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Introduction
Fisheries and agricultural farming have evolved rather parallely in the history of human civilization. Interest in fish eating dates back to the dawn of the history. It is believed that hunting of fish was not uncommon in prehistoric times, at the dwelling sites near a river or lake or cave dwellers of the late old stone Age (40000 B.C.). Egyptian know the knowledge of fish culture far back 2500 B.C., Chinese also cultured the carp traditionally in 2000 B.C. The interest in the nutritive value of fish was first keenly taken where there occurred a sudden meat scarcity in the post World-War I period. The discovery of vitamins, A and D, placed fish in esteemed position because of the revelation that fish are generally rich in them. “the fish as food for mankind.” This need was felt only in the last decades of nineteenth century.

India is a vast subcontinent of contrasts with its varied physical and meteorological features. The fresh water habitats are as kaleidoscopic as the land itself. The hill streams with torrential falls over precipitous rocks, the broad and long placid rivers with their extensive deltaic and esturine system, and tanks, lakes, backwater and pools form the major inland aquatic media accommodating diverse animal groups. The
animals vary in size from microscopic protozoa to some of the large fishes.

Since times immemorial, fresh water has always been of vital importance to man and it is interesting to note that his early habitations were within easy reach of lakes and river. Man's primary concern with water was thought to be for drinking, food and as a means of cleaning.

The Government of India established the Central Inland Fisheries Research Station at Calcutta in 1947. It acted as a premier research centre of India. The pond culture substation of institute was opened at (inaugurated) Cuttack in 1949, to detect the solution to research problems in fish culture in ponds.

Four important species of fish viz. Catla (Catla catla), rohu (Labeo rohita), mrigal (Cirrhina mrigala) and common carp (Cyprinus carpio) are widely propagated in fresh water reservoirs throughout India due to their suitability for polyculture. Catla, rohu and mrigal are collectively known as Indian major carps. Common carp is most extensively cultivated species all over the world. Although exotic to India, it is already being cultivated in the country singly, as well as with Indian
major carps. It is voraciously omnivorous, efficiently converting the food ingested into flesh, grows very fast and is prone to artificial feeds.

In the interesting study, Mammen (1982), reported a steady increase in estimated fish-eating Indian population, both rural and urban. Fish culture now-a-days has become the primary occupation of many of the fish farmers. In a survey conducted by the Indian Institute of Management, Ahmedabad (IIM study series 1985) it was observed that out of the 620 individual fish farmers interviewed throughout the country, about 45 % culture fish as a primary occupation while 55 % have it as a secondary occupation. In any case fish farming is a profitable profession to the farmer who can easily get the fish seed from the Government agencies at a subsidised price, and to raise the fish to a marketable size without much inconvenience. It not only helps the farmer to supplement their income, but also adds, the much needed animals protein component to the diet of their families.

The breeding of major carps naturally take place in large reservoir or rivers and in man made bund type ponds during spawning season. The natural spawning of fishes occurs in flooded curved section of the rivers, during the monsoon months.
The breeding requirement (need) of these carps are complex. Extensive studies have been done on this aspect (Dubey and Tuli, 1961; Ganpati and Chako, 1954; Khan, 1947; Rai, 1948; Ganpati and Alikunhi, 1950; Alikunhi et al., 1964; Saha et al., 1957).

Indian major carps breed naturally only once in a year during the monsoon and after hypophysectomy (induced breeding) they could be induced to breed twice at an interval of 2 month to obtain equal number of eggs at each spawning (Bhowmick et al., 1977).

Indian Institute of Management, Ahmedabad, suggested that nomenclature based on size of large fingerlings viz 125-150mm should purchased by fish farmers to seed the pond.

The Maharashtra Government established 29 fresh water fish seed farms. These fresh water fish seed farms have been started in six regions viz Amravati, Nagpur, Bombay, Nasik, Pune and Aurangabad.

Major carps have been widely used in aquaculture all over India and have also been included in many experiments with polyculture. (Das et al., 1975 and Sen et al., 1978) Generally common carp is well established in India and used in poly culture with major
carps. They are playing important role in economy and development of our country.


