CHAPTER 1

GENERAL INTRODUCTION
Limnology is a new branch of science that emerged in the early 19th century. In the broad sense it is the study of functional relationships and productivity of fresh water biotic communities, as they are affected by the dynamics of physical, chemical, biotic and environmental factors (Wetzel, 1975).

Lakes and ponds are important fresh water habitats throughout many regions of the world, although the amount of water in them constitutes only a minute fraction of the total freshwater resource on the Earth.

Fresh water is a very important and necessary source for man. The fresh water bodies are vital resources for developing countries. In Indian sub-continent, they are mostly man made and bear great economic significance. Indian history is full of events prompting construction of fresh water reservoirs for recreating, irrigation, food control and drinking water supply.

Man has tried and is trying to cope with this problem and has rapidly advanced counteract. In order to study the fresh water ecosystems with respect to their chemistry and biological aspects a new branch of science emerged, called “Limnology”. Its credit must go to F.A. Forel, who for the first time began the study of fresh waters and described lake as ‘microcosm’ (Welech, 1935).

The worldwide problem of increasing pollution of water is an additional factor, as health and well-being are dependent on the quality of water. The environmental pollution has become a threat of future sustainable life on the earth. Eutrophication means only an increase in primary production but also an increase in higher trophic levels, changes of the community structure and may also means changes in main paths of energy flow within the aquatic ecosystem (Kagalou 2003). Changes in the aquatic environment accompanying anthropogenic pollution are a cause of growing concern and require monitoring of the surface waters and organisms inhibiting them. The monitoring of the
quantity of surface waters by hydrobiological parameters is among environmental priorities. The zooplankton community, which closely related to all other components of the biota, is a sensitive indicator of the state of the monitoring of water objects (Vandysh, 2004).

Since the problem of water pollution in India is very critical, extensive studies are required to protect the natural and manmade water resources. Thus, water quality assessment can be done either by monitoring the physico-chemical properties of water or by analyzing inhabiting biota.

Sources of water pollution are countless. Industries are of great concern and industrialization contributing to water pollution has reached the alarming situation. The main pollutants of factory wastes include oil, detergents, suspended particles, poisonous chemicals, including fertilizers and pesticides.

Thus causing water-born diseases like diarrhea, dysentery, typhoid, fever intestinal helminthes, jaundice, cholera etc., that is endemic to India (Baruah et al; 1998). Due to this study of different water.

In India, the annual rainfall is about 107cm. the country is rich in precipitation and surface water resources. Surface water or river flow is constituted by a direct run off from rain and a delayed run-off from subsurface water conserved in the soil and in ground water acquires. The major industrialized and thickly populated cities are situated on the fresh water banks.

. In India on an average 70% of intake water by the industries is discarded as wastewater, which is contaminated with a host of toxic substance, thus polluting the water bodies (Taqui Khan, 1987). The modern agricultural practices have polluted the water bodies due to excessive application of fertilizers and pesticides (Carpenter, 2005). Considerable work has been done on hydrobiological characteristics of freshwater bodies in India. Limnological
investigations in lakes and ponds of Maharashtra have been carried out by workers like Goel et.al (1985, 1986) and Trivedy (1990).

Physico-chemical factors are very important in estimating the constituents of water and concentration of pollutant or contaminant. The chemical and biological factors are interrelated and interdependent. The physical factors include water movement, light, temperature, turbidity and suspended solids. The chemical factors include pH, carbonates, bicarbonates, oxygen, carbon-dioxide cations, and anions and dissolved organic materials. The main object of the physico-chemical analysis of water is to determine the status of different chemical constituents, which are present in the natural and disturbed aquatic ecosystem.

Limnological variation in pond and reverine ecosystems was done by (Saha and Pandit, 1985). An intimate relationship between the water and ambient temperature was observed. PH of the pond was alkaline and that of river was acidic.

Khan et al; (1970) studied the population ecology of zooplankton in a polluted pond at Aligarh. Alkalinity fluctuated due to photosynthetic activity of green biota. In 1989, Sing and Trivedi did studies on the impact of sewage on the quality of Ganga River water. PH dissolved oxygen, nitrogen and phosphorous were directly influenced by water temperature. High alkalinity was due to accumulation of phosphates and silica in sewage. Calcium and Magnesium were high.

The high concentration of phosphorous indicated pollution. The phosphate load from detergent inputs and its effects in freshwater was done. Detergents resulted in an increase in pH Michael (1980) presented an article on all the available Indian limnological works in the form of “A Historical Resume of Indian Limnology”, which covered the works done till 1979. A broad categorization of Indian freshwater investigations published, Trivedi et al;
(1984), made the evaluation of drinking water quality in Satura District. The wells exhibited high amounts of solids, carbonated chlorides, total hardness, calcium magnesium as compared to the surface sources.

Seasonal variations in water temperature, which is due to the high specific heat of water. Water temperature reaches its peak in summer (Saha, 1985) and the maximum temperature attained by water in the planes of India is comparatively more than of water located at higher altitudes (Unni, 1985).

The low pH value during monsoon might be due to high turbidity and elevated water temperature, which arrest photosynthetic creativity leading to accumulation of free Carbon Dioxide followed by lower pH during monsoon. Dissolved organic Phosphorus in the fresh water medium is believed to exist as orthophosphate (Hutchinson, 1975). Maximum phosphate is being found in the monsoon due to influx of water containing fertilizers from the fields, which bring phosphate from catchments areas (Pandey et al.; 1992). Studies on Central Indian reservoirs indicate that calcium and carbonates are the most dominant ions and minor reservoirs have higher concentration of bicarbonates as compared to the major reservoirs (Unni, 1985).

Freshwater biodiversity is the overriding conservation priority during the international decades for action “Water for life – 2005 to 2015”. Freshwater makes up only 0.01% of the world’s water and approximately 0.8% of the earth surface, yet this tiny fraction of global water supports at least 1 lakh species out of approximately 1.8 million almost 6% of all described species. Inland waters and freshwater biodiversity constitute a valuable natural resource. Their conservation and management are critical to the interests of all human, nations and governments.

Yet this precious heritage is in crisis. Freshwater waters are experiencing declines in biodiversity far greater than those in the most affected terrestrial ecosystems, and if trends in human demands for water remain unaltered and
species loses continue at current rates, the opportunity to conserve much of the remaining biodiversity in freshwater will vanish before the “Water for Life decades end in 2015”. According to David Dudgeon (2005).

Biodiversity is part of our daily lives and livelihood. The welfare of the mankind, including of our future generations, is strongly linked to the conservation and sustainable use of it. Forests, mountains, oceans, estuaries, rivers, lakes, deserts and agriculture and many such varied ecosystems provide us with food, fodder, textiles, medicines, dyes, and scores of products needed for sustaining life. The ecosystems also perform a variety of other functions necessary for maintaining life. These include release of oxygen, watershed conservation, moderation of climate etc.

