CHAPTER 5

SUMMARY AND CONCLUSION
The present investigation has been carried on the aspect entitled “Limnological study of Girna Priject near Panzangaon Tal. Nandgaon District Nashik (M.S.) India”. Looking towards present status, environmental studies are must, because it is the burning topic today. These studies are helpful in understanding the biochemical changes in the ecosystem, as well as it determines inter-relationship in between biological characters. By assuming the above fact efforts were done to establish correlation between biochemical and biological characters.

Girna Project can also be considered has biodiversity, because it consists of various factors such as, Physicochemical and biological factors. Physicochemical and water analysis parameters consists of atmospheric temperature, water temperature, rain fall, pH, turbidity, Total dissolved solids, dissolved oxygen, dissolved carbon dioxide, methyl alkalinity, total hardness, calcium hardness, magnesium hardness, chlorides and biological oxygen demand. The biological parameters comprises of plankton aquatic plants, crustaceans, molluscans and fishes.

In ecological point of view of Girna Project is an ideal example of ecosystem including the various factors of food chain and foodweb. After thorough investigation and after compilation of observation so many facts came forward which can be summarized as follows, The atmospheric temperature of the various localities of Girna Project varied from 15.5\(^{0}\)C to 32\(^{0}\)C being highest in the month of May 2009 and lowest during the month of December 2007. The water temperature varied from 15.5\(^{0}\)C to 32\(^{0}\)C being highest in the month of May 2009 and lowest during the month of January 2008.

The Rain fall varied from 3 mm to 474 mm being highs in the month of September 2009. The pH varied from 7 to 7.6. The water is slightly alkaline. The turbidity varied from 6 to 14 NTU. The TDS varied from 152
mg/L to 254 mg/L being highest in the month of August 2008 and lowest during the month of January 2009.

The dissolved oxygen varied from 3.6 mg/L to 8.2 mg/L being highest in the month of December, January 2008 and lowest during the month of March, April and May 2009. The dissolved CO$_2$ was recorded maximum i.e. 1.4 mg/L and minimum 0.2 mg/L in 2007-09. The highest concentration of CO$_2$ recorded in Monsoon and lowest in winter and moderate in summer. The total alkalinity varied from 32 mg/L to 68 mg/L being highest in the month of May 2008 and lowest during the month of August 2007.

The total hardness varied from 26.2 mg/L to 56.4 gm/L being highest in the month of May 2008 and lowest during the month of June, July and August 2008. The Ca varied from 16.0 mg/L to 34.4 mg/L being highest in the month of May 2008 and lowest during the month of August 2008. The Mg varied from 8.6 mg/L to 25.60 mg/L being highest in the month of May 2008 and lowest during the month of August 2008.

The chlorides varied from 11.40 mg/L to 42.60 mg/L being highest in the month of April and May 2008 and lowest during the month of October 2007. The biological oxygen demand varied from 0.6 to 2.2 mg/lit in both the year.

The study of diversity of phytoplanktons comprises of four groups viz. Euglinophyceae, chlorophyceae, Bacillariophyceae and Cynophyceae or myxophyceae. This study was carried out at the different stations of Girna Project, during period of July 2007 to June 2009. The group Chlorophyceae was represented 8 species viz. Chlamydomonas confrta, Scenedesmus graminatus, spirogyra purvula, Pediastrum duplex, Ulothrix zonata, chlorococcum, oedogonium patulum, Chara acuminate. The group Bacillariophyceae were represented three species viz. Nitzschia denticulata,
Nevicula simplex and Synedra ulna. The myxophyceae were represented four species viz. Oscillatoria tenius, Lyngbia, Anabaena constricta and Microcystis sp.

The study of diversity of Zooplanktons comprises four groups viz. rotifera, cladocera, ostracoda and Copepod. During the study of two years i.e. July 2007 to June 2009 about fourteen species of zooplankton are reported. They are motile animal, microscopic mostly free-living. They show wide range and morphological variation and adaptation. They are mostly soft bodies metazoan invertebrate, short life cycle under favorable conditions of temperature, food and photoperiods. The rotifer produces many generations each year and can rapidly increased in pollution under favorable conditions.

They are important component of aquatic food web as they occupy intermediate position as they are phytoplankton feeding upon algae and are being fed by carnivorous zooplankton and fishes. They represent six species viz. Brachionus angularis, B. calyciflorus, Euchinilus sp., Keratella sp, Lecane luna, Monostyla bulla. The Cladocera are crustaceans zooplanktons. They are also called as water fleas. They are filter feeders feeds on suspended living particles. Cladocerans are abundant in shallow, weedy, backwaters of reservoir. These are also plays an important role in fresh water environment and they also important as a food of fishes.

