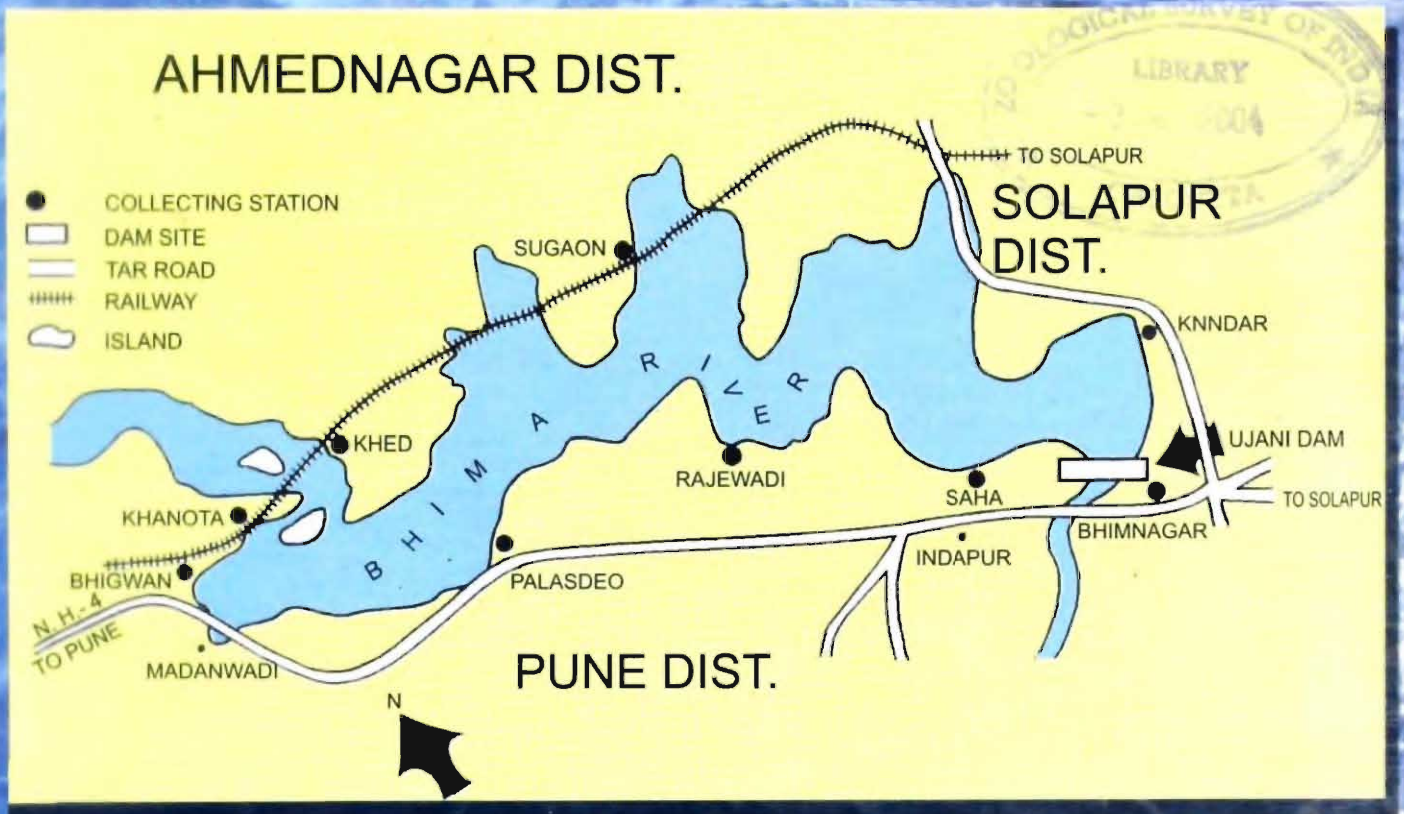
Fauna of Wetland Series 3

FAUNA *of* Ujani

(Maharashtra)



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Wetland Ecosystem Series No. 3

FAUNA OF UJANI

(Maharashtra)

Edited by

The Director, Zoological Survey of India, Kolkata

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CONTENTS

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THE UJANI WETLAND : AN OVERVIEW

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INTRODUCTION

As defined under the Ramsar Convention held in Iran in 1971, the Wetlands represent an ecosystem whose formation has been dominated by water. They comprise marshes, swamps, mangroves, lagoons, peat lands, bogs, flood plains, inland deltas and lakes and cover 6% of the worlds land surface. The wetlands are essential life systems playing vital role in regulating water cycles (hydrological cycle) and cleaning the environment. They are indeed ecological treasures and by effectively absorbing the flood water, they act as barriers against sudden surge of storm waters, containing its havoc and protecting coastal belts from seasonal flood.

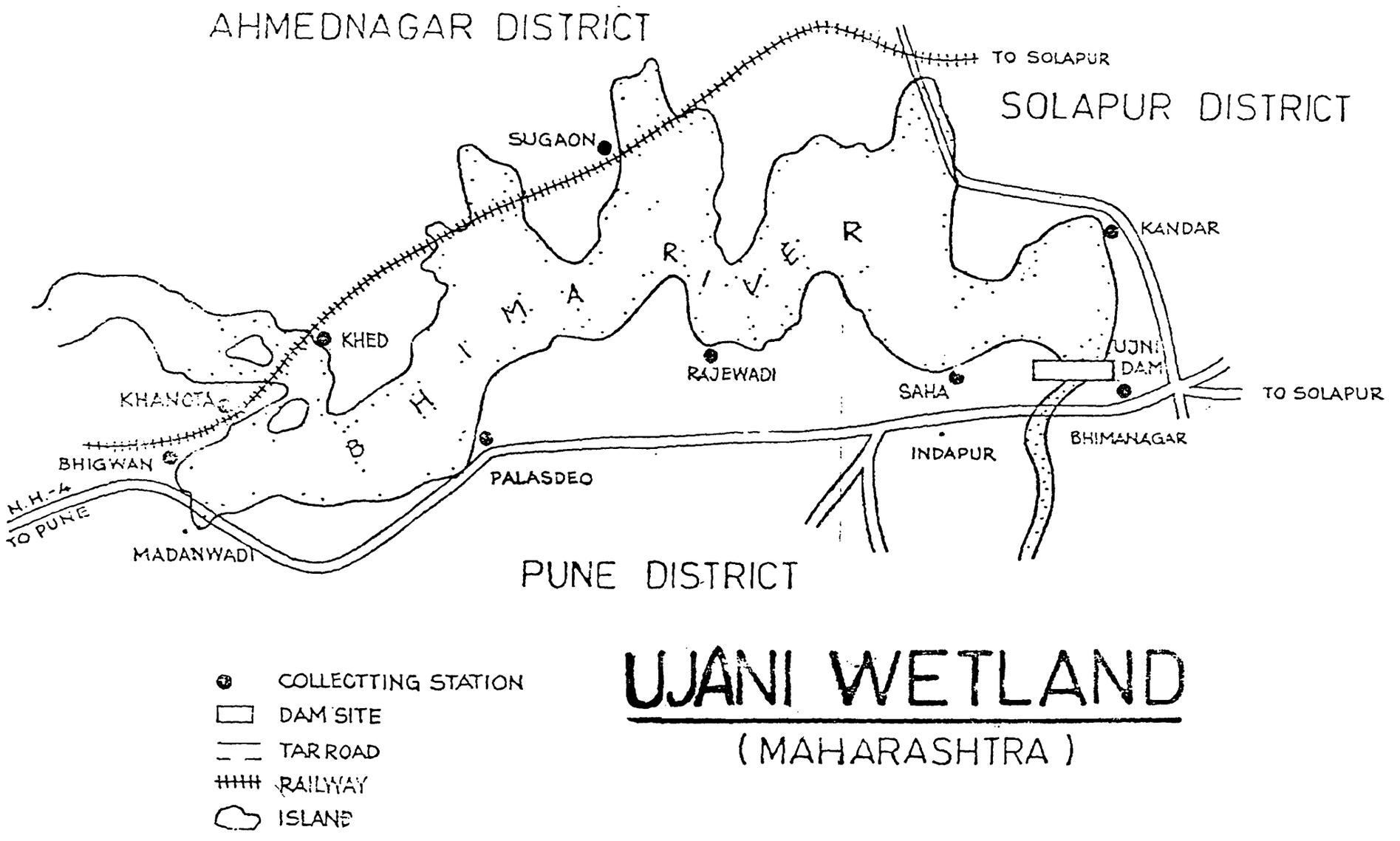
In 1989, the Ministry of Environment and Forests, Govt. of India in the booklet entitled "Conservation of Wetlands of India," mentioned that Maharashtra contained over, 3007 sq. km. of wetlands, of which 216 sq. km. were classified as 'natural', the rest man-made-either paddy fields or reservoirs of dams. Amongst the man-made wetlands, the Ujani wetland is the back water of the Ujani Irrigation Project at Bhigwan Village and is considered by some experts to be country's one of the best wetlands.

The Ujani wetland is formed due to construction of dam on Bhima river which is a tributary of Krishna river. It is situated 140 km away from Pune on Pune-Solapur road and is used, both for irrigation and pisciculture.

DESCRIPTION

The Ujani Wetland came into existence in 1980. Before its formation the area consisted of semi-arid marginal agricultural tracts and wasteland on the banks of Bhima river. It lies on the border of Solapur, Ahmednagar and Pune districts of Maharashtra in the longitude 75°07'15"E and latitude 18°04'24"N. It is located in the rain shadow region of western ghats and receives an annual rainfall of about 500 mm which falls mainly in August and September. Its gross catchment area is 14,856 sq.km. and total reservoir area is 357 sq.km. (MWL). Water depth in the reservoir ranges from 1-20 metres since most of the inundated land is in the plains. The temperature ranges from 12°C to 35°C. Since the completion of the dam in 1980, irrigation water is readily available, leading to cu..vation of cash crops like sugar cane and ground nut. One 12 MW hydroelectric power plant is now under construction.

The aquatic vegetation is predominant at certain stations of this wetland which reduces photosynthetic activity in the water resul ing in the development of anoxic condition at or near the bottom. The water in the wetland is ; artially polluted by domestic sewage besides washing and bathing activity. Two stations, namely, Bhigwan and Khanota where denisty of plankton is higher, water is relatively more turbid than at other places. The range fluctuation in the



Ujani Wetland Maharashtra

number of zooplankton per litre observed here is 30-213 (Singh & Yazdani, 1991). The detailed limnological data, both biotic and abiotic, is given in the following chapters of this document.

FAUNAL EXPLORATION

Altogether 14 faunistic surveys, each of a weeks duration, were undertaken by Western Regional Station, Z.S.I., Pune in different seasons between 1989 and 1992. Besides collecting faunal samples, data on the hydrobiology of this wetland have also been obtained in different periods of the year. Nine stations were selected at the wetland for faunal samplings, recording of physico-chemical parameters and for making general observation on the biodiversity. They were : Bhigwan, Khanota, Khed, Palasdeo, Rajewadi, Sugaon, Saha, Ujani dam and Kandar (see Map). Approximately 4000 examples of Zoological specimens representing various groups of fauna have been collected. Visual identification was made for birds and most mammals and those have been supported by photographs wherever possible. In major groups of fauna, data on current eco-status have also been added.

GENERAL OBSERVATIONS ON THE FAUNA AND FLORA

The fauna and flora of this recently formed wetland is still settling to newly emerging niches. The major faunal groups occuring in this wetland are fishes, amphibians, reptiles, birds, mammals, insects, crustaceans, molluscs and rotifers. Among benthic forms molluscs are most common and among zooplanktons, rotifers, cladocerains, copepods and ostracods are fairly common.

Though this wetland was initially a favourable site for highly specialised mud flat feeders, it became a favourite ground for large number of greater flamingoes (*Phoenicopterus roseus*) which displayed spectacular breeding behaviour over there. The wetland, prior to formation of reservoir, attracted large flocks of waders such as stilt, godwits, snipe and plovers. However, in 1980s the wetland witnessed influx of fish-eating birds such as terns, sea-gulls, besides a variety of water fowl species and ducks. Unfortunately, the use of fertilisers by nearby farmers promoted eutrophication of this wetland which transformed the mud banks into a thick tangle of weeds. The open water expanses also became clogged with submerged weeds. Thus the wetland became less conducive for birds such as flamingoes. An account of flamingo-fish interaction at the Ujani wetland had been given by Singh & Yazdani (op.cit.).

The vegetation around Ujani wetland is mostly dominated by shrubs and grasses and there is striking paucity of higher plants. However, prior to construction of dam, the tree cover used to be dominated by *Acacia nilotica* and *Azadirachta indica* with *Tamarindus indicus* planted on road sides and *Vitex negundo* and *Pongamia pinnata* in moist places along the river and streams. *Ficus bengalensis* were also present on field boundaries and along the road and in villages.

The present document contains results of faunistic surveys (vertebrates and some selected groups of invertebrates) of the Ujani wetland. It contains inventory of 384 species, of which 166 species belong to vertebrates and 182 species of invertebrates. Among the vertebrates mammals comprise 1 species, birds 102 species, reptiles 9 species, and fishes 54 species. Among the invertebrates the break up of species in selected groups is : rotifers 14 species,

ostracods 7 species, cladoceran 33 species, molluscs 11 species, Odonata 42 species, aquatic and semiaquatic heteroptera 31 species, aquatic Coleoptera 44 species.

SOCIO-ECONOMIC IMPORTANCE

The construction of dam and the resultant formation of reservoir at Ujani has undoubtedly offerred exceptional opportunity to villagers to cultivate cash crops in larger areas and culture food fishes on a large scale. This has indeed brought about prosperity to the inhabitants by way of increase in their per capita income. However, some adverse effects of dam construction have also been observed in the lives of village community. They are mainly loss of fuel & scarcity of cattle forage. Gole (1992) studied these problems and suggested the following corrective measures :

(i) To plant horticultural & woody species in the area instead of sugar cane or even jowar on light soils.

(ii) Formation of wet meadow and an experimental marshy area by stablising water level.

(iii) Planting of trees and shrubs that tolerate submergence, along the edge of the reservoir and removal of weeds physically.

(iv) Provision of earthen mounds and islands in the area of submergence for use by water fowl.

(v) Planting of *Acacia nilotica* trees and aquatic grasses to provide shelter to water fowls.

(vi) The earthen mounds are expected to provide suitable niches where aquatic life including fishes find shelter and place for breeding.

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LIMNOLOGICAL INVESTIGATIONS - ABIOTIC FACTORS

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INTRODUCTION

Considerable work on wetlands of India has been carried out by many scientists in the present century. Important work on wetlands being those of Michael (1964), Munawar (1970), Sharma & Gupta (1974), Patil (1976), Pandit and Kaul (1982), Kaul *et. al* (1982), Trishal (1988), Gopal et. al (1982), Patil et. al (1985), Gole (1991), Bharucha & Gogte (1990), & Singh & Patil (1991), and others. Such studies were focused towards understanding the ecology of group of plankton and their importance as fish food organisms, indicators of pollution and for trophic status of the waterbody etc. However, such studies on wetlands from many regions of Maharashtra are still lacking. Recently Bharucha & Gogte (1990) and Gole (1991), have studied wetlands and thrown some light on the Avian profile, however, these studies are not focused on detail investigation of hydrobiology and biodiversity in plankton. The present work was carried out on Ujani wetland from 1989 to 1991 with the objectives to maintain the records of the wetlands and to prepare a baseline data for future studies.

THE GENERAL ECOLOGY OF THE WETLAND

The river Bhima which rises in the Western Ghats at a distance of 100 kms south of Bombay is damned at Ujani, 120 kms. south-east of Pune. The reservoir so formed is spread over an area of 357 MM^2. and (irrigation dept.) 1,33000 ha. land gets benefited by this wetland in the drought prone Solapur district of Maharashtra. It is located in rain shadow region of western Ghat. The rain fall in the area was recorded upto 500mm. The temperature ranges in summer was between 35°c to 41°c and in winter between 12°c to 30°c. This place shows thorn and shrub vegetations. The trees are not abundant due to irregular rainfall. The erosion on the bank of wetland seems to be more. There are two big islands, in the dam area having approximate area of 90 ha. & 85 ha. respectively.

There are number of inlets and some small island are formed in the reservoir. The shallow water shows the predominance of many aquatic weeds such as *Ipomea* sp. *Eichhornia cragssipes* and *Paspalum.* They are occupying many shallow area of the wetland. This growth sometimes prevents the appearance of other macrophytes which help the water fowl for nesting.

The wetland is well known for its waterfowl and the large flock of Greater flamingo (*Phoenicopterus roseus*) which enjoy greater part of year in this wetland. During winter a large number of migratory birds such as ducks and waders, coots and terns and many birds of prey were observed.

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The wetland is good fishing ground with a annual catch of 430 M tonnes providing employment to several persons. The department of fisheries have set up four stocking stations around the wetland.

The large fish fauna also attracted aquatic mammals such as otters. However, their number is very small and that too only on sheltered places.

PHYSICO-CHEMICAL FACTORS

Description of the wetland : This wetland is formed due to construction of Ujani dam across the Bhima river. This dam is named after Ujani village. The shape of the wetland varies from place to place with back water covering an area of large irrigated field. The water catchment area is 14,856 kms. with a depth ranging from 1 metre to 20 metres. The shoreline of back water is wavy. The dam is constructed by displacing some villages from the nearby submerged area. The main town like Indapur & Bhigwan are on the way and near to dam site. Dense growth of aquatic vegetation has been observed in the back waters of wetland. The water is used for bathing and washing. The wetland is also visited by cattles and consequently considerable amount of cowdung is added in the water. The water also gets polluted due to waste matter. Considerable amount of waste effluents and domestic sewage from the nearby village flows into the water. At present the wetland is not used completely for pisciculture. Every year the wetland is used by fishermen on nominal licence fee.

The wetland water was greenish blue throughout the period of study except in monsoon due to rain. Many aquatic weeds and birds have been seen in and around the wetland. The water level was found reduced drastically during summer.

The saliant morphometric features of the wetland are as follows :

1. The total area of water reservoir	—	357 Mml. (MSL).
2. Catchment area	—	14856 sq/kms.
3. Source of water	—	River Valley.
4. Latitude	—	18°04' 15" N.
5. Longitude	—	75°07' 15" E.
6. Gross storage capacity	—	3140 MM^3.
7. Controlling level of the dam	—	501,40 m.
8. Maximum height of the dam above the lowest point of foundation	—	560,40 m.

The water in the wetland is polluted by domestic sewage near khedelg village and used for washing and bathing purpose. Khandar village is a small locality where considerable amount of effluents and domestic sewage flows into the back water of wetland. The rest of the area of wetland was comparatively less polluted.

In all, seven stations were selected for present study. They are as follows (Fig. 1.)

1) *Bhigwan* : This is a good station for collection of water and plankton samples and also for primary productivity study. Near a small bridge collection of plankton and other aquatic fauna collections were made. Since this sampling station is near to Bhigwan town, quite a large amount of domestic wastage enter in the water. Domestic garbage is also thrown in the water.

2) *Saha* : Saha sampling station is entirely different from the Bigwan station. Here boats were available for fishing and for plankton sampling. This is an anchoring station for fishermen's boats. Aquatic vegetation is removed regularly by fishermen here. Mollusca and decapoda are found in good number. There were a large number of irrigated fields of paddy, sugarcane and maize in and around this station. Considerable amount of agricultural run off comes in the water from the nearby land. This station is regularly visited by local aquatic and migratory birds including Flamingo.
3) *Palasdeo* : Collection of water and plankton samples were made from main birdge where depth of water was 1 to 10 meters. This is a complete undisturbed spot and is not affected by human settlement. However, dense strands of aquatic vegetation particularly of *Ipomea & Eichhornia* have been observed.
4) *Rajewadi* : This station is 2 kms. away from main road where a small bridge connects the two isolated waterbodies. Aquatic vegetation is abundant. Vast areas of irrigated agricultural land occur in and around the station. Collection of plankton samples were made here besides water samples.
5) *Khandar* : Khandar station is situated quite far from Bhigwan on the opposite side of the wetland where water is moderately polluted due to domestic waste and local activities. Here water from the wetland is pumped in the field for irrigation. People in this locality use this water for bathing and washing purposes. There is plenty of feacal pollution and on one side of the road cattle are also washed here.
6) *Khanota* : Khanota is a good sampling station from where considerable amount of aquatic collection were made during winter and summer seasons. Here one can hire boat and fishermen for fishing, plankton trawl and water sample collection from the deep waters. This station also receives quite a large amount of domestic waste and cowdung This is also anchoring place for boats of the fishermen. A small island is seen near this area. Aquatic birds are abundant here.
7) *Khed* : Luxurient growth of aquatic macrophytes is observed near the bridge side. It includes *Eichhornia, Pistia, Potamogeton, Ipomea & Hydrilla,* etc. Water samples were taken from the deeper layer for Physico-chemical analysis. Small farm of medicinal plants at Rajegaon is located near this station.

MATERIAL AND METHODS

Collection of water and Plankton samples were made every three months between 10.30 am to 11.30 am. The water samples were collected just below the surface with the help of a wide mouth bottle and brought to the laboratory immediately for physico-chemical analysis. Precaution was taken to avoid unnecessary shaking of water while bringing to the laboratory. Water for dissolved oxygen was collected with the help of a narrow mouth bottle of 300 ml capacity having solid stopper. The Physico-chemical factors studied include temp erature, rainfall, pH, turbidity (visibility), free carbondioxide, dissolved oxygen, carbonate, bicarbonate, chloride, nitrate, phosphate, specific conductivity and total dissolved solid etc. Dissolved oxygen was fixed in the field as per modified Winkler method. pH was determined with the help of a Lovibond comparator.

Carbondioxide was detected in the field using N/44 NaOH for titration. Temperature was recorded by an ordinary centigrade thermaometer. Sechi disc was used to obtain turbidity index but the reading could not be taken during monsoon as the water was not clear at some places. The seechi disc readings were taken for the transparancy. Chemical factors such as dissolved oxygen, free carbondioxide, total alkalinity, chloride, calcium, magnesium, total hardness, Ammonical nitrogen and Phosphorus were estimated as per method given in standard methods for the examination of water APHA (1971). The Physico-chemical data recorded during one year of study are given in the tables 1-8 and (Fig. 2-20).

RESULTS

Meteorological alittle move data

The data for maximum and minimum temperature, relative humidity and total rainfall have been obtained from meterological department Poona. It was noticed that there was heavy rain in monsoon in July 91 and few showers in winter but a long dry spell was also noticed in summer from January 92 to June 92.

Temperature : Water Temperature (fig. 2) was lowest in the month of Feb. 92 (21°c) and the maximum (32°c) in April 92. There was a steep rise in temperature of water from Feb. 92 to April 92 and then it remained constant upto August 92. The temperature fluctuation between maximum and minimum was 11°c during the course of one year study at all the stations. (Table 1-7), (Figs 2-20).

pH : pH of the water was generally above 7.0 and the range was between 5.8 to 8.2. The maximum pH value was recorded in the month of Feb. 1992 in Khandar. The minimum pH was 6-8 recorded in the month of October 1991 at Saha. The fluctuation in the pH was in the range of 1.4. It was observed that the pH values were almost within 7 to 8 throughout the year Tables 1-7.

Transparency : Seechi disc was used for obtaining visibility value but the water of the wetland was comparatively clear as the Seechi disc remained visible upto at 100 cm. However in monsoon the transparency values decreased.

Free carbon-di-oxide : It was not detected in water throughout the period of investigation except at few occasion where it was always above 12 mg/L. The maximum carbondioxide of 35 mg/L was detected in the month of October 91 at Bhigwan. The minimum value was Nil.

Bicarbonate (Total) alkalinity : Bicarbonate content of the water was always above 140 mg/L. In the present study hydroxide was not detected in the water whereas bicarbonate alkalinity of the water showed wide fluctuation and the range was from 40 mg/Litre to 248 mg/L. Maximum bicarbonate content in the water was observed in August 92 at Khed and lowest at Rajewadi water and it was 40 mg/Litre. The bicarbonate content of the water decreases gradually from Feb to August at Saha and the carbonate content was maximum upto 80 mg/L but in 50% samples it was not detected.

Total Hardness : The hardness of water showed wide fluctuations and it was highest (200 mg/L) at Palasdeo in February 1992 and lowest (**102** mg/L) at Khed in April 1992 (Table 1 to 7).

Calcium : The calcium content of water was always above 56 mg/Litre. The maximum values recorded was 152 mg/L found in Feb. 92 at Palasdeo and the minimum of 56 mg/L noticed in October 91 in Khandar, where as at Saha it was highest in February 92 to August 92 and lowest in October 91 (Table 1-7).

Magnesium : Magnesium content of water was low at Palasdeo and it was between 25 to 70 mg/ L. At Saha it was highest in August 92 and the lowest value was noticed in Oct 91. At Khandar it is observed that there was steep rise in magnesium content from Oct. 91 to August 92.

Dissolved Oxygen content : Dissolved oxygen content was always above 3.8 mg/L. The fluctuation was between 3.8 to 8.6 mg/L. The maximum value was obtained in April 92 at Saha and the minimum value was 3.8 mg/L in April 92, at Palasdeo.

Chloride : The chloride content of water was in the range of 45 mg to 180 mg/L. High chloride content was noticed in the water in Oct. 91 and it was always above 40 mg/litre and the maximum was 180 mg/litre at Khonota. Chloride content was high at Khanota station where as at Saha station significant increase was not noticed (Table 1 to 7).

Phosphate : Inorganic phosphate content was generally 0.01 to 1.04 mg/L and maximum value was 1.04 mg/L at Khanota in the month of August 92. It shows direct relation with phytoplankton population.

Free Ammonical N2 : It was observed that at Palasdeo the maximum ammonical nitrogen content was (0.92 mg/litre) was recorded at Palasdeo and minimum (0.12) at many Stations.

Conductivity : Specific conductivity of water was in the normal range with a slight fluctuation seasonally Fig. 2-20, Table No. 1 to 7.

Total dissolved solid : The total dissolved solid values were in the range at 10 to 50 mg/litre. The maximum value was at Khed in August 92 and minimum at Khed and Khanota in Oct. 91. More or less uniform distribution of total dissolved solid was observed.

DISCUSSION : The water at all the sampling station was turbid during monsoon season due to siltation, agricultural run off and the earthern bundh. Most of the stations get dried up in summer. Consequently the water level gets reduced. The rainfall during the study period was low which also affected the water level besides evaporation. The mean transparency values were low at Khanota, Rajewadi and Bhigwan during most of the time of sampling, indicating enrichment of nutrients and plankton as stated by Edmondson *et. al.* 1956, Hickel, 1973 and Patil (in press) and to some extent due to suspended particles from the surroundings area. The highest range was 50-100 cm. indicates high trophic status of the wetland. Some workers like Yoshimura (1935), Rawson (1960) used transparency values, as an index of eutrophication and came to conclusion that more the transparent water ; more oxygen is at deeper layer of the waterbody. In the present wetland the bottom oxygen content usually found depleted. The pH of the water of wetland was not very high and had the range of 6.8 to 8.7%. Generally high pH indicates higher productivity (Davis 1955; Bhatnager 1984). Wetzel (1960) reported high pH with photosynthesis activity. In the present investigation it does not apply as the pH was low. Moitra and Bhattacharya (1965), Jana (1973) reported a bloom of Phytoplankton when the pH was high. The present investigation corroborates view of above authors. pH of water has shown direct correlation with phenolophthalein alkalinity as pointed out by (Patil *et. al*, 1985). However, the present pH range shows that the water of this wetland is favourable for aquatic life (Das, 1978). The variation in pH seems to be a minor seasonal variation (George, 1966). The relation between pH and D. O. seems to be direct while inverse relationship was noticed between pH and carbondioxide. Similar type of inference was drawn by (Rao, 1955, Reid, 1961).