Biodiversity may be broadly defines as the variety and variability among living organisms and the ecological complexes in which they occur. Biodiversity can be considered at different scales ranging from the gene to ecosystem. The most commonly used meaning of biodiversity is at the level of species (Organismal biodiversity).

In ponds, most animal species belong to crustaceans, rotifers, insects, or oligocheats. Planktonic and periphytic algae as well as different life forms of microphytes are also specious in ponds and lakes. A number of factors, both abiotic and biotic that operates at different scales affect freshwater biodiversity. Environmental disturbances may result in reduced biodiversity due to either direct lethal effect on organisms or due to more complex interactions between different factors. The zooplankton community is closely related to all other components biota (phytoplankton, zooplankton fish and benthos) is sensitive indicatorof the state of the aquatic environment. Which allows ecologist to include if in the system of monitoring of water quality.
Freshwater zooplankton is an important biological component in aquatic ecosystem, whose main function is to act as a primary and secondary links in the food chain. Zooplankton is important aquatic organisms occurring abundantly in all types of aquatic habitats and they play a vital role in energy transfer in aquatic ecosystem (Altaff, 2004). Zooplankton constitutes important food items of many omnivorous and carnivorous fishes (Sharifun; 2007).

The freshwater fish aquaculture of our country includes 2.25 million hectares of ponds and tanks, 1.30 million hectares of derelict water, 2.09 million hectares of lakes and reservoirs, 0.12 million km of canals and 2.30 million hectares of paddy fields (Anita, 2003). Considering the availability of water area exclusively in the form of ponds and tanks. It is observed that only 45 percent of the areas have been brought under aquaculture.

This shows that potential of horizontal expansion of this sector in the coming years (Ayyappan, 2000) maintenance of healthy aquatic environment and production of sufficient fish food organisms are primary factors for successful pond aquaculture operation. Hence, the present investigation was undertaken to study the fish fauna and prospectus in aquaculture of reservoir in relation to the limnological parameters.

The term biodiversity broadly exists at three major levels: i. Ecosystem level, such as forests, grasslands, deserts, and mountains, coastal and marine areas. ii. Species level: The earth has several million species ranging from microbes to giant trees, whales and elephants. iii. Genetic level: Within a species itself there exists genetic variations. For instance rice plant has several thousand varieties existing in India itself. Altogether the earth's biodiversity harbors billions of genes.
The most straightforward definition is “variation of life at all levels of biological organization”. A second definition holds that biodiversity is a measure of the relative diversity among organisms present in different ecosystems. “Diversity” in this definition includes diversity within a species and among species, and comparative diversity among ecosystems. A third definition that is often used by ecologists is the “totality of genes, species, and ecosystems of a region”. An advantage of this definition is to describe most circumstances and present a unified view of the traditional three levels at which biodiversity has been identified:

- Genetic diversity – diversity of genes within a species. There is a genetic variability among the population and the individuals of the same species. (See also population genetics.)

- Species diversity – diversity among species in an ecosystem. “Biodiversity hotspots” are excellent examples of species diversity.

- Ecosystem diversity – diversity at a higher level of organization, the ecosystem. Diversity of habitat in a given unit area. To do with the variety of ecosystems on Earth.

The 1992 United Nations Earth Summit in Rio de Janeiro defined “biodiversity” as “the variability among living organisms from all sources, including, ‘inter alia’, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems”. This is, in fact, the closest thing to a single legally accepted definition of biodiversity, since it is the definition adopted by the United Nations Convention on Biological Diversity.

If the gene is the fundamental unit of natural selection, For geneticists, biodiversity is the diversity of genes and organisms. They study
processes such as mutations, gene exchanges, and genome dynamics that occur at the DNA level and generate evolution.

Intensified and enhanced food production through irrigation, use of fertilizer, plant protection (pesticides) or the introduction of crop varieties and cropping patterns affect biodiversity, and thus impact global nutritional status and human health. Habitat simplification, species loss and species succession often enhance communities vulnerabilities as a function of environmental receptivity to ill health Supplied through collection from wild populations and cultivation. Many communities rely on natural products collected from ecosystem for medicinal and cultural purposes, in addition to food.

Although synthetic medicines are available for many purposes, the global need and demand for natural products persists for use as medicinal products and biomedical research that relies on plants, animals and microbes to understand human physiology and to understand and treat human diseases.

Biodiversity provides many ecosystem services that are often not readily visible. It plays a part in regulating the chemistry of our atmosphere and water supply. Biodiversity is directly involved in recycling nutrients and providing fertile soils. Experiments with controlled environments have shown that humans cannot easily build ecosystems to support human needs; for example insect pollination cannot be mimicked by human-made construction, and that activity alone represents tens of billions of dollars in ecosystem services per annum to humankind.

There are a multitude of anthropocentric benefits of biodiversity in the areas of agriculture, science and medicine, industrial materials, ecological services, in leisure, and in cultural, aesthetic and intellectual value. Biodiversity is also central to an ecocentric philosophy. It is important for contemporary
audiences to understand the reasons for believing in conservation of biodiversity. One way to identify the reasons why we believe in it is to look at what we get from biological diversity and the things that we lose as a result of species extinction, which has taken place over the last 600 years. Mass extinction is the direct result of human activity and not of natural phenomena which is the perception of many modern day thinkers.

There are many benefits that are obtained from natural ecosystem processes. Some ecosystem services that benefit society are air quality, climate (both global CO$_2$ sequestration and regional and local), water purification, disease control, biological pest control, pollination and prevention of erosion.

Along with those come non-material benefits that are obtained from ecosystems which are spiritual and aesthetic values, knowledge systems and the value of education that we obtain today. However, the public remains unaware of the crisis in sustaining biodiversity. Biodiversity takes a look into the importance to life and provides modern audiences with a clear understanding of the current threat to life on Earth.

A significant proportion of drugs are derived, directly or indirectly, from biological sources; in most cases these medicines cannot presently be synthesized in a laboratory setting. About 40% of the pharmaceuticals used in the US are manufactured using natural compounds found in plants, animals, and microorganisms. Moreover, only a small proportion of the total diversity of plants has been thoroughly investigated for potential sources of new drugs. Many drugs are also derived from microorganisms.

Nutrition and biodiversity are linked at many levels: the ecosystem, with food production as an ecosystem service; the species in the ecosystem and the genetic diversity within species. Nutritional composition between foods and
among varieties/cultivars/breeds of the same food can differ dramatically, affecting micronutrient availability in the diet. Healthy local diets, with adequate average levels of nutrients intake, necessitates maintenance of high biodiversity levels.

