3. MATERIAL AND METHODS:

- **SURVEY AND MORPHOMETRIC FEATURES:**
  
  In present study, survey of wetlands of drought prone eastern part of Sangli district was made to observe present status of water storage and availability of water for whole year with the help of local people. The field visits were carried out from January 2006 to December 2006 to collect the information at micro level.

  Morphometric features such as catchment area, total capacity, dead storage, type of dam, length and type of slipway, submergence etc. were studied by obtaining the information through local people as well as through irrigation department. Morphometric features of each reservoir were studied by the methods described by Trivedy *et al* (1998).

- **PHYSICO–CHEMICAL ENVIRONMENT OF WATER BODIES:**
  
  Six reservoirs were visited monthly for the period of two consecutive years (August 2006 to July 2008). Three sampling sites for each reservoir were selected for monthly analysis. The water samples were collected approximately 10–15 meters from border line of each wetland. Therefore, sampling sites were constant through out the annum. Water samples were collected in pre-cleaned five liter plastic cans and immediately brought to the laboratory for various physico-chemical analysis.

  Data was gathered on air-water temperature, relative humidity, pH, free carbon-dioxide and dissolved oxygen etc., these experiments were performed at the respective sites only.

  The air and water temperature was recorded by using mercury thermometer, Relative humidity with the help of Thermo-Hygrometer 412 CTH. Transparency of water was determined by Secchi disc method. pH by using pH meter (Hanna Model Champ). Electrical conductivity is
determined by EQUP - TRONICS – Auto temperature conductivity meter Model – EQ- 661.

The chemical parameters such as dissolved oxygen, free carbon dioxide, total alkalinity, total hardness, calcium, magnesium, chlorides, total dissolved solids, total Kjeldahl nitrogen and total phosphorus were determined by standard methods as described by American Public Health Association (APHA, 1985, 2005) Trivedy et. al. (1998).

For the physico-chemical properties and biological parameters of pollution standards by WHO (1993), Goel (2001) and Palmer’s Index (1969) were followed.

- **PRODUCTIVITY OF WETLANDS:**

  **Aquatic macrophytes:**
  
  During every visit aquatic macrophytes and marginal macrophytes were studied, photographed and collected from reservoirs and kept in polythene bags for further process. In laboratory they were identified by using Cooke’s ‘The Flora of Presidency of Bombay’ (1967), Flora of Kolhapur district (Yadav and Sardesai 2002) and other relevant published literature.

  **Phytoplankton:**
  
  The phytoplankton were collected using plankton net. It was prepared by using bolting silk No. 125. Total 100 liters of water sample was filtered and concentrate was collected in 200 ml plastic bottle. Two separate sets of concentrate samples were preserved by adding 4% formalin and 1 ml of Lugol’s Iodine.

  Identification of phytoplankton was made following APHA 2005, Fritsch (1944), Bongale and Bharati (1978) and Prescott (1982) and consulting experts. The qualitative analysis of phytoplankton was performed
under Olympus trinocular 20C Hi microscope by focus 10 X 45x with 7.5 mega pixel camera.

**Primary Productivity:**

Primary productivity was calculated for the period of two sampling years (August 2006 to July 2008) by employing the light and dark bottle method by Gaarder and Gran (1927). The setting of experiment was done monthly from site II of each reservoir. Oxygen content in light and dark bottles along with initial dissolved oxygen were determined by Winkler’s Iodometric method with three replicates.

- **ANTHROPOGENIC THREATS:**

**Pollution intensity:**

An indirect method of quantifying pollution intensity value, potability is developed on the basis of the data collected qualitatively and quantitatively primary and secondary hand for the wetlands under study.

This model is based on assigning numerical values for various factors, with the total score indicative of magnitude of potability.

The numerical values based on observable variables on the collection site were entered in the data sheets for all the wetlands.

**MPN Technique** (Most Probable Number):

The standard test to estimate the number of coliform is carried out by multiple tube dilution technique as described by American Public Health Association (APHA, 1985, 2005) and Trivedy *et al.* (1998).

There are three steps to estimate the coliform group by MPN technique, presumptive test, conformed test and completed tests.