Bicarbonate detected at all the stations during the entire period of investigation. However during certain occasion the carbonate was nil and the range of carbonate was Nil to 80 mg/ L. It was not detected at Palasdeo. Direct relationship was noticed between pH and Carbonate (Chari, 1980). Increase in pH also increases Co_3 & decrease in pH means low carbonate. This seems to be true in the case of present wetland water. Carbonate at Palasdeo was not detected and this may be explained on the basis of amount of equillibrium of Co_2 in water which inhibits conversion of bicarbonate into carbonate (Ruttner 1953, Munawar 1970, Harshney *et. al.* 1982).

Alikunhi *et. al.* (1955) pointed out 100 ppm alkalinity as separation point for high productive & low productive water. Thus the water of the present wetland seems to be productive as the total alkalinity indicates pollution. Thus the present water of wetland seems to be moderately polluted due to domestic sewage and agricultural run off, which indirectly suggest the beginning of eutrophication.

The alkalinity was due to salts of Ca & mg. The water seems to be hard as per Moyle (1946) that the separation point between soft & hard water is 40 mg/litre. Freiser and Fernando (1966) stated that in high alkalinity, the bicarbonate systems prevail & pH is on higher side but it does not hold good for the present investigation as the total alkalinity is not so high to prevail to bicarbonate system.

Dissolved oxygen showed marked variations at different sampling stations and did not show any definite trend in seasonal distribution. The content of dissolved oxygen has been reported due to various factors such as temperature, photosynthesis, plankton and addition of run off. (Bhatnagar, 1984). In the present wetland direct relationship was noticed between pH and D. O. while inverse relationship between pH & Co_2 (Ganapati 1940, Rao 1995). The D. O. content was always above 3, it was less in some months as some of the oxygen goes out during high temperature which decreases solubility of oxygen and also during oxydation some oxygen is utilised. Thus these two processes affect the D. O. content of the water.

In the present study clinograde oxygen profile was observed. The maximum value was noticed at the surface layer with a fall after 100 cm. to the bottom of wetland, where anoxic condition was recorded. (Table-8). The dissolved oxygen content was in favourable range for the aquatic life since the lowest value to maintain the fish fauna is 5 mg/L and pH critical value is 3 mg/L. (Ellis *et. al.*, 1946, Dimick & Marryfield 1947). High D. O. content indicates algal growth and photosynthesis plays an important role in rearation of waters as shown by Patil and Panda (in press).

The temperature of water and air goes hand in hand in some smaller water bodies as stated by Munawar (1970). Welch (1952) also pointed out that the smaller water body quickly reacts to air temparature. In the present wetland a well marked relationship could not be seen as the water temperature does not follow closely the changes in air temperature and it may be due to large size of the wetland (Patil *et. al.* 1985).

The occurence of free carbondioxide in the water frequently suggests that the loss of CO_2 in the process of photosynthesis is less than its gain in the process of decay of organic matter. Liberation of Co_2 in the process of decomposition of bottom deposits is sufficient to convert Co_3 completely into HCO_3. This is further confirmed by the absence of Co_3 on some occasions in the water of this wetland.

Hardness was always abvove 50 mg/litre and it seems that the water of the present wetland is suitable for favourable growth of organisms (Swingle, 1967).

Many stations showed substantial higher values of chloride content which may be attributed to the addition of considerable amount of domestic sewage. High chloride content indicates presence of high organic matter of animal origin (Thresh *et. al.* 1944). The level of chloride content increases proportionally with pollution (Bhatnagar 1984). At some stations chloride content was substantially low which indicates absence of pollution as stated by (Sreenivasan, 1976).

In the present study the chloride content at Khanota was quite high and the range was 102-180 mg/L. as compared to Bhigwan. The values were surprisingly high in Feb. at Bhigwan station and there was no specific pattern of chloride observed at all the stations.

Specific conductivity of water ranged from 50 to 120 M ohm. Ellis (1937) pointed out that for supporting good fish population the conductance value should be in the vicinity of 150-500 × 10 – 6 m. The total dissolved solid values were in the range of 10 to 18 mg/litre.

Calcium content of the water of the wetland was on higher side than magnesium and the ratio was 2.1 for Ca & mg. This is not close to the ratio recorded in the tropical and high altitute Valley, lakes (Zutshi & Vass 1973).

Nutrients generally considered to be limiting factors for Phytoplankton production (Fog 1965 and Hutchinson 1967). Taking into account the quantity of phosphate, ammoniacal nitrogen and conductivity values the water of the wetland is of moderate fertility. Vollenweider & Fred (1953) stated that increase in electric conductivity enhances the state of enrichment. In the present investigations the conductivity values were slightly on higher side and phosphate values were also high when the temperature of water was low at almost all the stations.

All these abiotic factors reveal that the wetland is in the moderate stage of entrophication. Nevertheless, nutrients like phosphate, ammonical Nitrogen, Chloride and alkalinity show the beginning of higher trophic state of the wetland.

SUMMARY

Ecology of a freshwater wetland near Pune in Maharashtra has been studied. The wetland at present is leased for rearing fishes and prawns (besides its use for irrigation) to Fisherman society. Seasonal variations in abiotic factors of the wetland have been studied for a period of one year. The collection of water and plankton samples were made once in three months for seasonal studies on species composition and for biodiversity in the wetland. The Physico-Chemical parameters recorded (Fig. 2-20), include air temperature and water turbidity, pH, CO_2, CO_3, HCO_3, Chloride, total hardness, dissolved oxygen, phosphate, specific conductivity and ammonical nitrogen. pH of water has shown minor seasonal variations. The transparancy values were low and CO_2 was detected. Direct relationship was observed between pH and phenolphthalein alkalinity. The Phosphate and Ammonical N_2 values were within the normal range. D.O. content was always above 9.8 mg / litre. The wetland is isothermic with no sign of thermal stratification however, in summer months stratification exists for shorter duration. Primary productivity studies were conducted and the results are given separately in this volume.

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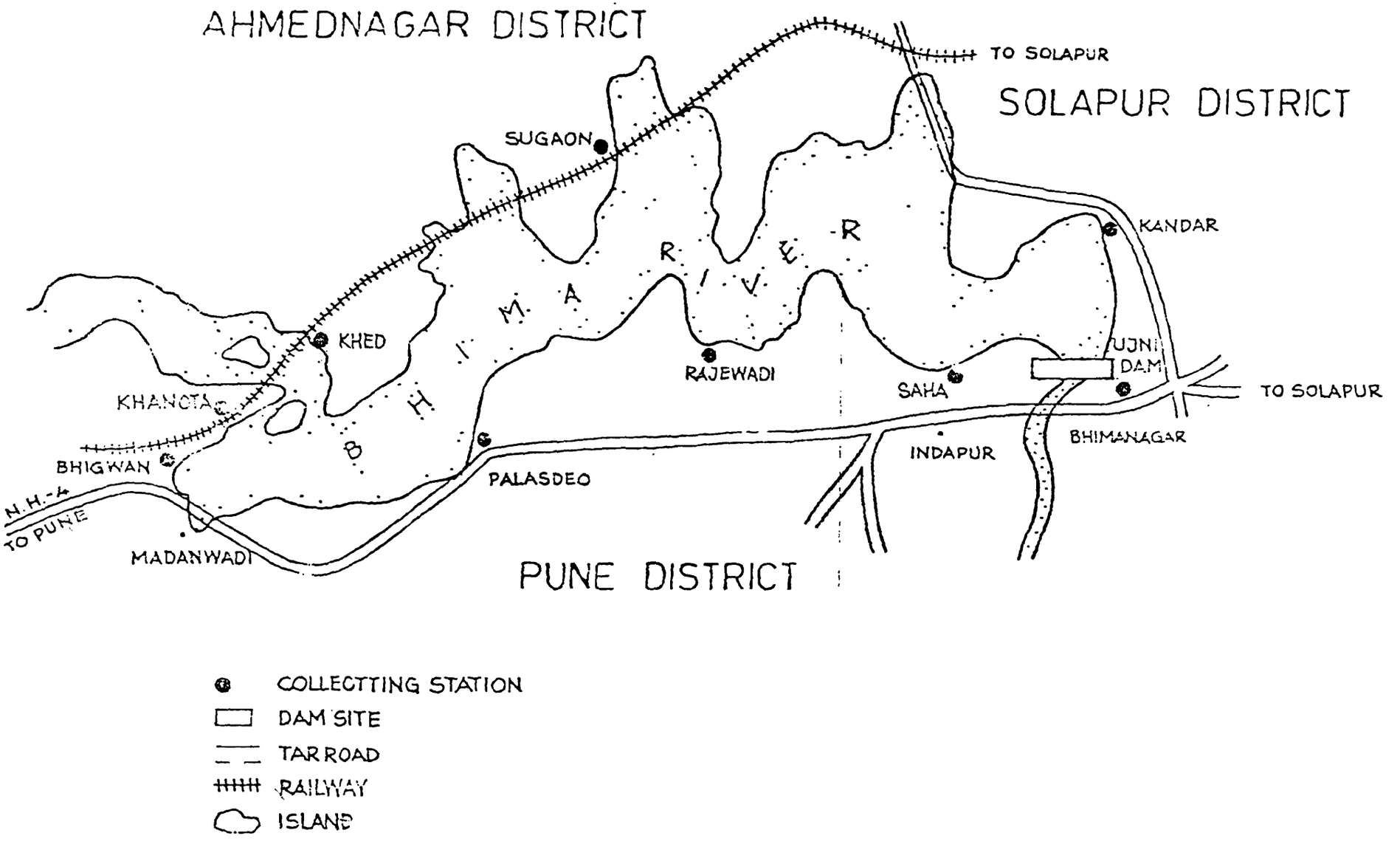
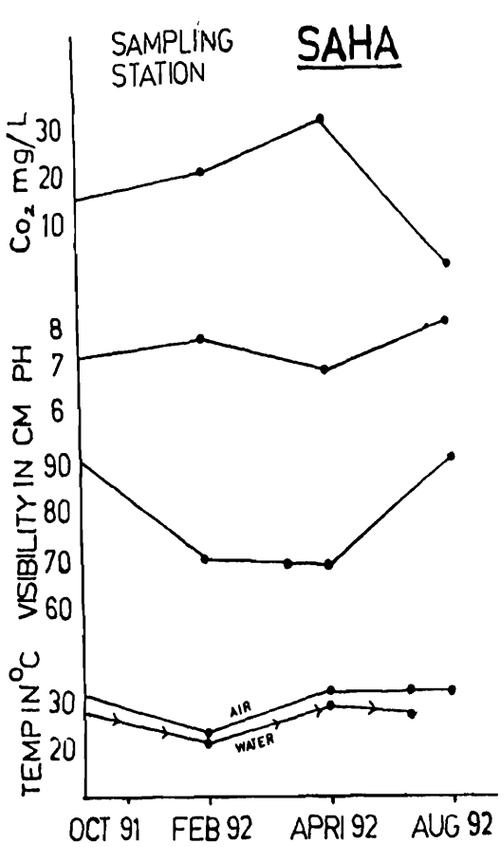
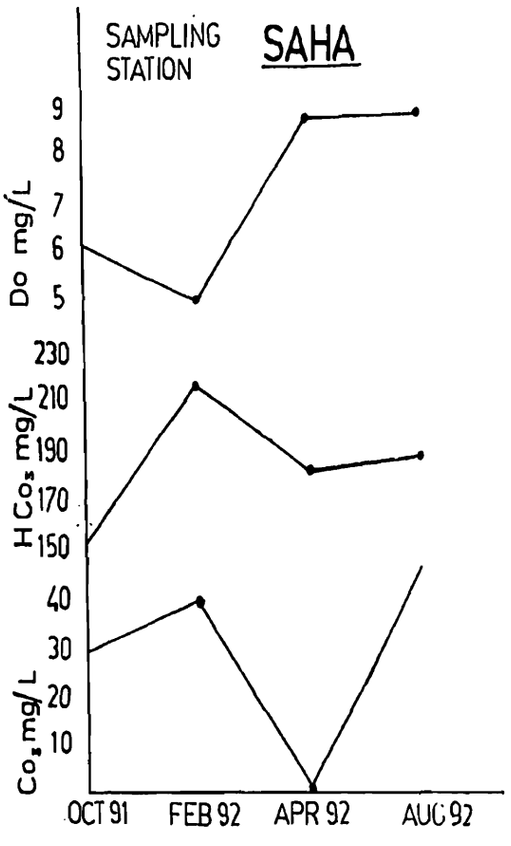
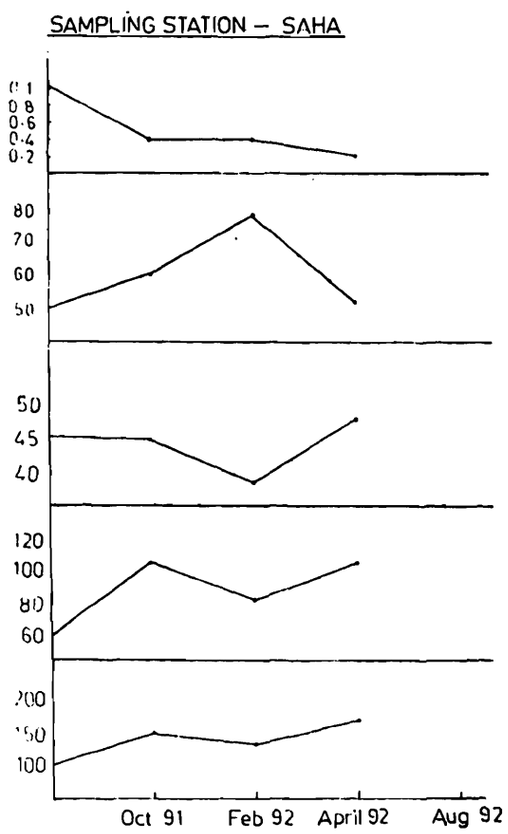


Ujani Wetland, Maharashtra

Fig. 1. Collectting Station; **2.** Dam Site; **3.** Tar Road; **4.** Railway; **5.** Island.







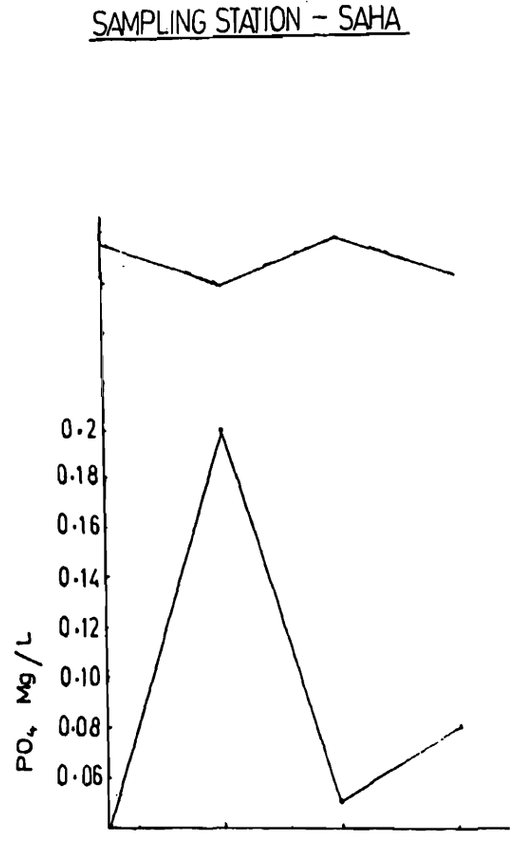
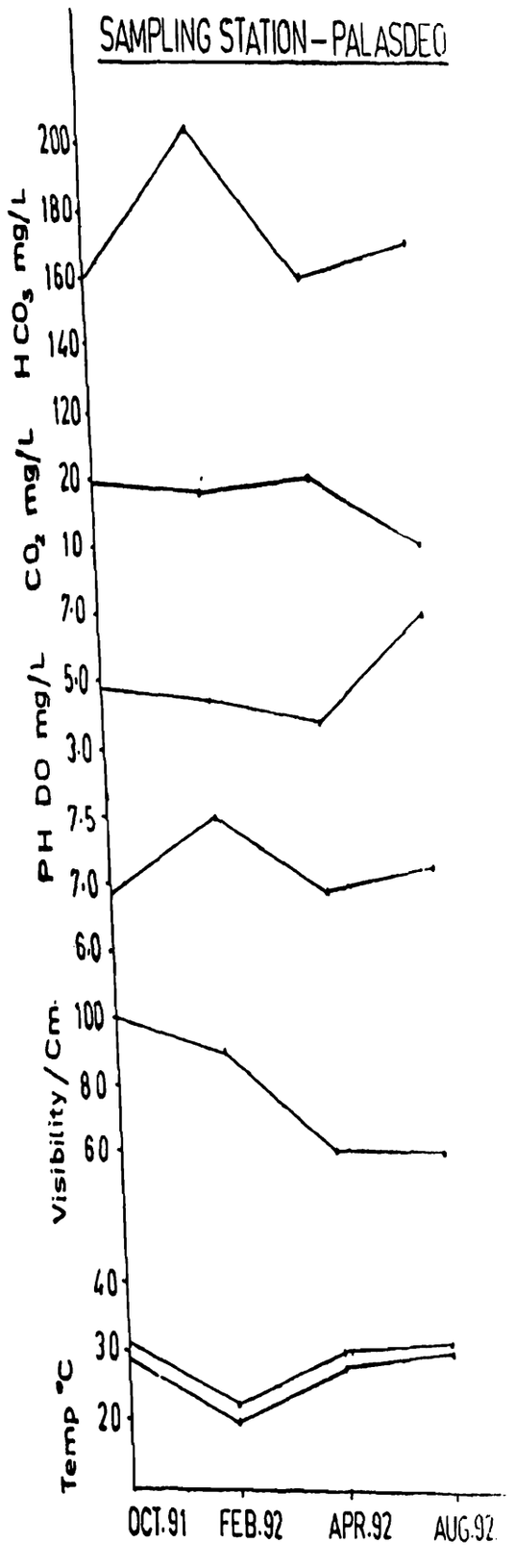


Fig. 2. Seasonal Variations in temperature, visibility pH and carbondioxide at Saha Station. **Fig. 3.** Seasonal Variations in Carbonate, bicarbonate and dissolved oxygen at Saha Station. **Fig. 4.** Seasonal Variations in total hardness, calcium, Magnessium, Chloride and ammoniacal nitrogen at Saha Station. **Fig. 5.** Seasonal Variations in Phosphate content at Saha Station.



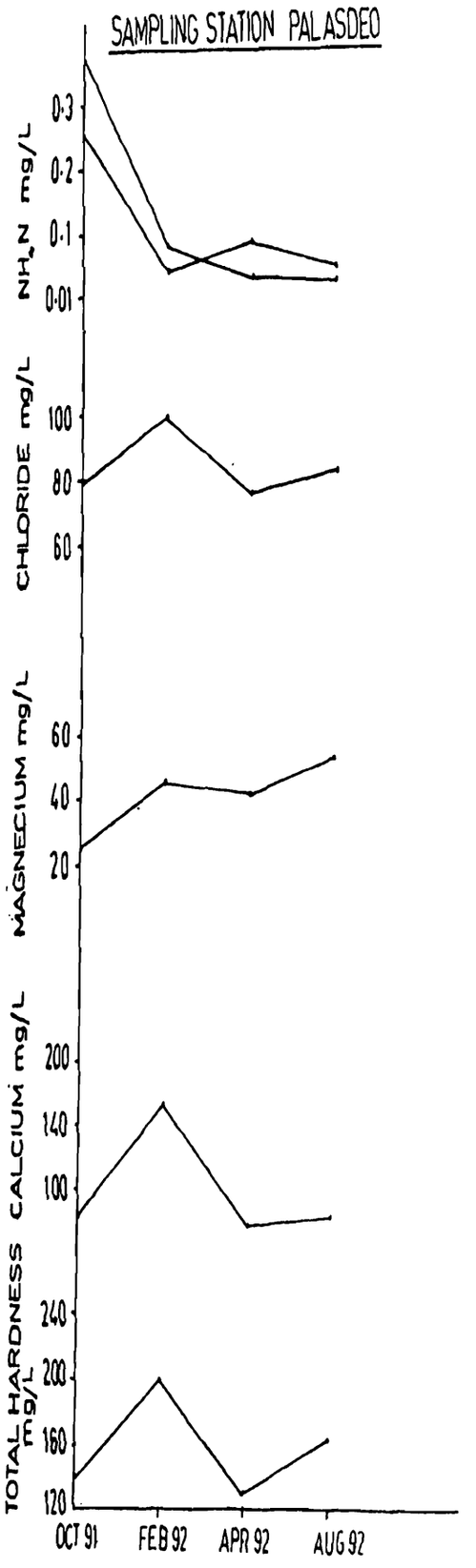
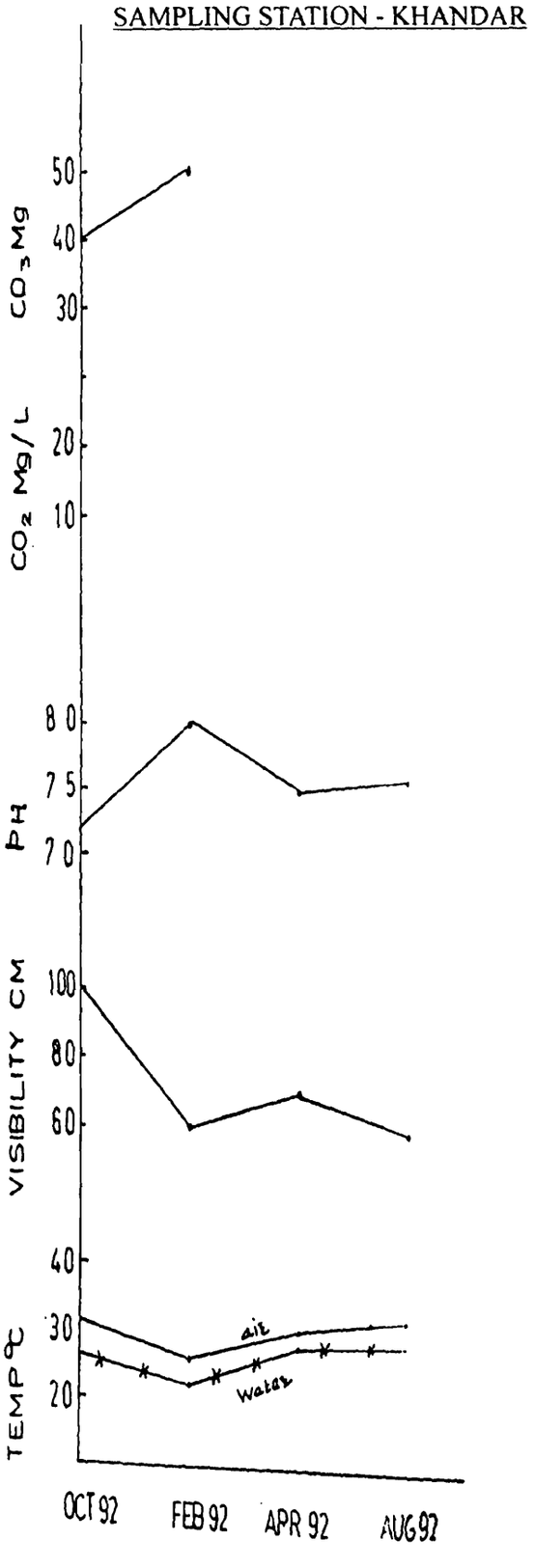


Fig. 6. Seasonal Variations in temperature, visibility pH CO_2, bicarbonate at Palasdeo Station. **Fig. 7.** Seasonal Variations in total hardness, Calcium, Magnessium, Chloride and ammoniacal nitrogen at Palasdeo Station.



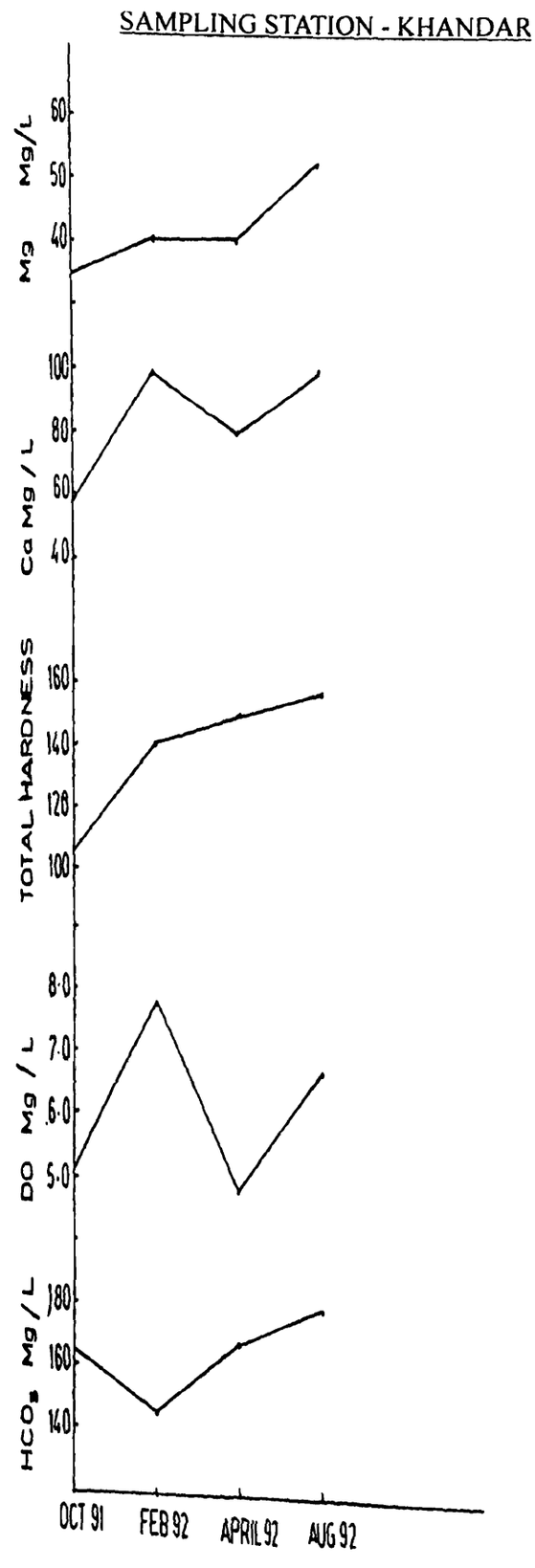


Fig. 8. Seasonal Variations in temperature, visibility pH CO_2, carbonate in the water of khandar Station.
Fig. 9. Seasonal Variations bicarbonate dissoved oxygen, total hardness, calcium and Magessium in the water of khandar Station.