Since 1986 the terms and the concept have achieved widespread use among biologists, environmentalists, political leaders, and concerned citizens worldwide. It is generally used to equate to a concern for the natural environment and nature conservation. This use has coincided with the expansion of concern over extinction observed in the decades of the 20th century.

Biodiversity provides numerous ecosystem services that are crucial to human well-being at present and in the future. Climate is an integral part of ecosystem functioning and human health is impacted directly and indirectly by results of climatic conditions upon terrestrial and marine ecosystems. Marine biodiversity is affected by ocean acidification relate to levels of carbon in the atmosphere. Terrestrial biodiversity is influenced by climate variability, such as extreme weather events (i.e. drought, flooding) that directly influence ecosystem health and the productivity and availability of ecosystem goods and services for human use. Longer term changes in climate affect the viability and health of ecosystems influencing shifts in the distribution of plants, pathogens, animals, and even human settlements.

Biodiversity is a broad concept. The United Nations Convention on Biological Diversity defines biodiversity as ‘the variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems’ (UNEP, 1992, Article 2). Thus, biodiversity encompasses the complete range of genetic,
species, and ecosystem diversity. Also, it underlies most biotic ecosystem processes, such as production and decomposition.

Most estimates of the total number of species on Earth lie between five million and 30 million, of which only about two million species have been formally described. Climate change is one of multiple interacting stresses on ecosystems. Other stresses include habitat fragmentation through land-use change, overexploitation, invasive alien species, and pollution. Also, because of their role in the global carbon cycle, and because of the wide range of ecosystem services; they provide that are essential for human well-being as noted above, it is now recognized at international level that the maintenance of natural ecosystems, including their genetic and species diversity, is essential to meet the ultimate objective of the United Nations Framework Convention on Climate Change.

Additionally, biophysical diversity of microorganisms, flora and fauna provides extensive knowledge which carry important benefits for biological, health, and pharmacological sciences. Significant medical and pharmacological discoveries are made through greater understanding of the earth’s biodiversity. Loss in biodiversity may limit discovery of potential treatments for many diseases and health problems.

There is growing concern about the health consequences of biodiversity loss and change. Biodiversity changes affect ecosystem functioning and significant disruptions of ecosystems can result in life sustaining ecosystem goods and services. Biodiversity loss also means that we are losing, before discover, many of nature’s chemicals and genes, of the kind that have already provided humankind with enormous health benefits.
Scientists have shown that habitats with greater biodiversity are more resilient that is, they are better able to adjust to and recover from various disturbances. Because different species may perform overlapping functions in a biologically diverse ecosystem, a disturbance that affects one species may have lesser impact on the ecosystem as a whole. Habitats with little diversity are more vulnerable, because a disturbance affecting one species may cause the entire network of interactions to collapse.

Biodiversity is most well known to the public as a loss of animals with a backbone, when in fact there exist 20 times that number of insects and five times as many flowering plants. While many of these species may be highly valuable to the human race for the above reasons, the vast majority are often completely unknown to anyone but specialists. In fact it is often estimated that less than half and perhaps less than two-thirds of earth organisms have even been identified. As a soft guide, however, the numbers of identified modern species as of 2004 can be 287,655 plants, including: 15,000 mosses, 13,025 ferns, 980 gymnosperms, 199,350 dicotyledons, 59,300 monocotyledons; 74,000-120,000 fungi; 10,000 lichens. The 1,250,000 animals, including: 1,190,200 invertebrates: 950,000 insects, 70,000 molluscs, 40,000 crustaceans, 130,200 others. The 58,808 vertebrates: 29,300 fish, 5,743 amphibians, 8,240 reptiles, 10,234 birds, (9799 extant as of 2006) 5,416 mammals. However the total number of species for some phyla may be much higher: 10-30 million insects; 5-10 million bacteria; 1.5 million fungi; 1 million mites.

Diversity studies on meiofauna indicated occurrence of 40,000 species (Giere,(1993) . Besides on the nature of sand and other physic-chemical factors Gray, (2002) variations are observed in the meiofaunal composition in different beaches (Colatasson,(1991); Ansari et. al.(1996); and Rodriguez et.al. (2003).In India published reports on meiofaunal diversity are
Aquatic biodiversity describes the diversity of species and ecosystems found in and around aquatic habitats such as rivers, lake and oceans. As with terrestrial ecosystems, aquatic biodiversity varies from region to region. Aquatic biodiversity is greatest in tropical latitudes. For example, an estimated 3,000 species of fish are found in the Amazon River alone.

Coral reef habitats also have extremely high biodiversity, nearly a quarter of all known marine species are found in coral reefs. The Great Barrier Reef, off the coast of Australia, is the largest coral reef system in the world. It supports over 700 species of coral. In addition to 1,600 fish species and 4,000 species of molluscs. In the Antarctic Ocean, on the other hand, only 120 fish species are found. These species possess special molecular, biochemical “antifreeze” properties to deal with the cold water temperatures. However, habitats nonetheless support many unique aquatic groups, such as the albatross, penguin, and large numbers of marine mammals such as the whale and seal.

Many fresh-water habitats also harbor a high proportion of unique species. This is due to the fact that, unlike oceans, fresh-water habitat often is isolated from one another, with natural barriers between them that are difficult to cross. This preservation of fresh-water habitats therefore is particularly critical to conserving aquatic biodiversity.
Aquatic biodiversity is threatened on many fronts. Fresh-water habitats support many of the most highly threatened animal groups. These include fish, mussels, amphibians, and crustaceans.

Fresh-water habitats are threatened by many factors, including pollution from industry, increased acidification, and agricultural runoff containing residues of fertilizers or pesticides. In addition, the building of dams destroys many rivers altogether, as when marshy areas are filled.

Aquatic ecosystems also are particularly fragile because the disturbance of a watershed can affect multiple components downstream, including rivers, lakes, estuaries, and oceans. Perhaps the largest threat to ocean biodiversity is overfishing. In addition to depleting commercial species of fish, bivalves, and crustaceans, many fishing methods cause the needless deaths of noncommercial fish species as well as numerous reptiles, birds, and marine mammals and also amphibian Population Declines.

Water is a liquid of life, as there can be no life without water. Pure water is an animating fluid while polluted water is a real curse of living beings, water is one of the most unusual natural compound found on the earth. Water is one of the main agents in pathogenesis and is the medium for several different ecosystems. The water is favorable to biological system. Water form an integrate part of protoplasm and is the very basis need of life. Water is a crucial
ecological factor of determines the suitability of ecosystem to support life. Water is a quality of characteristics of aquatic environments arises from a multitude of physical, chemical and biological interaction. The main source of water is precipitation.