In the recent years pollution has created serious problem all over the World. Water pollution has already become a serious problem in many areas of the country.

Industrial pollution is causing a variety of problems, discharges of untreated sewage from town and cities also cause more severe problem of biological pollution which to a large extent is responsible for the spread of water borne diseases.

Regular fish kills by discharge of polluted wastewater is reported from many parts of India. The wastes indirectly affect the fish foods such as plankton and algae or directly kill the fish and also spoil the spawning ground of many favourite fishes.

Many wastes containing hazardous substances like pesticides or heavy metals are highly toxic to fishes and also to human beings. Some of the metals and pesticides accumulate in the ecosystem and reach man and animals phosphates and nitrates popularly known as nutrients in the ecosystem are critical parameters in causing problems of eutrophication in ponds and lakes and other aquatic ecosystem. This accumulation of nutrients in excess results in heavy algal bloom, many times death and decay of algae result due to oxygen depletion this
ultimately results in fish kills.

The variety and complexity of various industrial discharge many time results in synergism and antagonism behaving in different fashion in the water body totally affecting the ecology of aquatic ecosystem. Unfortunately, all the industrial wastes are not biodegradable (e.g., pesticides particularly). Chlorinated hydrocarbons persist in water and soil for very long periods and are concentrated as they pass through aquatic organisms into food chain. Organic phosphorus pesticides are highly toxic.

For many years the water pollution studies were based entirely upon physicochemical analysis. But certain shortcomings were noticed in such studies, primarily due to the lack of knowledge about the impact of the effluents on the biology of the organisms subjected to them. The shortcomings noticed were (a) biological effects obtained at concentrations below analytical capabilities, toxicants and other sources of the stress may act quite differently in mixtures than individually. Environmental quality strongly mediates toxic response and chemical tests apply only to the movement of sampling and they do not show cumulative effects of the present and past conditions.

Because of the presence of drawbacks some methods have been established by biologists. These methods involved use of living
organisms which were directly exposed to the pollutants in the concerned medium. Such an assessment of pollution with living organisms is known as "biological monitoring". Biological monitoring is useful in detecting pollution. It estimates degree of pollution and also assesses its intensity.

Many criteria have been in vogue from time to time for assessing the pollution of a riverine system. In most of the industrialised countries, the study of the characteristics of natural water resources has been accompanied by research oriented towards the definition of criteria for water quality. However, in India, such attempts have been few and only recently a preliminary assignment of water quality indices to eighteen major Indian rivers has been worked out by Tiwari and Mishra (1986).

Environmental parameters have a marked effect on the physiology of aquatic organisms. Water temperature is a prominent factor in environment of animals and plays a key role in determining their distribution, growth and other processes. The impact of season on susceptibility of pesticides has received less attention. Most of the toxicity studies are confined to observations at particular temperature but information regarding the effect of seasonal changes in temperature on the toxicity of pesticides is scanty, though this parameter has pro-
found effect on other interacting factors influencing the poisoning.

Agricultural pesticides are now-a-days extensively used in control of a variety of agricultural pests. Improper handling and misuse of these pesticides has often resulted in pollution of the environment especially of water. These chemicals are highly toxic to fish (Jolley, 1973; Arora et al., 1971a, 72; Dalela et al., 1978). Organochlorine pesticides due to their persistent and non-biodegradable nature (Amminikutty and Rege, 1977; Sastry and Sharma, 1979) accumulate in the different tissue of fishes. A number of reports have appeared in recent year on the toxicity, uptake and tissue distribution of pesticides in a number of fishes (Koundinya and Ramamurthi, 1980).

The influence of pollution condition on increased abundance of fish parasite has been subject of discussion for a long (Bylund, 1976; Sorbar and Safik, 1978; Maeseneev, 1979). Significant influence of higher salinity and low acidity condition to favour parasitic growth in qualitative and quantitative terms, has been observed by Gopalkrishnan and Pal (1964) in India and Nordenberg (1963) and Mikailov and Abdullaeva (1973) abroad, respectively.