For presumptive test single and double strength Mc Conkey’s broth (Himedia) were prepared, sterilized in test tubes containing Durham’s tube to show the gas production. Three sets were used, with each set having 5 tubes.
The first set was filled with 10 ml. double strength medium and other two sets with 5 ml single strength medium. 10 ml of water sample was inoculated in the first set and 1 ml and 0.1 ml in the second and third set respectively. Finally all tubes were incubated at 37 °C for the period of 24 – 48 hours. The tubes were analyzed after incubation for gas production (MPN index of 100 ml of sample).

**Biological oxygen Demand (BOD):**

Biological oxygen Demand (BOD) of water samples was evaluated by measuring oxygen concentration before and after incubation for 5 days by Winkler’s Idometric Method. The results were expressed in mg/l.

- **IMPORTANCE OF WETLANDS:**
  
  **Agricultural productivity and fishery:**

  The study of Agricultural productivity and fishery productivity of all the reservoirs was conducted with the help of questionnaire. (Appendix I and II). The survey was conducted in nearby villages of reservoir. Local people were interviewed by using questionnaire. The data obtained by filling up questionnaire was analyzed in the laboratory. The head of household was considered as the unit of analysis. The socio-economic condition of the house is closely related to the family head.

  Based on the survey, productivity with reference to agriculture and fishery was calculated.

  Birnal reservoir water is used only for drinking purpose to town (tahsil place) Jath and for fishery. Water is not lifted for agricultural use or for any other use.

  The fishes captured by fishermen were observed during the regular visits of study period. Fishermen and their family members were interviewed about their whole activity and their profit. Fishes were identified following the state keys of Jhingran (1982, 1991), Jayaram (1999).
An indirect method of quantifying importance value in relation to agriculture, fishery and potability is developed on the basis of the data collected qualitatively and quantitatively primary and secondary hand for the wetlands under study.

This model is based on assigning numerical values for various biological, environmental, and socio-economic risk factors, with the total score indicative of magnitude of either threat potability or importance in relation to agriculture and fishery.

The numerical values based on observed variables were entered in the data sheets in the collection site itself while, numerical values based on analytical work were entered after completion of analysis for all the seasons for all the wetlands.

**Avifauna:**

The birds observed in and around the reservoir were identified by using standard keys of Salim Ali (2002) and Bruce Campbell (1974).
APPENDIX - I

Questionnaire for Agricultural Development or improvement by wetlands

1. Name of family leader :
2. Age :
3. Caste :
4. Address :

5. Total number of family members : Male: Female:

6. Total original land :
   a) Under Irrigation:  b) Dry land:  c) Useless land :

7. Number of Cattle :

8. Crops cultivated :

   Before construction after construction of wetland
   1
   2
   3
   4

9. Availability of water : Yes / No
   Well:  Water tank:
   Water supply scheme:  Bore well:

10. Whether the water tank near the village is beneficial or not: Yes /No
    If Yes, How it is helpful?
    1) By Direct supply : Yes / No
    2) Increase in well water level : Yes / No

11. What types of benefits did you receive from the water tank water?
    a) Increase in the land under irrigation.
    b) Increase in gross productivity of yield.
    c) Increase in economic status.
    d) Increase in industries in area.

12. Overall effect of wetland on your family and village area.
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APPENDIX - II

Questionnaire for Fish farming Development or improvement by wetlands

1. Name of family leader : 
2. Age : 
3. Caste : 
4. Address : 

5. Total number of family members : Male: Female: 

6. Since how many years you are doing fishing. 

7. Which nets do you use for fishing? 

8. Which fishes do you get in this water body? 
   1. 
   2. 
   3. 
   4. 

9. How much yield of fish do you get per visit? 

10. How many days do you do fishing in a month? 

11. In which months do you do fishing? 

12. Where do you sale these fishes? 

13. Approximate cost of fishes per kg. 

14. Approximate annual income from fishing. 

15. Do you do fishing individually? Or Are you associated with fishing Society? 

16. Name of the fishing society. 

17. Do you pay some amount to society? 

18. Overall effect of this water body on you and villagers. 

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