Water is the most important compound and essential for life. A good quality of water is required for living organisms including plants and animals. Water is also necessary for photosynthetic reaction because of which energy become available either directly or indirectly in all living organisms. Water is in dispersible for existence and survival of plants, animals and human. Man requires water for various purposes like drinking, cooking, washing, etc. water is a biological necessity for plants and animals.

The chemical and physiological processes of organisms involve utilization of water in some form or other. Water is influenced by the inputs of materials containing salts or minerals, their solubility and chemical equilibrium prevailing in the aqueous solution. Any water body is capable of assimilating certain amount of pollution without serious effects due to dilution and self purification factors. Water covers about 71% of the earth surface but only 2.7 % is the fresh water out of which 1% ice free from water in streams, ponds, lakes, rivers and reservoirs.

Water is present on the planet in three forms i.e. liquid, solid and gaseous water. Liquid water is the most common from exceeding 97% of the volume of water on the planet nearby 1350 million km³. Solids water in the form of ice found in the glacier and on ice polar, gaseous water is the form of atmospheric water vapors by evaporation of water is constantly presents in the air. Water moves in a continuous cycle from ocean to cloud to earth that to the ocean. All the water resources that circulate on earth comes from the seas, river,
lakes, ponds and return to them at same points it is called as continuous water or hydrological cycle.

Water is indispensable for existence and survival of plants, animals and human like drinking; cooking, washing etc. water is the main source for the generation of hydroelectricity.

Water is needed to fulfill the diverse requirements in so many divers’ ways. Water is vital to life since for all physiological activities of plants and is essential for animals as well as an average it constitute 80% of protoplasm ranging from 9%in dry dormant seed to 95% jelly fish. It serves not only quench the thirst but also to meet the food requirements because it is an essential raw material in the process of photosynthesis through which green plants makes food i.e. used by all tropic level directly or indirectly water is renewable natural sources a basic human needs is essential to life.

Water has been recognized as a vital element’s for human survival water has multipurpose use similarly within a few days persons would die without water. The quality of water thus lower down in respect of its uses some of these beneficial uses of water are drinking by man and animals, support of aquatic life generation of electric power, irrigation and recreation.

Major natural stores of water within the global hydrological cycle
<table>
<thead>
<tr>
<th>Store</th>
<th>Proportion of total (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceans and seas</td>
<td>97.41</td>
</tr>
<tr>
<td>Icecaps and glaciers</td>
<td>1.9</td>
</tr>
<tr>
<td>Ground water</td>
<td>0.5</td>
</tr>
<tr>
<td>Soil moisture</td>
<td>0.01</td>
</tr>
<tr>
<td>Lakes and Rivers</td>
<td>0.009</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Water is important natural resources essential for the survival of life. The addition of any substances to water or changing of water physical and chemical characteristics in any way which interferes with its uses. Water becomes polluted by the presence or addition of inorganic or organic substances or biological agents.

In destroy the balance of ecosystem and causes hazards to public health. The polluted and unpotable water due to poor environmental sanitations has been the major cause of diseases like diarrhea, dysentery, typhoid, fever, intestinal helminthes, jaundice, cholera etc.

Organic interdependence is its key feature. All organism plant or animals perform specific role in their ecosystem. They grow reproduce and require food for maintenance. Energy transfer takes place through food chain. All plants or animals are requiring energy. The energy obtain from sun and enters the ecosystem when a plants uses sunlight to make food by photosynthesis. Movement of energy takes in the form of food from one form of
life to another. As organisms consume food and use it up, energy travel from one to another organism. Energy transfer develops.

Among the different components of natural environments, water is the most important component. In our solar system, our mother earth is the only planet on which water is known to be present. Therefore, it looks blue from the space. In fact, 2/3 part of the surface of our spherical earth is covered by water bodies to which we call “hydrosphere.”

Unfortunately, 97% of the water present on the earth is not directly potable. It is not fresh water but it is saline oceans and seas account for such a large proportion so that only 3% of water occurs in fresh condition out of these 3% of fresh water. Most of it (about 70%), is caught in ice caps and glaciers. About 25% of it is present as ground water and soils, the remaining part (about 5%) of fresh water is present in the form of atmospheric vapors and also in the form of liquid fresh water in lakes, ponds and rivers, major natural store of water within the global hydrological cycle.

The vast majority of the water on earth is stored in the ocean and most of the fresh water is stored in ice caps and glaciers. On account of the above-mentioned proportion, it would be clear that fresh water is present in the extremely limited quality. It is a scarce commodity. But at the same time, it is essential water forms the basic need of mankind as it is used for drinking and other domestic uses every now and then. It is used for irrigation (assured water supply) for raising crop in dry season. Thus water has remained a great demand for its multiple uses. Therefore, water is required very much by different societies for different uses.

Recently, on account of rising demand for water by increasing population and also due to changing the life style, water has become more and
more a source commodity. The “pulls” from various purposes and sections of
the society are so strong the water supply has become a major issue “a boiling
spot” which is likely to create “wars” in near future.

The availability of water to mankind thus depends upon some
natural factors like-rainfall, groundwater, rate of evaporation and run-off. As
world population grows so does the demand for fresh unpolluted water obtained
either form surface or underground sources, water is valuable but often limited
renewable resources.

Water is most important of all resources, as most living thing is
made up mostly of water. The planet we live in is covered by about 70% of
water this film of water helps to maintain the climate dilutes the pollutants and
is essential for all living things. Even though most of this water is saline (as
oceans and surrounding the landmasses). A fraction of freshwater is constantly
recycled, and purified by the hydrological cycle. This fresh water (3%) is the
life line of agriculture manufacturing and numerous other activities. All living
things are interconnected all landmasses are connected to each other on this
planet through the global circulation of water.

In the recent past much had been talked about the miss use and
wastage of water; it has been quoted very often that the future conflict between
nations will be for fresh water and water will be one of the most priced
commodities in the international market, it is no joke; given the careless attitude
of the governments the waste and the pollution of the water resources it is no
wonder that water is charged very little and encouraged to be wasted and
polluted. The useable water that is renewable is 43750 cu km/year (The Hindu
may 16, 2004).
Fresh water availability’s is very much limited over the earth’s surface. 97% of the volume is found in the oceans, it is salty and unable for irrigation, industrial and domestic purpose, of the remaining 3% freshwater, a major portion is in the ice caps or in deep ground and is very difficult and expensive to use. It is estimated that only 0.003%, of the total water is available for man. Here again it is very unevenly distributed. The fresh water sources are lakes, rivers, reserves and streams ground water, water vapors and soil moisture. For every 100 liters of freshwater is renewable and we continue to get supply of water through hydrological cycle. If this water is taken care of it is enough to satisfy the human need by polluting the water sources and drawing more quantity of water than could be replenished man has already disturbed the water cycle.