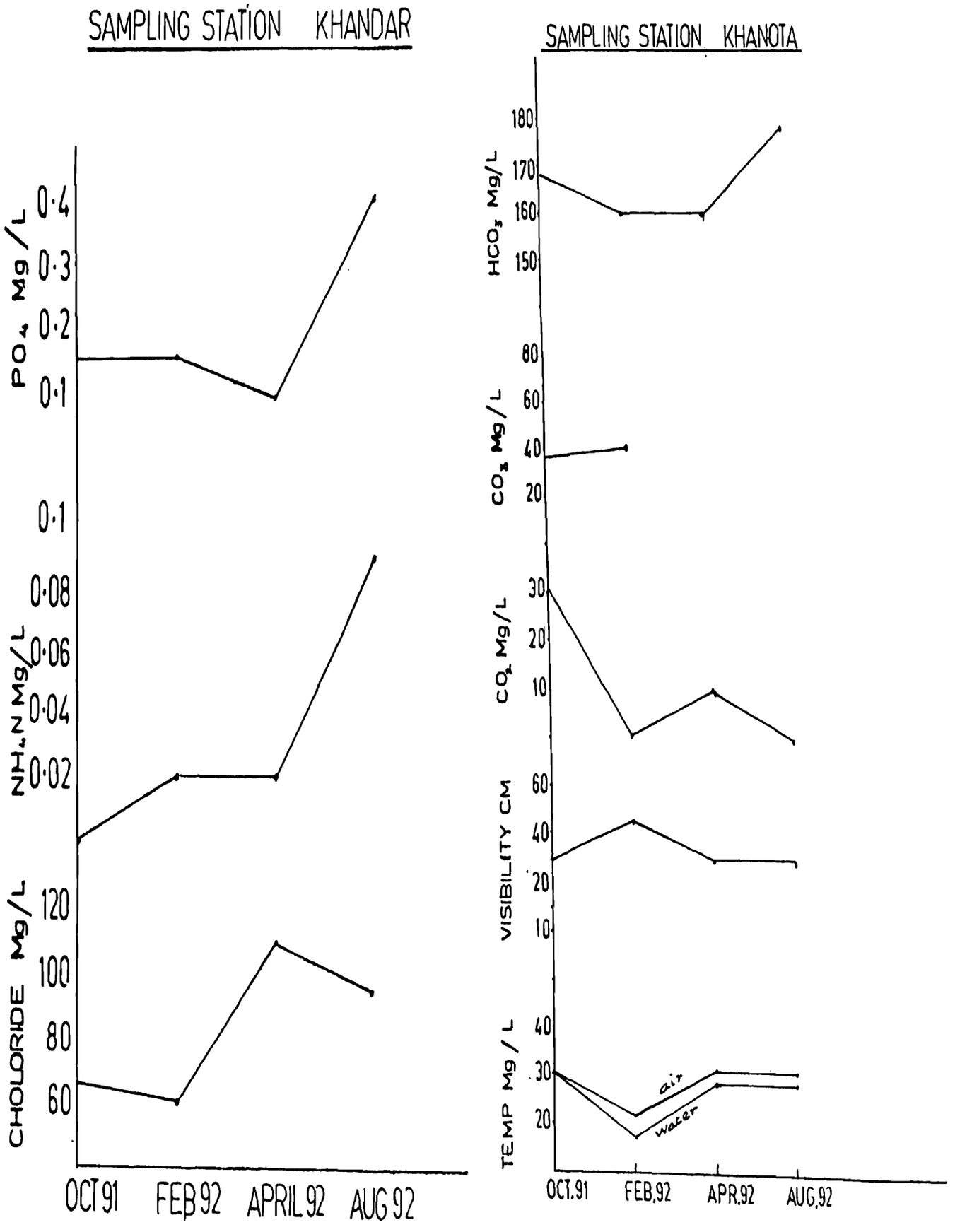


Fig. 10 : Seasonal Variations in the Chloride Contant ammoniacal nitrogen and Phosphate in the Water of Khandor Station. **Fig. 11 :** Seasonal Variations in temperature, visibility free CO_2, Carbonate and bicarbonate in Water of Khandor Station.

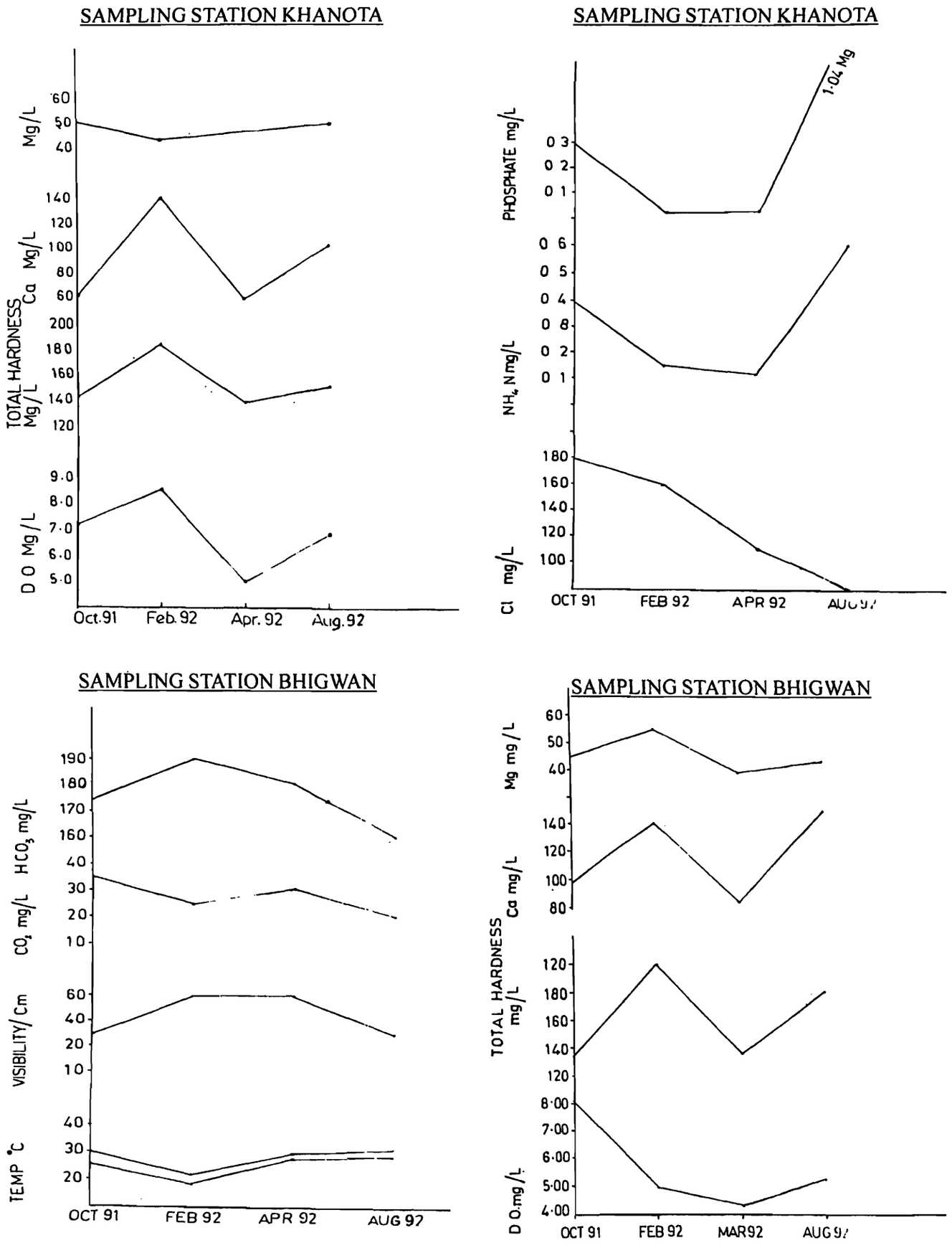
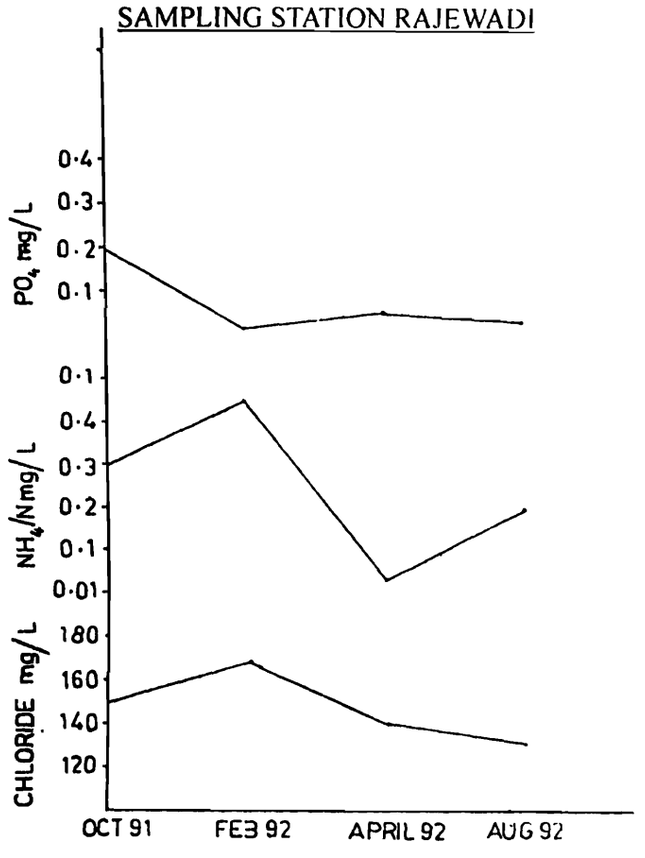
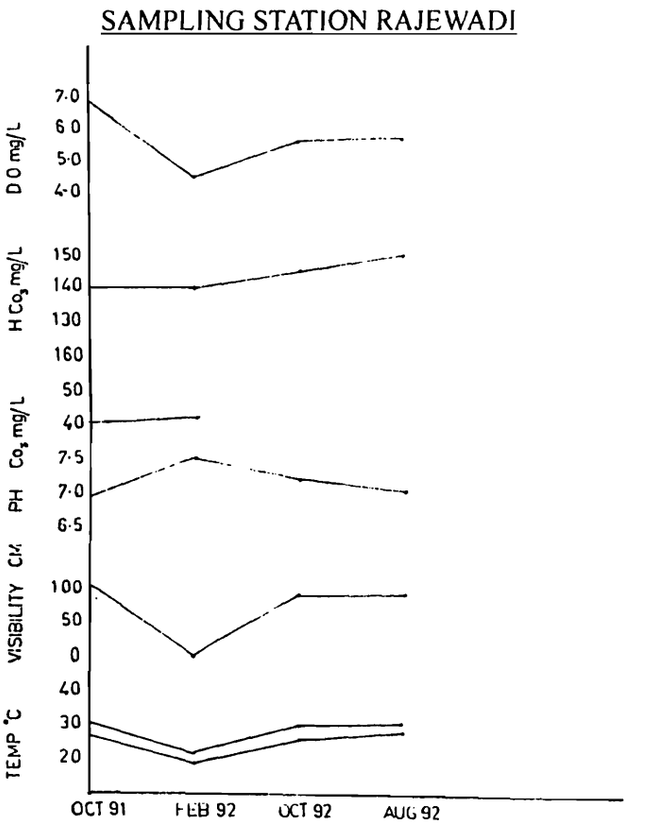
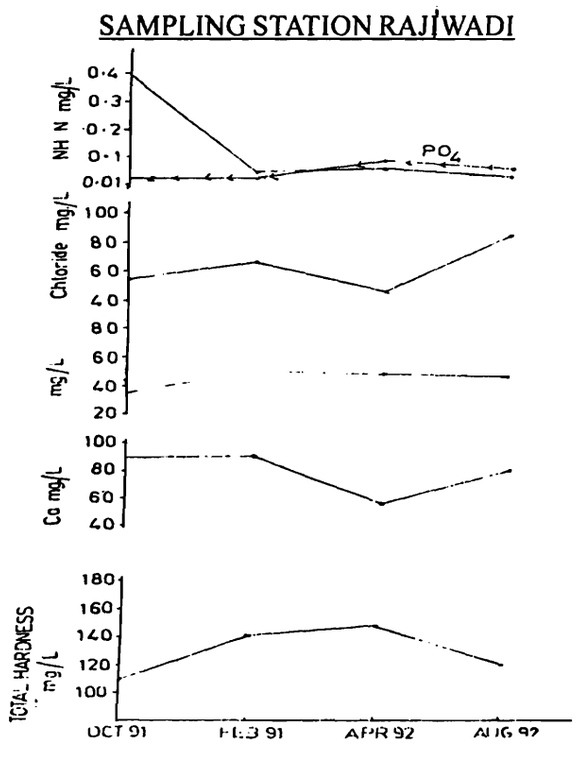


Fig. 12 : Seasonal Variations in dissolved oxygen, total hardness and calcium and magnessium content.
Fig. 13 : Seasonal Variations in chloride, ammoniacal nitrogen and phosphate in the water of Khanota Station.
Fig. 14 : Seasonal Variations in temperature, visibility CO_2 and bicarbonate in the water of Bhigwan Station.
Fig. 15 : Seasonal Variations in dissolved oxygen, total hardness and magnessium in the water of Bhigwan Station.







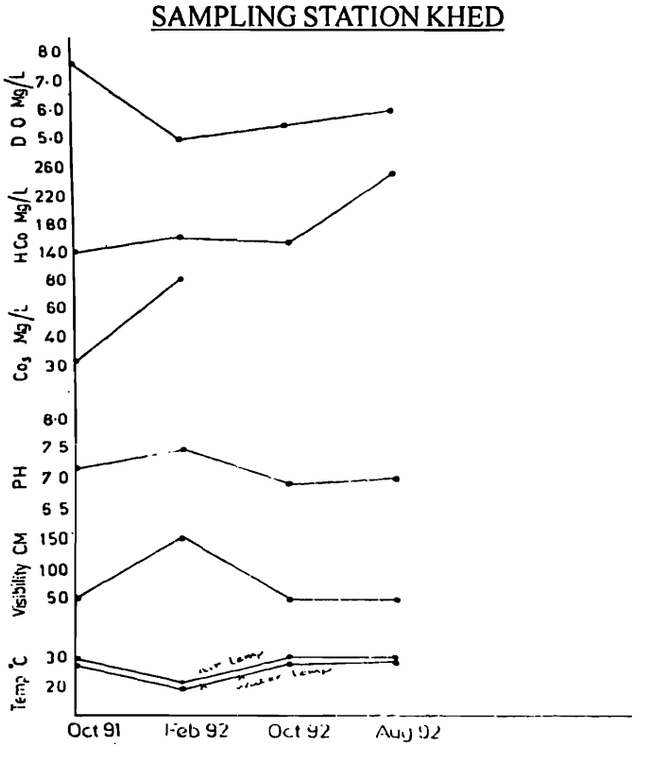
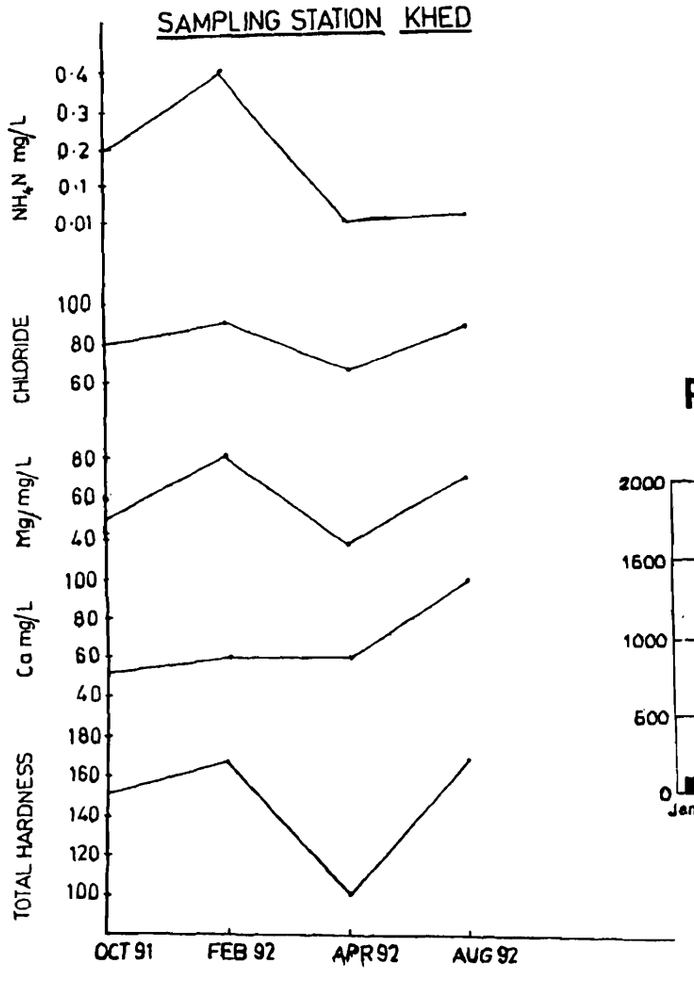
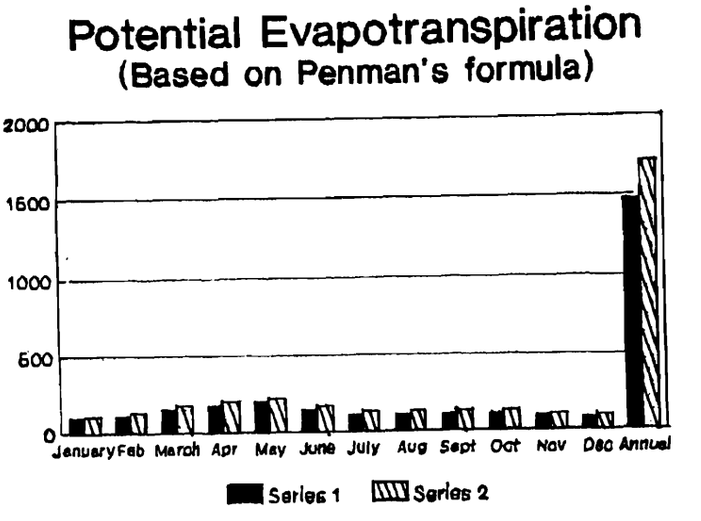


Fig. 16 : Seasonal Variations in chloride, ammoniacal nitrogen and phosphate in the water of Bhigwan Station. **Fig. 17 :** Seasonal Variations in temperature, visibility pH, CO_2 and bicarbonate and dissolved oxygen in the water of Rajewadi. **Fig. 18 :** Seasonal Variations in total hardness, calcium, magnessium, chloride and ammoniacal nitrogen in the water of Rajewari. **Fig. 19 :** Seasonal Variations in temperature, pH, CO_3, HCO_3, and dissolved oxygen in water of Khed Station.





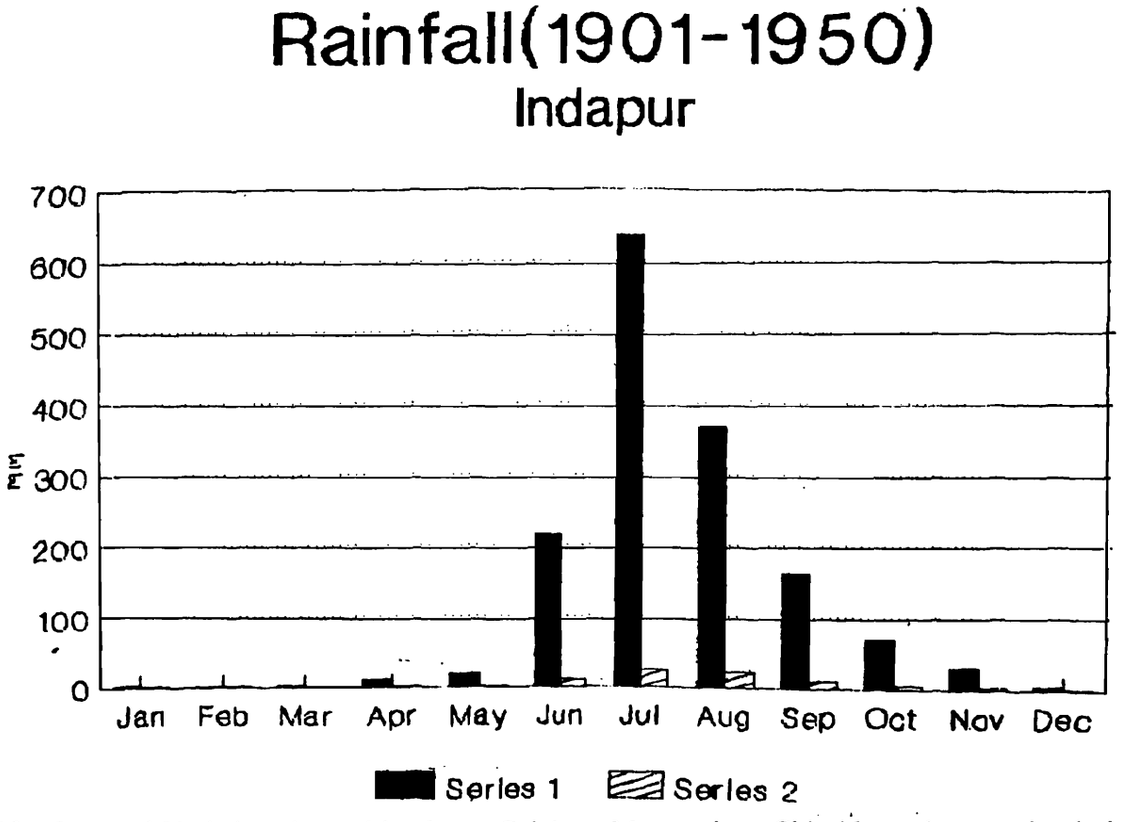


Fig. 20 : Seasonal Variations in total hardness, Calcium, Magnessium, Chloride, and ammoniacal nitrogen in the water of Khed Station.

Table 1. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92. at Saha Station

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		32	24	32	32.1	24-32.1
Water Temperature °C		28	22	29	27	22-29
Visibility cm (Seechi Transparency)		90	70	68	90	68-90
pH		7.1	7.5	6.8	7.8	6.8-7.5
Carbondioxide	mg/L	15	20	30	nil	nil-30
Carbonate	mg/L	30	40	nil	46	0-46
Bicarbonate	mg/L	150	225	180	180	150-225
Dissolved oxygen	mg/L	6.2	5.0	8.6	8.6	6.2-8.6
Total hardness	mg/L	102	150	136	168	102-168
Calcium	mg/L	60	105	82	105	60-105
Magnessium	mg/L	46	45	38	48	38-48
Chloride	mg/L	50	60	70	52	50-78
NH_4N	mg/L	0.10	0.04	0.04	0.02	.02-.10
Ortho Phosphate	mg/L	0.04	0.20	0.05	0.08	.04-.20
Total dissolved solid	mg/L	18	15	18	16	15-18
Conductivity (specific) μ ohm		50	60	80	120	50-120

Table 2. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92. at Station Rajewadi

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		31	22	30.5	31	22-31
Water Temperature °C		26	17	29.5	28.5	17-28.5
Visibility cm (Seechi Transparency)		Nil	Nil	90	90	Nil-90
pH		6.9	7.5	7.2	7.0	6.9-7.5
Carbondioxide	mg/L	Nil	Nil	20	10	Nil-20
Carbonate	mg/L	40	42	Nil	Nil	Nil-42
Bicarbonate	mg/L	140	140	145	150	140-150
Dissolved oxygen	mg/L	6.8	4.5	5.6	5.6	4.5-6.8
Total hardness	mg/L	110	140	148	120	110-148
Calcium	mg/L	90	90	56	80	56-90
Magnessium	mg/L	35	50	48	45	35-50
Chloride	mg/L	55	65	45	82	45-82
NH_4N	mg/L	0.4	0.04	0.05	0.02	0.02-0.4
Phosphate	mg/L	0.02	0.2	0.07	0.4	0.02-0.2
Total dissolved solid	mg/L	16	17	18	20	16-20
Conductivity (specific) μ ohm		96	72	78	86	72-96

Table 3. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92 at Station Palasdeo

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		31.5	23	30	31.0	23-31.5
Water Temperature °C		29.5	20	27.8	29.5	20-29.5
Visibility cm (Seechi Transparency)		100	90	60	60	60-100
pH		6.8	7.5	6.9	7.2	6.8-7.5
Carbondioxide	mg/L	20	18	60	25	18-60
Carbonate	mg/L	Nil	Nil	Nil	Nil	Nil
Bicarbonate	mg/L	160	205	160	170	160-205
Dissolved oxygen	mg/L	4.8	4.5	3.8	6.9	3.8-6.9
Total hardness	mg/L	140	200	130	162	130-200
Calcium	mg/L	80	152	75	102	75-152
Magnessium	mg/L	25	45	42	52	25-52
Chloride	mg/L	80	100	75	82	75-100
NH_4N	mg/L	0.92	0.08	0.03	0.02	0.02-0.92
Phosphate	mg/L	0.25	0.04	0.08	0.04	0.04-0.25
Total dissolved solid	mg/L	18	20	25	22	18-25
Conductivity (specific) μ ohm		75	80	81	61	61-81

Table 4. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92. at Station Khanota

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		35	21	31	31	21-31
Water Temperature °C		30	17	28.8	28	17-30
Visibility cm (Seechi Transparency)		30	45	30	30	30-45
pH		7.0	7.8	7.0	7.5	7.0-7.8
Carbondioxide	mg/L	30	Nil	10	Nil	Nil-30
Carbonate	mg/L	35	40	Nil	80	Nil-80
Bicarbonate	mg/L	168	160	160	178	160-178
Dissolved oxygen	mg/L	7.2	8.5	5.0	6.8	5.0-8.5
Total hardness	mg/L	142	184	138	150	138-184
Calcium	mg/L	60	140	58	100	58-140
Magnessium	mg/L	50	45	46	48	45-50
Chloride	mg/L	180	160	110	102	102-180
NH_4N	mg/L	0.4	0.05	0.02	0.6	0.02-0.6
Phosphate	mg/L	0.30	0.02	0.02	1.04	0.02-1.04
Total dissolved solid	mg/L	10	12	10	12	10-12
Conductivity (specific) μ ohm		4.5	8.5	9.5	7.2	4.5-9.5

Table 5. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92 at Station Bhigwan

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		31	22	30	31	22-31
Water Temperature °C		26	18	28.5	28.5	18-28.5
Visibility cm (Seechi Transparency)		35	60	60	30	30-60
pH		8.2	7.5	7.2	7.6	7.2-8.2
Carbondioxide	mg/L	35	25	30	20	20-35
Carbonate	mg/L	Nil	Nil	Nil	Nil	Nil
Bicarbonate	mg/L	175	190	180	160	160-190
Dissolved oxygen	mg/L	8.2	5.0	4.2	5.8	4.2-8.2
Total hardness	mg/L	135	200	136	180	135-200
Calcium	mg/L	80	140	82	148	80-148
Magnessium	mg/L	45	55	38	41	38-55
Chloride	mg/L	150	168	140	130	130-168
NH_4N	mg/L	0.30	0.45	0.04	0.2	0.04-0.30
Phosphate	mg/L	0.22	0.02	0.05	0.03	0.02-0.22
Total dissolved solid	mg/L	16	17	20	17	16-20
Conductivity (specific) uohm		120	60	65	90	60-120

Table 6. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92 at Station Khed

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		30	22	30	30	22-30
Water Temperature °C		26.7	19	27	28	19-28
Visibility cm (Seechi Transparency)		100	150	40	50	50-150
Ph		7.2	7.5	6.9	7.0	6.9-7.5
Carbondioxide	mg/L	Nil	Nil	15	Nil	Nil-15
Carbonate	mg/L	32	80	Nil	50	Nil-80
Bicarbonate	mg/L	140	160	154	248	140-248
Dissolved oxygen	mg/L	7.6	5.0	5.4	5.8	5.0-7.6
Total hardness	mg/L	150	168	100	170	100-170
Calcium	mg/L	56	60	60	100	56-100
Magnessium	mg/L	48	80	35	70	35-80
Chloride	mg/L	80	90	65	88	65-90
NH_4N	mg/L	0.2	0.4	0.01	0.02	0.01-0.2
Phosphate	mg/L	0.15	0.12	0.05	0.40	0.05-0.40
Total dissolved solid	mg/L	10	15	22	50	10-50
Conductivity (specific) μ ohm		80	86	100	90	80-100

Table 7. Showing Various Physico-chemical Parameters in Ujani Wetland Water in 91-92. at Station Khandar

Parameters		Oct 91	Feb 92	April 92	Aug 92	Range
Air Temperature °C		31	23.5	30	31.5	23.5-31.5
Water Temperature °C		26.5	22.00	26	28.5	22.0-28.5
Visibility cm (Secehi Transparency)		100	60	70	60	60-100
Ph		7.2	8.0	7.5	7.6	7.2-8
Carbondioxide	mg/L	Nil	Nil	20	Nil	Nil-20
Carbonate	mg/L	40	50	Nil	30	Nil-50
Bicarbonate	mg/L	165	145	168	180	145-180
Dissolved oxygen	mg/L	5.1	7.8	4.8	6.8	5.1-7.8
Total hardness	mg/L	106	140	150	158	106-158
Calcium	mg/L	56	100	80	100	56-100
Magnessium	mg/L	35	40	40	52	35-52
Chloride	mg/L	65	60	110	96	60-110
NH_4N	mg/L	0.01	0.02	0.02	0.09	0.01-0.09
Phosphate	mg/L	0.15	0.15	0.09	0.40	0.09-0.14
Total dissolved solid	mg/L	12	18	16	12	12-18
Conductivity (specific) μ ohm		70	70	74	90	70-90

Table 8. Showing Dissolved Oxygen distributions in the Wetland Water at various depth in Oct. 91

The samples of water from the deeper layer were collected in Oct. 91 with the help of kemmerer sampler. It was observed that the dissolved oxygen of the wetland water decreases as the depth increases following complete anoxic condition as shown below at various stations.

