Water is one of the most precious resources necessary for the survival of all living organisms. Out of the total global water, only 3% in the form of freshwater, is suitable for human consumption. Water is considered as an universal solvent. Present day man is living in a ‘chemical age’ and these chemicals whether they are natural or man made, have the capacity to degrade the delicately balanced ecological system by polluting water, air and soil. Therefore, while realizing the need of the chemicals, it should be ensured that they do not spoil our environment. Global chemical pollution has been a matter of great concern with increase in public awareness towards environmental problems.

Physico-chemical analysis is the prime consideration to assess the quality of water for its best usage (Sharma and Sarang, 2004). Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. Most of the forms exists only within narrow range of conditions. The changes in the water quality may be essential for the existence of some organism while, for others such changes may not be desirable. Aquatic environment depicts ecological features that lead to the establishment of a very dynamic system in which the plankton communities play an important role.

The chemical factors may be divided into four groups. First waters are alkaline due to carbonates, bicarbonates and pH, constituting buffer system. Most of the fresh waters are slightly alkaline in nature. Secondly, dissolved gases of oxygen and carbon dioxide are the significant factors responsible for the water quality. The third category contains the ions, which are involved in algal nutrition such as nitrates, phosphates, sulphates and silicates. Nitrates and phosphates show great relation to algal growth. Silicates are useful for only one group of algae such as diatoms. Dissolved organic substances influence the oxygen levels. Dissolved
organic matter, includes a certain amount of organic debris and colloidal substances. Several important concepts in ecology have been developed from studies on the aquatic ecosystems and organisms.

Water finds application in almost all spheres of life. In general, organized water uses can be generalized into municipal, industrial and agricultural water uses. The quantity and quality requirements depend on the intended use of water.

Quantity of potable water is as important as its quality. Various physico-chemical and biological factors are governing the quality of water. Richness in the productivity of aquatic ecosystems is due to the presence of nutrients. Phytoplankton constitutes the basis of nutrient cycle of an ecosystem. They play an important role in maintaining the equilibrium between living organisms and abiotic factors. As water is precious, it is becoming more unfit to mankind due to direct or indirect inference of human activity. Water bodies have been contaminated with variety of hazardous chemical pollutants that cause harmful effect on drinking water and adverse impact on human health and aquatic life as well (Telliard and Rubin, 1972).

There is 400 billion gallons of water on the earth but it is not evenly distributed. Water ‘deposits’ occur as rivers, lakes, streams and oceans. Water is also found in the soil as groundwater and is bound up as ice in glaciers. If our entire supply of water were equal to 55 gallons, the oceans would comprise over .53 gallons (97%). Of the remaining two gallons, more than one gallon would be tied up in glaciers and ice caps. The rest of the water would be found in under ground aquifers or in the soil. Of which, less inland seas or estuaries. So although, there are 400 billion gallons of water in the ecosphere, only a small part is directly available to human beings. At any one time, only about five of every 100,000 gallons of water in the world supply is in motion as precipitation, running streams
or atmospheric vapour. The rest is stored in underground, in lakes, in glaciers or in the oceans. Water may be held or stored in the ground for thousands of years.

The total amount of water in the hydrosphere consists of free water in liquid, solid or gaseous states in the atmosphere, on the earth’s surface and in the crust down to a depth of 20,000 meters. The earth’s hydrosphere contains about 1,386 million cubic kilometers of water (Shiklomanov, 2000). But, not all this quantity is in usable form. Major portion of this (97.3%) is saline. The rest (2.7%) is freshwater. The greater portion of this freshwater stock (68.7%) is in the form of ice and snow cover in the Arctic, Antarctic and mountainous regions. Fresh groundwater comprises 29.9% of total freshwater resources. Only 0.25% of the total amount of freshwater on the earth is concentrated in lakes, reservoirs and river systems (Varma, 1999; Shiklomanov, 2000).

Global water use assessments have been made with different degrees of comprehensiveness and reliability in many countries of the world. Various studies on the quantity and pattern of water use were conducted at different periods in various countries. Most significant of these studies include (Lvovitch, 1975; Falkenmark and Lindth, 1974; DeMare, 1977; USGS, 1980 and Ambroggi, 1980). Several basic factors such as socio-economic development level, demographic pressure, physiographic features, meteorological aspects and area of the territory determine the volume and structure of water use, its dynamics and future tendencies.

It has been estimated that, out of the total precipitation of around 400 million hectare meters with respect to India, the surface water availability is about 178 million hectare meters. Out of this, about 50% cannot be put to beneficial use because of topographical and other constraints. In addition, there is a ground water potential of about 42 million hectare meters. The availability of water is highly uneven in both space and time since precipitation is confined to only about three to
four months in a year. Further, rainfall does not respect state boundaries. Not merely rivers, but even underground aquifers often cut across state boundaries. Water as a resource is one and indivisible rainfall, river waters, surface ponds, lakes and groundwater are all part of one system.