The air we intake, the water which we drink the food we use and the soil on which we grow plants on are all polluted by pes-
ticides. Pesticides represent some of the most wide spread pollutants raising difficult problems for the environmental protection because they cause hazardous effects upon useful organism both in aquatic as well as in the terrestrial environment. James et al., (1992); Stylianos et al., (1992); Basak and Konar; (1977) Ramesh et al., (1992), Bakre et al., (1990) and Fernando et al., (1992), have assessed the residues of various pesticides in fish and fishfood organisms.

Generally, water soluble pesticides are transported in water system while the insoluble ones get bound to the particulates are carried by water streams. Caro and Taylor reported that about 0.07% of dieldrin applied to the soil, persists in run off water. Largest quantities of DDT in water were about 70 mg/l and 440 mg/l in mud. ICAR (1970) has reported that fish mortality was seen in the various ponds where DDT was used in the city drains. Pesticides badly accumulate in tissue of aquatic organisms. They make fish unable to tolerate low temperature in water.

Recently, studies have proved that extremely low quantities of pesticides which enter the aquatic environment can affect productivity of organisms, kill eggs and larvae of clams and oysters, influence the behaviour of fishes such as schooling and feeding and deteriorate water quality, slight concentration of organochlorine pesticides af-
fects reproduction in fishes, there is every possibility that these pesticidal pollutants may adversely affect local fishery. In recent survey conducted by U.S. Public Health Service it was observed that pesticides were the cause of 32% fish kill in 1960, 21% in 1961, 18% in 1962, 30% in 1970 and these pesticidal pollutants ranked second to all other industrial wastes.

The standards developed by the Indian Standard Institute are being revised from time to time on the experience gained and new standards are added. The standards for water pollution control includes:

a) discharge into any land water,
b) into public sewers,
c) on land for irrigation,
d) into main coastal area.

Tolerance limit for specific industrial effluents discharged into or and land surface water are also available, the tolerance limits of various species of the ecosystem to variety of waste, chemical hazardous substance are also known. This type of toxicity studies otherwise known as “bioassay” are very useful tool in the hands of researchers to advice the industry, civic body etc. for the control and abatement of pollution and consequently conservation of aquatic ecosystem. The Central and State Pollution Control Boards are also developing standards for tolerance limit for discharge of sewage and industrial effluents in fresh water.
Fresh water is one of the most precious commodities for the human beings. It is used by rural and urban community. Fresh water lakes are located in the different areas. Fresh water is used for drinking, irrigation and for aquaculture.

Now a days unplanned urbanization, industrialization and population expansion affected most of the aquatic ecosystem.

According to an United National report, the fresh water currently available per person per year in India is 2,000 m$^3$ which is very meagre. To overcome this situation, conservation of inland natural resources like, lakes, tanks, rivers ponds, streams, wetland etc. is essential and a satisfactory supply must be made available to the community protection of water from any contamination is the first line of defence against infection and disease source protection is almost invariably the best method of ensuring safe drinking water and is to be preferred to treat a contaminated water supply to render it suitable for consumption. Protection and management of water bodies have been recognised as a priority sector all over the world since the quality of potable water is directly related to public health.

Fresh water constitutes only a small fraction (2%) of the earth’s total water supply. Nearly all of this about 1.998% of the total is locked in the masses of polar ice caps, glaciers and clouds. The remaining fraction 0.00912% is found in the lakes, wells and underground reserves of the world which is trapped by mankind for various uses.
The 1992 'Earth Summit' called UNCED in Rio de Janeiro, Brazil is regarded as a unique and crucial opportunity for developing countries to work together to mobilize world attention. These efforts need widespread support if the world's water problems are to be successfully confronted and Earth is to be sustained as a fertile, green and bountiful planet, the common home of living beings.

Organic pollution from domestic sewage, eutrophication due to excessive addition of nutrients from agricultural activities and toxic pollutants from industrial effluents etc. have serious impact in an ecosystem. The water quality assessment is usually done by monitoring the physico-chemical properties of water.

Limnological study of fresh water is essential. The word Limnology was first used for the study of lake by F.A. Foral in 1892; he did voluminous work in this field.