	Stations				
Depth in Meters	Palasdeo D. O. Mg/2	Khanota in Meters	Rajewadi in Meters	Kanthor in Meters	Saha in Meters
Surface	8.6	7.3	6.2	5.2	6.2
1. meter	8.0	6.1	5.0	3.4	5.0
2. meter	6.0	5.0	4.1	2.0	4.2
3. meter	4.3	3.8	2.9	1.0	2.0
Bottom	2.0	1.1	0.2	0.0	0.0

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LIMNOLOGICAL INVESTIGATIONS - BIOTIC FACTORS

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INTRODUCTION

Studies on biotic factors were carried out for Ujani wetland. The quantitative analysis of Zooplankton and Phytoplankton were made. The Zooplankton was composed of Rotifers cladocera, Copepods and Ostracods. Correlative studies between Obiotic factors and different groups of plankton of Wetland has been made to prepare a base line data for future study.

MATERIAL AND METHODS

Plankton samples were collected with the help of plankton net of silk bolting cloth (200 meshs/cm). In all, 40 litres of water was filtered through the net from each of the collecting stations in order to get all representatives from the samples (Fig. 1). The plankton net was washed again to obtain any adhering form within meshes of the net. Plankton collection were made for qualitative analysis by towing the net through the surface of water and live organisms were seen for qualitative analysis. Plankton concentrate was preserved in 5% buffered formalin. The quantitative estimation of zooplankton was carried out with the help of "Sedgwick Rafter Cell" under 100x magnification of Bionocular Microscope. The enumeration of Phytaplankton was made by drop method under high mignification of 400x.

On an average three counts were made for each sample and the mean concentration was calculated. From the mean value, concentration of both zoo and phytoplankton, the total count per litre was calculated. The individual plankton was considered as unit of organisms/litre of water. The seasonal percentage composition of different groups of Zooplankton and Phytoplankton is given in fig. 3 & 8.

Table No. 3 shows annual average percentage distribution of Zooplankton during 91-92 at different stations.

Annual average % composition of Zooplankton of wetland.

Rotifera	48.00%	Cladocera	30.16%
Copepoda	22.00%	Ostracoda	00.62%

It is clear from the above data that Rotifer was the dominant group.

ROTIFER

Rotifers were the most dominant group almost throughout the year except at few stations. *Brachions calyciflorus* and *B. angularis* were the dominant species wetland. Seasonal variation of Rotifer group is given in fig. (1 & 2). In all, 17 species of the group were observed in this wetland, but their distribution in population was not much prominent where as their occurrence was very much irregular (Tables 5, 7, 9 & 11).

Seasonal distribution of Rotifer was highly variable at all the stations depending upon the concentration of Dissolved oxygen & free carbondioxide. In all, seventeen species of Rotifer were observed but their pattern of distribution was very irregular. Major peaks were observed in the winter months i.e. January, February to December. As many as 6 species of *Brachionus* were seen in the samples of Ujani wetland whereas *Brachionus falcatus* and *B. quadridentatus* were absent in the samples of summer season. The population of Rotifer was more than Cladocera & Copepoda.

CLADOCERA

Cladocera was the second dominant group of Zooplankton. In all 10 species of Cladocera were studied. The Cladoceran fauna in the quantitative analysis was well represented in the reduced number of predators. *Moina micrura* and *Diaphanosoma sarsi* were the dominant forms found in the samples. The peaks of Cladocera & Copepods were noticed in the month of February 92 and April 92 respectively.

COPEPODA

Copepods were not observed in large numbers but found in the samples throughout the period of investigations. The pulses were dominated by cyclopoids and calanoids copepods. The copepodids stages of cyclopoids and calanoids were counted with the adult copepods. Efforts were also made to count them in particular species of copepoda. Two peaks were observed first in Feb. and second in April 92 (Fig. 1 & 2). Nauplii were poorly represented (Tables 5, 7, 9 & 11) (Figs. 1 & 2).

OSTRACODS

Ostracods were represented by very few species in the samples studied as most of the species are bottom dwellers. However, attempts were made to collect the species of Ostracods from the bottom mud.

PHYTOPLANKTON

Phytoplankton samples were collected and the identification of various forms were made upto genera only. During the one year seasonal study 23 genera were recorded of which 5 belong to Myxophyceae 2 to Euglenophyceae, 10 to Chlorophyceae and 6 to Bacillariophyceae. The total phytoplankton peak was (Table 2) observed in the month of April 92 with one minor peak in Oct. 92. Annual avarage percentage of phytoplankton is given below.

The quantitative data on Phytoplankton clearly show their abundance in the wetland. The analysis of relative abundance shows that chlorophyceae was the most dominant group followed by bacillariophyceae and myxophyceae (Table 4) (Fig. 8).

MYXOPHYCEAE

It was quite interesting to note that myxophyceae was composed of mainly *Anabaena, Oscillatoria, Spirulina Merismopedia & Nostoc.* The maximum population was found in the month of October at stations Khanota, Khandar and at Khed in April 92.

CHLOROPHYCEAE

It was represented by *Eudorina, Cosmariun, Pandorina, Staurastrum Pediastrum, Closterium, Scenedesmus, Hydrodicton, Volvox* and *Spirogyra.* The maximum concentration was recorded in the month of April 92 at Saha, Palasdeo, Rajewadi, Bhigwan & Khed. At Kandhar in October 91.

EUGLENOPHYCEAE

Euglenophyceae was poorly represented by *Euglena & Phacus* and percentage never exceeded above 4.

BACILLARIOPHYCEAE

Many members of bacillariophyceae occurred during certain month of the year. The diatoms showed maxima in the months of August and October at almost all stations. The main genera represented were *Cyclotella, Fragillaria, Pinnularia, Synedra, Navicula & Asterionella.*

Annual average % composition of phytoplankton

Myxophyceae	25.73%	Chlorophyceae	37.87%
Euglenophyceae	0.06%	Bacillariophyceae	36.43%

DISCUSSION

Seventeen species of Rotifers were recorded. The appearance of all the species were very sparse & irregular. Two peaks were observed in the months of winter. Pennak (1949, 1955) could not observe any seasonal periodicity. In the present study seasonal winter abundance is observed. This is in contrast to summer abundance as studied by Nayar 1970 and Patil 1976, Patil et. al. 1985.

Rotifers are generally been considered to indicate trophic status of the water body (pejler, 1957, Radwan 1976, Arora 1961, 1966). As such Rotifers are well known for cosmopolitanism (Ameren 1964, Green 1967, Patil 1976, Patil *et.al.* 1985) but there is large differences between temperate and tropical rotifers of wetland. In the present study, majority of Rotifer species are cosmopolitan and some of them were noticed when the temperature was high. However there are cosmotropical species also. As many as 5 species of *Brachionus* were observed in Ujani wetland. Green (1972) pointed out that *Brachionus* is important genus for the tropical area than temperate and northern area. The present study on Rotifers of Ujani wetland corroborates the view of Green. Lair (1980) stated that genera *Brachionus* and *keratella* are very sensitive to increase in temperature but it does not hold good in present investigations.

The density of Rotifers of wetland was more than crustacean groups belonging to (i.e. cladocera, Ostracoda and copepoda). The specific reason at present could not be given as there is no evidence in the form of experimental data but it can be opined that feeding activities of fishes on large crustaceans, the rotifer becomes abundant and to the absence of predators fish fauna as observed by Pennington (1961), the detail rapid, replacement of rotifers by *Daphnia* in tube culture of micro algae. Thus the depleted number of crustaceans, the rotifers exceed in the plankton samples.

There are number of opinions regarding dominance of Rotifers. Yousuf and Quadri attributed

it to temperature which is the main factor for appearance of Rotifers while Davis (1955) has stated that pH is the important parameter in controlling the rotifer populations. Balkhi et. al. (1984) pointed out that temperature and dissolved oxygen have their influence on the abundance of species composition of Rotifers in Anchor lake. Compbell (1941) attributed it to three factors like dissolved oxygen, CO_2 and pH in freshwater plankton. However in the present wetland, Rotifer did not show any marked relationship with any of physicochemical parameters and peaks occurred and with no specific pattern.

Summer season has been considered suitable for the peak of loricate rotifers i.e. April & May (Michael 1964 & Patil 1976) when the alkalinity & temperature is high as stated by Byars (1960). In the present wetland water the peak was observed in August or February. There was no prominent peak and their occurrence was irregular.

The species of Rotifer *Keratella valga* appears to be indicative of Mesotrophic environment (Leentavaar, 1980). Pajler (1957) stated that this species is distributed in Northern region and he related it to low temperature. Leentavaar (1980) suggests that distribution of this species is also controlled by water quality. The present investigation corroborates the view of Leentavaar. *Fililia longiseta* & *F. terminalis* were present in winter. Ruttner (1980) concluded that in warm climate *Filinia longiseta* may occur and in warm monomictic lake *F. terminalis* does not show its occurrence however, *F. longiseta* occurs/or may be present.

It is observed that the genus *Brachionus* showed its occurrence in the water of the wetland with complete absence of boreal genus *Notholca* which is the characteristic of many tropical waters as stated by Green (1972) and Chengalath et. al. (1974). The same holds good in the present study.

CRUSTACEANS

The seasonal population dynamics of 10 species of Cladocera, 3 species of copepoda, 3 species of Ostracods was studied. The cladoceran was second dominant group. *Moina* & *Diaphanosoma* were the two genera found throughout the period of investigation. The peaks of cladocera and copepods were observed in Feb. 92 & April 92 respectively except at Rajewadi & Khandar. Nauplii were poorly represented in the samples.

In all, ten species of cladocera were observed in wetland water during quantitative estimation of plankton samples collected for this purpose. However, in qualitative samples much more species were observed among Macrophytes by our co-worker (Dr. P. D. Rane). As such the population of cladocera in the wetland was good and as per annual percentage composition of zooplankton, cladocera was the second dominant group followed by copepoda. The reason might be due to good fish population in the wetland and in the presence of good number of predator the crustaceans come in the second and third rank. This is further supported by Harbaeck et al. (1961) that when the fish stock was low, the large size *Daphnia* comprised 80% of the population. *Diaphanosoma sarsi* & *Moina micrura* were the only cladocerans found throughout the period of investigation. Both these species are *euryplastic* and can tolerate wide range of temperature. *Microthrix spinosa, Ceriodaphnia cornuta, Diaphanosoma sarsi, simocephlus vetulus, Moina micrura* and *Chydorus sphaericus* were the species slightly better represented in the samples. Other species of cladocera were sparse and their distribution was irregular.

The cladoceran distribution pattern in the wetland was not found much fixed and from a one year study we cannot attribute with certaintity that this wetland may not have fixed seasonal pattern of abundance. Nordlie (1976) pointed out that there are two types of zooplankton assemblages occurred in the Florida lake, one type is poor in Cladocera and rich in Rotifer and in the second type assemblage rich in Cladocera with reduced numbers of Rotifers. The first type assemblage is found in the present wetland. The diversity among cladocera is related with vegetations like *Ceratophyllum, Hydrilla, Eichhornia* etc. This corroborates the views of Shireman and Martin (1978) & Quade (1969) and Patil (in press).

In all ten species of Cladocera were recorded. The most abundant tropical species were *Diaphanosoma sarsi, Ceriodaphnia cornuta, Moina micrura* and *simocephalus vetulus.* The Cladocerans and to some extent copepods play marked role in vertical migration on daily basis Bhatnagar (1984). However chemical nature of water is also important in determining the distribution of these Crustaceans. Here the two pulses of Cladocerans were recorded one in Feb. 1992 and other in April 92. The peak of copepods was found once only with stable distribution of this group throughout the year. As stated by Swar & Fernando (1980) the different peaks of different zooplankton groups were observed in various months and those were not related to the changes in temperature. The pH of the wetland water and its fluctuations was very limited and there was no significant effect of pH on the zooplankton as shown by Swar & Fernando (1980). This is in contrast to earlier observations of Das & Srivastava (1956) & Moitra and Bhattacharya (1965) that zooplankton vary inversely with pH.

During one year study it was noticed that all the species populations size could not attain the original populations when the work was initiated. Keen (1976) stated that the chydorid cladocerans attain its original population size at the initiation of his studies it does not seem so in the present investigation.

Brooks & Dodson (1965), Harbaeck *et. al.* (1961) & Patil (1978) have concluded that the larger species get replaced by smaller one. In similar way the large size Cladocera, Copepoda & Ostracoda falls first pray of the fish fauna thus affecting the planktonic Crustacean population.

Data on physicochemical parameters is already discussed in the earlier part of this work. This data are adopted here for interpretations.

Comita and Anderson (1959) & Edmondson (1965) pointed out that availability of food affect fertility of females thus indirectly affecting birth rate and mortality of zooplankton. It seems to be true in the present investigation. Thus food is one of the vital factors which control zooplankton population as suggested by Swar & Fernando, 1980, Patil & Panda (in press).

The population of cyclopoids and calanoids were abundant and ranks third in the percentage composition. The abundance of copepods in tropical eutrophic water has been already noted by Burgis, (1974). Copepods was represented by three genera only *i.e. Cyclops, Diaptomus* and *Mesocyclops,* Reid & Wood (1976) have stated that copepods were abundant in open water than cladocerans although the number of species of former may be less. It holds good in the present study. This group was present in the sample through out the period of investigation. The maximum intensity shown by copepods was in the months of Feb. & April 92 and the maximum number was 80 units/ litre in April 91 at Rajewadi. The annual percentage composition of copepods was 22.73%. This shows that copepods population was comparatively better in the

wetland water. The peaks of copepods & phytoplankton did not exactly coincide with each other but follow one another (Patil, 1976). This is in contrast to the observations of Kow (1953). Nauplii show difinite peaks which perhaps indicate active period of reproduction.

Vaas & Vass Vanoven (1959) have stated that generally microcrustaceans feed on minute phytoplanktonic forms, epiphyton and detritus. It seems to be reasonable that there is direct relation between phytoplankton and copepods.

PHYTOPLANKTON

Seasonal variations on the population of phytoplankton were studied for a period of one year. The identification of various groups of algae were made upto generic level only. In all 23 genera were observed of which 5 belong to Myxophyceae 2 to Euglenophceae, 10 to Chlorophyceae and 6 to Bacillariophyceae. The total phytoplankton peak was observed either in the month of April or October at seven different stations. The percentage distribution data on various groups of algae reveals that in almost all stations the chlorophyceae was the dominant group usually followed by bacillariophyceae. Myxophyceae were also better represented but Euglenophyceae was very poorly represented. The important work in this field are of (Ganapati, 1940, Das & Srivastava 1955 a, George 1962, Zafar 1964, Lakshminarayana 1965, Singh 1960, Zafar 1964, Patil 1976. Patil *et. al.* 1985 and others). Many workers attributed such studies toward understanding the ecology of Phytoplankton and importance of fish food, indicators of pollution and trophic status of the water bodies. In present study, such type of studies of a freshwater wetland has been carried out from 91 to 92 since such studies on wetland of India especially of Maharashtra are not reported in detail.

Chlorophyceae was the dominant group in the phytoplankton population and the average annual % composition was 37.87%. The percentage is comparatively high as compared to those mesotrophic waterbodies studied by Patil (1976). Considering the density of algae in the wetland, this wetland system can be considered as one of the "Mesotrophic System" As the myxophyceae density was comparatively low and the water was without any prominent algal bloom (Welch, 1952). The maxima of myxophyceae was generally observed in the month of October, when the water temperature was quite high but the maxima was not observed in the month of summer as has been shown by Chu & Tiffany (1951) Pearsall (1932). At some stations sometimes it was also seen in April month.

Chlorophyceae was the main dominant group followed by bacillariophyceae, myxophyceae and euglenophyceae. It was always observed that the euglenophyceae was poorly represented and its occurrence was very irregular as already reported by Patil (1977). Among these four group green algae and diatoms were well represented in the wetland water. Chlorococales was not maximum when the pH was high. This is in contrast to the finding of Gonzalves & Joshi (1946) and Munawar (1970) and agrees with the findings of Kant and Anand (1978).

In the present study the maxima of phytoplankton were seen in different months April & Oct. and the pH was varied at different station from 6 to 8.5. This corroborate the view of Vyas & Kumar (1968) that the Phytoplankton peaks were observed when the temperature and pH was high.

Dominance of phytoplankton over zooplankton was observed. Temperature plays an important

role in seasonal periodicity of Phytoplankton (This is in agreement with the findings of (Hutchinson, 1944, Macombie, 1953) and this is in contrast to the observations of (Jana 1973, Chari 1980, 1985). Gross primary production was 5.25 gm CM2/day to 7.9 gm CM2/day.

George (1966) pointed out that diatoms did not form a major group of phytoplankton in Delhi tanks. Alikunhi *et. al.* (1955) also reported same thing in freshwaters of Cuttack; in the present study diatom seems to be the second major group. George (1963) pointed out that this apparent numerical inferiority of the diatoms appear to be related with food chain and stated that there is not equal preference of various planktivore to algae. Diatoms are completely digested and there is no other chance of appearing again, once it is taken inside whereas most of the blue green algae can appear again through the alimentory canal practically without any harm Patil et. al. (1985). In present study we cannot atribute to digestion with certaintity as we have no direct evidence in the form of experimental data. Direct relationship could be established between the bloom of green algae and the low phosphate content, suggests utility of the nutrients for the growth of green algae (Komarovasky 1953). Well marked relationship between ammoniacal N2 & diatoms abundance could not be established.

It is well known that when D. O. value is high the phytoplankton has to be rich. Same holds good here in Ujani wetland. The most undesirable effect of eutrophication is the change of the flora i.e. diatom to green to nuisance blue green which were favoured by increased nutrients. Thus formation of different food chains leading to less desirable fish species (Casterlin and Reynolds, 1977).

List of Zooplankton species of wetland

A. **Rotifera**

Rotaria rotaria Pallas

Conochilus unicornis Rosselet.

Filinia longiseta Ehrenberg.

F. terminalis Plate.

Keratella cochlearis Gosse.

K. tropica Apstein.

Asplanchna intermedia Hudson.

Trichocerca cylindrica Imhoff.

Brachionus angularis Gosse.

B. calyciflorus Wierzeijski.

B. caudatus Barrois & Daday.

B. forficula Wierzeijski.

B. quadridentata Hermann.

B. urceolaris O.F. Muller.

Ephiphanes macrourus Barrois & Daday.

Lecane (M) *bulla* Gosse.

L. closterocerca Schmarda.

B. **Cladocera**

Diaphanosoma sarsi Richard.

Simocphalus vetulus (O.F. Muller).

Scapholeberis kingi Sars.

Moina micrura karz.

Ceriodaphnia cornuta Sars.

Macrothrix spinosa King.

Chydorus sphaericus (O.F. Muller).

Chydorus reticulatus Daday.

Biapertura Karua (King).

Pleuroxus aduncus (Jurine).

Copepoda

1. *Cyclops* sp.
2. *Mesocyclops hyalinus* Rehberg.
3. *Diaptomus* sp.

Ostracoda

1. *Stenocypris* sp.
2. *Strandesia indica* Hartmann.
3. *Cypretta globossa* Sars.

List of Phytoplankton

Myxophyceae

1. *Oscilatoria*
2. *Spirulina*
3. *Anabaena*
4. *Nostoc*
5. *Merismopaedia*

Chlorophyceae

1. *Eudorina*
2. *Pediastrum*
3. *Closterium*
4. *Scenedesmus*
5. *Spirogyra*
6. *Cosmerium*
7. *Hydrodicton*
8. *Pandorina*
9. *Volvox*
10. *Staurastrum*

Euglenophyceae

1. *Euglena*
2. *Phacus*

Bacillariophyceae

1. *Cyclotella*
2. *Fragillaria*
3. *Pinnularia*
4. *Synedra*
5. *Navicula*
6. *Asterionella*

AQUATIC WEEDS

Aquatic weeds are dominant in this wetland and they are problematic in tropical and subtropical countries where a warm water and increasing number of dams, reservoir, irrigation projects are found useless by aquatic weeds which reduce water flow as much as four fifth. Over-abundance develops severe problems for development of fisheries, public health, irrigation thus interfering the human activities and decreases the efficiency in which aquatic resources are utilised. However they are important in food web in aquatic ecosystem. They provide support, shelter and oxygen to other organisms and play an important role in biological production. In the month of october 1991 the nutrient of this wetland remained trapped in the macrophytes indirectly affecting phytoplankton production. The list of Aquatic macrophytes is given below :

Name of Plants	Family	Habitat	Status
Jusiaea repens Linnaeus	Ongraceae	Semiaquatic	MA
Ipomea aquatica Forsk	Convolvulaceae	Aquatic	MA
Ipomea sp.	-do-	-do-	MA
Polygonum glabrum wild	Polygoniaceae	Semiaquatic	
Hydrilla verticillata Route	Hydrocharitaceae	Aquatic	RS.
Vallisnania spiralis Linnaeus	-do-	-do-	RS.
Otellia Olismoides Pers	-do-	-do-	RS.
Lemna minor Linnaeus	Lemnaecae	-do-	FF
Potamogeton indicus Roxb	Potamagetonaceae	-do-	RS.
Najas indica Cham	Naidaceae	-do-	RS.
Paspallum sp.	Poaceae	-do-	MA
Azolla pinnata Roxb	Salviniceae	Aquatic	FF
Ceratophyllum demersum Linnacus	Ceratophyllaceae	-do-	RS.
Hygrorysa sp.	Graminae	-do-	MA
Eichhornia crassipes (Mart)	Pontedesiaceae	-do-	FF

MA–Marshy Amphibious Rs. Rooted Submergent, FF-Free floating

SUMMARY

The studies on zooplankton and phytoplankton were carried out for a period of one year. The quantitative analysis of plankton reveals that the zooplankton was composed of Rotifers, Cladocera, Copepods and Ostracods, whereas, Phytoplankton was composed of Chlorophyceae, Euglenophyceae, Bacillariophyceae and Myxophyceae. Correlative studies between abiotic factors and different groups of plankton of wetland were made and the results are given in tables and graphs.

From a year round investigations 33 species of zooplankton were seen while counting plankton samples. Their seasonal variations (in major groups) are given in Table 1 and Fig. (1, 2) for different sampling stations. In all 17 species of Rotifers, 10 Cladocera, 3 copepods and 3 ostracods species were noticed in the quantitative analysis of zooplankton (Tables 5, 7, 9, 11). The zooplankton was comparatively low, where as phytoplankton (Tables 6, 8, 10, 12) was better represented. The maxima of zooplankton was observed in the month of Feb. 1992 at Khed and it was 302 unitperlitre. However, other peaks were noticed in the months of April and August. The annual average percentage composition of major groups of zooplankton and phytoplankton is given in Table 3 and 4, Figs. 2 and 8 respectively.

