“ECOLOGY AND ECONOMICS OF
BENETURA RESERVOIR”

INTRODUCTION:-

The earth is a beautiful and fascinating planet of universe. Life could exist on a
certain planet, the first question a biologist asks, is water in liquid form available there? If
it is not, life as we know it could not exist; all the reactions of life are carried out in
aqueous solution. The whole some living conditions means environment which is
hygienically safe and also aesthetically acceptable and provides us sufficient clean water,
the soil and other resources as necessary for our modern living.

The environment can be defined as the outer, physical, biological and social
system in which we live the total environment is a complex entity. The main components
and environment are water air and land with soil, minerals, plants, animals and climate.
The social system in which we live is also important dimensions, of environment.
Environmental biology may thus be defined as ‘the study of air, land water and energy
systems in relation to life systems’ i.e. study of atmosphere, hydrosphere and lithosphere
in relation to biosphere.

The ecology is the study of ‘life at home’ with emphasis on the pattern of
relations between organisms and their environment.

The word ecology is of recent origin having been first proposed by the German
biologist Ernst Haeckle in 1869 Ecology as ‘The study of the natural environment
including the relation of organism to one another and to their surroundings, Ecology is
the study of organism at home.

Ecology as ‘the scientific natural history concerned with the sociology and
economics of animals. (Charles Elton) The word economics is derived from the Greek
word oikos, As nomics means ‘management’ Economics translates as the management of
the household and accordingly ecology and economics should be companion disciplines.
Life does not occur in a vacuum every living organism is surrounded by material and forces which constitutes its environment. The ecology is quite vast, the ecological principals provides a background for understanding the fundamental relationship of the natural community and also the science dealing with particular environment such as forest, soil, ocean, and inland water, Ecology there are a number of fields, either focusing on specific areas of interest or using particular approaches to address ecological problems. e.g. behavioral ecology is concerned with explaining the patterns of behavior in animals. Physiological ecology explores the physiology of an individual and considers the consequences on function and behavior. A particular emphasis on the impact of evolution on current patterns is the focus of evolutionary ecology.

A recent development has been the use of molecular biology to directly tackle ecological problems molecular ecology. Ecological studies are not restricted to natural systems understanding both the human effects on nature and the ecology of artificial environments are important areas of study.

Ecology can be considered on a wide scale, moving from an individual molecule to the entire global ecosystem. However four identifiable subdivisions of scale are of particular interest.

i) Individuals

ii) Populations

iii) Communities and

iv) Ecosystems.

An ecosystem is any spatial or organizational unit, which includes a community of living organism and non-living substances of environment interacting to produce an exchange of material between the living and non-living parts. Ecosystem may be natural as a pond, a lake, a river, an estuary, an ocean, a forest, etc. or it may be man made or artificial like an aquarium, a dam, a cropland, a garden and so on. The living community of plants and animals in any area together with the non-living components of the environment such as soil, air and water constitute the ecosystem.

Ecological system an ecosystem are functionally open systems consideration of both the in put and out put, environment is an important part of the concept one of the
universal features of all ecosystems whether terrestrial and aquatic ecosystem in water. These form the two major habitat conditions for the Earths living organisms.

In Aquatic ecosystems, plants and animals live in water. These species are adapted to live in different types of aquatic habitat. Aquatic ecosystems may be classified as being stagnant ecosystems or running water ecosystems. The aquatic ecosystems are also classified into freshwater, brackish and marine ecosystems, which are based on the salinity level. The freshwater ecosystem that have running water are streams and rivers, ponds, tanks and lakes are ecosystems where water does not flow.

The pond ecosystem is the simplest aquatic ecosystem. There are differences between a temporary pond thus has water only in monsoon season and a larger tank or pond or lake that is an aquatic ecosystem throughout the year. The pond ecosystem which play an important role in water.

Water is the best of all things water is, the mother liquor of all forms of life. It is the vital essence miracle, of nature and the great. Sustainer of life. The essentiality of water for living systems is quite evident as with out water there is no life. Water is the universal internal medium of all organisms comprising more than 90% of living matter. Water is the only inorganic liquid that occurs naturally on Earth. Water is also the external medium of all aquatic life forms and can function as recourse, condition and a habitat the unique relationship between water and living organisms. If any single compound should be selected as characteristics of life it is water. Nearly more than 75% of the earth surface covered by water either as ocean, or freshwater therefore earth is some times called a “water planet”. It exists in all three form solid, liquid and gases. Fresh water is also available in form of rain, snow, dew etc.

