INTRODUCTION

Now a days it is assumed that for mankind to survive as today's way of life it is necessary to increase our knowledge about the environment and acquire concomitant behaviour patterns to safeguard the proper functioning of the ecosystem. First of all the analysis of the aquatic network is the measure of the healthiness of the surrounding area. Its contamination substantiates the degree of human perturbation that country is suffering which always leads to disfunctions (Miracle, 1988).

Limnology is the study of fresh or saline waters which are contained within continental boundaries (Goldman and Horne, 1983). Limnology is also described as "Hydrobiology or aquatic biology". According to Edgardo Baldi a prominent Italian ecologist "Limnology" is the science dealing with internal actions of processes and methods whereby matter and energy are transformed within the lake or pond.

Although limnological observations have a long history, they only evolved into distinct discipline during the last two centuries. For the first definition of limnology, one we owe to F.A. Forel (1892), a Swiss

professor, who has been called the father of Limnology. His pioneer investigations were focussed on Le Leman (Lake Geneva). He published three volumes on lake Geneva in 1892, 1895 and 1904. In the first 40 years of the 19th Century, E.A. Birge and C. Juday worked on Wisconsin lake to became the first American limnologists. The International Association of Limnology was formed in 1922 by Thienemann and Naumann. Some important literature appeared in many languages such as Macan and Worthington (1951) Welch (1952), Treatise on limnology by Hutchinson (1957, 1967, 1975); Reid (1962);, on tropical limnology by Beadle (1974), Wetzel (1975), and Cole (1983).

At present limnology plays an important role in the decision making processes for problems of dam construction, Pollution Control, fish enhancement and aquaculture practices. Applied limnology has great scope in healthy existence of natural and manmade water bodies and to harvest the natural resources at sustainable level. (Goldman and Horne, 1983).

The increasing demand for proteinaceous food has made it necessary to exploit more completely and efficiently the water resources other than domestic water uses, especially those from inland.

All developing countries in the world are facing Shortage of food Supply to support the ever

increasing demand by growing populations. According to the report of FAO (1962) the diet of the populations of these countries is in sufficient and nutritionally unbalanced in which animal protein deficiency is a serious dietary lack. As the proteins from vegetables do not have all the essential amino acids required for human growth, proteins of animal origin becomes essential. Due to the present day inflation, the Conventional sources of animal proteins available in the form of milk, pork, poultry, egg etc. are beyond the means of the common man. Therefore perhaps the only alternative is fish protein, which is not only a complete protein but is easier to digest and comparatively cheaper.

In India we have great inland fresh water resources. In the fight against hunger and malnutrition, harvesting of this water bodies and increasing the fish production from it, therefore becomes a must. There are vast masses of impounded waters in India and every year there is an addition of hundreds of hector of new water mass, in the form of water supply tanks, irrigation and flood control reservoirs etc. According to Bhimachar (1975), no development programme has effectively been initiated in all these perennial and seasonal tanks at present, except that fisherman take out from these tanks whatever weed fish that may be naturally stocked during

the monsoon floods when the tanks overflow. There is an immense scope for stepping up fish production in these tanks if suitable measures are undertaken.

In order to utilize a fresh water body successfully for fish production it is very important to study the biotic and abiotic factors influencing the biological productivity of the said water body. Research in this field is no doubt of indirect assistance but it will serve as a guideline, to maximise the use of the productivity of water and to introduce exotic fish species to balance the ecological status of the water body.

Such investigations in attempting to estimate the productivity of any water body involves maping the shape and depths of the waterbody (Surface area and sub-surface configurations), observations on the physical factors like temperature, humidity, rainfall, turbidity, light penetration, colour of water; Chemical factors like pH, dissolved oxygen, free carbon, dioxide chlorinity, hardness of water and important nutrients like phosphates and nitrates and effect of pollution if any.

In biological investigation, study of micro and macro flora and fauna always provides the clear picture of the ecological relationship existing in the water body.

An investigation, based on ecological appraisal can focus light on the effects of the variations in the abiotic factors on the biotic community, the interrelationships amongst the organisms, the predator - prey relationship and consequent food chain.

Reservoir is an unique man made ecosystem where fluviatile and lacustrine conditions coexist. According to Jhingran (1975), the total man made reservoir area in India today is about 1,094, 960: 616 hector. Out of which 40% is formed by small reservoirs and tanks. This area does not include the area occupied by rivers, natural lakes etc.

In Maharashtra state out of the 151, 114. 710 ha. area of total fresh water bodies about 89% area is constituted by small reservoirs and tanks like Shiroli reservoir Such Small and Shallower fresh water bodies have been found to be much more productive than large impoundments (Holt, 1966). Therefore, the real prospect of future increase in fish production appears to lie in the exploitation of these small water bodies where the factors involved in the productions of fish can be properly controlled.

Several research workers from abroad have made contributions on hydrobiology on large natural lakes and

man made reservoirs of North America, Canda and Europe in temperate climatic conditions.