Limnology is a study of functional relationship and productivity of freshwater, biotic community as they are affected by dynamics of physical, chemical, and biotic environmental parameter. In India, limnological work was started by Prasad (1916). He studied seasonal conditions and pond life of Punjab.

For the present study, Zirpurwadi lake situated in Digras Tahsil of Yavatmal District of Maharashtra has been selected. The lake has been in use for fish farming since long period. The study of seasonal changes in physico-chemical characteristics of this lake will be of
help to monitor biodiversity of the lake so that changes, if any, in the future could be evaluated and correlated with the fish production. Study of no. of physico-chemical characteristics was undertaken to know its effect on fish production.

Temperature is an important ecological factor. At higher temperature the metabolic activity of an organism increases, and need of oxygen also increases but at the same time solubility of oxygen decreases. Organisms in water have varying sensitivities to temperature fluctuations. According to Day (1994) the disease resistance power of fishes decreases with increase in temperature.

pH is the value expressed as the negative logarithm of the hydrogen ion concentration. The pH range is in between 0 to 14; the neutral pH is 7, less than 7 being acidic and above 7 basic or alkaline pH of the water mostly depend on presence of CO₂, bicarbonate and carbonate equilibrium.

The conductivity of a sample is a numeric expression of its ability to carry on electric current, which in turn depends on the ionic strength. The ionic strength of the sample depends on ionisation of solute and other substances dissolved in it. The conductance is measured with the help of conductivity meter.

Conductivity is one of the criteria to classify the lake one.
Increase in value of conductivity is due to the presence of dissolved salts and waste water Rawson (1960)

Most of the salts and a variety of organic substance (except lipids), are soluble in water. Thus, a water sample of either from surface, ground or marine source contains appreciable quantity of dissolved solids normally confer a degree of hardness to water.

High total dissolved solids may lead to corrosion. For drinking water the limit of total dissolved solids is 500 mg/l. The organic substances present in water contribute to total dissolved solids. In natural waters, total dissolved solids range between 10 to 30,000 mg/l.

Natural water normally has a low chlorides content compared to bicarbonates and sulphates. High chloride are found in inland saline lakes, estuaries and marine waters. High chlorides level indicates pollution from domestic sewage and industrial effluents. Drinking water with 250 mg/l chlorides is safe for human consumption, a level above 250 mg/l imparts salty taste to potable water.

Human beings and animals excrete chlorides in the form of sodium chloride along with nitrogenous compounds, hence they act as a pollution indicator, more amount of chloride may damage agricultural plant.
Natural water contains higher levels of sulphates contributed from weathering of the rocks. In addition to this, domestic sewage and industrial waste also contribute sulphates to an aquatic ecosystem and hence high levels of sulphates is an indication of pollution from organic matter.

Drinking water with 250 mg/l sulphate is safe for human consumption. Sulphate concentration increases due to discharge of industrial waste and domestic sewage in water. Sulphates are important constituent of hardness along with magnesium and calcium.

Biological oxidation of sulphur containing organic matter and precipitation in zone of high sulphur emission contribute sulphate to the water. Excessive sulphate in water creat objectionable taste.

In water bodies, phosphorous occurs in its inorganic and organic forms, of the two inorganic phosphorus as orthophosphate plays dynamic role by acting as the limiting nutrient. The natural source of phosphorus is rock in which it is bound, other sources are agricultural run-off, sewage, food residue and water of laundry.

On precipitation, orthophosphate gets trapped in sediments, while under reducing conditions as obtain in most of the eutrophic eco-
system, some of the sedimentary phosphorus is recycled in soluble form. Unlike nitrate phosphate often becomes a limiting nutrient and its constant supply produces classical manifestation like algal blooms of algae and excessive growth of aquatic weed.

Drinking water with 0.1mg/l is safe for human consumption a level above 0.1 mg/l is hazards to human being and animals.

Dissolved oxygen is one of the most important parameter of water quality directly affecting survival and distribution of flora and fauna in an ecosystem.

The two main sources of Dissolved Oxygen are photosynthesis and diffusion of air. Major factors responsible for depletion of dissolved oxygen are biochemical oxidation and respiration by flora and fauna.