Life was first organized in waters is one of the primary necessity of living and non living cycles occurring in the universe. Water is used in every part of day to day life, in natural conserving surface water is a habitat of wild life and to the general people recreational aspects are important a part from drinking water.

Chemically water is a monoxide of hydrogen (HoH ). Water is colorless liquid & possesses a high dielectric constant. Water is known as universal solvent present on the earth, that is why the natural water contains many salts in dissolved form.
Water has high specific heat and this property of high heat capacity of water is functionally important to aquatic organisms. Water may be classifieds fresh water and marine water. The study of fresh water ecosystems of all kinds lakes reservoirs, streams, ponds, marshes bogs etc is known as limnology. Pond are small bodies of water in which the litteral zone is relatively large and the limnetic and profoundal region are small or absent. Ponds may be found in must region of adequate rainfall. Ponds as a whole as an ecosystem. The inseparability of living organism & the non living environment is at one apparent with the first sample collected. Not only is the pond a place where animals and plants live, but the animal and plants make the pond.

Our country is bestowed with beautiful natural resources in the form of extensive coastline liver system estuaries, ponds, tanks, lakes, reservoirs & etc. exposed to the warm, tropical climate, these water bodies are extremely productive and they harbour enviable spectrum of fish genetic resources. Optimum utilization of these resources and lead to many fold increase in inland fish production earning the country a place among the top in land fish producing nations of the world.

India has rich fresh water resources in the form of rivers, lakes, rivulets from all the resources in India the total available freshwater is estimated to be 1900 billion cubic meters per year. About 80% of this water is lost as surface run off. The surface flow represents 97% of the available water. The water spread area of reservoirs and tanks is about 3 million hectares. Where as lakes and ponds of India, measures more than 1.5 million hectares. In India there are about 1, 17,000 small and large natural and manmade fresh water bodies. Every year there is an addition in the total water supply tanks, city water supply tanks, irrigation tanks, flood control reservoirs, etc.

Shrivastav et al (1983) and Jain (1948) reported the approximately estimate of cultural water spread area as 2.3 million hectares in India.

Most of the small bodies are located in the vicinity of temples and mosques like religious places. Most of the Yatras and Mealas are celebrated near these lake. The day to day maintenance of these reservoirs is neglected. These activities cause pollution of these holy water bodies. Water is precious and therefore it is duty of each and every individual on the earth to conserve the all the available water. It is due to negligence of man many ground and surface water sources get contaminated. Ultimately the
contamination of water lead to many hazards situations and many times it becomes harmful to the large community. The contaminated water is dangerous to aquatic flora and fauna and to the precious vegetation grown on such water.

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 gives us a measure of the way on which individuals in a community are distributed.

Some lake die because of lack of oxygen. In a normal lake, the amount of dissolved oxygen in the water varies little with depth. In eutrophic lake oxygen count varies from sufficient at the surface to very low at the bottom. The population pressure and activities near lake like bathing and cloth washing contribute substantially in reduction of the oxygen level of the lakes. The surface area runs off increase the volume of nitrates and phosphates flowing in to the lake water, which stimulate weed growth.

The study of freshwaters in all their aspects physical, chemical, geological and biological is termed, limnology is the study of freshwater or saline water which are contained within continental boundaries (Goldman and Harm 1983) limnology is also described as hydrobiology or aquatic biology.

The primary productivity of the phytoplankton is one of the most important sources of energy input in aquatic ecosystem. This productivity is greatly dependent on the nutrient status of the aquatic body in relation with other physico-chemical parameters. The process that contributes to primary productivity exhibit complex environmental relationship where radiant energy is converted to chemical energy with the help for other physico-chemical parameters by the autotrophs through photosynthesis. Planktonic organisms play a vital role in aquatic environment they form and important link in the food chain and are capable of affecting the entire aquatic life. Information with regard to the freshwater planktonic organisms is scanty in India. Even the basic aspects of the knowledge of freshwater plankton is very limited and detailed study on these biological and ecological relations are required, However the prominent contribution to the freshwater plankton in India, were made by Allikunhi (1952), Arora (1937-1966) Chacko and krishnamorthy (1954) Trivedi (1979) Verma et al.(1982) Singh and Singh (1985) Bhattacharya and Saha (1988) Trivedi Garuda and Goel (1985) Ghosh and George
Direct correlations have been established between the planktonic crop and fish production because planktonic biomass indirectly related to the fish production.