Some of the workers from abroad who have studied various aspects of the hydrobiological conditions in fresh waters are Juday et. al. (1932), Ricken (1937), Brett (1950), Smith (1952, 1961), Wright (1954), Hutchinson (1957), Weiss and Oglisky (1960), Rodgens and Anderson (1961), Beeton (1963), Spannow (1966), Fish (1969, 1975) Fish and Chapman (1969) Feeles (1974), Dutchie and Ostrofsky (1974), Green (1975), O, Connell and Carten (1976) and Candan et. al. (1976) etc. This work is mainly restricted to deep and large natural lakes and gigantic man made reservoirs. But very little work seems to have been done on the tropical and subtropical water bodies.

In India Workers like Chacko (1949, 1950), Ganapati (1940, 1956, 1957, 1962), Krishnamurthi (1965), Michael (1968), and Vijayaraghavan (1971, 1973), have done some hydrobiological work on historic shallow water bodies like moats, temple tanks and village ponds in South India. A few like David et.al. (1969), Jhingran (1963) have worked on the large brackish water lakes and reservoirs. Sreenivasan (1962 - 1972) reported a detailed account on the productivity of tropical waters of Tamilnadu.

In recent studies on hydrobiology of the freshwater lentic habitats about its physico-chemical characteristics and their productivity is well documented by Savant (1983); Angadi (1985), Subbamma and Rama Sarma (1992), and Pandey et.al. (1993).

Few records are also available on the nutrient composition (phosphate and Nitrates) of the freshwater lakes (Johnson, 1991a, 1991b) and ecological influence on phosphate (Kanabur, 1986) and nitrate metabolism in sewage (Kanabur, 1990) of the fresh water tank.

The knowledge of physico - chemical parameters along with biological Characteristics can provide clear idea of the trophic status of any water body. Several Workers like Sreenivasan (1964b), Mathew (1975), Jhingran et.al. (1981), Mehrotra and Jhingran (1986), Shukla and Bais (1990), Bais et.al. (1993), have studied the nature of reservoir and lakes.

Among various natural resources water is an important resource and is one of the prime necessities of life. Due to rapid industrialization and urbanization, quality of this precious resource has been deteriorated considerably. Undesirable Changes in the physico - Chemical characteristics of water brings about water pollution; Which in turn affects the planktonic flora. Considerable reports are available on plankton studies

from Indian waters (Munawar, 1970, Qadri and Yousuf 1980, Joshi et.al 1981, Pant et.al. 1985, Ramanibai and Ravichandran 1987, Thakur and Bais 1987, Yousuf and Shah 1988, Mishra 1989), but the relationship between physico - chemical characteristics and planktonic fauna has been studied by few (Pant et.al. 1985, Patil et.al. 1985, Saha and Choudhary 1985, Valecha et.al. 1987).

Zooplanktons are important as a major trophic link between primary and higher forms in fresh water. They are generally represented by three main groups viz Rotifera, Copepoda and cladocera. Amongst them, copepods form an important part and also seem to have significant co-relations with limnochemical characteristics. Their population is largely governed by the interaction of a number of physical, chemical and biological conditions of the water body and tolerance of organisms to variations of these conditions. These changes are visualized in their population abundance, distribution and species diversity. The copepods are generally regarded as pollution sensitive taxa as they disappear in polluted water (Verma et.al. 1984). However, Bhatti and Rana (1987) reported cyclops , a dominant genus of copepods as pollution tolerant form.

Studies on tropical Zooplankton are fragmentary (Adeniji 1978, Benzie 1984, Khan and Ejike 1984, Sendacz,

1984, Chapman et.al. 1985). In India the work on freshwater Zoo plankton is primarily by Ganapati (1964), Vasisht and Battish (1971), Nayar (1969 and 1971), Kannan (1979), Sharma and Sharma (1984).

Since no efforts have been made to study and correlate various hydrobiological factors in a small and productive water body like Shiroli reservoir, near Kolhapur.

There are about 229 tanks and reservoirs in Kolhapur district (213 village and Zilha Parishad tanks 14 minor irrigation tanks and 2 reservoirs) covering 3569 hect. of water spread area. Among 213 tanks, 86 tanks are perennial having maximum water spread area of 3362 hect;, minimum 958 hect. and average water spread area is 2016 hect.

Around the Kolhapur city, about 10 tanks of varying sizes (5 hect to 200 hect.) are present, which are used for minor irrigation, washing and bathing purpose. As a representative of these tanks "Shiroli reservoir" was selected for the hydrobiological study. This reservoir (11.61 hect) is situated at the western side of Shiroli Village in survey no.503, which is about 6 miles North West of Kolhapur city (Latitude 16^{O} 40' North, Longitude 74^{O} 15' East) at the height of 634 meters from mean sea level. Earlier, the reservoir water

was mainly used for drinking and domestic purpose, by the villagers but since last two decades, due to contamination of sewage and eutrophication of water body, it is not suitable for drinking purpose. This water body is covered with earthen impoundments on the southern and western sides, with the spillway at North - West corner to overflow excess of water during Monsoon.

The present study is aimed to investigate some of the important physical and chemical parameters along with the flora and fauna of the reservoir. Similarly by studying the phyto and Zooplankton qualitatively and quantitatively to find out what type of exotic fishes can be introduced in the tank in future so as to utilize the water body successfully for fish production.