1 INTRODUCTION
The modern man has become a major force in altering the physical, chemical and biological nature of his own resources. Industrial evolution due to an ever expanding technology and industry, created to achieve the material comforts, brings us in contact with rare minerals of the earth, for which evolution seems to provide no effective homeostatic balance. Practically, pollution is a secondary effect of some activity which in some way or the other benefits the society. But, technology will continue to be welcome as long as it makes survival comfortable and the need of the hour is to search an 'equilibrium' between technological development and maintenance of environmental quality.

The water which covers almost two thirds of global area is related directly to energy conversion by the aquatic vegetation, mainly phytoplanktons. This remains one of the major parts of earth's productivity. But, water pollution is increasing as a result of the addition of sludge waste water and untreated disposals from the fast growing industries into the rivers. Furthermore, most of our metropolitan cities are located on river banks or sea coast. These cities draw their water supply from river and return the sewage, particularly untreated water into the river. These unhealthy trends leading to the physical, chemical and biological modifications of our environment, specially water, have become important factors in threatening the future progress of the whole mankind and the quality of life on this planet. Every year many more new chemicals are being added to our environment. Many of the synthetic chemicals are persistant in nature as they do not undergo biodegradation rapidly and thus, tend to accumulate in the ecosystem. In contrast to the problems created by synthetic chemicals, other contaminants significantly increase their 'pool size' resulting in an undesirable proportion in the system.

The behaviour of these contaminants, specially the trace elements and heavy metals in natural aqueous system is of paramount importance not only to the researchers but also to the general public, precisely due to their direct toxicity to the aquatic organisms and indirect toxicity to human beings via food-chain. The toxicity of our reservoir is also increasing day by day owing to the addition of mutagens and carcinogens. Most common amongst them are the heavy metal nitrites and nitrates, dyes and pesticides. Heavy metals particularly are considered to be hazardous due to their persistent nature and long biological half-life. The inorganic aerosols contain a large number of trace elements, which constitute an important family of carcinogens and
mutagens. These are quite prevalent in urban and industrial areas and organisms are continuously exposed to them. In nature these elements are fairly widespread in rocks and in soils and cycle slowly by degrading into a limited way by weathering. Due to the geologic formation and by the waste discharged to the natural water as a result of man's activity or natural process, cations of heavy metals are liberated and find their way into surface water and soil water. This has been happening since early geological times and it is only within the last few hundred years that man has significantly affected their environmental levels. The activity of metals in aqueous system varies depending upon the nature of the metal species. Some of the metals present in low concentrations in natural waters constitute essential ingredients for living organisms but their soluble derivatives may sometimes be highly toxic. Pollution by heavy metals is often more serious than other types of pollutions.

It has been established that alkylation of heavy metals produces greater toxicity than the original metal ions. Methylation of mercury and arsenic by microorganisms is well documented (Goldwater, 1971), but alkylation of lead and lead salts in vivo is not seen frequently in nature (Petersen, 1975). Besides this, Wong et al. (1975) have reported from their studies that some microorganisms (Acromonas, Acaligenes, Acinetobacter and Flavobacterium) in lake sediments, could transform certain inorganic and organic lead compounds into a volatile tetramethyl lead. In forests, lead deposited in humus and moss affects the decomposers first. Due to the lead toxicity incomplete humification and slowing down of the biogeochemical cycling occurs. The negatively charged organic groups are blocked and this increases the power of resistance of litter to decompose (Tyler, 1972). As a result of decreased decomposition in terrestrial ecosystems, the amount of litter and incompletely decomposed organic compounds increases. Thus, more and more mineral nutrients remain bound in unavailable forms and out of circulation. This way, the turnover of important elements particularly phosphorous gets retarded and thus limits the growth rate and productivity of forest ecosystem. If the organic compounds are suddenly destroyed by fire or forest clearing, it results in a temporary, drastic increase in concentration of heavy metals in soil and this may be transported through the soil horizons into ground water and finally the aquatic ecosystem will be affected (Tyler, 1972).

Although metals have many physical properties in common, their chemical reactivity is quite diverse and their toxic effect on biological systems is
even more diverse. Because of their known varying degree of toxicity, an international standard for the permissive doses of various metals has been set up by WHO, USPHS and ISI, India (1979). The concentration above that level is considered to be injurious. The increased use of fossil fuel resources, application of sludges to agriculture lands, uninterrupted release of industrial waste, use of atomic weapons and atom as a source of future energy makes it desirable to reexamine the role of excess metals in plant growth, as potential danger exists in the areas of high concentration, where vegetation is the first victim. Whatever may be the reasons of metal toxicity, it is the need of time to lay stress upon this problem for human existence.

Metals, as serious toxicants, eventually must find their way into the cell. Plant cell walls are normally considered to be highly permeable to compounds of low molecular wieght. However, if materials present in the algal cell wall show a high affinity for environment contaminants, particularly heavy metals, they might bind to the cell wall. The entry into the cell could affect the various sites and transport of various molecules within the cell due to high binding affinity with a number of ligand molecules.

Considering the direct threat of exponential increase of metal emission, its accumulation in the aquatic systems (due to slow biodegradation) especially into micro-algae (aquatic producer) and its entry into the food chain causing serious health hazards, it is imperative to take some steps to minimize their effects on human beings. To extrapolate their sites of action and reduction of metabolic pathways of higher organisms including man, an attempt has been made to study a unicellular fresh water alga, Chlamydomonas reinhardii, as an aquatic model system to evaluate the action of heavy metals. Although, this unique system has diversely been exploited earlier for physiological, biochemical and genetical work (Remillard and Witman, 1982; Woolhouse, 1983; Bloodgood and Levin, 1983; Snell, 1985; Yagawa et al., 1986; Haung, 1986) but its recent use as an indicator and biological monitor of environmental contamination (Cain and Cain, 1984; Netrawali et al., 1986 and Bhattacharjee, 1986) is the focus of our interest. The development of large number of mutants of C.reinhardii has added a new dimension to the study of eukaryotic cellular function in general and the role of cell wall in particular. The adverse effects of heavy metals viz., CoCl₂, HgCl₂, ZnCl₂ and Pb(NO₃)₂ have been studied on various physiological processes. The comparative performance of C.reinhardii WT 15+C (Wild strain) and C.reinhardii CW 3+C (a cell wall-less mutant)
in presence of various concentrations of above metal salts was analysed in terms of growth. The effects were also visualized on total protein content, pigment content (chlorophyll) and enzymatic levels. The synthetic profiles of DNA and RNA by the radioactive thymidine and uridine incorporation were also studied to reckon the target molecules affected by these pollutants. The changes in the level of these molecules are the indices of physiological perturbation.