CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

In this study selected water quality parameters Chlorophyll-a, TSM and Turbidity were estimated using optical remote sensing method. Both multi and hyperspectral data were used in the estimation using various models and indices. In the estimation process the parameters were measured using laboratory method and the index values were computed. The index values were correlated with the laboratory measured values and band combinations that give high correlation were selected for estimation. The relation between the indices and the water quality parameters were established using regression study. This relation was used to estimate water quality parameter concentration at other places of the same water body.

The water quality parameters were estimated with different hyperspectral models. The efficiency of different models in estimating the water quality parameters was compared. The performance of multispectral and hyperspectral data in estimating the water quality parameters was compared and found the hyperspectral data provide accurate results than multispectral data.

The existing models were improved to get better accuracy in estimation. The results obtained from these improved models were compared with existing models and results from improved algorithms are encouraging.

The correlations between different water quality parameters were studied. The turbidity shows a positive correlation with TSM. The secchi disk depth was correlated with turbidity and found a negative correlation. The correlation between Chl-a and TSM was not consistent between lakes as one lake shows high correlation and
another shows very low correlation. The relations between the area and water quality parameters concentration were investigated. The surface area of water shows positive correlation with chlorophyll-a.

It was found that the Spectroradiometer based Hyperspectral data provide high correlation in estimating the water quality parameters than the multispectral data. As the hyperion data is noisy and with low SNR, the preprocessing like atmospheric effect correction, noise removal and destriping operations are essential. The determination coefficients obtained using hyperion data were less than the spectroradiometer results.

The narrow hyperspectral data in hundreds of bands provides high determination coefficient but the volume of generated data by the satellite is large and the data rate requirement for transmission is high. A study was carried out to find optimal spectral bandwidth in Chlorophyll-a estimation. The tradeoff between the increase in data rate due to narrow bandwidths and improvement of Chl-a estimation accuracy showed that eight nm bandwidth is optimal for Chl-a estimation. Further reduction in bandwidth does not provide significant improvement in Chl-a estimation.

7.2 FUTURE SCOPE

Though the relation between the chemical parameters like Total Nitrogen (TN) and Total Phosphorous (TP) with the chlorophyll-a is reported, study on quantitative relation between them is a potential topic of research. The relation between water surface area and the Chlorophyll-a concentration is a potential area of study for future. Inconsistency in relation between TSM and Chlorophyll-a was found in this study. The reason for this inconsistency may be investigated in future with more and frequent samples. Study of larger lake which has high variation of parameter with more samples may give consistent results.