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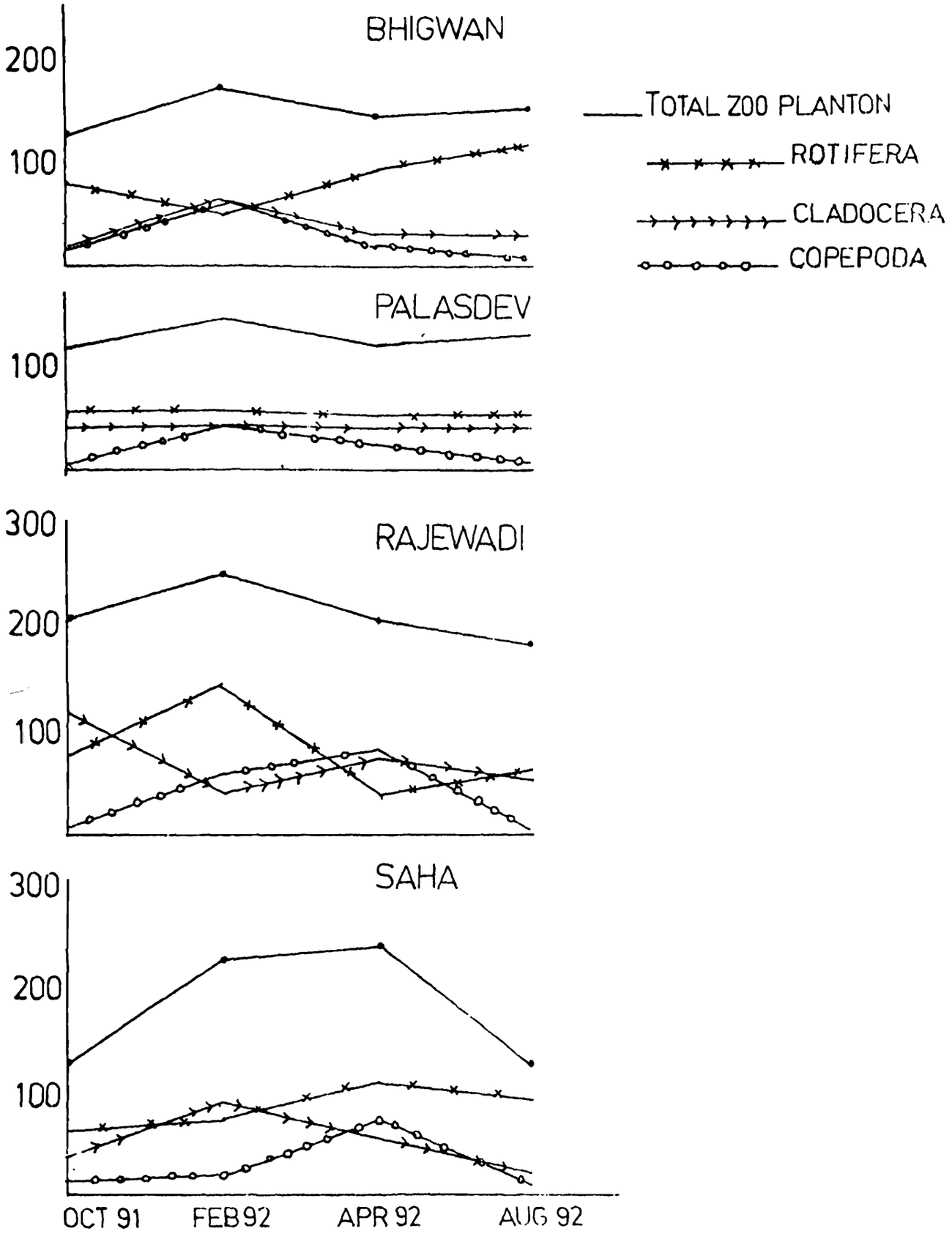

Fig. 1. Showing seasonal variations in total Zooplankton, Rotifera, Cladocera and Ostracoda Population

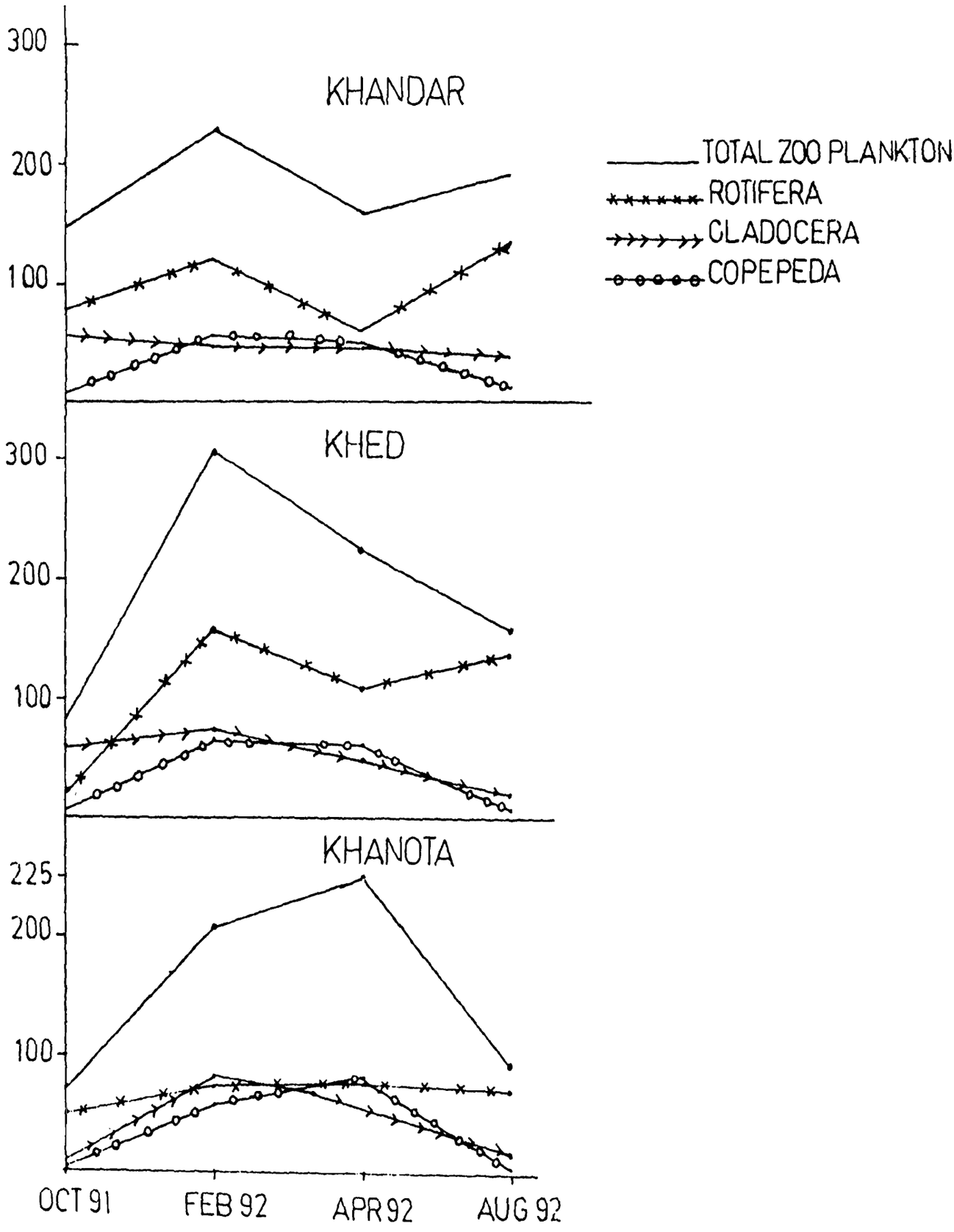

Fig. 2. Showing seasonal variations in total Zooplankton, Rotifers, Cladocera and Ostracods

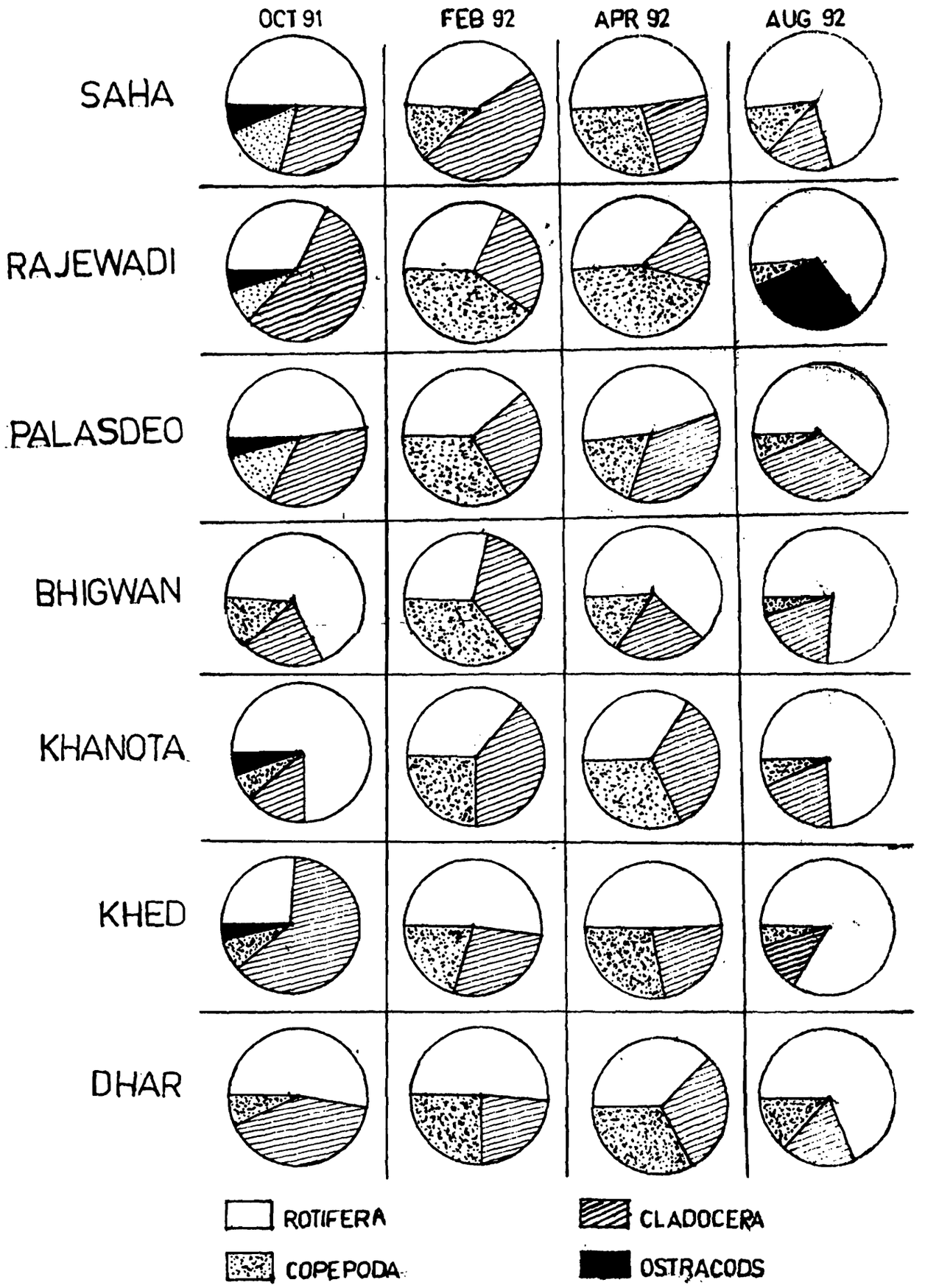

Fig. 3 : Seasonal variations in percentage composition of zooplankton at different stations in Ujani Wetland

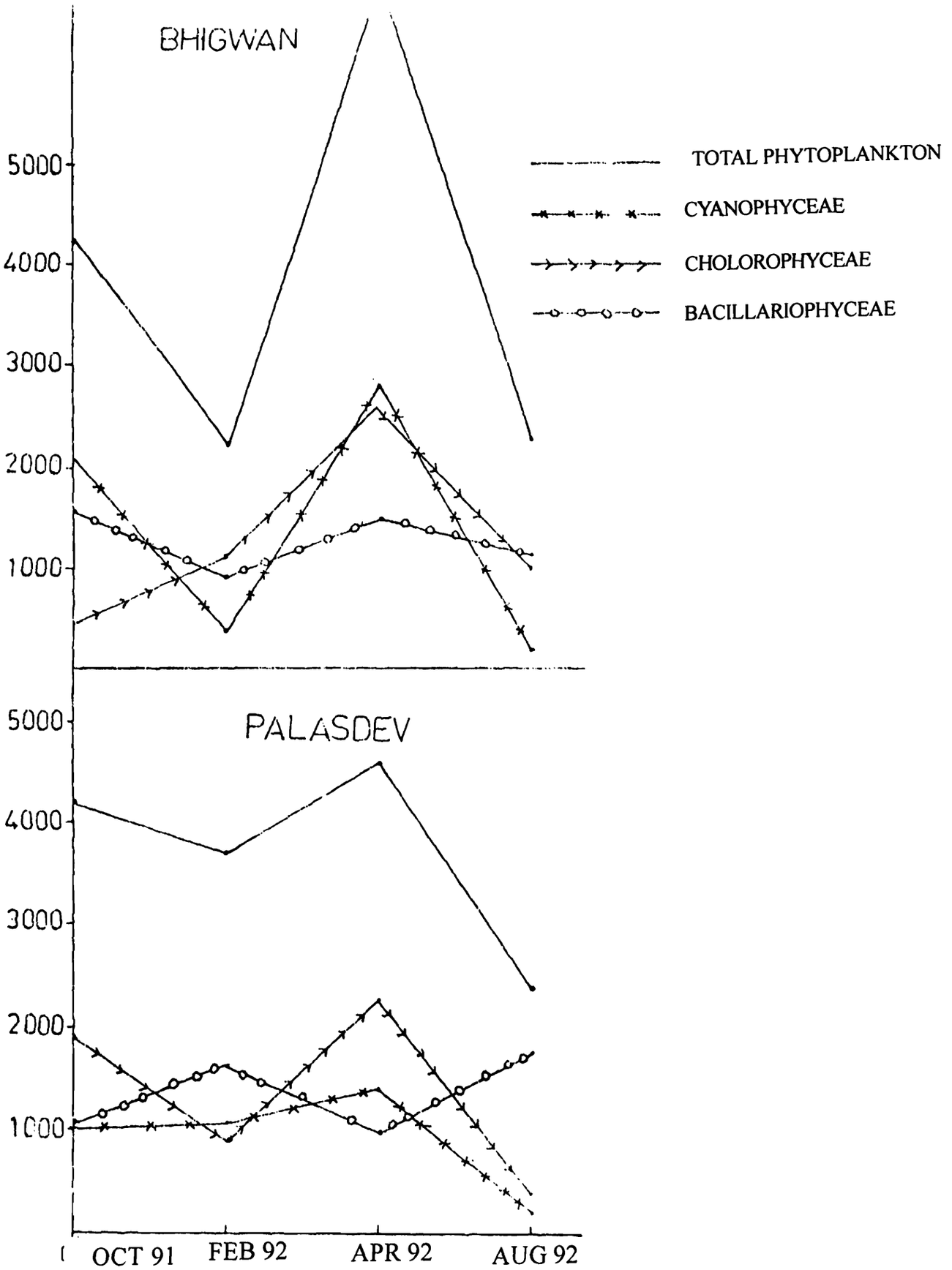

Fig. 4. Showing seasonal variations in Total Phytoplankton, Cyanophyceae, Chlorophyceae Euglenophyceae and Bacillariophyceae population.

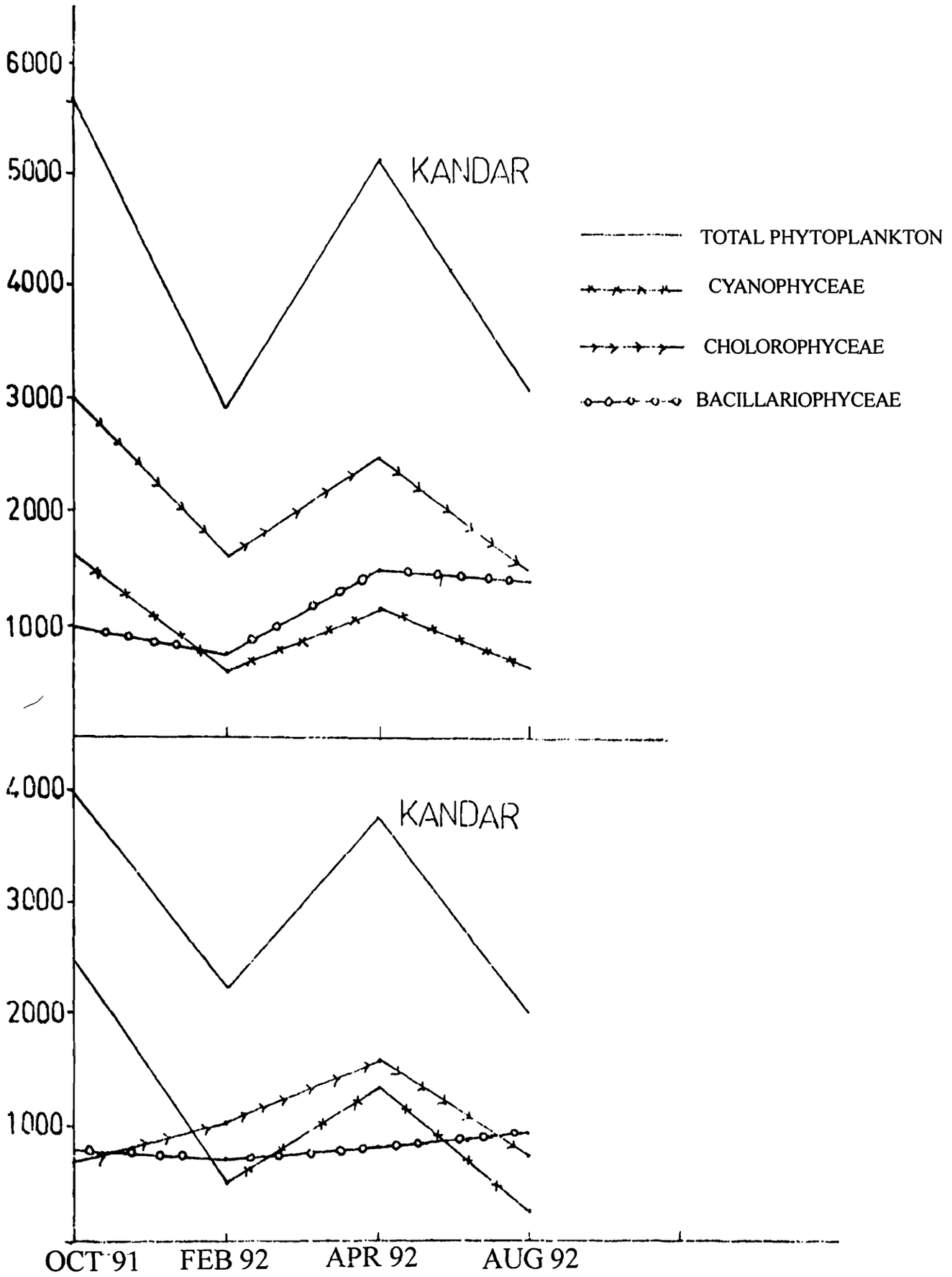

Fig. 5. Showing seasonal variations in total Phytoplankton, Cyanophyceae, Cholorophyceae Euglenophyceae and Bacillariophyceae

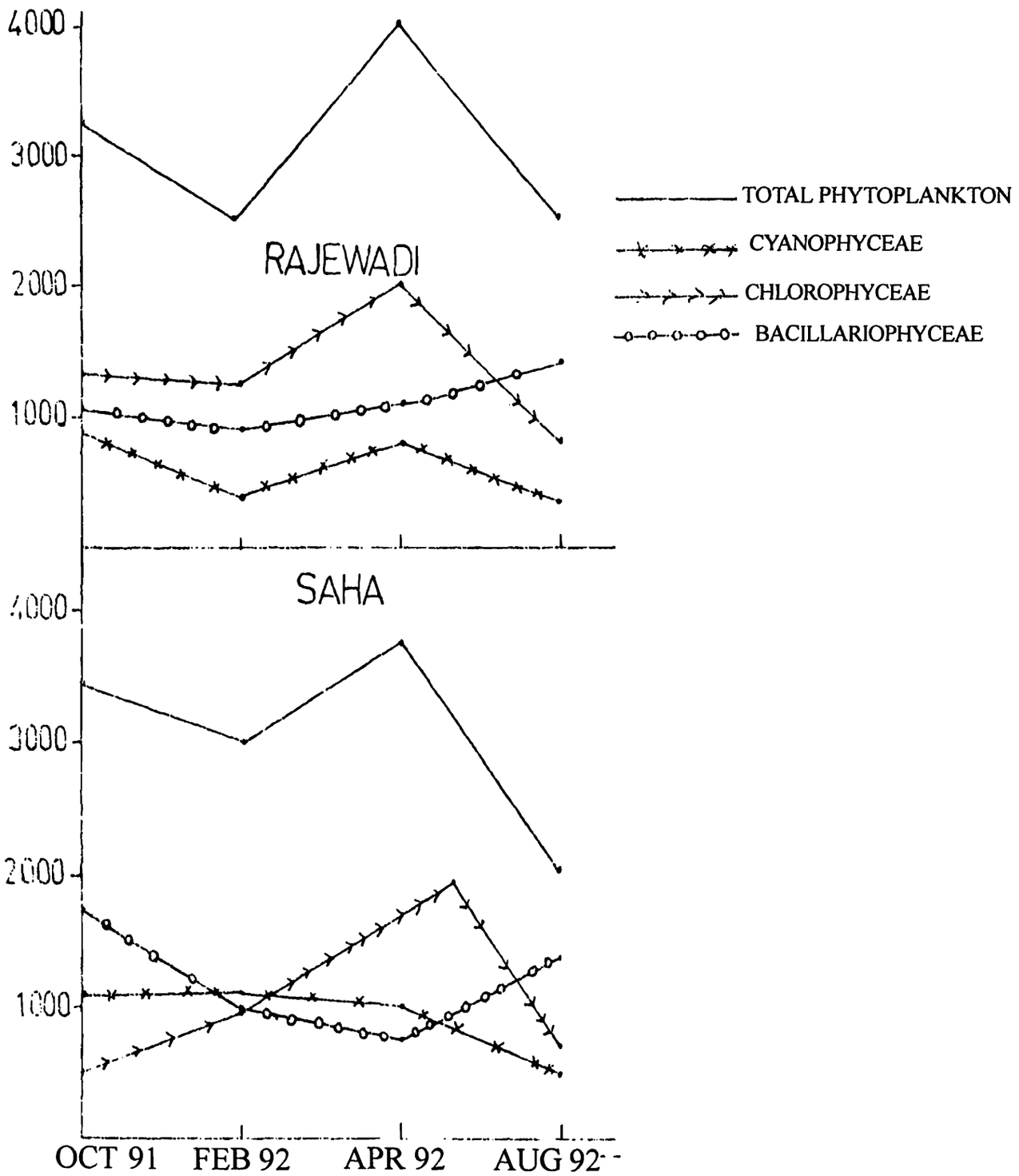

Fig. 6. Showing seasonal variations in total Phytoplankton, Cyanophyceae, Chlorophyceae Euglenophyceae and Bacillariophyceae population

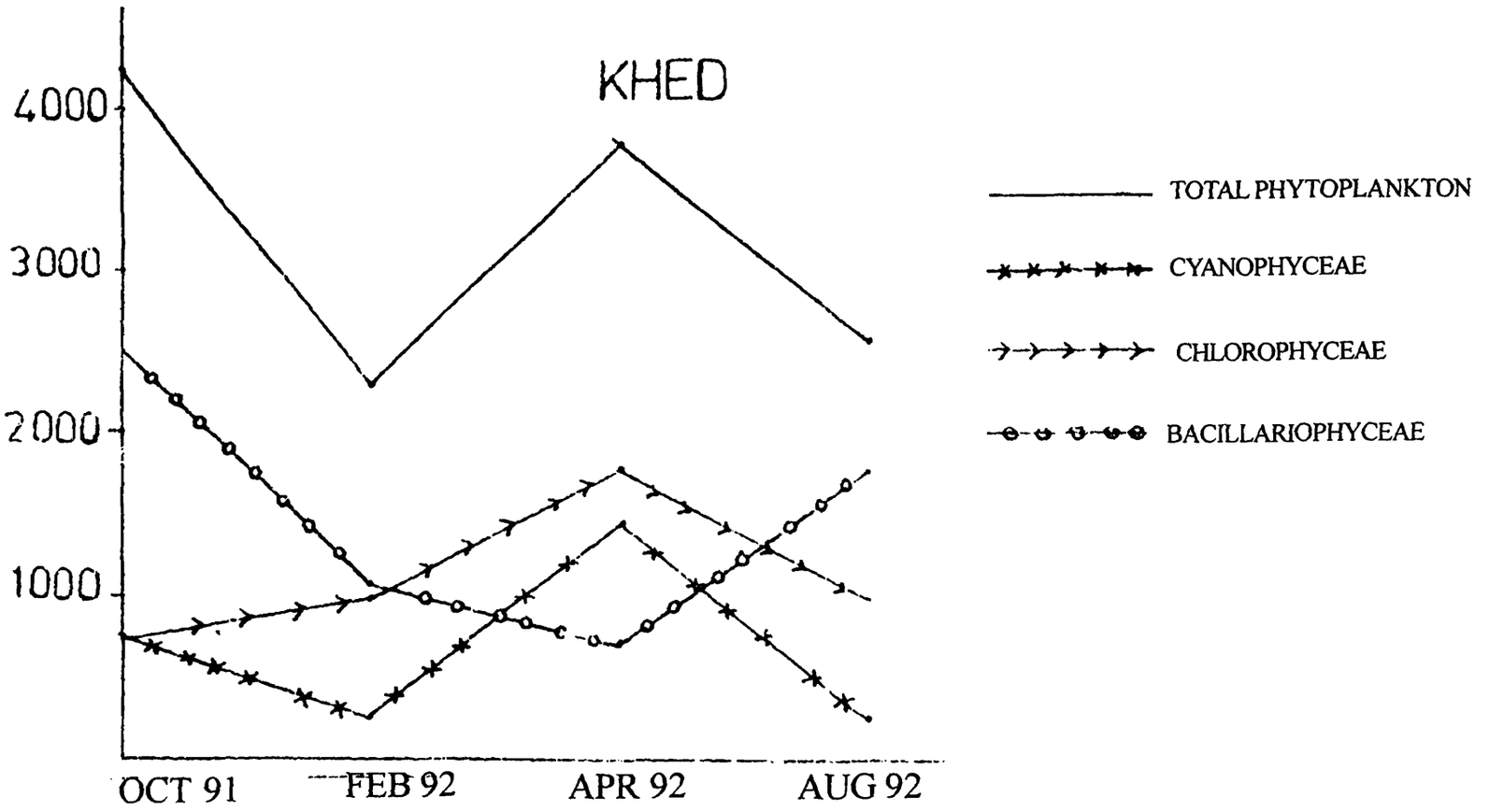

Fig. 7. Showing seasonal Variatinis in total Phytoplanton, Cyonophyceae, Chlorophyceae Euglenophyceae, and Bacillariophyceae population.

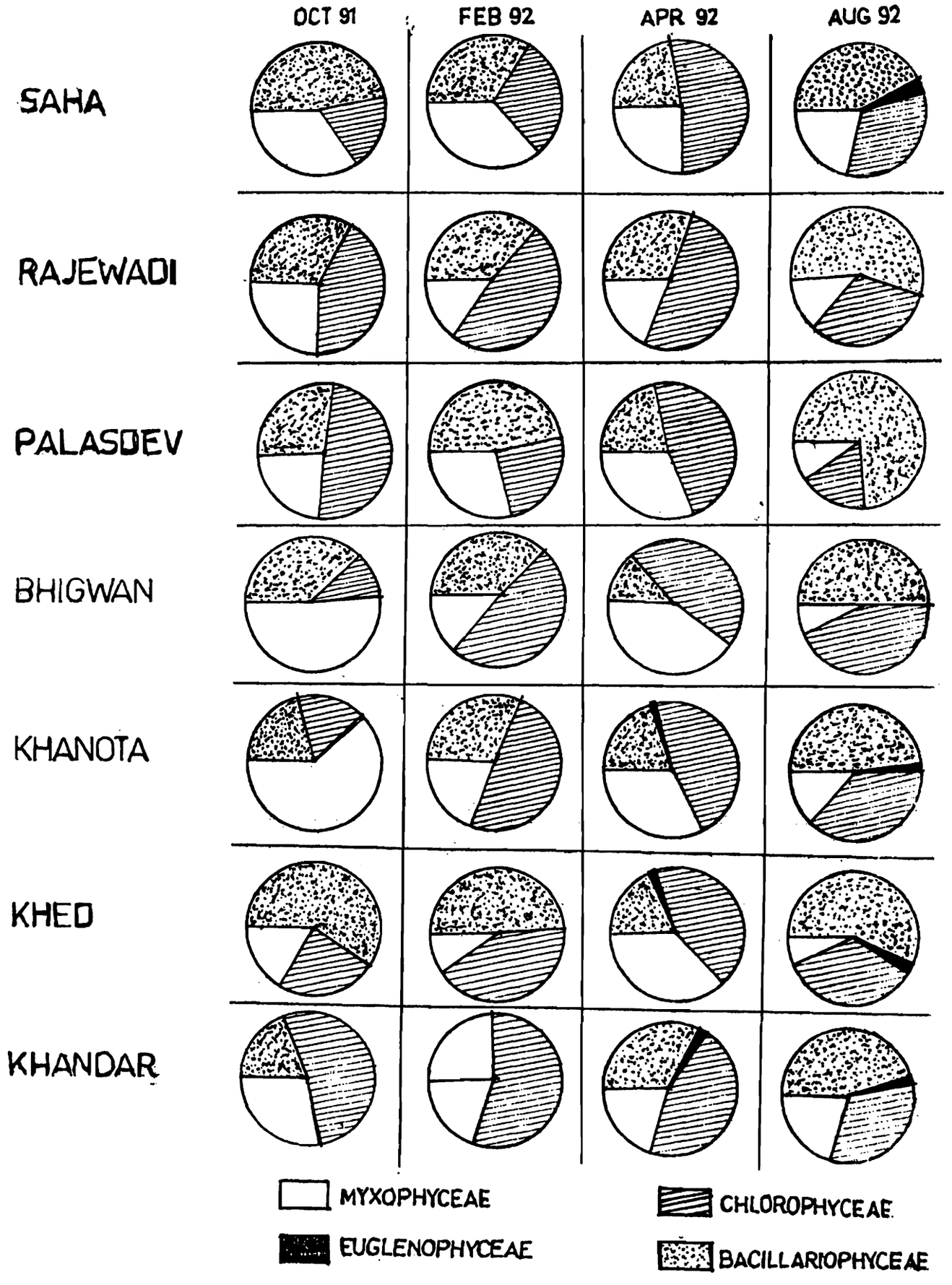

Fig. 8 : Seasonal variations in percentage composition of Phytoplankton at different stations in Ujani Wetland.

