INTRODUCTION

What makes the Earth different from other planet? The answer is water. For existence of life as we know it, water is the most precious substances. Marine and aquatic environments are the homes for a diverse array of organism, without which, these organisms would not survive. The ocean and aquatic habitats are oftenly exploited for these resources. However, neither habitat is limitless in its ability to absorb neither negative impacts nor the medium.

Water is the unique component of nature has played the crucial role in the evaluation of life from molecule to man. Since time immemorial, the culture and civilization of human society’s dependence on the water resources were effectively exploited and conserved. The aquatic resources of the country are its national wealth and their sustained civilization for various a purposes should be given top priority. In the last 25 years unprecedented population exploration and rapid industrialization coupled with intensive agricultural practices have exerted intolerable stress on the aquatic resources.

During the last few centuries, relationship with the environment has drastically changed. Environment has always been changing and many species on earth could not cope up with changing environment and as a result either they have sunk or they are on brink of vanishing. Hence, equilibrium between man and environment must be maintained at any cost.

Environmental pollution is the result of urban industrial technological revolution and speedy exploitation of every bit of natural resources. The mad rat race among nations over the entire globe for development jeopardizes the existence of man itself. The craze of progress in agricultural, industry transportation and technology is taken as the general criterion of development of any nation. Such activity of human beings has created adverse effects on all living organisms in the biosphere.
Rapid industrializations have left for us the pollutant that contaminate soil, depletes wild life and exhausts natural resources. Today, the environment has become foul, contaminated undesirably and therefore, harmful for the health of living organisms including man. The splendid plenitude of nature is heritage that should never by man has disturbed the delicate ecological balance existing between living and non living components on the planet earth. This undesirable situation created by man has threatened the survival of man himself and other living biota on the earth. The term environment, so far as pollution concerned includes the water, the soil, the air etc.

Environmental pollution is thus evil of all man made progress. It is not only the industrialized countries which are threatened with the environmental pollution but the menace is growing in India.

Today, India occupies 7th place among the industrialized and developing countries of the world. Every industry is provided with a good infrastructure in several industries like chemicals, power nuclear energy, food, petroleum, pesticides and plastic etc. with the increase in population, the need of individual is also increasing resulting into increase in industrialization. Water is one of the basic requirements of an industry for its growth and survival, but at the same time we cannot dispose the waste from the industry into open environment. The waste may be either in the form of water garbage or any other.

Acquisition of knowledge about science and technology and their application to meet the ever increasing needs of man has left no part of the biosphere untouched, making his own survival unsafe. Extensive modifications in the environment have been caused due to dumping of millions of tones of waste materials covering from less to highly degradable forms or into substances that harmful to living beings. With increasing population more and more demands are made on the limited sources of energy and materials.

Water resources have been the most exploited natural system man strode to the earth. Pollution of any water body is increasing steadily due to rapid population
growth, industrial proliferation, urbanization, wide spheres of human activities. Time is, perhaps not too far when pure and clean water would be inadequate for maintaining the normal living standards.

94% water around the globe is saltwater in the oceans and 6% is fresh water of the later, about 27% is in glacerious and 72% is underground, less than 1% of the total is world fresh water and found in atmosphere, rivers, and streams and in lakes. Thus less than 1% of water is available for human consumption.

In India, lakes and estuaries covers about 2.6 million hectors area, and hence rapid race of industrializations and urbanization have posed a serious threat to these vast catchments of water resources.

India has abundant natural resources including a number of perennial rivers besides reservoirs, lakes, estuaries and brackish water lakes. Water from these sources is being used for drinking, bathing, sanitation, to generate electricity for irrigation, fisheries and industries etc.

In the 50 years of India’s independence, at least 50 million people have died prematurely due to malnutrition and more than million children being victimized every year, due to lack of clean drinking water.

The environment performs three basic functions for well being of human beings; first, it provides living space and other amenities that make life qualitatively rich. Second, it is a source of agricultural, mineral, water and other resources that are consumed directly or indirectly. Third, it is the sink where all the waste produced by man is assimilated.