Water is removed from a source’s and reused on the downstream with changes in quality and quantity. Water with drawn from a source made unusable due to losses, contamination etc. which is not available for further use. Most of the water withdrawn is used for irrigation (63%), domestics and municipal uses (7%) for drinking purpages.

The world scale total water stored in the fresh water lakes and rivers is about 90000 billion cubic meter (BGM) that is about 0.26% of the total fresh water reserves of the world with references to India total precipitation is about 4000 Bcm i.e. 4 % of the total average runoff of world’s rivers. With the growing population, India is gradually under stress as precipitate water has declined from 5177 cubic meter in 1951 to1969 cu. Mt .in 2001 if the population continue to rise at the current rate by the year 2025 per capita water supply will decline to 1000 cu. Mt. .

The WHO Report states 1.5 billion people do not have safe drinking water and 1.7 billion people do not have adequate sanitary facilities.
Around five million children die due to water borne diseases every year. Water is prime natural resources a basic human need and a precious national asset, planning, development and management of water resources need to be governed by national perspectives.

Water is part of a larger ecological system, but it is polluted due to many human activities with drawn & water from spurse at the rapid rate reduces the renewable act. Its importance and scarcity is attached to fresh water, therefore it has to be treated as an essential component of environment for sustaining all life forms. Water is essential for living, health and comfort level and maintaining the ecosystem yet; everywhere water quality and quantity are decreasing. Water stress and scarcity levels are increasing. Hence it is time to act before it become too late.

Water pollution is serious problem today contaminated water is constant threat to all plant and animals forms. Human is uses of water includes drinking, cooking, washing, farming and industrial processes. The reckless practices of throwing urban sewage, poisonous industrial wastes, shipping refuse and frequent oils spills from tankers are some of the common causes of pollution of lake, river and sea waters.

Maintaining the quality of water is the important one for man since it is directly linked with his daily life. Water get contaminated by any foreign matter this may be either natural or artificial. “Any alteration in the physical properties of water as well as combination of any foreign substance, that leads to health hazards or decrease in the quality of the water” can be termed as water pollution.

Water pollution may be caused due to urbanization and industrial activities. The water pollutants are many and varied for example oils, grease,
sewage water, toxic compounds and other substances. There is ever scope for the transmission of disease such as typhoid, cholera, jaundice, etc. though the polluted water. According to an estimate more than 80% of Indians suffer water born disease. It is also estimated that more than 16% die annually since water is considered as the universal solvent it contain a wide variety of substances both in suspension and solution.

Most of the water resources in India are getting polluted by the release of large quantities of municipal and domestic waste and organic substances that provide nutrition for bacteria and fungi thus this disposal causes several undesirable effect such as water born disease.

Water sources surrounded by the industries such as leather, tanneries, sugar factory, oil refineries, water fates contaminated by the wastes released from these industries which damage biological activities and kill useful bacteria; pesticides used for crop protection such as fungicides will get washed down to nearly water resources, making it polluted. Water has great importance in the life of living organisms. Economy and health of nation depend on the quality and quantity of water.

Thus for only nation any aquatic ecosystem like lake, rivers, coastline is national wealth, hence they are constantly exploited for the betterment of human being. Due to this it is found that in the last few quarters of the 19th century and in the beginning of the 20th century fresh water has become critical natural resource; hence every nation must intensively plan for water resources management.

Day by day quality of water is distributed due to manmade activities i.e. urbanization, industrialization and increasing population. Hence it is said that if third world war will take place it might be for water only.
Thus man has modified aquatic ecosystem for his betterment, also interrupted in the global energy and material cycles. Due to this in the beginning of 21\textsuperscript{st} century fresh water is going to be the most sources resources and its availability exploitation and sustainable use is necessary for any developed country Chandrasekhar (1996)

Form about last hundred years particularly in developed countries scientist are monitoring the aquatic resources industrial revolution in these countries has affected the environment in crucial manner due to which the awareness for the protection of environmental awareness for the protection of environment in them is responsible for introducing the concepts of environmental awareness, environmental impact assessment.

The American Public Health Association (APHA), Environmental Protection Agency (EPA), etc. come into existence many of these provided the valuable literature, methodology for the study of aquatic ecosystem and water pollution. In India aquatic ecosystem and resources are little or adversely affected mainly by the

1) Urban liquid waste.
2) Industrial liquid waste.
3) Surface run-off from the cultivated land on which fertilizer, Pesticides and lot of other type of chemicals applied for better Productivity.
4) Surface run-off from area on which solid waste is dumped.
5) Surface run-off from area on which urban industrial solid waste is dumped.

The influence of these factors varies in magnitude depending upon geographical location of water body. Tropical aquatic ecosystems in India are
unique in physico-chemical, biological and pollution characteristics and there is need of through investigation on them.

Only in the recent years environmental monitoring through regular assessment of quality has become important practices in the conservation of the aquatic resources. Water is the most vital biotic components which occur in all three form of the water in hydrological cycle water quality at a given time, thus acts as limiting factors that regulate the biotic diversity and biomass. Thus water quality assessment generally involves analysis of physico-chemical, biological parameter that affect the quality of water. Maharashtra pollution control board governs the pollution of lakes, reservoirs and other type of pollution.

Government of India in (1995) under ministry of environment has also initiated the program for conservation of lakes and reservoirs. Recently government of India with the help of world banks of financial assistance has also announced the hydrological science project in eight states including Maharashtra.

Water is the carries of pathogenic micro-organism and can causes immense harm to public health. The water born diseases are typhoid and paratyphoid, fever, dysentery and cholera, polio and infections hepatitis. The responsible organisms occur in the faces or urine of infected people and are finally discharged into water body. Historically the first step in water pollution control was the disinfections technique for the preservation of water born diseases, which are still in use. Sewage and runoff from agricultural land provide plant nutrient in natural setting in the natural biological process called eutrophication.

Source of water pollution are countless and most important one and of great concerns is due to human activities. Even today, opens defecation in the
field and along the drains of the industrial efficient or domestic sewage in natural water, various organization of water pollution, contradict board, public health associated and many workers are engaged to analyses water bodies and trying to improve the quality of water. Datta and Munshi (1995); Michael (1964); Bhatnagar A.(1989); Masood Ahmed and krishnamurthy (1990) and Kodarkar et.al.(1998), are pioneers in the limnological studies of various water bodies in India.

With the growth of scientific knowledge and development of sophisticated instrument for studying the physical, chemical and biological characteristics of water in their entirely man has been able to understand today a great about various types of aquatic ecosystem.

