SUMMARY

Thol Wildlife Sanctuary, having a wetland with a potential of internationally importance and among the eight national wetland sites has been identified and declared for conservation. It is a fresh water ecosystem is dominated by birds. Almost 92 different species of waterfowl falling across 14 different families have been recorded. It is also a potential Ramsar site.

The status of water quality for wetlands of TBS covering a single season with several parameters had been studied by the Researchers in the past. In most of the studies, the focus was on waterfowl of Thol wetland with emphasis on their species richness and abundance. As far as abiotic component like water quality is concerned only few primary parameters had been considered.

An integrated approach was thought of whereby an attempt is made to study the Thol Wetland through important Ecological Characters like Components (Physical, Chemical and Biological parameters of water quality) as well as Process (Primary Production and Photosynthesis Respiration Ratio) in context with Ecosystem Services (Wildlife propagation and Irrigation). Further, the rational planning of any water quality management requires knowing the nature and extent of water quality degradation. It strives to maintain and restore the 'wholesomeness' in terms of 'designated best use concept'. For an overall assessment of an ecosystem, Physico-chemical studies have to be supplemented with biological assessments. The concept of Bio monitoring i.e. using benthic

macro invertebrates -the native organisms living in water bodies as sensitive indicators of prevailing water quality was used during the study. Thol Wetland Ecosystem was assessed by studying Physico-chemical parameters (29), Water Quality Index (based on 16 Physico-chemical parameters), Biomonitoring (2 Parameters), Biological Assessment - Gross Primary Productivity and Photosynthesis Respiration Ratio, Heavy Metals (9), and Sediment Quality (8 parameters) on Seasonal basis covering all three seasons.

Fluctuations in various Physico-chemical parameters were observed during summer, monsoon and winter seasons of the study period. The correlation coefficient indicates positive and negative correlation of Physico-chemical parameters with each other. The study shows that the water of Thol Bird Sanctuary Wetland exhibits high concentration of BOD, COD, TOC, TSS, NO_3-N, Phosphate etc. The WQI values across the locations and during the monsoon and winter seasons are found to be excellent. However, the comparative value during the summer is higher than the other period of the year which indicates that organic load gets accumulated during summer. Moreover, the Integrated water quality of Thol wetland is observed to be 'Moderately Polluted' owing to comparatively high organic content. The results of Physico-chemical analysis are in consonance with the Biological Water Quality Criteria developed by Central Pollution Control Board. The value of total daily productivity (Gross Primary Productivity - GPP) ranged from 0.3 g $C/m^3/d$ to 16.883 g $C/m^3/d$ and the average value during the study period of 7.261 g $C/m^3/d$. It is also found that to the yearly

primary production, summer season contributes maximum. The value of Photosynthesis – Respiration ratio (P/R) ranged from 2.607 to 0.032 against the average P/R ratio of 1.297 during the study period. During the in-situ measurements, the Photosynthesis Respiration Ratio is found to be greater than 1 during winter and summer seasons. This indicates that there is an accumulation of organic matter in Thol Wetland. However during monsoon season, the Photosynthesis Respiration ratio is found to be less than 1 indicating that Respiration activity is more than the Photosynthesis the reasons being organic content gets diluted during the monsoon season as well as the rapid depletion of organic content by the primary consumers.

Thus, an integrative approach, which included physical-chemical, habitat and biological assessments, was followed to provide increased accuracy.Use of Biomonitoring for water quality assessment using Benthic Macroinvertebrates can be used as a complementary method along with the regular physico-chemical analysis for comprehensive water quality monitoring. The WQI thus developed is a simple tool yet very useful for the water quality assessment and it can be used by all concerned for maintaining good health of the Thol wetland. The study therefore would also provide an opportunity to have an insight in knowing the status of benthic diversity apart from the water and sediment quality and may be used appropriately during the process of conservation and management of the Thol wetland ecology in an integrated manner. The study could also be used as a reference for further integrated studies on Thol Wetland.