Generally, in ecosystems free from pollution, high dissolved oxygen is found in euphotic zone, while the value of dissolved oxygen are negligible in polluted water bodies due to presence of H₂S, ferrous ion, nitrites etc. If the temperature is more, dissolved oxygen is less. This is in accordance with view of Hussainy (1967).

Dissolved oxygen test is the basis of biological oxygen demand test which is an important parameter to evaluate pollution.

In an aquatic ecosystem, sources of CO₂ are community respiration and decomposition, while it is consumed in the photosynthe-
sis. Depending on pH and other biological conditions, CO₂ is found in any one of the three forms i.e. free CO₂, CO₃ or HCO₃. Free CO₂ usually combines with water to form carbonic acid.

Thus, pH of such a water is acidic (pH 0 - 6.35). When the pH ranges between 6.35 - 10.33 the carbon is found in the form of bicarbonate (HCO₃), while when pH is between 10.33 - 14 it is in the form of carbonates (CO₃). In the absence of CO₂ which is the only source of carbon for autotrophs, soluble bicarbonate (HCO₃) are converted into free CO₂ and relatively insoluble carbonates (CO₃).

Hardness of water is mainly imparted by alkaline earth metallic cation, mainly calcium and magnesium present in it. Generally an aquatic ecosystem receives calcium from lime stone, dolomite and gypsum deposit in the catchment and its level may range between ‘0’ to several hundred mg/l.

Further, hardness could be temporary due to carbonates and bicarbonates or permanent due to sulphate and chloride of main cations.

Total hardness has a great effect on biotic diversity and biomass in an ecosystem. Hardness also restricts water use. Hard water is nonsuitable for cooking, washing and bathing due to high boiling point in the first, while poor lather foaming capacity in the latter uses.
It is defined as quantitative capacity to neutralise an acidic solution. The alkalinity to natural waters is mainly imparted by three predominant bases: Carbonates, bicarbonates and hydroxides thus alkalinity is estimated as total.

Alkalinity less then 100 mg/l is desirable for domestic use. Alkalinity is not harmful to human being.

Turbidity means water containing some particles having particle size more than $10^{-9}$ m so that the water become muddy or unclear.

Planktonic organism, silt or clay particles are responsible for the turbidity of lake or water body. Turbidity is harmful for fish cultivation, turbidity restricts penetration of sunlight and reduces photosynthetic activity.

Environment energy in the form of solar radiation entering into an aquatic ecosystem is fixed by primary producers resulting into the production of glucose through photosynthesis. The extent to which light can penetrate depends on transparency of a standing water column.

Further on the basis of transparency, a standing water column stratifies into trophogenic, compensetory and tropholotic zones.
Water transparency is dependent on turbidity which is directly proportional to the amount of suspended matter.

The source of sodium in fresh water is from weathering of various rocks. Industrial wastes and domestic sewage rich in sodium, increases its concentration in natural water after disposal. Sodium salts are highly soluble in water. Water with more concentration of sodium can be related with various diseases.

The term plankton first time used in 1887 by Victor Henson to designate the heterogenous assemblage of a minute organism and the detritus in waters, plankton retain by net are called net plankton and that pass through the net are called as nano-plankton. Hutchinson (1957) has remarked that “a skillful limnologist can probably learn more about the nature of lake from a series of oxygen determination than from any other kind of chemical data”.

Many minute microscopic plants and animals are able to spend their whole life floating in the water. These suspended organisms form plankton. They are unable to move rapidly and also unable to determine the direction of their movements.

Study of phytoplankton is important because algae are ba-
sis of many food chains and their productivity and ecology may influence other aquatic life and fishery production. Algal population serve as indicator species (Pridmore et al., 1982; Uttarwar and Vidya, 1982).