The Cladocera represents four species viz. Daphnia carinata, Monia dubia, Alona affinis and Bosmina sp. The Ostracoda are small crustaceans with bivalve, carapace, large antennae, found in any aquatic habitat. They are rarely caught in plankton net because most of them are live on or near bottom and only occasionally they swim upwards. The Ostracoda represents only one species viz. Candona. The Copepod is major group of crustaceans’ zooplanktons. They constitute two groups i.e.Cyclopoida and Calanoidea,
Cyclopoida generally carnivorous in habit and Calanoidea are omnivorous in habit. The Copepod represents three species viz. Cyclops, Eucyclops and ectocyclops.

The aquatic weeds are the important in the food web in the aquatic ecosystem. They provide support, shelter and oxygen to other organism and play a vital role in the biological production, the aquatic weeds are represent six species viz. Azolla, Marselia, Cyperus, Eicchornia, Hydrilla verticillata and Vallisneria spiralis. The diversity of aquatic animals comprises crustaceans, molluscs and fishes. The study was carried during February 2007 to January 2009. Among the invertebrates crustaceans and molluscs were recorded.

The class crustacea represented two orders i.e. decapoda and macrura. They represented five species viz. Berytelphusa guerini, Berytelphusa cunicularis, Mysis, and Macrobrachium malcomsonii and rosenbergi.

The mollusca represented by two classes i.e. gastropoda and bivalvia. The class gastropoda represented by two orders i.e. megagastropoda and basommatophora. The order megagastropoda represented only species viz. Pila globosa. The order basommatophora represent two species viz. Lymanaea auricularia, and Planorbis. The class bivalvia represent one order Eulamellibranchita. The order Eulamellibranchita represents one species viz. Lamellilidenes marginalis.

The fishes were collected during July 2007 to June 2009. The biodiversity of large number of fish species including various groups of fishes are recorded. About 24 species of fishes among their some species are local whereas other are seeded for fish farming. The present work confirms the occurrence of 24 fish species belonging to 6 orders, 14 genera and 5 families. The order cypriniforms was dominant with several fish species. The order cypriniforms includes 12 species. This order is found to be dominant as the
constitutes highest number of species. The order siluriformes includes four species. The order channiformes includes three species. The order perciformes, mastacembeliformes and clupeiformes includes two species each.

The following namely Notopterus notopterus, Notopterus chitala, Cirrihina mrigala, Cirrihina reba, Punctius chola, Punctius sophore, Punctius ticto, Labeo rohita, Labeo bata, Labeo calabasu, Catla catla, Hypothamicththys molitrix, Cyprinus carpio, Mystus cavasius, Mystus tengra, Rita rita, Wallago attu, Chanda nama, chanda ranga, Channa gachua ,Channa punctatus, Channa marulius, and Mastacembelus armatus. From the present study it may be concluded that there were only minor differences in physicochemical and biological parameters of all the three sampling stations selected for this study. There was no pollution due to sewage or industrial effluents.

The physicochemical parameters and biodiversity of Girna Project was undertaken from July, 2007 to June 2009 with a view of investigate the various changes in its hydrobiological features during the summer, monsoon and winter seasons and co-related the same with the plankton productivity.

The water quality parameters such as dissolved oxygen, total alkalinity, hardness, BOD, free Carbon Dioxide and nutrients concentration have been studied. The present investigation showed an inverse relationship between pH, free Carbon dioxide content, which also appeared to be seasonal. There was also a direct relationship between dissolved oxygen and phytoplankton bloom. This fact can also support by other workers in this field. Dissolved oxygen was least in summer season may be due to low water level, high temperature, death and decay of macro vegetation.

Dissolved oxygen content showed definite positive correlation with zooplankton population. Dissolved oxygen has very weak correlation with water
temperature and with carbon dioxide. The general level of free carbon dioxide was low. Slightly increased Carbon dioxide was noted in winter season when the temperature was minimum.

In the present a significant correlation between pH and alkalinity was positively correlated with hardness. The relation between alkalinity and pH was direct and was negative in case of water temperature.

Girna Project is an ideal place for the growth of fishes. The reservoir has been extensively utilized for the fish farming. Among the fishes recorded throughout the year majority of them are added for fish farming while some of them are local varieties. Fish farming could be useful to enhance the utility of the reservoir.

As these studies reporting dominance of phytoplanktons, growth of macro invertebrates as well as fish fauna is bound to take place from these studies it could be noted that high value of phytoplankton are beneficial for the growth of fish fauna.

Apart from these macro invertebrates were also recorded during the present investigation. Among the macro invertebrates various type of crustaceans, molluscs are recorded.

1. Girna Project is the genuine place of biodiversity.
2. There was no pollution sewage or industrial effluents.
3. The Project is ideal place for fish farming.
4. The summer ; monsoon and winter seasons shows seasonal fluctuations in physico-chemical parameters and water parameters indicates that the Project is rich in nutrients
5. The Project not shows any industrial effluent. It is better source for irrigation and drinking as well as fish culture.
6. Beside these studies, the regular monitoring of Girna Project is very essential.

7. The aquatic weeds and other plants are much rare because the hard rocky area. There is less vegetation. Only some sites rare aquatic plants are noted only monsoon and winter seasons at the villages and farming regions.