The study of freshwater in all their aspects physical, chemical, geological and biological is termed limnology (Odum 1971). Limnology is the study of fresh water or saline water, which are contained within continental boundaries. Limnology is also described as “Hydrobiology or aquatic biology”. According to Rodger do Bali a prominent Italian ecologist limnology is the science dealing with internal action of processes and dealing with internal action processes and methods whereby matter and energy are transformed within lake or pond thus the increasing place of developmental activities and extensive uses of water resources are subjecting the quality and hydrobiology of fresh water resources. These activities not only influence the micro fauna freshwater but also favors the development of variety of undesirable new fauna rendering the water unfit human consumption, this increase in the nutrient status is termed as ‘Eutrophication’ which makes the water body unfit for most of use.

The water sources in Maharashtra are mainly rain fed and thus receive their annual supply of water only during the rainy season. Thus there sources get depleted rapidly during the dry periods of the year. This process is
further unhandled due to the high temperature that is experienced in most part of the state.

With an increase awareness about the proper use of water and increasing pressure on the water resources, there is a rapid change observed in general use of water resources on over the state also practices like “Arrest water, Percolate water” rain water harvesting.

An ecosystem refers to visual community of interacting population of different species and their local non biological environment. Thus energy ecosystem is composed of the species, population and the according stapler ecosystem is the total assemblage of components entering into interaction of a group of organisms.

Ecosystem is a life supporting unit. It could be very small like pond water or a very large and dented forest. The term ecosystem is applied to a local community of organism interacting with their local non living environment. Every ecosystem has a flow of energy and cycling of nutrients which blind the organism together in a group. It forms a spatial unit of nature. All organism’s plant or animals perform a specific role in their ecosystem. They grow reproduce and require food for maintenance.Ecology is divided on the basis of the type of habitat for fresh water ecology; terrestrial ecology and estuarine ecology.

Limnology (fresh water ecology) is a recent one and mainly emerged in 20th centaury fresh water habitats may be divided into two series.

1. Standing water or lentic
2. Running water or lotic
Lentic water environments includes all forms of inland water such as lakes, reservoir, ponds and their integrated in which the motion of water is not that of constant flow in definite direction. Lotic water includes rivers.

Biotic component of environment are plants, animal and microbes. Animals cannot produce their food material but depends upon plants and other organism to obtain energy for their survival. Microbes are the decomposers, producers, consumers and decomposers forms complex ecosystem.

Natural water bodies are contain numerous organisms including phytoplankton, zooplankton, aquatic animals and fishes; but polluted water contain a lot of organic ; inorganic material and water bodies have been polluted largely due to concentration of increasing human and animal wastes with its pathogens collection during its course up reservoir. The catchments area of these reservoirs highly occupied by small village and agriculture fields. The total area under the reservoirs in India 3.1 million hectors, these are includes 19000 small reservoirs with a total water surface area 14855.57 hectors under reservoirs. This reservoir water is mainly used for drinking, irrigation and for fishery purpose from the catchments area, there is an addition of domestic sewage excessive use of agrochemicals, mixing of agricultural run-off in these reservoir water. All the activities have been resulted in altering the physicochemical characters and diversity and density of biomass in the water bodies.

The contaminated water bodies have been polluted largely due to contamination of microbes, human and animals waste with its pathogen collecting during its course up reservoirs. Information on species diversity, richness evened during its course up reservoirs. Information on species diversity, richness, evened and dominance species evolution on the biological component of ecosystem is essential to understand differential changes in
environment of deterioration of water quality. Krishnamurthy and Subramanian (1999); biological contamination is a basic measure of community structure and organization and the most important parameters to understand the health status of the ecosystem. The biological diversity index a measure of the way’s on which individual is a community distributed.

Thus the increasing place of the development activities and extensive uses of water resources are subjective the quality and hydrobiology of fresh water resource; these influence the micro fauna and fresh water but also favors the development of variety of undesirable new fauna rendering the water until for human consumption.

India is rich in natural resources has a system of rivers; tributaries covering a length of 27359Km. the quality of water resources is usually described accordingly to its physical, chemical and biological characteristic. Assessment of water quality of the river is an important aspect for the development activities of the region because it is the sum of the water supply of drinking; domestic; industrial; agricultural and aquaculture practices Jain and Seethapathi (1996).

Many researchers have done research on physicochemical and biological parameters or characteristic of rivers and dams or reservoirs water bodies Trivedi and Goel (1986). Saxena (1990); Reddy et.al, (1994); Kulkarni Rajendra Rao et.al. (2002); Jakher and Rawat (2003); Gopikumar and Jaya Prakash (2004); Saktrivel Veena et.al. (2005); Pawar and Pulle (2005); Anusha Pawar et.al. (2006); Mishra Vidya et.al. (2007); Sharma et.al. (2007); Rajlaxmi and Krishnamurthy (2007). Madhuri Pesaver and Minakshi Gurav,(2008),were studied water quality and Jall and Kalwa lake Thane, Chandanshivite.al. (2008), studied physicochemical aspects of pollutionin river Mula-Muta at pune, Maharashtra. Jaybhaye et.al.(2008), study on physicochemical parameter
and a minor reservoir sawana, Hingoli- District, Maharashtra. Kamble and Muley,(2008), study on some physicochemical parameter of kalbadevi estuary in Ratnagiri-District,(M.S.). Manjappa et.al. (2008), were studies on environmental status and Tungbhadra River near Harihar, Karnataka, (India). Gonjari and Patil,(2008), were studied hydrobiological studies on Tripati Reservoir near Satara, Maharashtra. Fotedar Amita and Fotedar B.K.,(2008), studied water chemistry of Tawi River from Nagrola to khampur area, Jammu Himalaya, Jammu (J & K).

Kulkarni et.al.,(2009), Kamble et.al.,(2009) ; Koorosh et.al., (2009); Deshpande S. M. and Gondwale ,(2009); Sudesh D. Rathod and Patil (2009). were studied assessment of some hydrological parameters of Ulhas river estuary in the vicinity of Thane city,(2009), Patil, Anil R. and Lohar Prakash S. studied seasonal variations in physicochemical parameters of river Patalganga, Raigad District, Maharashtra,(2009); Bankar et.al. (2010) were studied physicochemical analysis of kathralu pond water near Chitradurga, Karnataka. Fotedar et.al. (2010), were studied water chemistry of loran mandi Nallan, Poonch area, (J & K), state. Quadri et.al. (2010) were studied on the physicochemical characteristics of River Bindusara, Beed, Maharashtra.

The biodiversity of plankton in the water bodies shows correlation with reference in the occurrence and the physicochemical parameters. The phytoplankton’s are serving as producers in the food chain in aquatic ecosystem and productivity and also depends upon the quality of water.