Table 1. Showing Total Zooplankton Units Per Litre at Different Sampling Stations In Ujani Wetland

Zooplankton	October 91	February 92	April 92	Aug. 92
Station Saha				
Rotifers	63	72	112	90
Cladocera	40	88	56	22
Copepoda	17	22	72	14
Ostracoda	4	—	—	—
Total :	124	182	240	126
Station Rajewadi				
Rotifers	81	146	64	116
Cladocera	119	42	24	56
Copepoda	8	62	80	12
Ostracoda	5	—	—	—
Total :	213	150	168	184
Station Palasdeo				
Rotifers	56	56	52	82
Cladocera	40	42	44	42
Copepoda	18	48	24	8
Ostracoda	6	—	—	—
Total :	120	146	120	132
Station Bhigwan				
Rotifers	84	50	94	120
Cladocera	22	64	32	28
Copepoda	20	64	24	8
Ostracoda	—	—	—	—
Total :	126	178	150	156
Station Khanota				
Rotifers	53	74	76	68
Cladocera	12	78	71	18
Copepoda	4	60	78	6
Ostracoda	4	—	—	—
Total :	73	212	225	92

Zooplankton	October 91	February 92	April 92	Aug. 92
Station Khed				
Rotifers	23	162	110	133
Cladocera	58	72	46	18
Copepoda	4	68	66	8
Ostracoda	2	—	—	—
Total :	87	302	222	159
Station Khandar				
Rotifers	82	120	60	128
Cladocera	53	46	48	38
Copepoda	11	58	50	18
Ostracoda	2	—	—	—
Total :	148	224	158	184

Table 2. Showing Phytoplankton Units per litre at Different Sampling Stations in Ujani Wetland.

Phytoplankton	Oct.91	Feb. 92	April 92	Aug. 92
Station No. 1 Saha				
Myxophyceae	1114	1090	1030	475
Chlorophyceae	530	950	1950	670
Euglenophyceae	—	—	20	60
Bacillariophyceae	1702	980	730	860
Total :	3346	3020	3730	2065
Station No. 2 Rajewadi				
Myxophyceae	890	400	800	350
Chlorophyceae	1310	1230	2020	785
Euglenophyceae	—	—	—	—
Bacillariophyceae	1045	894	1110	1400
Total :	3245	2524	3930	2535
Station No. 3 Palasdeo				
Myxophyceae	1020	1100	1400	250
Chlorophyceae	1948	910	2240	410
Euglenophyceae	20	—	—	—
Bacillariophyceae	1170	1690	990	1760
Total :	4158	3700	4630	2420

Phytoplankton	Oct.91	Feb. 92	April 92	Aug. 92
	Station No. 4 Bhigwan			
Cyanophyceae	2140	360	2820	170
Chlorophyceae	425	1080	2610	970
Euglenophyceae	—	—	—	—
Bacillariophyceae	1604	820	1470	1140
Total :	4169	2260	6900	2280
	Station No. 5 Khanota			
Cyanophyceae	2540	490	1310	270
Chlorophyceae	700	1060	1610	735
Euglenophyceae	—	—	30	50
Bacillariophyceae	768	660	770	910
Total :	4008	2210	3720	1965
	Station No. 6 Khed			
Cyanophyceae	720	250	1400	262
Chlorophyceae	934	962	1700	956
Euglenophyceae	—	—	50	100
Bacillariophyceae	2540	1070	700	1760
Total :	4194	2282	3850	3078
	Station No. 7 Kandar			
Cyanophyceae	1622	570	1160	665
Chlorophyceae	2998	1580	2440	965
Euglenophyceae	50	—	80	65
Bacillariophyceae	970	720	1470	1410
Total :	5640	2870	5150	3105

Table 3. Showing Zooplankton Percentage Distribution in Various Months at Different Sampling Stations.

Zooplankton	October 91	February 92	April 92	Aug. 92	Annual average % of groups
	Station : Saha				
Rotifers	50.80	39.56	46.66	71.42	52.11
Cladocera	32.25	48.35	22.33	17.46	30.09
Copepoda	13.70	12.08	30.00	11.91	16.92
Ostracoda	3.02	—	—	—	00.77

Zooplankton	October 91	February 92	April 92	Aug. 92	Annual Average % of groups
		Station : Rajewadi			
Rotifers	38.08	30.66	38.05	63.04	42.45
Cladocera	57.86	28.00	14.28	30.43	32.64
Copepoda	3.75	41.33	47.60	6.52	24.80
Ostracoda	2.34	—	—	—	00.58
		Station : Palasdeo			
Rotifers	46.66	38.33	43.33	61.12	47.36
Cladocera	33.33	28.78	36.66	31.81	32.64
Copepoda	15.00	32.87	20.00	6.06	18.48
Ostracoda	5.00	—	—	—	1.25
		Station : Bhigwan			
Rotifers	66.66	28.08	62.66	76.92	58.58
Cladocera	19.46	35.95	21.33	17.94	23.67
Copepoda	15.87	35.95	16.00	5.92	18.48
Ostracoda	—	—	—	—	—
		Station : Khanota			
Rotifers	72.60	34.90	33.77	73.91	53.79
Cladocera	16.43	36.79	31.35	19.56	26.03
Copepoda	5.47	28.30	34.66	6.52	18,73
Ostracoda	5.47	—	—	—	1.25
		Station : Khed			
Rotifers	26.43	53.64	49.54	83.64	53.31
Cladocera	66.66	23.84	20.72	11.32	30.63
Copepoda	4.59	22.51	29.72	5.03	15.46
Ostracoda	2.29	—	—	—	0.57
		Station : Kandar			
Rotifers	55.40	53.57	37.99	69.56	54.12
Cladocera	35.80	20.53	30.37	20.65	26.83
Copepoda	7.4	25.89	31.64	9.78	18.67
Ostracoda	1.35	—	—	—	0.33

Table 4. Showing Phytoplankton Percentage Composition in Various Month at Different Sampling Station

Phytoplankton	Oct.91	Feb. 92	April 92	Aug. 92	Annual Average % of groups
		Station : Saha			
Myxophyceae	33.29	36.09	27.61	23.00	29.99
Chlorophyceae	15.83	31.45	52.27	32.44	32.99
Euglenophyceae	—	—	0.53	2.90	0.85
Bacillariophyceae	50.86	32.13	19.57	41.64	36.05
		Station : Rajewadi			
Myxophyceae	27.42	15.24	20.35	13.30	19.07
Chlorophyceae	40.36	48.73	51.39	30.96	42.86
Euglenophyceae	—	—	—	—	—
Bacillariophyceae	32.20	35.41	28.24	55.22	37.76
		Station : Palasdeo			
Myxophyceae	24.64	29.72	30.23	10.33	23.60
Chlorophyceae	47.07	24.59	48.38	16.94	34.24
Euglenophyceae	0.48	—	—	—	0.12
Bacillariophyceae	28.27	45.67	21.38	72.72	42.01
		Station : Bhigwan			
Myxophyceae	51.33	15.92	40.86	7.45	28.29
Chlorophyceae	10.19	47.78	37.82	42.54	34.65
Euglenophyceae	—	—	—	—	—
Bacillariophyceae	38.47	36.28	21.30	50.00	36.51
		Station : Khanota			
Myxophyceae	63.37	22.17	35.21	13.74	33.62
Chlorophyceae	17.46	47.96	43.27	37.40	36.52
Euglenophyceae	—	—	00.80	2.40	0.80
Bacillariophyceae	19.16	29.86	20.69	46.31	29.00
		Station : Khed			
Myxophyceae	17.16	10.95	36.36	8.51	18.21
Chlorophyceae	22.26	42.52	44.15	31.05	34.99
Euglenophyceae	—	—	1.29	3.24	1.13
Bacillariophyceae	60.56	46.88	18.18	57.17	45.69
		Station : Kandar			
Myxophyceae	28.75	19.86	22.52	21.41	23.13
Chlorophyceae	53.18	55.05	42.37	31.07	45.41
Euglenophyceae	0.88	—	1.55	2.09	1.13
Bacillariophyceae	17.19	25.08	28.54	45.41	29.03

Table 5. Showing Zooplankton Population of Ujani Wetland at Different Stations in October, 91

	Saha	Kandar	Rajewadi	Palasdeo	Bhigwan	Khanota	Khed
(a) Rotifera *Rotaria* sp.	6	—	—	—	—	2	—
Conochilus unicornis Rosselet	—	9	—	—	15	2	—
Filinia longiscta Ehrenberg	10	—	2	6	15	—	8
F. terminalis Plate	—	—	—	8	10	—	4
Keratella cochlearis (Gosse)	6	10	15	30	—	10	—
K. tropica Apstein	—	5	—	10	—	—	—
Asplanchna intermedia Hudson	—	4	—	—	—	—	—
Trichocerca cylindrica Imhoff	—	—	2	—	—	—	—
Brachionus angularis Gosse	10	8	15	0	—	—	5
B. calyciflorus Wierzeiski	15	10	25	—	30	28	2
B. caudatus Barroiss Daday	—	8	—	—	10	—	—
B. forficula Wierzeiski	—	2	6	—	2	—	—
B. quadridentata Hermann.	10	8	4	—	2	2	4
B. urceolaris O.F. Muller	6	2	10	2	—	4	—
B. macrourus Barrois & Daday	—	—	2	—	—	—	—
Lecane (M.) *bulla* Gosse.	—	6	—	—	—	2	—
L. closterocerca Schmarda	—	4	—	—	—	3	—
Total :	63	82	81	56	84	53	23
(b) Cladocera							
Diaphanosoma sarsi Richard	7	14	18	10	—	—	20
Simocephalus vetulus Schoedler.	—	10	—	—	—	—	—
Scapholeberis Kingi Sars.	10	20	60	20	—	10	28
Moina micrura Jurine	—	—	5	—	—	—	—
Macrothrix spinosa Kingi.	5	5	2	10	8	2	6
Chydorus sphaericus (O.F. Muller)	6	—	10	—	4	—	4
Chydorus (*E.*) *reticulatus* Daday	2	—	8	—	2	—	—
Biaperturea karua King	10	—	—	—	—	—	—
Pleuroxus aduncus (Jurine)	—	—	—	—	—	—	—
Ceriodaphnia cornuta Richard	—	4	16	—	8	—	—
Total Cladocera :	40	53	119	40	22	12	58

	Saha	Kandar	Rajewadi	Palasdeo	Bhigwan	Khanota	Khed
(c) *Copepoda*							
Cyclops hyalinus Rehberg	1	—	8	8	—	—	4
Diaptomus sp.	+	—	—	2	-	2	—
Copepodids	10	6	—	—	8	2	—
Nauplius larvae	5	—	—	8	12	—	—
Total Copepoda :	17	11	8	18	20	4	4
(d) *Ostracod*							
Stenocypris spp.	2	—	3	4	—	4	—
Strandesia indica Hartmann.	—	2	2	—	—	—	—
Cypretta globulus Sars	2	—	—	2	—	—	2
Total Ostracods :	4	2	5	6	—	4	2
Grand Total Zooplankton :	124	148	213	120	126	73	91

Table 6. Phytoplankton Population of Ujani Wetland at Different Sampling Stations in October, 91 Per Litre

Myxophyceae	Saha	Kandar	Rajewadi	Palasdeo	Bhigwan	Khanota	Khed
Oscillatoria	1012	1512	890	620	1520	2000	520
Spirulina	102	110	—	—	620	540	—
Anabaena	—	—	—	400	—	—	200
Total :	1114	1622	890	1020	2140	2540	720
Chlorophyceae							
Eudorina	—	396	400	312	153	—	—
Pandorina	140	—	—	200	—	140	250
Pediastrum	—	896	450	250	—	300	—
Spirogyra	—	1080	—	200	150	—	—
Staurastrum		110	226	—	76	—	244
Scenedesmus		90	—	260	750	122	260
Closterium	190	400	200	160	—	80	180
Total :	530	2998	1310	1948	425	700	934
Englenophyceae							
Englena	—	50	—	20	—	—	—
Total :	—	50	—	20	—	—	—

Bacillariophyceae							
Cyclotella	50	150	260	200	208	188	300
Fragillaria	232	320	220	—	800	—	—
Pinularia	160	500	375	210	—	344	460
Asterionella		200	—	190	300	—	900
Synedra	800	—	—	240	596	236	700
Navicula	260	—	—	220	—	—	180
Total :	1702	970	1045	1170	1604	768	2540
Total Phyto :	**3346**	**5640**	**3245**	**4158**	**4169**	**4008**	**4194**

Table 7. Showing Distributions of Various Zooplankton at Different Sampling Station in February 92 Per Litre

	Khed	Khanota	Bhigwan	Saha	Khandar	Rajwadi	Palasdeo
Rotaria sp.							
Conochilus unicornis Rouseel	2	–	–	4	–	2	4
Filinia longiseta Ehrenberg	8	10	8	10	8	6	6
F. terminalis plate	8	–	–	14	4	2	10
Keratella cochlearis (Gosse)	10	4	4	–	2	–	–
K. tropica Apstein	10	–	–	16	–	8	–
Asplanchna intermedia Hudson	2	6	10	–	6	–	14
Trichocerca cylindrica Imhoff	6	–	–	2	–	–	–
Brachionus angularis Gosse	–	4	2	10	20	10	5
B. calyciflorus Wiereeiski	16	2	–	4	30	–	–
B. caudatus Barrois & Daday	50	8	6	10	40	–	–
B. forficulla Wierzeiski	–	10	8	–	–	8	8
B. urceolaris O.F. Muller	40	20	4	2	10	6	4
Epiphanes macrourus Barrois & Daday	–	–	–	–	2	–	–
Lecane bulla Gosse	10	8	6	–	–	4	4
L. closterocerca Smarda	–	2	2	–	–	–	–
Total :	162	74	50	72	122	46	55
Cladocera							
Diaphanosoma sarsi Richard	8	10	6	30	8	10	14
Simocephalus vetulus Schoedler	10	2	8	40	26	6	12
Scapholeberis kingi Sars	18	26	–	–	–	–	6
Moina micrura Jurine	16	30	40	18	16	20	10
Chydorus sphaericus O. F. Muller	20	–	2	–	–	–	–
Ceriodaphnia cornuta Richard	–	10	8	2	4	6	–
Total :	72	78	64	90	54	42	42
Copepoda							
Cyclops hyalinus Rehberg	40	20	22	20	–	–	–
Diaptomus sp.	22	38	40	–	50	52	40
Nauplius Larvae	6	2	2	2	8	10	8
Total :	68	60	64	22	58	62	48
Grand Total :	**302**	**212**	**178**	**184**	**234**	**150**	**145**

Table 8. Showing Phytoplankton Distribution at Different Sampling Station in February 92 Per Litre

Phytoplankton	Khed	Khanota	Bhigwan	Saha	Khandar	Rajwadi	Palasdeo
Myxophyceae							
Anabaena	100	220	100	400	350	200	–
Oscillatoria	100	150	180	400	100	150	800
Merismopedia	50	120	80	200	120	–	300
Nostoc	–	–	–	80	–	50	–
	250	490	360	1080	570	400	1100
Chlorophyceae							
Eudorina	–	–	–	–	–	340	220
Pediastrum	150	160	300	–	–	700	–
Closterium	–	–	60	200	300	–	100
Scenedesmus	200	180	–	150	800	500	420
Spirogyra	–	300	200	–	–	–	–
Cosmarium	250	120	140	300	120	300	170
Hydrodicton	100	–	200	100	50	200	60
Pandorina	150	200	–	100	120	150	100
Volvox	112	–	180	80	100	80	–
Staurastrum	–	100	–	–	80	–	60
Total :	962	1060	1080	930	1570	2270	1130
Bacilloriophyceae							
Cyclotella	60	–	300	100	200	–	360
Frogillaria	160	–	120	50	250	100	250
Pinnularia	200	120	60	300	150	344	–
Synedra	400	300	140	80	120	330	600
Naviculla	200	80	200	250	–	–	480
Asterionella	150	160	–	200	–	220	–
Total :	1170	660	820	980	720	994	1690
Grand Total :	**2382**	**2210**	**2260**	**2990**	**2860**	**3664**	**3920**

Table 9. Showing Zooplankton Populatin at Various Sampling Stations in April '92 Per Litre

Rotifera 1	Khandar 2	Khanota 3	Khed 4	Rajewadi 5	Saha 6	Bhigwan 7	Palasdeo 8
Concochilus sp.	–	–	10	–	–	–	–
Filinia longiseta Erenberg.	–	10	20	18	30	–	–
F. terminalis Plate	4	6	8	–	–	–	–
Keratella cochlearis Gosse	4	4	–	6	–	16	10
K. tropica Apstein.	–	8	–	–	–	6	6
Asplanchna intermedia Hudson.	–	–	–	–	–	4	–
Trichocerca cylindrica Imhoff.	–	–	6	–	10	–	8
Brachionus angularis Gosse	16	–	12	10	8	–	4
B. calyciflorus Wierzeiski	10	24	30	–	34	40	–
B. caudatus Barrois & Daday.	–	8	–	–	–	20	–
B. forficula Wierzeski	8	4	–	–	8	–	–
B. quadridentatus Hermann	–	–	10	20	18	–	16
B. urceolaris O. F. Muller	10	12	8	6	–	–	–
Ephiphane macrourus Barrois & Daday	–	–	6	4	4	8	8
Lecane (M) bulla Gosse	–	–	–	–	–	–	–
Total :	52	76	110	64	112	94	52
Cladocera							
Diaphanosoma sarsi Richard	8	14	10	20	16	10	–
Simocephalus vetulus Schoedler	–	10	–	18	10	–	10
Scapholeberis kingi Sars	10	4	4	–	–	–	4
Moina micrura Junrine	16	–	4	10	8	2	4
Macrothrix spinosa King	6	–	–	8	6	–	–
Chydorus sphaericus (O. F. Muller)	–	10	–	–	–	–	–
Chydorus reticulatus Daday	8	8	6	4	4	6	6
Biapertura karua Sars	6	–	–	=	–	–	–
Pleruroxus aduncus (Jurine)	–	7	4	4	–	14	8
Ceriodophnia cornuta Richard	–	18	18	10	12	–	12
Total Cladocera :	54	71	46	74	56	32	44
Capepoda							
Diaptonms sp.	10	20	6	8	10	–	–
Mesocyclops hyalinus Rehberg	10	18	20	22	12	14	16
Copepodids	20	22	20	24	20	–	–
Nauplius larvae	10	18	20	26	30	10	8
Total Copepoda :	50	78	66	80	72	24	24
Total Zoopiankton :	**156**	**225**	**222**	**218**	**240**	**150**	**120**

Table 10. Showing Phytoplankton Populatin at Ujani Wetland at Different Sampling Stations in April 1992 Per Litre

Myxophyceae	Khandar	Khanota	Khed	Rajewadi	Saha	Bhigwan	Palasdeo
Oscillatoria	900	1200	1000	800	620	2000	1400
Spirulina	210	110	–	–	410	620	–
Anabaena	50	–	400	–	–	200	–
Total :	1160	1310	1400	800	1030	2820	1400
Chlorophyceae							
Eudorina	300	400	350	–	200	180	–
Pediastrum	140	200	180	250	150	–	120
Spirogyra	100	150	–	–	–	100	–
Staurastrum	–	–	620	550	600	1080	800
Scenedesmus	900	400	200	500	–	150	620
Closterium	550	200	–	320	1000	–	700
Cosmarium	200	260	350	–	–	500	–
Oedogonium	250	–	–	400	–	600	–
Total :	2440	1610	1700	2020	1950	2610	2240
Euglenophyceae							
Euglena	80	–	50	–	–	–	–
Phacus	–	30	–	–	20	–	–
Total :	80	30	50	–	20	–	–
Bacillariophyceae							
Cyclotella	200	150	200	150	100	180	160
Fragillaria	230	500	–	800	–	460	220
Pinnularia	200	–	–	–	510	–	–
Asterionella	700	–	500	160	–	610	–
Synedra	140	–	–	–	120	220	610
Navicula	–	120	–	–	–	–	–
Total :	1470	770	700	1110	730	1470	990
Total Phytoplankton :	**5150**	**3720**	**3850**	**3930**	**3730**	**6900**	**4630**

Table 11. Showing Distribution of Zooplankton Population at Different Samplin Stations in August 1992 Per Litre

Zooplankton	Khed	Khanota	Bhigwan	Saha	Khandar	Rajwadi	Palasdeo
Rotifera							
Rotaria sp.	5	—	—	—	—	—	—
Conochilus unicornis Rousell.	10	8	10	12	16	—	—
Filinia longiseta Ehrenberg.	20	6	18	16	22	28	20
F. terminalis Plate	12	4	—	—	10	8	12
Keratella cochlearis (Gosse)	10	—	10	8	6	2	4
K. tropica Asptein	—	2	6	4	—	4	—
Asplanchana intermedia Hudson.	—	6	—	—	2	6	8
Trichocerca cylindrica IMhoff.	10	4	12	4	6	8	—
Brachionus angularis Gosse.	8	—	10	6	16	12	6
B. calyciflorus weirzejski	18	2	8	6	4	—	—
B. caudatus Barroris & Daday.	12	10	—	—	10	—	—
B. forficula weirzejski	10	—	22	10	16	20	10
B. urceolariso F. Muller	8	20	—	—	—	—	—
Epiphanes macrourus Barrois & Daday.	6	4	12	8	6	16	—
Lecane (M) *bulla* Gosse	—	—	8	10	8	6	4
L. closterocerca schmarda	4	2	4	6	6	6	—
Total :	133	68	120	90	128	116	64
Cladocera							
Diaphanosma sarsi Richard	4	6	10	12	14	12	8
Simocephalus vetulus Schoedler	—	4	4	—	10	16	20
Scapholeberis kingi sars	4	4	2	—	6	4	—
Moina micrura Jurine	6	—	8	6	2	4	—
Chydorus sphaericus O. F. Muller	2	—	—	4	4	14	10
Ceriodaphnia cornuta Richard	—	4	4	—	2	6	4
Total :	16	18	28	22	38	56	42
Copepoda							
Cyclops hyalinus Rehberg	2	4	6	—	14	10	6
Diaptomus sp.	4	—	2	10	4	2	2
Nauplius larvae	2	2	2	4	—	—	—
Total :	8	6	10	14	18	12	8
Grand Total :	**157**	**92**	**158**	**126**	**184**	**184**	**114**

Table 12. Showing Phytoplankton Population of Ujani Wetland at Different Station in August 1992 Per Litre

Phytoplankton	Khed	Khanota	Bhigwan	Saha	Khandar	Rajwadi	Palasdeo
Myxophyceae							
Ananbaena	80	120	110	260	320	120	130
Ocillatoria	102	60	—	—	140	—	—
Merismopedea	140	55	160	120	150	170	120
Nostoc	40	35	—	95	55	60	—
Total :	362	270	270	475	665	350	250
Chorophycene							
Eudorina	296	120	—	60	40	45	100
Pediastrum	140	80	180	—	55	—	40
Closterium	110	100	160	70	120	180	80
Scenedesmus	90	65	120	50	180	220	60
Spirogyra	80	60	110	40	100	200	—
Cosmerium	—	—	90	140	160	110	40
Hydrodicton	100	120	150	170	96	80	—
Pandorina	—	170	—	200	100	120	45
Volvox	—	—	—	—	—	110	—
Staurastrum	—	—	160	—	120	60	50
Total	816	715	970	730	971	1125	415
Bacillariophyceae							
Clyclotella	200	150	350	—	400	—	200
Fragillaria	60	344	200	150	360	—	260
Pinnulaira	120	236	—	—	—	—	—
Synedra	800	180	170	160	120	140	—
Navicula	220	—	420	360	210	240	700
Asterionella	360	—	—	190	320	520	600
Total :	1760	910	1140	860	1410	900	1760
Euglenophyceae							
Phacus	100	50	—	60	65	—	—
Total :	100	50	—	60	65	—	—
Grand Total :	**3038**	**1945**	**2380**	**2125**	**3111**	**2375**	**2425**

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ROTIFERA

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INTRODUCTION

The rotifers are also called wheel animalcules or Rotatoria. They are small, usually microscopic, pseudocoelomate animals. Majority of them are found in freshwater and only few are found in the sea. In some respects they resemble the Molluscan "trochophore larva" The range of the length is from 40 microns to 240 microns in size. They are generally elongated and spherical in shape and size. Corona is important in this group for identification. The unsegmented body can be divided into three parts head, trunk and foot having superficial segments. A cuticular structure called lorica helps in identification of loricate rotifers from illoricate rotifers. The lorica if well developed, is thick, rigid and box like and heavily sculptured.

Foot if present, is with one or two toes which help in Locomotion. When the food is taken in, much of it goes into Pharynx where a masticatory apparatus called mastax is present which consist of cuticular plates and forms a trophi. The muscles move the trophi parts. mastax of seven cuticularised plates, the unpaired fulcrum, paired rami, unci and manubria. The cuticular jaws are called as trophi. Fulcrum and rami together called incus and unci and manubria as malleus. These trophi of rotiters are important systematic features, used as criteria at all taxonomic levels, Edmondson (1944). Only major variation is not useful in separating class, order and families, but some types of trophi vary in such a way that species can be recognised on the basis of details of trophi alone.

To find the trophi the animal was kept in cavity slide by putting sodium hydrochlorite (commercial chlorax) and was observed quickly under high power microscope before the soft part is dissolved.

DESCRIPTION

This group is easily transported and usually regarded potentially cosmopolitan (pennak, 1953). Many species are world wide in their distributions but some species show a distinctly limited geographical distribution.

PRESERVATION

General plankton were collected by silk bolting cloth net and was preserved in 5% Formalin with 2% glycerine. This group is badly destroted after preservation therefore a small amount of hot water was added to allow the specimen to fix in natural condition. Later on a suitable preservative was added.

Out of the two classes of Rotifera the only subclass Eurotatoria is represented in India and

the other sub-class segisona are not yet attempted. Out of 29 Eurotatorian families recognised by Koste (1978, only 24 families are reported from this country, sharma (1991) and these include 310 species belonging to 60 genera. Of course this figure comprise only about 12.4% of the world rotifer fauna.