Environment is also a representative of physical component of the earth an important and influencing factor. Rapid growth of population, unplanned town, and rapid growth of industries is the common problems of any developing country. Uncontrolled development in country is responsible for alarming situation for environmental crisis and ecological disturbance all over the globe.

Pollution may be natural or artificial. Natural pollution is related with the adverse weather conditions viz. intense rain, sudden thaws etc. this may consists of
run off from land carrying silt, vegetable matter, manure etc. washed into a water coarse during a storm of following erosion of river, banks and valley slopes. Natural pollution being intermittent and restricted in short reaches of rivers is of little consequence.

Artificial pollution is mainly caused by waste from household, industries and agricultural lands. The domestic wastes include human excreta, washing, kitchen and laundry washes, which do not receive any treatment and are directly discharged into reservoirs or water courses. This problem is particularly true of unsewered small towns and cities situated close to flowing rivers.

The word pollution has come from the Latin word “pollutionem” meaning defilement (Haney, 1966). The materials which cause pollution of environment are called pollutants. Environmental pollution can be classified on the basis of environment (air, water, soil noise, radiation thermal etc) in which it occurs. According to the pollutants by which pollution is caused.

Environmental pollution is the unfavorable alternation of the surroundings, wholly or partly. Pollution is usually intensified by the addition of waste products of human activities. The substances, which cause pollution of environment, are called pollutants. Pollutant is a harmful solid, liquid or gaseous substance present in concentration environment, which is injurious for the living biota. The effect of pollution on trophic, system and toxicity level in water can be estimated and quantified through physico-chemical analysis. The changes in trophic, system and toxicity level, reflects on the community structure, namely occurrence, diversity and abundance patterns of the species. Several studies in recent years are aimed to depict the community structure in ambient environmental conditions and water bodies subjected to man made pollution stress.

There is constant addition of industrial, domestic and agricultural wastes to ground water reservoirs through percolation to an alarming level which is generally irreversible. Excessive mineralization produces objectionable taste, odor and hardness, to the drinking water. Physicochemical factors and their influence on
drinking water is an essential step to understand water quality.

Industrialization is gradually becoming the keyword in the process of the developing nations in the world. It will help the nation in increasing their productivity and preventing drain of foreign currency, which brings prosperity into a nation. But, no industrialization process can be envisaged without causing pollution. Industries are polluting our water resources, air, water and land. Efforts should make to put the level of pollution under the permissible range. Most of the industries are not complying with the provisions of Environment Protection Act and discharge effluent from their industries without the required treatment into a river that pollutes the water and destroys the aquatic life.

Now a day, the defilement of water for reuse the industrialization, urbanization and developmental activities, consequent pollution has brought variable water crises. Rivers receives waste chemicals from industries and laboratories cause imbalance in physical parameters of variety of industrial effluent such as waste water from tanneries and leather, food processing, refining, bleaching, slaughter houses, manufacture of batteries, dyes, and paper-pulp etc. are the chief sources for adding toxicants in water. Besides these, substances from industries, forestry and agriculture also add many toxic substances to fresh water.

The simplest procedure to dispose the waste effluents in India is to discharge into the nearby surface water body a stream, considering that the toxic constituents present in the effluents may get diluted to the level which is not harmful to man and animals. Ground water pollution may cause by natural phenomena. According to survey conducted by NEERI, 70% of India’s freshwater is polluted because these resources have been freely used for the industrial and public as disposed site for waste disposal.

Industrial origin in India has started with the establishment of Cotton textile in 1818 at Fort Gloster, New Calcutta. The textile industry, was one of the largest industry in the country, and now occupied a unique place on the industrial map of India. The effluents from mills are generally colourd having high total solids, BOD,
COD and temperature

In India most of the villages and towns are located near rivers, lakes and mostly and are at health risk due to disposal of water nearby the locality. The pollution of rivers and lakes with chemical contaminants has become one of the most crucial environmental problems in the 21st century causes tremendous amounts of distraction.

The direct discharge of industrial effluent into the rivers and the run off from fields into the ponds, lakes, and rivers cause seriously affect the physical parameters like, to dissolved oxygen, pH, salinity, carbon dioxide level and thereby indirectly affect the fishes, a cheapest source of protein.