The zooplanktonic word depends upon the availability of phytoplankton and they form the second tropic level in the aquatic food chain. Phytoplanktons are includes diatoms; bacilleriophyceae; green algae (Chlorophyceae); blue green algae (cynophyceae); flagellate (Euglenophyceae); Volvox; Euglena; Oscillatoria; microcytis etc. which are important among aquatic flora.
Phytoplanktons bring the primary producer from the lowest tropic level in the food chain of fresh water ecosystem and play a key role in fish culture Mishra And Tripathi (2001); Baburao (1997) More and Nanden (2003); Kulkarni et.al. (2005); Nafeesa Begam and Narayana (2006); Pawar et.al. (2006) and Jaybhaye et.al. (2007). The fresh water zooplanktons are the main important group of most of them are feeds upon and incorporate the primary producer into their bodies and make themselves available to higher organisms in food chain Michael. (1973). The zooplanktons are including commercially important groups of Crustaceans as shrimps, larvae of crustaceans and fishes and other aquatic animals are consumed by variety of secondary consumers.

The zooplanktons in water belong to four main taxonomic groups such as Rotifera; Copepoda; ostracoda and cladocera. Copepoda and Cladocera are the dominant represented groups of crustacean in fresh water habitats. They are abundant in the shallow area of the reservoirs but only few species are abundant in the open water. They play a vital role as primary consumers. The occurrence abundance of zooplanktons in a pond depends on its productivity which intern is influenced by physico-chemical parameters and the level of nutrients. Zooplanktons occupy an intermediate position in food webs many of themes are feed on algae and bacteria.

The zooplankton can also play an important role in indicating the presence and absence of certain species of fishes and various ecological aspects of zooplanktons have been a subject of extensive study in India, Zutshi et.al. (1984); Baburao(1997); Prasad(2003); Lendhe and Yeragi (2004); Vaishael Somani et.al. (2004); Pawar et.al.(2006); Nafeesa Begum and J. Nareyana(2006);Waghmare and Mali (2007);Jayabhaye et.al.(2007); Pulle (2000); Narsimha Rao and Jaya Raju (2001); Pawar andMadlapure et.al.(2003); Pawar and Pulle (2005); Kamble and Meshram (2005); Bhagat and Meshram (2007); Charjan et.al.(2008) and George and Jimenez et.al.(2009).
Aijaz et.al., (2009); studied of phytoplankton of welar lake (Ramsar site), Jammu and Kashmir; India. Salaskar and Yeragi (2009); were studied Rotifer diversity in Powai lake, Mumbai, Maharashtra. Koorosh et.al. (2009); studied abundance of copipodes from three contrasting lakes of Mysore, Karnataka, India. Sugumaran et.al. (2009); were studied diversity of meiofauna of channel; east coast of India. Jindal and Thakur,(2009); studied biodiversity and trophic status in relation to hydrological factor sof Revalasar wetland (District Mandi, Himachal Pradesh), India. Bhivgade et.al. (2010); studied Limnological studies on some aspects of Nagzari tank, Ambajogai, District-Beed, Maharashtra. Mahor (2009); were studied diversity and seasonal fluctuation of zooplankton at freshwater Reservoir Tigra Gwaliar, (M.P.).

The benthic macro-invertebrates may be used as convenient tools to assess overall biodiversity in aquatic ecosystem. These invertebrates communities are known to respond to change in water quality of habitat. The earlier studies on macro invertebrates have been made by Michael (1968). These aquatic animals are including crustaceans, molluscs and fishes; while are large and economically important in the aquatic system. In the productive capacity of water body, the important bottom fauna at link in the energy flow from primary production to fish and other aquatic animals field has been stressed and considerable studies on biodiversity and diversity of aquatic animals from different water bodies of India, have been carried out during the last few decade; Hamilton Buchanana, (1822); Day, (1878); Mishra, (1962); Krishnamoorthy, (1966); Gupta, (1976); Jayram, (1981); Bose and Lakra, (1994); Chandrashekhar and Kodarkar, (1994); Sarkar and Banerjee, (2000). These organisms in habit of river, lake, and reservoir bottom and their distribution is directly related to food availability and quantity sediments types (organic, sandy, clay). The macro benthos is playing an eminent role and occupied a distinct place food cycle. The bottom fauna are also play an important
role in the mineralization and recycling of organic matter. The aquatic plants and animals are bringing about changes in the food web of a freshwater aquatic ecosystem. Anitha (2004; 2005); Rayali Shrinivas Rao (2006); Kiran et al. (2006); Sharma Shailendra et al. (2007) and Sharma et al. (2007). Kamble and Kamble, (2009); were studies of biodiversity of some aquatic animals including crustaceans, molluscs and fishes from Ruti reservoir near Ashti, District-Beed, (M.S.) India. Patale and Manisha Patil,(2009); also studied a note on ichthyofauna of Panzara river (Tal- Sakri, District-Dhule), Maharashtra. Sirsat et al. (2010); studied fish fauna from Bendsura project, District-Beed, Maharashtra. Sharma et al. (2010); studies shows distribution of molluscs biodiversity in Narmada river, Madhya Pradesh, India. Archna Shurma and Devendra Mohan (2010); studied fish faunal diversity of Hemawas dam; Pali, Rajasthan. Tiwary and SunilKumar Trivedy (2010); studied seasonal changes in abundance and vertical distribution of copepod and cladoceran species in eutrophicated, Daha river , Bihar. Beenamma Joseph and Sadanad M. Yamakanamardi (2010); studied winter, summer and rainy season and changes in the abundance and biomass of zooplankton in relation to environmental variable Kukkra halli lala of Mysore, Karnataka state, India. C.S.Stella et al. (2010) were studied four new distributional records of bivalve species of Areidae family, sulites, at Rampur Bushar; District- Shimla, Himachal Pradesh, India. Shrikanth et al. (2010) studied on fish diversity of Ramappa lake, Warangal District, Andra Pradesh, India.

Gulf of Mannar is rich in Molluscsans diversity and mainly Gastropods are being regularly exploited Satyamurthi (1952 and 1956). Devaraj (1998), Nair and Rao (1974) have reported on the commercially important molluscs of India. Bhagade and Mane (2005) were studied the biodiversity of the edible bivalves shell fishes from Ratnagiri coast of Maharashtra. Kulkarni et al. (2006) were study diversity population density and biomass of some
molluscs at Haji Ali sea Shore of Mumbai, West coast of India. D. Annadurai (2006) were studied Gastropoda diversity of the Gulp of Mannar. Jayaseeli and Muragan (2003) were also recorded certain bivalves.

Number of researchers have studied Taxonomy and Ichthyofaunal diversity; biodiversity and distribution of fishes in fresh water bodies of various part of India during the last few decades; Hamilton and Buchanna (1922); Day (1978) were recorded fish fauna of Godavari and Krishna River. Jayaram (1981 and 1995); Talwar and Jhingran (1991); Menon (1992).