The Bdelloids Rotifers may be taken as typical example of this group. The most conspicuous internal structure of head is corona which creates the current of food. Many rotifers are omnivorous. The corona is funnel shaped where food particles are easily ingested. There is a small preventricules and mastax. The Rotifers respire aerobically but sometimes they can tolerate anaerobic condition also when there is a change in temperature and food. Increase in population decreases food supply and males appear in the population. They are smaller in size and die after copulation.

The rotifers also show cyclomorphosis like Cladocera e.g. *Brachionus calyciflorus* and *Keratella cochlearis.*

SIGNIFICANCE

The rotifers are important in the aquatic food chain and play important role in biological productivity. They form the major part of freshwater plankton. They comprise food of fingerlings and fry of fishes. The rotifer are also used as bioindicators to depict the trophic status of water quality. They are used in toxicological and bioassay experiments.

HISTORICAL RESUME

Rotifer was first studied by Leewenhock (1703). In India study on this group was initiated by Anderson (1889) from the collection in and around Calcutta who dealt with 47 species. Murray (1906) reported 32 species from various altitudes of Sikkim. Edmondson and Hutchinson (1934) studied Yale North India expendition collection from Punjab and North west forntier province, Kashmir basin, Tibet and 9 localities from Nilgiri in Southern India. Later, number of workers have contributed on this field like sewell (1935), Donner (1949), Pasha (1961), Arora (1962, 1963a, 1963b, 1965, 1966), Nayar 1956, Wulfert (1966), Vasisht & Gupta (1964, Chandramohan Rao 1976a, Patil (1976, 1977), Das and Akthar (1976), Sharma (1977, 1978a, 1978b, 1979), Sharma and Michael (1980).

MATERIAL & METHODS

During the present investigation plankton samples were collected from seven sampling stations of Ujani wetland with the help of plankton net (200 mesh size/cm.). Fixation, preservation and preparation of slides were made as given by Arora (1962). For the study of Mastax specimens were treated with KOH and mounted in glycerine jelly, Patil (1988).

RESULTS

As mentioned by Arora (1962) there are different opinions regarding the position of Rotifera amongst the invertebrates, some authors consider it a class where as others opine it a phylum. However in the present study Rotifera is considered as Phylum and not a class as stated by Pennak (1953) :

Phylum : ROTIFERA
Class : MONOGONONTA
Order : PLOIMIDA
Family : BRACHIONIDAE

Brachionus angularis Gosse

Lorica almost spherical, without posterior projection. Anterior end with very small projections. Lorica stippled. Mastex Malleoramate. This species showed its occurrence in large numbers. The specimen found in Northern India agree with the description of voigt (1957). The body length range as given by Arora (1963a).

Material Examined : Ujani wetland; Khanota, 7.1.90, 1♀

Distribution : Madras , Punjab Kashmir, Rajasthan, Kerala, N. W. India, Bihar, West Bengal, Nagpur, Maharashtra, Orissa, Meghalaya, Manipur, Maharashtra Ujani Bhigwan (Present record).

Brachionus calyciflorus Pallas

It is well known that this species is exceedingly variable in size and the length of spines, the present material collected from this area is slightly bigger than those described by Arora (1962) from Nagpur. Specimen were with dorso-ventrally compressed lorica, anterior end of the lorica with four broad basal spines of which medians are longer than lateral spines. Posterior spines long and of equal length. This is a cosmopolitan species.

Material Examined : Ujani Wetland, Bhigwan, 4.1.90., 1♀

Distribution : Punjab & Kashmir, Nagpur, Rajasthan, Bihar, Chandigarh, Orissa, N. W. India, Meghalaya, Assam & Manipur, Maharashtra Ujani (Present record).

Brachionus caudatus Barrois & Daday

The shape, size and pattern of lorica are important in indentification of this genus. The anatomy and the shape of trophi are fairly uniform in all the species of *Brachionus* and they do not have any taxonomic value. Only from three stations in Ujani this species showed its occurrence, lorica has four anterior spines of equal length of which two are dorsal and two marginal. Two long posterior spines of equal length slightly incurred towards inside are present on the posterior side. Ahlstrom (1940) has given measurements of this form. Green (1972) reported this species from Mboandong and lake kotto, West Comeroon. Max Voight (1957) has not given any measurements of the species collected from middle Europe.

Material Examined : Ujani Wetland, Rajewadi, 6.1.90., 1♀

Distribution : Punjab & Kashmir, Delhi, Nagpur, Rajasthan, Bihar, Chandigarh, Orissa, N. W. India, Meghalaya, Assam & Manipur, Pune Ujani (Present record).

Brachionus falcatus Zacharias

A fairly large rotifer, can be identified by its two very long intermediate projections which are present at the anterior end of lorica and curved ventrally. The present specimen agrees with the description of Arora (1962). It is slightly bigger in size than those described by Sache

(1972), Voigt (1957), Green (1972) and Arora (1962). Two specimens found in the present collection, are almost equal in size.

Material Examined : Ujani wetland, khanota, 8.6.90, 1♀

Distribution : Nagpur, Baroda, Rajasthan, Kerala, N. W. India, Bihar, Andhra Pradesh, West Bengal, Orissa and Assam, Pune (Present record).

Brachionus quadridentatus Hermann

Lorica compressed dorsoventrally and divided into dorsal and ventral plate. It is broader than long with six anterior and two posterior spines. Among anterior spines the marginal and intermediate are of same length whereas the median ones are longer and curved outwards. Foot opening with downwardly pointing process. This specimen is slightly bigger than the form recorded from Nagpur by Arora (1962), Max Voigt (1975) gives the length range between 136 – 190μ. Most common species are claimed by Ahlstrom 1940.

Material examined : Ujani wetland, Rajewadi, 6-1-90, 1♀

Distribution : West Bengal, Nagpur, Rajasthan, Kerala, N. W. India, Bihar, Andhra Pradesh, Orissa, Meghalaya, Maharashtra (present record).

Brachionus urceolaris, Muller

This agrees with the description of Arora (1962) however, the present specimens are longer than the specimens recorded from Meghalaya Patil (1988). Max Voigt (1957) gives length and breadth range of the form from middle Europe as 185 to 250μ.

This species can easily be identified from its allied form by the presence of its six anterior spines of middling but of equal length at the anterior end. Posterior spines absent. Foot opening with small lateral projections. In the present collection, very few individuals were found.

Material Examined : Ujani Wetland, Bhigwan, 10-6-90, 1♀

Distribution : Nagpur, Vijayawada, West Bengal, Assam, Ujani, Maharashtra (Present record).

Brachionus rubens Ehrenberg

This species showed its occurrence in the present collection in quite a large number. It is slightly bigger than the Ceylon specimen recorded by Chengalath (1973). Lorica stippled, anterior end of lorica somewhat broad with two small ridges on its dorsal side. Foot opening is characteristic for its separation from allied species *B. urceolaris.*

Material Examined : Ujani wetland; Khanota, 8-6-90, 1♀

Distribution : West Bengal, Rajasthan and North West India, Assam, Ujani Maharashtra present record.

Brachionus forficulla, Wierzckski

This rotifers showed its appearance only in certain months of the years. Anterior intermediate spines missing. The anterior laterals are longer than the anterior median spines. This resembles with the form of Kerala, South India, Nayar (1969) lorica terminates posteriorly in a pair of

stout, more or less equal spines and has no swelling at the base of the spines. Very common in large and small lakes, river and rice fields.

Material Examined : Ujani Wetland, Bhigwan, 10-6-90, 1♀

Distribution : Cosmopolitan in nature.

Anuraeopsis fissa Gosse

This form agree with the length given by Green (1972). Lorica composed one dorsal plate and one ventral plate is joined by cuticle forming "U" shaped sinus in the anterior end. Additional information is given by Wulfert (1966).

Material Examined : Ujani Wetland, Khanota, 8-6-90, 1♀

Distribution : Baroda, Meghalaya.

Keratella cochlearis Gosse

This species was reported from India by Edmondson and Hutchinson (1934) from high altitude. It has been also recorded by Arora (1966) from Nagpur, Lorica with ventral and dorsal plates joined laterally of which dorsal plate is ornamented has reticulate sculpture on dorsum. One posterior spine is present however specimen without posterior spine is not seen. In all respect it agrees with those recorded by Ahlstorm (1943), Voigt (1957), Redescu (1960). There are several varities of this species but the present specimen agree with the typical *Keratella cochlearis* (Gosse). Large number of specimens were found during the investigation.

Material Examined : Ujani wetland, Bhigwan, 10-6-90, 1♀

Distribution : Kashmir, Nagpur, Meghalaya & Manipur, Ujani Pune (Present record).

Keratella tropica Apstein

Edmondson and Hutchinson (1934) recorded this species from high altitudinal region of India. The forms in my collection have posterior spines. The right posterior spine is larger where as the left one is very small. The foundation pattern of dorsum consists of three medium plaques posterior to the anterior median area and is completely closed having posteromedian area. There are also many varieties of this species but in the present study only few forms of *Keratellea tropica* were found.

Material Examined : Ujani Wetland, Rajewadi.

Distribution : Kashmir, Nagpur, Meghalaya and Manipur. Ujani Maharashtra (Present record).

Family : LECANIDAE

Lecane (M). bulla Gosse

Although this form is very common in plankton, very few specimens were seen in the present collections. Recently this species has been reported from Ontario by Chengalath and Mulla Mootil (1974) who pointed out that it showed variations in the width of lorica.

Material Examined : Ujani wetland, khanota, 10-6-90, 1♀

Distribution : West Bengal, Ujani, Maharashtra.

Family : ASPLANCHNIDAE

Asplanchana intermedia Hudson

With large body cavity, the stomach lying well away from epidermic. No intestine. Trophi incudate. The ovary in this form is nearly spheric but band or horse shoe shaped in the rest species of the genus. Predatory swallow whole rotifers and some Crustaceans as well as algal colony. The anus has shifted and lies on the same side of month, Nagpur (Arora : 1966).

Material Examined : Ujani wetland, Khanota.

Order : GNEIOTRACHA
Sub-order : TESTUDINELLIDAE

Filinia longiseta Ehrenberg

Agree with the description of Nagpur specimen (Arora, 1962).

Material Examined : Ujani wetland, Khanota, 10-6-90, 1♀

Distribution : Nagpur, Baroda, Chandigarh, Bihar, Rajasthan, West Bengal, Orissa and Meghalaya, Ujani, Maharashtra (Present record).

SUMMARY

This study revealed to 12 species of ostracods belonging to 4 genera from the first time for this locality. Eight species of family Bruchionidae were recorded from the present wetland.

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CLADOCERA (CRUSTACEA)

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INTRODUCTION

The IUCN, at its Ramsar conference in 1971, resolved to undertake studies on the conservation of the worlds fast depleting and disappearing wetlands. In India a few attempts have been made to study various aspects of wetlands (Pandit, 1980; Pandit *et al.*, 1982; Kaul *et al.*, 1978, 1980; Pieter, 1987; Rahmani and Arora, 1991; Mahajan et al., 1982; Yousuf et al., 1989). These studies relate to the physicochemical properties of water, plankton population, birds, fishes and macrophyte community or combination of one or two of these aspects.

No comprehensive studies of any particular faunal componant of plankton from Ujani wetland is available. Therefore Ujani wetland was chosen to study its various faunal components including planktons. Last few years flamingoes, whose main diet is plankton, have been coming here during the winter. This wetland though being an ideal habitat for flamingoes, no attempt has been made so far to study the fauna of this ecologicallly important area. Cladocera, commonly known as the waterfleas, are microscophic crustaceans, which are one of the major componants of fresh water planktons. They are not studied well in any Indian wetlands. However some scattered studies are available, such as, Biswas, 1965 : on cladocera of Sambhar lake, Rajasthan; Venkatraman, 1988, 1990, 1992 : Cladoceran studies from Keoladeo National Park, Rajasthan; Yousuf et al. 1984 : Cladocera from Anchar lake, Kashmir; Pandit et al. 1982 : Cladocera communities from Kashmir; Mahajan et al. 1982 : Cladocera from Ghana bird sanctuary. Balki et al. 1987, gave comprehensive account of Hydrology of lake Ankar, Kashmir. Present report is based on the cladocera collections made from Ujani wetland area during various surveys by Western Regional Station, Zoological Survey of India, Pune, during 1988 to 1992, which resulted in enumeration of 33 species belonging to 21 genera under 6 families. A new subspecies was also described.

MATERIAL AND METHODS

Bolting silk nets (Mesh size range 50-150 μ.m.) having a mouth 30 cms. in diameter and a length 90 cms. were used. In most localities vertical hauls from bottom to the surface were made at some distance away from the shore. Samples from the overgrown littoral region were collected by using a wide mouth glass bottle. Roughly 100 litres of water was taken from among the plants and poured through a plankton net. 5% formalin was used to preserve all samples. Subsequent sorting was done under the Stereo-Binacular Microscope. The measurements of the taxa have been given in milimetres (mm.)

SYSTEMATIC LIST

Class : CRUSTACEA
Super Order : DIPLOSTRACA
Order : CLADOCERA
Sub Order : EUCLADOCERA
Super Family (a) : SIDOIDEA
Family I : SIDIDAE

Genus i. ***Latonopsis*** Sars
1. *Latonopsis australis* Sars

Genus ii. ***Diaphanosoma*** Fischer
2. *Diaphanosoma sarsi* Richard
3. *Diaphanosoma excisum* Sars

Super Family (b) : CHYDOROIDEA
Family II : DAPHNIIDAE

Genus iii. ***Ceriodaphnia*** Dana
4. *Ceriodaphnia cornuta* Sars
5. *Ceriodaphnia reticulata* (Jurine)

Genus iv. ***Daphnia*** O. F. Muller
6. *Daphnia lumholtzi* Sars

Sub Family : SCAPHOLEBERINAE

Genus v. ***Scapholeberis*** Schoedler
7. *Scapholeberis kingi* Sars

Genus vi. ***Simocephalus*** Schoedler
8. *Simocephalus vetulus* (O. F. Muller)

Family III : MOINIDAE

Genus vii. ***Moina*** Baird
9. *Moina micrura* Kurz.

Family IV : BOSMINIDAE

Genus viii. ***Bosminopsis*** Richard
10. *Bosminopsis deitersi* Richard

Family V : MACROTHRICIDAE

Genus ix. ***Echinisca*** Lievin
11. *Echinisca triserialis* (Brady)
12. *Echinisca odiosa* (Gurney)

Genus x. ***Ilyocryptus*** Sars

13. *Ilyocryptus spinifer* Herrick

Family VI : CHYDORIDAE
Sub Family : CHYDORINAE

Genus xi. ***Pleuroxus*** Baird

14. *Pleuroxus aduncus bhigawanensis* ssp.n.

Genus xii. ***Chydorus*** Leach

15. *Chydorus sphaericus* (O. F. Muller)
16. *Chydorus kallipygos* Brehm.
17. *Chydorus ventricosus* Daday
18. *Chydorus eurynotus* Sars.

Genus xiii. ***Dunhevedia*** King

19. *Dunhevedia crassa* King.
20. *Dunhevedia crassa cilio-caudata* (Sovinski)

Genus xiv. ***Pseudochydorus*** Fryer

21. *Pseudochydorus globosus* (Baird)

Sub Family : ALONINAE

Genus xv. ***Alona*** Baird

22. *Alona archeri* Sars
23. *Alona davidi punctata* (Daday)
24. *Alona pulchella* King.
25. *Alona guttata* Sars.
26. *Alona capensis* Ruhe

Genus xvi. ***Camptocercus*** Baird

27. *Camptocercus rectirostris* Schoedler

Genus xvii. ***Leydigia*** Kurz

28. *Leydigia ciliata* Gauthier

Genus xviii. ***Biapertura*** Smirnov

29. *Biapertura karua* (King)
30. *Biapertura varrucosa* (Sars)

Genus xix. ***Indialona*** Petkovski

31. *Indialona ganapati* Petkovski

Genus xx. ***Natoalona*** Rajpaksha and Fernando

32. *Natoalona globulosa* (Daday)

Genus xxi. ***Ephemeroporus*** Frey

33. *Ephemeroporus barroisi* (Richard)

INVENTORY

1. ***Latonopsis australis*** Sars

Material Examined : Pune Dist., Ujani wetland : 2 exs., Palasdeo, 5.i.90; 3 exs., Khanota, 4.i.90; 1 ex., Saha, 21.i.91, (All coll. S. G. Patil).

Status : Uncommon

Length : 0.85-1.10 mm.

Distribution : INDIA : Rajasthan. Elsewhere—Australia, Oriental region.

Source : Biswas 1971, Michael and Sharma, 1988.

Remarks : This species usually found associated with partially submerged floating vegetation on the bank, characterized by its antennules shorter than anterior margin of head; head without fornex ; biarticulate branch of antenna with less than 12 setae and claw always with two spines.

2. ***Diaphanosoma sarsii*** Richard

Material Examined : Pune Dist., Ujani Wetland : 1ex., Rajewadi, 12.viii 92; 20 exs., Saha, 9.viii.92, (colls. S. G. Patil). 2exs., Bhigwan, 18.i.91, (Coll. R.M. Sharma).

Status : Common.

Length : 0.70 mm.

Distribution : INDIA : Bihar, Rajasthan, Meghalaya and West Bengal. Elsewhere–Pantropical.

Source : Michael and Sharma 1988.

Remarks : This species differs from the nearest one *D. excisum* Sars, mainly by greater breath of the shell duplicator and 18-22 denticles on the lower part of posterior margin.

3. ***Diaphanosoma excisum*** Sars

Material Examined : Pune Dist., Ujani Wetland : 15 exs., Saha, 21.1.91; 7exs., Khanota, 20.i.91: lex., Palasdeo, 22.i.91., (All Coll. R. M. Sharma).

Status : Uncommon.

Length : 0.82-1.0 mm.

Distribution : INDIA : West Bengal, Rajasthan, Bihar. Elsewhere—Common in tropics and subtropic regions.

Source : Biswas 1971, Michal and Sharma 1988.

Remarks : This species can be easily recognised from allied species by its shorter antennae and the absence of hairs on the side of postabdomen, less than 17 denticles on the lower part of posterior margin of valve.

4. ***Ceriodaphnia cornuta*** Sars.

Material Examined : Pune Dist., Ujani Wetland : 5 exs., Palasdeo, 5.i.90; 2 exs., Khed., 7.i.90; 50 exs., Khandar, 8.ii.92, (All Coll. S. G. Patil).

Status : Common.

Length : 0.62 mm.

Distribution : INDIA : West Bengal, Bihar, Rajasthan, Kerala, Meghalaya. Elsewhere—Cosmotropical and also reported from China and Japan.

Source : Michael and Sharma, 1988.

Remarks : This species is distinctive in that the anterior portion of the head is produced into a beak like structure.

5. ***Ceriodaphnia reticulata*** (Jurine)

Material Examined : Pune Dist., Ujani Wetland : 1 ex. Khanota, 13.viii.92; 6 exs., Khed, 8.viii.92, (All Coll. S. G. Patil).

Status : Rare.

Length : 0.85 mm.

Distribution : INDIA : Rajasthan, Bihar. Elsewhere—Holarctic, Neotropical and Ethiopian regions.

Source : Smirnov and Timms 1983.

Remarks : This species is distinctive in that the claw with distinct pecten of 6 teeth.

6. ***Daphnia lumholtzi*** Sars

Material Examined : Pune Dist., Ujani Wetland; Many exs., Khed bridge, 20.i.91 (Coll. R. M. Sharma).

Status : Rare.

Length : 2.5 mm.

Distribution : INDIA : Mirzapor, West Bengal, Orissa, Andhra Pradesh, Rajasthan, Tamil Nadu, Bihar, Elsewhere – Australia, Africa, Egypt, widespread in Asia.

Source : Biswas 1971, Michael and Sharma, 1988.

Remarks : The tail of female is varied from one half to slightly more than the carapace length. Head with distinct long helmet and long, distinct marginal denticles of the valve.

7. ***Scapholeberis kingi*** Sars

Material Examined : Pune Dist., Ujani Wetland : 4 exs., Saha, 13.iv.92; 2 exs., Khed, 11.iv.92; 5 exs., Bhigwan, 4.x.90, (Coll. S. G. Patil).

Status : Uncommon.

Length : 0.76 mm.

Distribution : INDIA : West Bengal, Kashmir, Tamil Nadu, Rajasthan, Meghalaya and Assam. Elsewhere-Africa, Australia, North America, Sri Lanka, Germany, China, Tailand, Indonesia.

Source : Biswas 1971.

Remarks : The other nearest species *S. aurita* Fisher, can be separated by its whitish or greenish colour which is never dark or black as in the present species.

8. ***Simocephalus vetulus*** (O. F. Muller)

Material Examined : Pune Dist., Ujani Wetland : 8 exs., Khanota, 20.i.91; 15 exs., Bhigwan, 18.i.91; 1 ex., Palasdeo, 22.i.91, (Coll. R. M. Sharma), 1 ex., Khandar, 11. viii. 92; 1 ex., Khed 9.ii.92, (Coll. S. G. Patil).

Status : Common.

Length : 2.85 mm.

Distribution : INDIA : Punjab, Kashmir, Karnataka, Uttar Pradesh, Rajasthan, Bihar, West Bengal. Elsewhere-Cosmopolitan.

Source : Michael and Sharma, 1988.

Remarks : It is the most common species and is usually found in weedy areas. The main characters for its identification are : frons rounded, ocellus elongated, usually without carapace spine.

9. ***Moina micrura*** Kurz.

Material Examined : Pune Dist., Ujani Wetland : 1 ex., Bhigwan, 10.iii.91; 12 exs., Rajewadi, 9.iii.91; 2 exs., Khanota, 11.iii.91, (All Coll. S. G. Patil). 3 exs., Saha, 13. iv.92, (Coll. S. G. Patil).

Status : Common.

Length : 1.1 mm.

Distribution : INDIA : West Bengal, Tamil Nadu, Bihar, Rajasthan. Elsewhere - Africa, Syria, U.S.S.R., France, Phillippines.

Source : Michael and Sharma, 1988.

Remarks : This species has ephippium with one egg only and ventral edge of valve evenly arched.

10. ***Bosminopsis deitersi*** Richard

Material Examined : Pune Dist., Ujani Wetland : 20 exs., Khed bridge, 11.iv.92; 11 exs., Khed bridge, 12.ii.92; Many exs., Khed bridge, 7.i.90, (All Coll. S. G. Patil).

Status : Rare (found only in one locality)

Length : 0.23 mm.

Distribution : INDIA : Delhi, Madhya Pradesh, Rajasthan. Elsewhere-Asia, Africa, North and South America.

Source : Uncommon.

Remarks : Small species, collected in only one locality. The antennules of this species are fused at their bases and the postabdomen tapers distally.

11. ***Echinisca triserialis*** (Brady)

Material Examined : Pune Dist., Ujani Wetland : 5 exs., Palasdeo, 22.i.91; 9 exs., Bhigwan, 18.i.91; 5 exs., Khanota, 20.i.91, (All Coll. R. M. Sharma). 1 ex., Palasdeo, 5.i.90; 2 exs.,

Rajewadi, 12.iv.92;1 ex., Saha, 7.iii.91., (All Coll. S. G. Patil).

Status : Common.

Length : 0.52 mm.

Distribution : INDIA : West Bengal, Rajasthan. Elsewhere-Cosmotropical.

Source : Biswas 1971.

Remarks : The dorso-posterior corner of the carapace pointed, antennules without spines and with small indentation along the anterior side and the largest antennal setae with two large spines in the area of the joint between its proximal and distal segments and they are followed by small spines.

12. *Echinisca odiosa* (Gurney)

Material Examined : Pune Dist., Ujani Wetland : 2 exs., Bhigwan, 14.iii.92, (Coll. S. G. Patil).

Status : Rare.

Length : 1 mm.

Distribution : Bihar, Madhya Pradesh, Rajasthan. Elsewhere-Russia, Madagascar.

Source : Biswas 1971, Michael and Sharma, 1988.

Remarks : Brehm (1933) assigned to the present genus those species of the *Macrothrix* in which the anus is guarded by a pair of peculiar flaps.

13. *Ilyocryptus spinifer* Herrick

Material Examined : Pune Dist., Ujani Wetland : 3 exs., Khanota, 19.i.91, (Coll. R. M. Sharma). 1 ex., Bhigwan 10.iii.91, (Coll. S. G. Patil).

Status : Rare.

Length : 0.76 mm.

Distribution : INDIA : West Bengal, Rajasthan, Meghalaya. Elsewhere-Pantropical, also recorded from North America, China, Australia and Cuba.

Source : Biswas 1971.

Remarks : This species is characterized by its triangular head, anal aperture opens in the middle part of postabdomen. Antennules more than 8 times longer than wide. It is mainly bottom feeder species.

14. *Pleuroxus aduncus bhigawanensis* ssp. nov.
(Plate I, figs. 1 to 3)

Material Examined : Holotype ♀, Paratypes 3 ♀ ♀, Bhigawan part of Ujani Wetland; 6.i.1990; Coll. S. G. Patil; Pune district; Maharashtra.

Parthenogenetic female : Length 0.31-0.35 mm. Heigth about $2\frac{1}{2}$ times larger than posterior part of valve. Posteroventral corner of valve with 1-2 denticles directed posteriorly. Ventral margin is convex anteriorly upto middle of the valve then almost straight upto posteroventral

corner. The marginal setae at anterior region, about 30 which are thin and thickened at their bases and look like rounded denticles. Posterior setae are large, thick, and feathered. Valve with lines. Rostrum long, pointed and directed downwards. Antennules reaching 1/3 part of rostrum with sensory setae in the middle. Antennae small, setae on antenna 0-0-3/ 1-1-3. Plate of labrum convex anteriorly with slightly pointed apex. Postabdomen short, tapering distally. Postanal part is projecting with 10-12 small anal denticles which decrease in size proximally and few last ones appears in groups. Lateral setae absent. Claw with two basal spines at the base. Intestine forming loops. Ocellus smaller than eye and situated near to the eye than to apex of rostrum. Posteroventral corner of valve may have different number of denticles at right and left valve. The number of these denticles also varies from specimen to specimen.

Remarks : This subspecies in general looks like the typical *Pleuroxus aduncus* (Jurine) except it has more elongated body. The presence of tubercle shaped denticles at the base of the antero-ventral setae is unique and found only in present subspecies by which it can be separated from all other sub-species of *P. aduncus*. The species *Pleuroxus denticulatus* Birge may come closer to present subspecies by having denticles of antero-ventral region but there is marked difference in the hight-length ratio of postabdomen in these species.

15. ***Chydorus sphaericus*** (O. F. Muller)

Material Examined : Pune Dist., Ujani Wetland : 5 exs., Khanota, 13.viii.92; 1 ex., Khed, 8 viii. 92, (All. Coll. S. G. Patil).

Status : Common.

Length : 0.32 mm.

Distribution : INDIA : West Bengal, Bihar, Kashmir, Ladakh, Tamil Nadu, Meghalaya. Elsewhere—Cosmopolitan.

Source : Michael and Sharma, 1988.

Remarks : Valve of this species is smooth or marked a polygons with straight borders and labrum is elongated and pointed.

16. ***Chydorus kallipygos*** Brehm.

Material Examined : Pune Dist., Ujani Wetland : 3 exs., Palasdeo, 5.i.90, (Coll. S. G. Patil).