The effluents of food processing industries contains pathogenic bacteria, hampers the process of self-purification of the stream. Due to presence of heavy metals in the effluent causes the danger to the fish life.

Aquatic pollution is mostly cause due to the industrial discharge in large quantities of highly objectionable waste into water bodies that posses a great threat to the aquatic fauna and flora. (Konar, 1970) has shown that, industrial effluent reduce survival, growth and reproduction in fish. Pollutants enter into food web through uptake by vegetation and planktons. Naturally, the higher invertebrate and vertebrate feeding upon these micro and macro aquatic fauna are also vulnerable to the threat of bioaccumulation of these pollutants.

In 1653, when Aurangzeb was appointed the Viceroy of the Deccan he made Fatehnager his capital which now days called Aurangabad since then the city come to be known as Aurangabad and now days encompassing three major MIDC areas includes Chikalthana, Waluj and Paithan MIDC area. These areas are industrially developed and situated nearby Aurangabad. In Aurangabad city, MIDC, Shendra is emerging as five star industrial estates. The industries are rapidly, developing and occupying private lands including Aurangabad-Paithan highways these industries produced medicines, beverages, cold drinks chemicals etc. Aurangabad city is one of the divisional places in Maharashtra State. It is fast
developing city and there are different types of industries. They discharge treated and untreated or partially treated effluent directly or indirectly into the river or streams. Due to contamination of ground water bodies, the drinking water is also sometime get polluted. Villagers of the surrounding area of industries are complaining about water quality and health problems. Keeping this in view, the present study was undertaken to assess the impact of industrial effluent on water quality.

In the present study, distillery effluent and dairy effluent were collected and assessed to know their impact on water quality and also its toxicity to aquatic animals.

Industrial effluents in developing countries are indiscriminately discharged into aquatic ecosystem and even into adjoining fields without any pretreatment. Industrial effluent contains variety of pollutants such as heavy metals, pesticides, fertilizers, detergents, organic and inorganic salts, oil etc. create serious problems to the non-target organisms. They inhibit aquatic water ecosystems especially fish (Motwani, et al., 1956; Annadurai and Krishnamurthy, 1999; Ramakrishanan et al., 1999).

The effluents from pharmaceuticals, breweries tanneries, dyeing, textile, paper, plastic, chemical, metallurgical, fertilizer, pesticides, coal mine, oil refineries etc. discharge into water bodies pose a several pollution problems.

Most of the industrial effluents are insusceptible to degradation. Sulphuric acid waste from coal mines is a chronic pollutant enhances hardness of water and corrodes concrete, etc. Due to discharge of hot (warm) effluents into the water system may severally alter the aquatic ecosystem by increasing the temperature of the water. Industrial discharges also impart colour, foul odor and turbidity to the receiving stream. They undergo putrefaction to form objectionable tastes.

There are about 295 distilleries spread through out the length and breadth of our country which produce nearly 41 billion liters of effluent annually. It is
estimated that, during the production of liter of alcohol about 15 liters of spent wash is produced with very high COD, low pH, high organic matter and suspended and dissolved solids. The polluting effect of distillery effluent is mainly attributed to changes in BOD, COD; colour suspended and dissolved organic matter and pH (Sharma, 2001).

Wastewater from distillery industry poses serious threat to the quality of receiving water bodies in several regions of the country. The spent wash is characterized by its colour, high temperature, low pH, high ash and high percentage of dissolved organic and inorganic matter of which 50% may be present in reducing sugars. The spent discharged from Indian distillery industry contains high amount of potassium, calcium, chloride, sulphate and BOD. The major toxic constituents in distillery effluent are high volume of highly sulphide (Ellis, 1937; Joshi, 1999). In addition to these, the low pH value, more organic load and high BOD are some of the other major pollution problems due to distillery industrial wastewater. The high BOD causes depletion of dissolved oxygen and proves harmful to aquatic life. Ramakritinan et al., (2005) studied on impact of distillery effluent on carbohydrate metabolism of cyprinus carpio.