The term plankton refers to microscopic plants and animals mostly found in and around euphotic zone in an aquatic ecosystem. Due to limited locomotion, plankton freely float in epilimnion and drift with water currents. (Planktonology is the branch of Limnology that involves the study of diversity of biomass, spatial distribution in time and space and overall various biological aspects like role of primary and secondary productivity, fecundity, pollution biology and overall energy dynamics of an aquatic ecosystem of different plankton species. The planktons are further divided, plankton consisting animal part is called as zooplankton and plant part is called as phytoplankton.) The phytoplankton can also be classified according to size of the constituents. The smallest planktonic animals and plant are called microplanktons. Microplanktons have size less than 3 mm and have dimension between 0.06 mm and 3 mm large number of zooplanktonic organism are like Protozoa, Rotifers, Crustaceans such as Cladocerans, Copepods and ostracods. It include phytoplankton like diatoms, dinoflagellates.

Rotifera and Cladocera are common zooplanktons mainly found in standing water, but also in swift streams. Planktons are not uniformly distributed, even within small distance, from place to place.
Lakes at high altitude have more plankton as compared to temperate regions. Lakes of low altitude are extremely variable in their planktons. Few zooplankton forms inhabit the hypolimnon layer in lake during summer period plankton varies depending upon the locality and the physical and chemical nature of lake. In later summer number of planktons decline as a thermocline develops and nutrients in water surface are depleted by phytoplankton. This is called summer minimum. In certain planktons, the whole population migrates to water surface at night and return to deeper water during the day. Some species of plankton comes to water surface in the afternoon but return to deeper water at night. Many crustaceans, cladocera, copepoda, rotifera and several other organisms show diurnal movements. Certain plankton come to live on the surface at dawn and twilight, but occupy the deeper water during other intervals.

Planktons are the important biotic component of aquatic habitat. They determine the trophic status and the quality of water of lakes and reservoirs (Ganpati, 1973). The pattern of algal distribution and its density is the main biological factor affecting the density and diversity of zooplanktons. Dissolved oxygen, temperature and organic matter are the important factors which control the growth of zooplankton (Rana, 1987, Bhat and Rana, 1987). Many researches have used the different
zooplanktons groups to evaluate the trophic status and pollution potential of the fresh water bodies all over the World. Zooplanktons are also used as biological indicators of eutrophication.

Phytoplanktons play a very important role in regulating the dynamics of the aquatic food web and become a driving force in shaping the community structure of zooplanktons (Xie et al., 1998). Zooplanktons play an integral role in transferring energy to the consumer, hence they form the next higher trophic level in the energy flow after phytoplanktons. Zooplanktons have attracted the attention of several workers throughout the world.

The fauna comprises of invertebrates and vertebrates. The member of Phylum - Mollusca are amongst the most conspicuous invertebrates and include familiar forms like, snails, shrimps (rob).

The vertebrates comprise of Pisces and Reptiles. Pisces are aquatic cold blooded, water breathing, gilled vertebrates represented as fish. Amphibians are adapted to live both in water and on land. Reptiles are the first vertebrates adapted for life in dry places, some live near water but for the breeding purpose and egg laying they return to land.

During the present study various phytoplanktons and zooplanktons were collected and identified from the Zirpurwadi lake other organisms like prawns, crabs, snails, fishes, amphibians, reptiles etc were also identified.
The remarkable achievements in the field of agriculture have been able to solve the food problem to a significant extent. The outcome of intensive and extensive cropping, indiscriminate use of fertilizers and pesticides needed to sustain high yielding varieties. Pesticides include insecticides, acaricides, herbicides, rodenticides, nematicides etc. The use of these chemicals in pest control have proved to be most effective tool.

Pesticides play both the positive and negative role. Pesticides affect the environment adversely. The extensive use of chemicals and fertilizers affect the aquatic life may be acute, resulting in mass mortality of fishes (Konar, 1977, Jhingran, 1970). Pesticidal pollution may be defined as a change in one or more components of ecosystem which are harmful to man, animal and wild life. Pesticides represent some of the most wide spread pollutants raising difficult problems for the environmental protection land.

In India, during 1982, the production of pesticides for agriculture development was about 250,000 tonnes. The recent report has indicated that there is a 15% increase in consumption of pesticides every year through the world. 25% of these pesticides finally reach the sea water, such enormous quantities, when added to water around create adverse effect on water quality. Although the use of pesticides has contributed to an increase in crop yield but they have
produced a number of ill-effects. Their acute effects include widespread pollution of natural environment accompanied by damage to marine and inland fisheries.