Among the planktonic communities, zooplankton occupies the key position in the food chain of lake determine its type. Therefore interactions between zooplankton and phytoplankton are acental topic in plankton ecology. Zooplanktons are the microscopic free swimming animal clue components of an aquatic ecosystem which are primary consumers of phytoplanktons, zooplanktons provide the main food item of fishes and can be used on indicators of the tropic phase of water body. Zooplankton play and integral role in transferring energy to the consumer, hence they form the next higher trophic level in the energy flow after phytoplankton. The diversity of the zooplanktons in the reservoirs is controlled by several physico chemical factors of water. Phytoplankton plays a very important role in regulating the dynamics of the aquatic food web and become a driving force in shaping the community feature of zooplankton.

Normally well balanced ecosystem maintains fairly constant biogeo- chemical and energy cycles, trophic states and biodiversity. However in balance as a result of pollution one sets in sensitive species are replaced by more tolerant fast breeding and hardy ones. Biodiversity is markedly reduced and succession set in fishes occupy high position in the food chain. Moderate cooler climate, high degree of precipitation and tropical ecosystem in lake sustain significant piscine fauna.

Fishes are used by human being in different forms from time immemorial. Millions of human beings suffer due to hunger and malnutrition, and fishes form rich sources of food and provide good staple food to tide over the nutritional need of man. Fish is rightly considered as the “poor man’s diet”. It costs much less in comparison to its food value. It is an almost zero-carbo hydrate food, good for diabetes and other such patients. Fish is a rich source of protein, vitamins and minerals. A special feature of fish flesh food is content of vitamin B_{12}, which is almost absent in plant food and also a good source of calcium and vitamin A. Fish flesh also contains measurable amount fat. In some fishes in which the flesh is poisonous on with repulsive odors, are also not used as food. In general herbivorous fishes are more tasteful; this is why carps are preferred much as food. Although freshwater are given preference over marine fishes from the
bulk supply of food of the world population in order of importance, the principal freshwater and marine fishes consumed as food in our country.

The most important fish bye product industry is fish oil, which act as a vehicle for fat soluble vitamins i.e. A, D, E, and K as well as a source of essential fatty acid for the structure of cell and function of cell membrane.

Inland fish production in the country witnessed a six fold increases from 0.22 million Ton in 1950-51 to 1.30 million ton in 1987-88. The overall growth rate in India fish production is almost on a per with a global four fold increase. A quantum jump in inland fish production occurred during the 6th and 7th plan period which witnessed overall growth rate more than 5 percent per annum. The projectable achievable target of fish production by 2000 A.D. is 8.0 million ton, of which the share of inland fisheries is estimated at 4.5 million ton. The country as 7.3 lakhs hectare of ponds and tanks that can be used for fresh water aquaculture, through only 1.50 lakhs hectare are being utilized at present. The remaining 6 lakh hectare either remain follow or produce fish at subsistence level.

Maharashtra is one of the largest state in the country in population & geographical area having a number of river like the Godavari, the Bhima, the Krishna, the Narmada, the Tapi , and other several rivers and their tributaries having a total of 1600km of rivers length. Sugunan (1945) mentions the total reservoir area in the state is 2,73,750 ha. However according the Sreenivasan (1998), Maharashtra is endowed with 1,79,430 hac, of reservoir area and the state produced 7.83 kg/ hac. fish farm its reservoirs. However IIMA (1985) worked out 1, 05,202 hac reservoir area comprising 72 reservoirs. Rathod (1989) mentions the total area in the state is about 3.01 lakh. Pathak (1990) is of the view that, the area under reservoirs in the state of 20 ha, and above estimated to about 2,36,157 hectares.

Reservoirs management strategy takes into account the prevailing environmental varieties and it comprises both capture and culture fisheries norms, Indian reservoir are spread over various geoclimatic regions and their drainages represent different types of catchments area. Besides, the varying design and purpose of dams make the reservoir different in their hydrographic and morphoedaphic characteristics. All these diversities frustrate the efforts of evolve a common management strategy that can be universally
applied to Indian reservoirs. Researches conducted in selected reservoirs. Selected as types, help we in arriving at common strategies for a group of reservoir Benetura reservoir are one such water body that could represent several of Indian reservoirs. Therefore ecology based fisheries investigations were carried out in this reservoir from August 2006 to July 2008 and the package was evolved to manage its fisheries with a scientific basis.