The protection of the environment today is a concern of the people around the globe. In India, deforestation, land degradation siltation of rivers and pollution
of water and air are the central features of environmental crises.

In India, after 1947 a big boost was given for industrialization, as it was thought to be a key to progress and prosperity. All over the country, industrial areas are established invariably in the proximity of major rivers, streams and lakes. Right from beginning, permission is given in principle that, erections of the industries should be hand in hand along with understanding of consequences of the pollution, but unfortunately, last two decades are witness for progressive deterioration in environmental health.

The textile industry effluent when discharged into river without adequate treatment cause irreversible changes in aquatic flora and fauna. The soluble chemicals and dyes present in wastewater also interfere with the survival of aquatic biota. Colloidal organic matter and soluble inorganic salts increase COD and BOD values of medium (Hussain et al., 2004) and make water unfit for aquatic animals and plants. (Little, 1967)

Shrinivas et al., (1984): stated that, major components of the textile industry effluents are starch, bicarbonates and chlorides and elements like, copper chromium, and zinc.

Dairy industry is the industry where milk is processed and various milk products. The volume of waste generated in an average would be about two to three times the volume of milk processes. Dairy wastes are white in colour and usually slightly alkaline in nature and turns into acidic quite rapidly due to the fermentation of milk sugar to lactic acid. Pollution affect on oxygen content. Dairy effluent decomposes rapidly and depletes dissolved oxygen of the receiving streams immediately, resulting in anaerobic conditions causing toxicity to fish and algae.

The pollution load of such effluent can be measured in terms of pH, total dissolved solids (TDS), total suspended solids (TSS), chemical oxygen demand (COD), biochemical oxygen demand (BOD) and the amount of dissolved oxygen. The study of physico-chemical parameters will enable to understand and the pollution level in the medium. These values will help to take preventive measures
to control pollution and their impacts on the environment.

In India, the milk production has increased from a mere 17 million tones in 1951 to 74 million tones at 1998 which is now 13.5% of the world’s milk production. Therefore, dairy industry is a potential flourishing venture in the market. Due to quantum jump in the milk production, the numbers of dairy plants of medium and large have been increased, so also due to insufficient proper handling and processing of milk increase in waste generation.

In dairy industry, during the processing of milk, waste water generation (6-10lit. of waste per liter of milk processed) has also increased (Tiwan, 1985). This waste water has been reported to be enriched of milk constituents such as casein, lactose, fat and inorganic salts, besides detergents and sanitizers used for washing. These all contribute high biochemical oxygen demand (BOD) and chemical oxygen demand (COD), than permissible limits. Thus, continuous disposal of these effluents without any prior treatment warrants immediate attention, (Mohanrao and Subrahmanyam, 1972).

Production and processing steps in industrial units are often results in wastage of 1-10% of the quantity of parent chemicals. Chemicals may enter environment through spills during their use transportation or disposal.

Effluent discharged by different industries play a major role in the pollution of water, soil and air. Earlier works (Mishra, et al., 1992; Baruah et al., 1996; Pondhe et al., 1997; Kalayanaraman et al., 1998) have analyzed various effluents from varied sources.

Sugar mill effluents play a major role in the contaminating of the ground water pollution. Heavy metal contamination in the ground water sources, among the different heavy metals, some metals like Fe, Hg, Mg, Mn, Na and Pb are found in sugar mill effluent. It is also reported that except Fe, all other metals (Hg, Mg, Mn and Pb) are found to be higher than permissible limit (Senthil Kumar and Narayanswami 1999). The higher concentration of heavy metals present in the groundwater primarily affects liver and kidney which are involved in the cleaning
process of body fluids and tissues (Mwachiro and Durve, 1997).

Ground and surface water may be contaminated by several sources. In farming areas the routine application of agricultural fertilizers is the major source (Altman and Parizek, 1995 and Emongor et al., 2005). In urban areas, the careless disposal of industrial effluent and other wastes may contribute greatly to make water quality poor (Chindah, et al., 2004, Emongor et al., 2005, Futado et al., 1998 and Ugochukwa, 2004).

