Sodium in Bheeman Falls (Thiruvannamalai); chloride and sulphate in Pykara
Falls (Nilgiris); fluride in Kutladampatti Falls (Madurai); nitrate in Chinna Mangalam Falls (Salem) and Kiliyur Falls (Salem); Phosphate in Kovai Kutralam (Coimbatore) were reported.

Most of the parameters such as total dissolved solids, pH, calcium, sodium, nitrate, chloride, fluorides, phosphate and sulphate were found within acceptable limits suggested by Bureau of Indian Standards and World Health Organization standards for drinking water.

The results of physico-chemical parameters were analyzed with the help of statistical aids such as Karl Pearson Correlation, one way ANOVA and t-test. In Karl Pearson Correlation most of the parameters of the sixteen waterfalls were found significant (positively or negatively).

The one way ANOVA reveals that few parameters were found significant between the four zones. The t-test results also shows that certain parameters were found significant between Eastern Ghats and Western Ghats. Thus, at all level the parameters were found significant.

For the first time maps were created to all the sampled locations by using GIS technologies. Distribution of algae in each class of all the zones were illustrated in the map.

Furthermore, the study divulges that the freshwater algal diversity in Waterfalls of Tamil Nadu states is substantial which has great potential as
Bio-fertilizer. The dominance of Chlorophyceae and Bacillariophyceae and lower level of Cyanophyceae and Euglenophyceae in the study area indicate the healthiness of water body. The physico – chemical analysis results were also affirm the same. Most of the physico- chemical parameters of the study area was found within the permissible limit.

However, these aspects are not fully elucidated and need further exploration. There is a need to share knowledge and experience in the fields of conservation and rehabilitation of water bodies and the struggle to protect the aquatic resources all over the world.