Karnataka state is endowed with 6.31 lakhs hectare of freshwater resources consisting of 4.15 lakhs hectare which includes ponds and tanks and 2.16 lakh hectare reservoirs. In addition, the state has 6000 kms of river stretch and 3000 kms length of canal. The freshwater resources of the state constitute about 9.3% of the country’s total freshwater resources (Karnataka Fisheries, The Paved path, 1997).

Earth’s water turnover depends on water storage and dynamics of storage. This storage dynamics is estimated by the period of full replenishment. The uneven distribution and differing climatic regimes influence the accessibility of water resources. Population growth and urbanization exert heavy demand on water resources. Surface as well as groundwater resources are under the threat of contamination. Globally total water abundance is not the problem; the problem is water availability in the right place in the right time and right form with right quality. Ambitious programmes for diversion of fresh water from areas of abundance (polar regions, high mountain ranges) to areas of scarcity are proposed. But, the cost of such plans is exorbitant and prohibitive.

Life has originated in a aquatic medium. Water makes up 80% of the human body. The higher plants and animals may have outer impervious coating, but their cells must remain in contact with the aqueous environment of the internal medium. About 86% of this is in the form of surface water (rivers, lakes, ponds, reservoirs and streams). A staggering 70% of this water is polluted with community wastes and accounts for four times as much wastewater than the industrial effluents. If the discharged wastes are biodegradable, they are acted
upon by the aerobic bacteria. However, if the quantum is large, the dissolved oxygen begins to deplete and anaerobic conditions prevails. In turn, which produces foul smelling hydrogen sulphide gas, which makes water turbid, sunlight cannot penetrate and the algae and fish will die.

The productivity of a water body is characterized by the presence of living organisms in the natural environment. Eutrophic lakes are characterized by quantitatively rich plankton, while oligotrophic lakes have poor plankton. A waterbody, in the initial stage is unusually rich in plankton. After initial phase of high productivity, it starts dwindling and after some years again improves.

**Plankton**

Phytoplankton forms the base of food chain in most of the aquatic ecosystems, thus playing a vital role in fisheries. The spatial and temporal variation of phytoplankton is regulated by major environmental factors. In India, attempts have been made by workers like Misra *et al.* (1976), Zutshi (1981) and Mathew (1989) to study the dynamics of planktonic communities with respect to their interaction with water quality.

Plankton forms an important component of fish food in aquatic environment and as such, the knowledge of their production and abundance is essential for successful management of fishery. By virtue of sheer abundance and intermediary role between phytoplankton and fish, they are considered as the chief index of utilization of aquatic biotope at the secondary trophic level. The herbivore zooplankton referred to as living machines transforming plant material into animal tissue. Hence they play an important role as the intermediaries for nutrients/ energy transfer between primary and tertiary trophic levels. The seasonal changes in zooplankton species are clearly related to the physico-chemical and biological parameters of aquatic environment.
SCOPE AND OBJECTIVES OF THE PRESENT STUDY

Hydrology is the science concerned with the distribution of water on the earth. It deals with the physical and chemical reactions with other naturally occurring substances and its relation to life on earth. The continuous movements of water between the earth and the atmosphere is known as the hydrological cycle. Under several influences, of which heat is predominant, water is evaporated from both oceans and land surfaces and is transpired from living cells. The transpired water vapour circulates through the atmosphere and is precipitated in the form of rain or snow.

In view of the vital importance of water for human and all life for maintaining ecological balances and for economic developmental activities of all kinds and considering its increasing scarcity, the planning and management of this resource and its optimal, economical and equitable use have become a matter of the utmost urgency. Ponds being dynamic systems are spatially and temporally subjected to physico-chemical and biological variations. The study has been undertaken for the following reasons:

1. The concentration of water pollution can be assessed by evaluating the physico-chemical and biological characteristics of the habitat.

2. Present investigation may give an idea to plan suitable measures for adverse impact on the lentic systems due to human intervention.

Any meaningful exploitation of pond and its resources calls for adequate information on the nature and extent of flow, the magnitude of pollution and types of pollutants, biological components apart from the extent of present exploitation. With this end in view, the following objectives were considered to be undertaken.
1. To study the seasonal variations in the physico-chemical factors of selected ponds of Chitradurga and its surrounding areas.

2. To study the periodicity, distribution and density of different algal communities.

3. To analyse the correlation relationship between various physico-chemical factors.

4. To find out the relationship between physico-chemical and biological characteristics through statistical analysis.

5. To find out the relationship between various biological parameters.

6. To understand any physico-chemical factor responsible for any change of specific group of plankton through statistical data.

7. To find out the pollution tolerant or indicator algae in the lentic system.

8. To evolve methodology, procedures and framework for similar studies on other ponds.