Bacteriological pollution of water is due to the presence of pathogenic bacteria, certain fungi, pathogenic protozoa, viruses, parasitic worms etc. The important sources of bacteriological pollution are domestic sewage and industrial wastes. Excreta of human beings, wild and domestic animals and birds of various genera also degrade water. The main pollutants belong to the coliform group contains subgroups, fecal streptococci and miscellaneous organism’s presence of coliform bacteria indicated the fecal contaminations of water.

MPN (most probable number) is a tool to measure the pollution load in water. Due to mixing of excreta of animals including man, a coliform bacterium indicates the hygienic status of water. In the present studies well water contain, high growth of coliform bacteria due to contamination of sewage.

In, 1972 in Iraq about 6,000 people were affected seriously on consuming bread and cereals contaminated with alkyl-mercury fungicides. Itai itai disease in Japan which produced severe bone and joint pain like arthritis was due to toxicity of cadmium in rice receiving effluent from a zinc cadmium mine upstream.

Toxicity depend on the chemical and physical properties of a substance, and may be defined as the quality of being poisons or harmful to animals or, plants. The toxicity of any compound is related to the dose. A highly toxic substance caused severe symptoms with small doses. Toxicity can be either acute or chronic. Acute toxicity is the ability of a substance to cause harmful effects which develop rapidly following absorption, i.e. a few hours or a day. Chronic toxicity is the ability of a substance to cause adverse health effects resulting from long term exposure to a
substance. The LC\textsubscript{50} is the concentration of toxicant or stressor which is lethal to 50\% of population of test animals determined specific test period. The method recommended by Sprague (1973) was followed too carryout the toxicity test.

Acute studies are also called the “first line of defense in the absence of data from term studies.” acute toxicity study can often provide clues on the mechanism of toxicity and the structure effect relationship for particular class of chemicals. Histopathological changes in organs such as gills, liver and kidney may be helpful in finding the cause of the death and identifying the target organs. Acute toxicity test have been useful in providing rapid estimation of the concentration of test material that causes direct harm to the test organism.

The acute toxicity studies are studied on different environmental pollutants like industrial wastes herbicides, pesticides, heavy metals, detergents etc. which alters the ecological set up and normal aquatic quality such as water hardness, salinity and pH etc. These studies are useful in making comparison with unpolluted waters and also provide information on degree of pollution due to toxicant severe and rapid damages to the aquatic organisms by the fastest action of poisoning. Usually the exposure time period for the acute toxicity tests is 24, 48, 72 and 96 hrs. In bioassay test, experimental organisms are subjected to a series of concentration of known toxicant under adequately controlled conditions. Acute toxicity involves the damage to organisms by the fastest acting mechanism.

Acute toxicity studies have played an important role in man’s efforts to monitor and modify the effects of toxicants on the biota the term ‘toxicity’ test and ‘bioassay’ is frequently used interchangeably. Today, there have been several reports on fish mortality which are attributed to pollution affecting various organs such acutely or chronically (Manjuladevi, 1988).

Chemical pollution has a great impact on aquatic organisms. Due to chemical pollution the normal functioning of cell is disturbed in turn, may result in alteration in the fundamental biochemical and physiological mechanism of animals
(Fowler, 1972, Larsson, et al., 1990, Urmila Devi and Balkrishnan 1990). Investigations on effect of pollutants on various organs of fish have gained importance in recent years. The histopathological effects of different pollutants on fish have been reported by many scientists. Sastry and Gupta (1978) studied the histopathological changes in *Channa punctatus* after chronic exposure to lead nitrate (6-8mg/l) and reported considerable degenerative changes in tissue.

In aquatic animals, gills, kidney and liver are supposed to be the main tissue for physiological maintenance.

Fishes are the most widely used test organisms in evaluating of water pollution tests, probably due to their adaptability to laboratory conditions, their availability and their varying degrees of sensitivity to toxic substances.

In the present study, effluents were collected from MIDC Chikalthana nearby city area for the analyses and for their toxicity test against freshwater fish, *Puntius ticto*

The position of *Puntius ticto* in the animal kingdom is:

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