In the field of ichthyofauna, valuable contributors were made by Day (1978) Wagh (1999); Rao (1999); Sarkar and Banerjee (2000); Sakhare (1999; 2001a; 2001b and 2003); Sakhre and Joshi (2002 a; 2002b; 2003 and 2004) and Paik et.al.(2003); Pawar et.al.(2003); Meshram and Meshram (2005); Muley and Patil (2006) ; Savalla and Piska (2006) were studied Ichthyofaunal diversity in Secret lake Durgam acherava Ranga; Jaybhaye et.al.(2006); Pawar et.al.(2007); Battal et.al.(2007); Sharma et.al.(2007); Ashashree et.al.(2008); Anish Dua and Chander Prakash (2009).

The present investigation have been carried out on the aspect of the Limnological study on Girna project water for inter relation between the physico chemical parameters of water bodies and biodiversity of plants and animals including certain crustaceans molluscs and fishes from different water sampling stations (A, B and C) of the Girna project.

Girna project is located in Nandgaon Taluka of Nashik District. Girna Project is built on River Girna. This Project is spread between $20^\circ$ – $29'$ – $23^\prime$N latitude and $74^\circ$ – $39'$ – $41^\prime$E longitudes at district Nashik. The Girna Project covers the catchments area of 5552 hectors. The total length of this project is 1162.17 meters.
Fig. No. 01: Map showing the location of Maharashtra in India

Fig. No. 02: Map showing the location of Nashik in Maharashtra
Fig. No. 03: Map showing the location of Nandgaon Taluka in Nashik District

Fig. No. 04: Map showing location of Girna Damin Nandgaon Taluka
The total width i.e. foot to construction of the project is made of soil press and stone construction. The capacity of the project is 1216.90 DLGM. The project provides its water to Malegaon, Chalisgaon, Amalner, Dhule, and Jalgaon district i.e. Chalisgaon Parola, Bhadgaon, Arendol, and lowlying bigcityes of Jalgaon. Mostly the water of project is provided for drinking, agriculture and industrial purposes.
<table>
<thead>
<tr>
<th>SN</th>
<th>Salient Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Location</td>
<td>panzangaon, Tal-Nandgaon.</td>
</tr>
<tr>
<td></td>
<td>L altitude</td>
<td>$74^0 -39'-41''N$</td>
</tr>
<tr>
<td></td>
<td>Longitude</td>
<td>$20^0 -29'-23''E$</td>
</tr>
<tr>
<td>2</td>
<td>Type of Project</td>
<td>Soil Press and stone construction</td>
</tr>
<tr>
<td></td>
<td>Approximate cost of project</td>
<td>1275 Lac</td>
</tr>
<tr>
<td>3</td>
<td>Construction of soil press length</td>
<td>536.45 Meter</td>
</tr>
<tr>
<td>4</td>
<td>Construction of Stone-length</td>
<td>426.72 Meter</td>
</tr>
<tr>
<td>5</td>
<td>Hight from soilpress wall</td>
<td>54.56 Meter</td>
</tr>
<tr>
<td>6</td>
<td>Hight from stone construction wall</td>
<td>43.59 Meter</td>
</tr>
<tr>
<td>7</td>
<td>Maximum Height (From River Bed)</td>
<td>54.56 Meters</td>
</tr>
<tr>
<td>8</td>
<td>Total Length</td>
<td>1162.17 Meters</td>
</tr>
<tr>
<td>9</td>
<td>Catchments Area</td>
<td>608.45 DLGM</td>
</tr>
<tr>
<td>10</td>
<td>Capacity of Live Storage</td>
<td>523.55 DLGM</td>
</tr>
<tr>
<td>11</td>
<td>Dead Storage</td>
<td>84.90 DLGM</td>
</tr>
<tr>
<td>12</td>
<td>Total Water Storage Capacity of Project</td>
<td>1216.90 DLGM</td>
</tr>
<tr>
<td></td>
<td>Source Name of River</td>
<td>Girna river</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>14</td>
<td>Total Catchments Area</td>
<td>5552 hectors</td>
</tr>
<tr>
<td>15</td>
<td>Total Irrigation of land</td>
<td>57207 hectares</td>
</tr>
<tr>
<td>16</td>
<td>Waster length (sandva)</td>
<td>214.58 meters</td>
</tr>
<tr>
<td>17</td>
<td>Distance From Nandgaon to Girna Project</td>
<td>25 km</td>
</tr>
</tbody>
</table>

This Project was constructed for irrigation, drinking, drinking water porpages however in the passing of time the water is used for agricultural and domestic purpose, such as washing, bathing and cleaning, etc. the local fisherman started the fishing activities in the recent past years are imposing greater stress on these ecosystem. The four canals supply the water for irrigation, drinking and industrial porpages.

1) **The Jamda left canal:**

The total length of Jamda left canal is: 56.36 km. The speed of the water releasing by the project is: 16.877 cusec/second. This canal irrigated: 19658 hectors of land in the area of Bhadgaon, Chalisgaon, Arndol and parola.

2. **The Jamda right canal:**

The total length of Jamda right canal is: 32.18 km. The speed of the water releasing by the project is: 16.877 cusec/second. This canal irrigated: 3666 hectors of land in the area of Chalisgaon and Bhadgaon.

3. **The Nimna Girna canal:**

The total length of the Nimna Girna canal is: 45.05 km. The speed of the water releasing by the project is: 20.816 cusec/second. This canal irrigated: 34888 hectors of land in the area of Arandol and Amalner.

4. **The Panzan left canal:**
The total length of the panzan left canal is: 53.20 km. The speed of the water releasing by the project is: 7.093 cusec/second. This canal irrigated: 12141 hectares of land in the area of, Bhadgaon, Chalisgaon, Arondol and Parola.

The present research work entitled “Limnological study of Girna Project near Panzangaon, Tal-Nandgaon, district- Nashik, (M.S). India”. The physico-chemical in relation to biological contamination of water body were carried out during the research period from July-2007 to Jun-2009 ; which following objects;

The in the recent past years are imposing greater stress on these ecosystem. The different human activities in the form of effective factor for pollution; in order to utilize a freshwater body it is very important to study the biotic and a biotic factor influencing the biological production of said water body.

The present work entitled Limnological study of Girna Project near Panzangaon, Tal-Nandgaon, district- Nashik, (M.S). India”. studies of physico-chemical and biological contamination some water bodies have been July 2007 to Jun 2009 with following object.

1. General Introduction
2. Study of physico-chemical nature of water.
3. Biological contamination in relation to physico-chemical parameters.
4. Diversity of Aquatic plants and animals.
5. Summary and Conclusions.