It is said that "there are no harmless substance, there are only harmless ways of using substance". This is true for any natural or man-made toxins which have the potential to cause undesirable effects on living systems including man. More than 10,000 synthetic chemicals, pesticides are widely used for agricultural and public health purposes and are considered environmental contaminants because of their persistent residues in virtually the whole of biosphere. Ever since the usage of DDT one of the earliest synthetic pesticides in 1940, its harmful effects were realised subsequently. All the organochlorine compounds synthesized later found to have high persistence in the ecosystem and many of the pesticides were later implicated in various health hazards to human and domestic animals.

Some of the pesticides were found to be highly toxic, carcinogenic and mutagenic which led to limit their usage and less harmful pesticide were favoured. This led to the dawn of the specialized branch of toxicology.

Studies on the toxicity of insecticides on non-target animals are mostly confined to fishes and literature on this subject has been reviewed by many workers (Holdon, 1973; McMin et al., 1976; Brungs et al., 1977; Saigal et al., 1985; Malu, 1987). Only limited investigators have made attempts to evaluate the effects of
pesticides to other aquatic life such as planktons, aquatic insects, molluscs and aquatic weeds. There is no question about the phenomenon that many pesticides including most chlorinated hydrocarbon, insecticides is accumulated in biological systems particularly in aquatic ecosystems. Thus, it has been shown that some organisms notably the ones, sitting on top of "foodchain" tend to accumulate high levels of pesticides, while such a generalized picture is basically correct. There are many aspects of bioaccumulation of pesticides that either clearly deviate from the general rule or remain un-explained.

Analysis of residues of persistent pesticides in different organisms of different trophic levels showed that there seems to be a strong tendency in animals of higher trophic levels to accumulate more amount than the lower level organisms. Predatory birds, mammals and man tend to show large residue content. Thus, an approximately tenfold concentration of a pollutant would be expected for each trophic level through which a pollutant passes. In the natural environment, the degree of biomagnification is usually a complex function of (a) the number of links in the food chains; (b) kinds of organisms in the food chain; (c) the nature of the compound being bioaccumulated; (d) the dose of substance at each level of the food chain; and (e) the time in contact with the pollutants. In aquatic ecosystems direct uptake from water and sediments appear to be the dominant process for many persistent pollutants.

Man must face the fact that every meal he eats contains some quantity of pesticide residue, however minimal and he may soon
face the possibility that every breath he draws will also contain some trace of pesticides however minute.

Pesticides are most wide spread molecule in various segment of environment. Their impact on the environment depends on the following factors:

a) Tendency to dissolve in water,

b) Tendency to vapourize,

c) Chemical stability towards degradation processes.

When pesticides are used properly their have tremendous benefit to man and environment, but their erratic use or abuse leads to considerable harm. The risks or hazards of using pesticides have increased in recent years. Their distribution in the environment has emerged as major problem throughout the world. Discharge from the Hindustan Insecticides Factory manufacturing DDT at Delhi caused the destruction of fish in the Jamuna river (ICAR, 1967). Similarly, many cases of pesticidal contamination have also been reviewed by Konar (1977) and in Karnataka's Shimoga and Chikmaglur districts, since 1975 over 300 people have been struck by a mysterious crippling attack of arthritis. It is due to consumption of crabs from the fields which were being sprayed with pesticides regularly. Recently, especially from the Bhopal tragedy, the society has become increasingly critical not only of the indiscriminate usage of various pesticides, but their harmful effects to man and his environment.

Accumulated pesticides disturb the ecosystem severely. But we are still unable to evaluate and eliminate their permanent effects
on living-beings. Recently scientific organizations like ICAR, CSIR, Agricultural and Non-agricultural Universities, Department of Science and Technology and Department of Environment etc., are engaged in developing safer approaches and alternatives to persistent pesticides.

There is a wide spread pesticides pollution of fresh water bodies like rivers, lakes, ponds and estuaries. Recently, U.S.A. has set up a National pesticides water monitoring Network with 162 sampling sites. Each site is sampled annually. Survey of river water bodies has been carried out in U.S.A., Canada, Europe etc.

DDT residues account for the largest followed by endrin, dieldrin, lindane, heptachlor and its epoxide. Peak level of these residues were observed in 1966 and there after there has been a decline both in residues levels and their occurance. According to Edwards (1977) the amount of organochlorine residues is observed one ppb which do not cause any acute toxicity to fish and aquatic biota.

Contamination of the environment with pesticide is directly related to their persistent nature, type of soil, organic matter, clay content, pH, nature of soil, collides, activity of organisms present in the soil, water and air flow, crop practices, intensity of wind, sunlight, rain, humidity and temperature effect the persistance of pesticides in the Soil (Matsumura, 1972). Similarly, transport and fate of pesticides in the aquatic environment are influenced by their concentration, dilution and degradation.
Pesticides present in water get concentrated in the tissue of plants and animals. The extent of accumulation indicates that how pesticides get transported in the food chain and pose hazardous effect. Insecticides applied to the agriculture crops, forests may be transported by wind and water into drainage, canal, lakes, rivers and oceans. Pesticides are used in controlling aquatic pests. The degradation of pesticides in aquatic system is attributed to both chemical and biological action (Sharma et al., 1980; Andrew et al., 1986; Miles et al., 1988; Singh and Seth, 1989).

Once the pesticides enter in aquatic environment they accumulate in fish, silt, bottom, zoophytoplankton, algae and aquatic plants (Metelev et al., 1983). Upon penetrating into an organism, pesticide rapidly spread in it. It has been observed that they influence the structure and function of ecosystems and communities, reduce population number, alter the natural habitat, change the normal behavioural patterns in animals, stimulate or suppress the growth in animals and plants, increase or decrease the reproductive capacity of animals, increase the susceptibility of certain plants and animals to disease and predators, change the natural evolution of the species, and affect different organs (Tarzwell, 1975; Johnson 1975; Schoettger and Mauck, 1976; Winberg, 1976; Mulla and Mian, 1981; Gupta and Gupta 1976).

Carbamate and organophosphate insecticides are regarded as non persistent, but some reports have indicated that residues of organophosphate insecticides are persisting for extended periods in organic
soil and in surrounding drainage system (Harris and Miles, 1975; Miles et al., 1978). Organochlorine insecticides residues have become an intrinsic part of the biological, geological and chemical cycles of the earth and are measurable in water (Pillai and Agarwal, 1979; Yamato et al., 1980).

Addition of pesticides to the field for protection of crop has resulted in decreasing fish yields from paddy fields. To increase the production of fish from paddy fields it is necessary to choose pesticides which are relatively less toxic to fish and fish food organism. Joshi et al., (1986) have studied compatibility of phosphomidon with rearing of carp fry in paddy fields.

When pesticides are present in water it results in various effects on aquatic ecosystem. Aquatic insects, planktons, fishes, molluscs, worms, water and soil are the main targets. The effect on aquatic life may be acute resulting in mass mortality of fishes (Jhingran, 1970, 1975; Konar, 1977).

Use of pesticides on commercial scale in agriculture started in 1946 and since then it is in constant research and progress. In India pesticide are used mainly in agriculture and public health scheme.

The organochlorine pesticides constitute one major group of insecticides. Endosulfan, the organochlorine pesticide is widely used in Vidarbha region of Maharashtra to eradicate the insect pest. Therefore the present problem “Endosulfan induced histopathological and
alterations in fresh water teleost, \textit{Labeo rohita} “was undertaken. The problem has been approached by taking into account:-

1) \textbf{Water analysis} :

   Water analysed as per standard method (APHA, 1981)

2) \textbf{Chronic toxicity} :

   Chronic toxicity studies are useful for assessment of the capacity of tolerance of fish against toxicants for a prolonged period. The various situation in the life of fish under stress conditions have been studied.

3) \textbf{Histopathology} :

   The histopathology has been studied with the idea to have a visual picture of the degree of damage to the fish with reference to important organs tissue, liver, kidney and intestine after exposure of the fish to acute and chronic toxicity.