Status : Uncommon

Length : 0.57 mm.

Distribution : INDIA : Tamil Nadu. Elsewhere- Ethiopian region.

Source : Michael and Sharma, 1988.

Remarks : This species is characterized by its broadly rounded plate of labrum with anterior depression in distal end.

17. ***Chydorus ventricosus*** Daday.

Material Examined : Pune Dist., Ujani Wetland : 2 exs., Saha, 21.i.91; 1 ex., Khandor, 19.i.91(All Coll. R. M. Sharma).

Status : Rare.

Length : 0.8 mm.

Distribution : INDIA : Tamil Nadu, Gujrat, Rajasthan. Elsewhere—Sri Lanka, China, Java and East Africa.

Source : Michael and Sharma, 1988.

Remarks : This is largest species of this genus. The species having ventral margin of valve with convexity in the middle with 10-15 long setae on the anterio-ventral margin and 25 to 35 submarginal setae posterior to bulge, placed well above the margin in a sinuous curve.

18. ***Chydorus eurynotus*** Sars

Material Examined : 3 exs., Palasdeo, 14.iv.92; 1 ex., Bhigwan, 8.i.90, (All Coll. S. G. Patil).

Status : Uncommon.

Length : 0.32 mm.

Distribution : North-West India. Elsewhere—Ethiopian, Australian and Neotropical region, Indo-Malayan.

Source : Michael and Sharma, 1988.

Remarks : The apex of the labrum of this species is rounded.

19. ***Dunhevedia crassa*** King

Material Examined : Pune Dist., Ujani Wetland : 2 exs., Khanota, 12.ii.92; 1 ex., Khed, 12, ii.92; 1 ex., Palasdeo, (Coll. S. G. Patil).

Status : Uncommon.

Length : 0.35 mm.

Distribution : INDIA : West Bengal, Gujrat, Rajasthan. Elsewhere-Holarctic region, Ethiopian, Indo-Malayan and Australian regions also recorded from Sourthern Part of european U. S. S.R.

Remarks : Anterior margin of labrum of this species without tubercle shaped convexity.

20. ***Dunhevedia crassa cilio-caudata*** (Sovinsky)

Material Examined : Pune Dist., Ujani Wetland : 2 1exs., Khed, 20.i.91; 1 ex., Khanota, 20.i.91 (Coll. R. M. Sharma).

Status : Rare.

Length : 0.5 mm.

Distribution : INDIA : Jammu and Kashmir. Elsewhere-Poland, U. S. S. R.

Source : Michael and Sharma, 1988, Smirnov, 1971.

Remarks : Anterior margin of labrum with a tubercle shaped convexity.

21. ***Pseudochydorus globosus*** (Baird)

Material Examined : Pune Dist., Ujani Wetland : 3 exs., Bhigwan, 4.x.90; 1ex., Rajewadi, 12.iv.92, (Coll. S. G. Patil).

Status : Rare.

Length : 0.82 mm.

Distribution : INDIA : West Bengal, Meghalaya, Elsewhere-Holarctic, Ethiopian, Indo-Malayan and Australian regions also recorded from Europeon U.S.S.R.

Source : Smirnov 1971.

Remarks : It is yellow in colour and commonly with brown spot on each side. The labrum is without a lamella and the postaabdomen elongated.

22. ***Alona archeri*** Sars.

Material Examined : Pune Dist., Ujani Wetland : 4 exs., Saha, 13.iv.92; 1 ex., Bhigwan, 4.x.90; (All Coll. S. G. Patil). 1 ex., Saha, 21.i.91 (Coll. R. M. Sharma).

Status : Rare.

Length : 0.43 mm.

Distribution : INDIA : Maharashtra (first record from India). Elsewhere—Central Asia, Indo-Malayan and Australian region, U.S.S.R.

Source : Smirnov, 1971.

Remarks : Postabdomen with parallel margin and its preanal corner projecting. 3-4 distal anal spines large with setae on the inner margin.

23. ***Alona davidi punctata*** (Daday)

Material Examined : Pune Dist., Ujani Wetland : 4 exs., Saha, 13.iv.92; 1 ex., Bhigwan, 4.x.90, (All Coll. S. G. Patil).

Status : Uncommon.

Length : 0.62 mm.

Distribution : INDIA : West Bengal. Elsewhere—Ethiopian and Australian region, Argentina.

Source : Smirnov and Timms, 1983.

24. ***Alona pulchella*** King.

Material Examined : Pune Dist., Ujani Wetland : 1 exs., Khandasa, 6.i.90, 1ex; Saha, 9.viii.92; Palasdeo, 10.ii.92, (All Coll. S. G. Patil).

Status : Abundent.

Length : 0.53 mm.

Distribution : INDIA : Gujarat, West Bengal, Tamil Nadu. Elsewhere—Cosmotropical.

Source : Michael and Sharma 1988.

25. ***Alona guttata*** Sars.

Material Examined : Pune Dist., Ujani Wetland : 2 exs., Khanota, 20.i.91; 1 ex., Palasdeo, 22.i.91; 4 exs., Bhigwan, 18.i.91, (All Coll. R. M. Sharma).

Status : Uncommon.

Length : 0.47 mm.

Distribution : INDIA : Ladakh, Tamil Nadu. Elsewhere—Cosmopolitan.

Source : Michael and Sharma, 1988.

26. ***Alona capensis*** Ruhe

Material Examined : Pune Dist., Ujani Wetland : 5 exs., Khanota, 20.i.91; 1 ex., Bhigwan, 23.i.91; 1 ex., Rajewadi, 21.i.91, (All Coll. R. M. Sharma).

Status : Rare.

Length : 0.6 mm.

Distribution : INDIA : Maharashtra (first record from India). Elsewhere—South Africa.

Source : Smirnov 1971.

Remarks : The valve of this species with rounded posterodorsal and posteroventral corner. The postabdomen with 7-8 anal denticles. Proximal large denticles accompanied by small denticles.

27. ***Camptocercus rectirostris*** Schoedler.

Material Examined : Pune Dist., Ujani Wetland : 1 exs., Saha. 9.viii. 92; 3 exs., Khanota, 12.ii.92; 2 exs., Khanota, 8.ii.91; 1 ex., Palasdeo, 14.iv.92, (All Coll. S. G. Patil).

Status : Rare.

Length : 0.76 mm.

Distribution : INDIA : Kashmir, Gujarat, Meghalaya, West Bengal. Elsewhere—Holaretic, Ethiopian, Indo-Malayan, New Zealand and Europian U. S. S. R.

Source : Michael and Sharma 1988.

28. ***Leydigia ciliata Gauthier.***

Material Examined : Pune Dist., Ujani Wetland : 2 exs., Rajewadi, 9.ii.91; lex., Khanota, 11.iii.91, (All Coll. S. G. Patil).

Status : Rare.

Length : 0.95 mm.

Distribution : INDIA : Maharashtra (first record from India). Elsewhere—Ethiopian and Neotropical region, Australia, East China, U.S.S.R. Kazakhstan.

Source : Smirnov, 1971.

Remarks : The postabdomen of this species is widest distally and distal groups of lateral setae on it contain more than two setae and longitudinal groups of granules on valve.

29. ***Biapertura karua*** King.

Material Examined : Pune Dist., Ujani Wetland : lex., Khed, 11.iv.92; 1 ex., Bhigwan, 14.iv.92., lex, Khanota, 11.iv.92., (All Coll. S. G. Patil).

Status : Common.

Length : 0.35 mm.

Distribution : INDIA : Meghalaya, West Bengal. Elsewhere- Cosmopolitan.

Source : Michael and Sharma, 1988.

Remarks : The postabdomen is rounded and has very small anal teeth. There are separate denticles on the ventroposterior corner of valve.

30. ***Biapertura verrucosa*** Sars.

Material Examined : Pune Dist., Ujani Wetland : lex., Palasdeo. 10.ii.92; 1 ex., Khanota, 11.iv.92; 1 ex., Bhigwan, 8.i.90, (All Coll. S. G. Patil)

Status : Common

Length : 0.32 mm.

Distribution : INDIA : Gujarat. Elsewhere-Indo-Malayan, Ethiopian and Neotropical regions.

31. ***Indialona ganapati*** Petkovski.

Material Examined : Pune Dist., Ujani Wetland : many exs., Khed bridge, 4.i.90., 12.ii.92, 11.iv.92 (All Coll. S. G. Patil).

Status : Uncommon.

Length : 0.25 mm.

Distribution : INDIA : Gujarat, Madhya Pradesh, Maharashtra.

Source : Smirnov, 1971, Michael and Sharma, 1988, Rane, 1993.

32. ***Notoalona globulosa*** (Daday)

Material Examined : Pune Dist., Ujani Wetland : 3 exs., Bhigwan, 10.iii.91, (Coll. S. G. Patil).

Status : Rare.

Length : 0.32 mm.

Distribution : INDIA : West Bengal, Madhya Pradesh. Elsewhere-Indo-Malagyan, Neotropical, Neartic region, Sri Lanka, Burma, Bangalades, Ghana, Indonesia, Malayacia, Philippines, Zambia.

Source : Rajpaksha and Fernando 1987.

33. ***Ephemeroporus barroisi*** Ricard.

Material Examined : Pune Dist., Ujani Wetland : 4 exs., Khanota, 11.iv.92; 2exs; Khandar, 10.v.92, (All Coll. S. G. Patil).

Status : Rare.

Length : 0.36 mm.

Distribution : INDIA : Gujrat, West Bengal. Elsewhere-Syria, South Africa, North America, Sahara, Nigeria, China, U.S.S.R., Sri Lanka, Philippines, Nepal, Australia.

SUMMARY

The cladocera fauna of Ujani Wetland is composed of 33 species. The two species *Chydorus reticulatus* Daday and *Macrothrix spinosa* King which are recorded by Dr. S. G. Patil in his paper no. 2 have not been included in this communication. By adding these two species the total number of spcies from Ujani will be 35. The species *Alona archeri, Alona capensis* and *Leydigia ciliata* are recorded for the first time from Indian water. The population of total Cladocera fluctuates in different seasons. The primary peak in cladocera species and number of individuals were recorded during the summer. This population decreased sharply in autumn and again showed secondary peak during winter. This type of bimodal temporal fluctuation in cladocera has also been recorded in other temperate lakes of the world (Welch, 1952). Balki *et. al.* 1987, noted same type of Cladocera fluctuations in wetlands of Kashmir.

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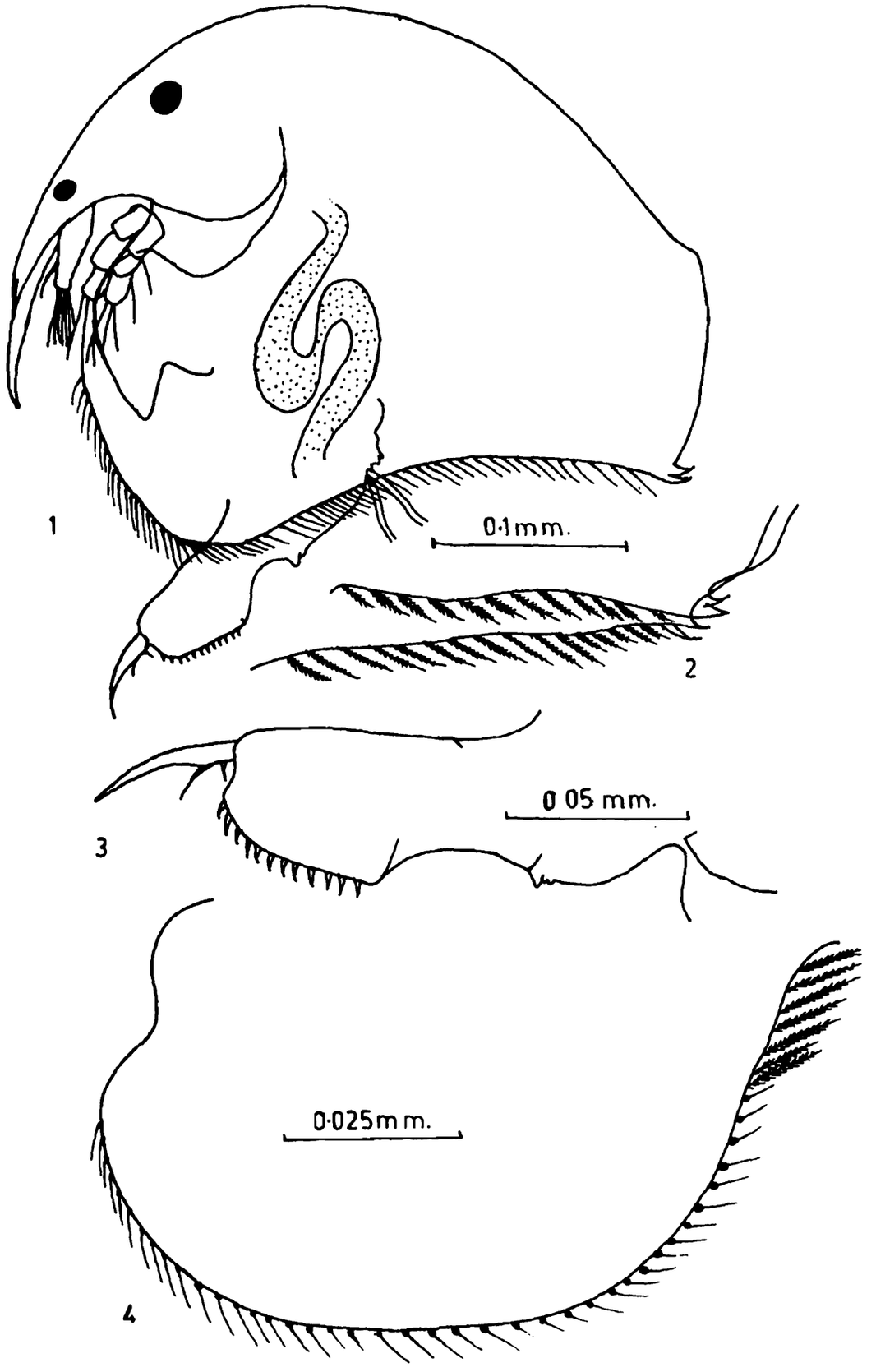

Fig. 1. Parthenogenetic femal. **Fig. 2.** Posteroventral corner of carapace with two denticles. **Fig. 3.** Postabdomen with claw, anal teeth and two basal spines. **Fig. 4.** Anteroventral corner of valve with denticles at the base of each marginal seta.

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FRESHWATER OSTRACODA

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INTRODUCTION

These Ostracods form inhabit in standing and running waters. However, these are not the true planktonic forms. The suborder Podocopa represents freshwater Ostracods while the suborder Cypridae is well represented in both marine and freshwater habitats.

They exhibit various pattern of their stay in water :

a) Limnetic with surface habits.

b) Free swimming below the surface.

c) Creeping on plants.

d) Burrowing.

They look like seed, hence are called seed shrimps. Indian species range between 0.5 mm. to 2 mm. in length. They have bivalve shell which opens dorsally and posteriorly. There are about 1700 species of which nearly one third occur in freshwater. Some Ostracods are also reported from the intestinal tracts of fish and Amphibia. However parasitism is not known.

Our knowledge on Ostracod fauna of Maharashtra is rather poor. The sub-class Ostracods belongs to class Crustacea and Phylum Arthropoda. World Ostracods have been studied extensively, however studies on Indian Ostracods by victor and Fernando 1973-76 are helpful for identification of Ostracods of this region. In India, freshwater Ostracods are common among benethic collections, vegetation, algal mat and plankton collection. They form an important link in the food chain of aquatic microanimals (Forbe, 1988). Some Ostracods are also parasitic in the gills of various species of freshwater cray fishes Rioja (1942, 1943). In geologic record they are used as stratiographic markers (Moore, 1961a), their Paleo-ecological exsistence has been proved beyond doubt. They are good food for fishes.

The important contributions in this field are of Baird (1859); Klie (1927); Gurney (1907); Arora (1931); Hartmann (1964); Michael & Victor (1975); Harshey (1985); Deb (1972).

Harshey (1985) recorded some Ostracods from Madhya Pradesh and made an important contribution to the Ostracods fauna of India. Harshey & Patil (1988) erected new species *Strandesia jabalpurensis* from Jabalpur.

METHOD OF COLLECTION

A small cone net or plankton net was used by Limnologists for collection of Ostracods, however, it is difficult to collect these organisms in net since the Ostracods are bottom dwellers and usually find their place among aquatic vegetation. Therefore a small dredge is necessary

to collect the Ostracods fauna which is preserved by adding slowly either formalin or alcohol with intervals, in such a way that they will die with their valves open. Later this collection is washed with the help of Tylar's Sieve of different mesh sizes and thus small Ostracods are also separated. Then these are sorted out under binocular dissecting microscope and kept in 70% methanol. All the specimens were collected from Ujani wetland by this method.

After dissecti on the valves and soft parts were should be mounted on slides and teared in a drop of glycerine for study under 10×40 magnification for identification. For identification carapace and appendages are important besides internal organs.

CLASSIFICATION

Subclass : OSTRACODA
Order : POPOCOPIDA
Family : CYPRIDIDAE
Sub-family : CYPRIDINAE
Sub-family : CYPRITTINAE
Sub-family : STENOCYPRINAE
Sub-family : CYPRIDOPSINAE
Family : CYCLOCYPRIDIDAE
Family : NOTODROMATIDAE
Family : ENCANDONIDAE
Family : ILYOCYPRIDIDAE

Family : CYPRIDIDAE
Sub-family : CYPRIDINAE

1. *Cypris subglobossa* Sowerby

Material Examined : 2♀♀, Khanota, 10.9.90, Coll. S. G. Patil.

Distribution : Andhra Pradesh, Maharashtra, Andhra Pradesh, Tamilnadu, Kerala,

Status : Common.

2. *Cypris dravidensis* Victor and Michael

Material Examined : 2♀♀, Rajewadi, 7.6.90, Coll. S. G. Patil.

Distribution : Tamilnadu, Maharashtra.

Status : Not Known.

3. *Strandesia parva* Hartmann

Material Examined : 1♀, Khanota, 8.6.90, Coll. S. G. Patil.

Distribution : Maharashtra, Rajasthan, Malabar coast, Kerala and Pilani Hill in Tamilnadu.

4. *Cyprinotus cingalensis* Brady

Material Examined : 1♀, Rajewadi, Ujani, 7. 6. 90, Coll. S. G. Patil.

Distribution : Andhra Pradesh and almost Maharashtra State.

Sub family : CYPRETTINAE

5. ***Cypretta globulus*** (Sars)

Material Examined : 1♀, Khanota, 10.9.91, Coll. S. G. Patil.

Distribution : Lahore and Andhra Pradesh.

Status : Locally common.

Sub family : STENOCYPRINAE

6. ***Stenocypris major*** (Baird)

Material Examined : 1♀, Khanota, 8.6.90, Coll. S. G. Patil.

Distribution : Tamilnadu, Karnataka, Andhra Pradesh, Kerala; Gujarat, Maharashtra, Madhya Pradesh and West Bengal.

7. ***Chrissia humilis*** (Klie)

Material Exam.ined : 1♀, Khanota, 10.9.91, Coll. S. G. Patil.

Distribution : Maharashtra, Kerala, Pondichery, Tamilnadu and West Bengal.

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INSECTA : ODONATA

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INTRODUCTION

Odonata, commonly known as dragon and damsel flies are semi aquatic insects. Essential stages of their life cycle, like eggs and larvae are wholely aquatic, while adults are on wing and pearch on aquatic vegetation especially on weeds and bushes. Though most of the odonate species appear staying close to water source, there are examples of these insects perching high on trees and shrubs considerably away from water.

In the present state of rapid urbanisation, most of the favourite sites of these graceful insects are vanishing. Further, indiscriminate assults on forest lands have reduced number of perineal streams, thus breeding of these predacious insects is feared to be localised and restricted.

However, in the modern agricultural and energy needs, dams, lakes and reservoirs are built on a large scale. These new sites are preferred by aquatic and semi aquatic fauna and flora. Thus inventorisation of odonates in Ujani wetland, which is created by daming the river Bhima in Pune district, was undertaken for the present study.

A total of more than 5,000 species of odonates distributed in 630 genera, grouped in 37 families under three suborders are known from the world over. Approximately 500 species are known to occur in India.

Record of Odonate species from this part of country dates back to the works of Fraser 1933-1936, where some species were reported from Bombay, Mahabaleswar, Poona and Satara area which mainly fall under the spreads of Western Ghats. Ujani wetland is formed as a result of a dam on the river Bhima in the year 1980. It is quite likely that odonates from surrounding area found a favourable breeding site and got established there. Location of Ujani wetland being mainly in plains and away from the Western Ghats proper, a limited number of odonate species were found in the collections from this area. The present inventory is based on earlier records together with actual collections made during the surveys conducted by the Western Regional Station of Zoological Survey of India, Pune, between 1988-1992. A total of 42 species are thus listed of which 16 species marked with * were actually collected. These 42 species belong to 31 genera and 21 subfamilies from 2 suborders. Notes on the distribution of these species come from their records from Indian region through the works of Fraser 1933-1936, Prasad 1976, Singh and Prasad 1977, Prasad and Thakur 1981, Prasad and Ghosh 1984 a and b and Lahiri 1987.

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SYSTEMATIC ACCOUNT

Order : ODONATA
Suborder : ZYGOPTERA
Superfamily : LESTOIDEA
Family : LESTIDAE
Subfamily : LESTINAE

(1) *Lestes viridulus* Rambur

Superfamily : COENAGRIONOIDEA
Family : PROTONEURIDAE
Subfamily : CACONEURINAE

(2) *Esme cyaneovittata* Fraser

Subfamily : DISPARONEURINAE

(3) *Elattoneura nigerrima* Laidlaw.

(4) *Disparoneura quadrimaculata* (Rambur)

Family : COENAGRIONIDAE
Subfamily : PSEUDAGRIONINAE

(5) *Archibasis oscillans* (Selys)

(6) *Pseudagrion decorum* (Rambur)

(7) *Ceriagrion aurantiacum* Laidlaw.

(8) *Ceriagrion coromandelianum* (Fraser).

Subfamily : ISCHNURINAE

(9) * *Aciagrion occidentale* Laidlaw.

(10) * *Ischnura aurora aurora* (Brauer)

(11) * *Ischnura senegalensis* (Rambur)

Subfamily : AGRIOCNEMIDINAE

(12) *Agriocnemis pieris* Laidlaw.

(13) * *Agriocnemis pygmaea* (Rambur)

Subfamily : COENAGRIONINAE

(14) *Cercoin calamorum* (Ris)

Superfamily : CALOPTERYGOIDEA
Family : CHLOROCYPHIDAE

(15) *Libellago lineata indica* Fraser.

Suborder : ANISOPTERA
Superfamily : AESHNOIDEA
Family : GOMPHIDAE
Subfamily : GOMPHINAE

(16) *Cyclogomphus ypsilon* Selys.

(17) *Cyclogomphus heterostylus* Selys.

(18) *Macrogomphus annulatus* (Selys).

(19) *Microgomphus torquatus* (Selys)

Subfamily : LINDENIINAE

(20) * *Ictinogomphus rapax* (Rambur)

Subfamily : GOMPHOIDINAE

(21) *Gomphidea T. nigrum* Selys.

Family : AESHNIDAE
Subfamily : AESHNINAE

(22) * *Anax immaculifrons* (Rambur)

(23) *Anax parthenope parthenope* (Selys)

(24) *Gynacantha millaridi* Fraser

(25) *Hemianax ephippiger* (Burmeister)

Superfamily : LIBELLULOIDEA
Family : CORDULIIDAE
Subfamily : CORDULIINAE

(26) *Macromia flavicincta* Selys.

Family : LIBELLULIDAE
Subfamily : TETRATHEMISTINAE

(27) *Hylaeothemis fruhstorferi* (Karsch)

Subfamily : LIBELLULINAE

(28) * *Potamarcha congener* (Rambur)

(29) *Orthetrum pruinosm neglectum* (Rambur)

(30) * *Orthetrum sabina sabina* (Drury)

Subfamily : BRACHYDIPLACTINAE

(31) *Brachydiplax sorbina* (Rambur)

Subfamily : SYMPETRINAE

(32) * *Acisoma panorpoides panorpoides* Rambur.

(33) *Diplacodes nebulosa* (Fabricius)

(34) **Diplacodes trivialis* (Rambur)

(35) *Neurothemis fulvia* (Drury)

(36) **Neurothemis tullia tullia* (Drury)

(37) **Brachythemis contaminata* (Fabricius)

Subfamily : TRITHEMISTINAE

(38) **Trithemis aurora* (Burmeister)

(39) *Trithemis kirbyi kirbyi* Selys.

(40) * *Trithemis pallidinervis* Kirby.

Subfamily : TRAMEINAE

(41) *Pantala flavcscens* (Fabricius)

(42) **Rhyothemis variegata variegata* (Linneaus).

Order : ODONATA
Suborder : ZYGOPTERA
Superfamily : LESTOIDEA
Family : LESTIDAE
Subfamily : LESTINAE

1. ***Lestes viridulus*** Rambur

Habit : Among dry grasses, commonest during the dry season.

Status : Common

External Distribution : Confined to peninsular India, Deccan and Western. India, Uttar Pradesh, Bombay, Rajasthan, Coorg, Kolar.

Superfamily : COENAGRIONOIDEA
Family : PROTONEURIDAE
Subfamily : CACONEURINAE

2. ***Esme cyaneovittata*** Fraser

Habitat : Gregarious in habits and found in colonies on banks of small streams.

Status : Common in Western Ghats.

External Distribution : Annamalai and Mudis Hills, Palni Hills, Western Ghats.

Source : Fraser (1933).

Subfamily : DISPARONEURINAE

3. ***Elattoneura nigerrima*** Laidlaw

Habitat : On banks of rivers and streams, sitting on stems of weeds.

Status : Common, localised.

External Distribution : Confined to Central and Western India, not further South than Satara.

Source : Fraser (1933).

4. ***Disparoneura quadrimaculata*** (Rambur)

Habitat : Found near streams & river.

Altitude : Below 500 mtrs.

Status : Common.

External distribution : India, Central India, Western Ghats, Mahabaleshwar, Poona, Panchmahal, Satara dist.

Source : Fraser (1933).

Family : COENAGRIONIDAE
Sub family : PSEUDOGRIONINAE

5. ***Archibasis oscillans*** (Selys)

Habitat : Common on small brooks and streams round the year.

Status : Common locally.

External Distribution : Confined to the Western Ghats of India.

Source : Fraser (1933).

6. * ***Pseudagrion decorum*** (Rambur)

Locality : Vill. Khanota, Indapur, 5.9.1989. Coll. R. M. Sharma, 1 ♂; 3 ♀♀

Altitude : Upto 2,200 mtrs.

Habitat : Along water bodies, migratory in nature upto West Coast of India.

Status : Common.

External Distribution : Throughout continental India and Mynammer, Ootekmad and Nilgiris.

Source : Fraser (1933); Prasad and Varshney (1988)

7. ***Cariagrion aurantiacum*** Laidlaw.

Habitat : Well away from water, in dry grasses, but breeds in streams.

Status : Common.

External Distribution : Many parts of India, Western Ghats, Nilgiri Wynaad, Poona, Assam and Bengal.

Source : Fraser (1933).

8. ***Cariagrion coromandelianum*** Fraser.

Habitat : Breeds in weedy ponds and tanks, in scrub jungle near water source.

Status : Common.

External Distribution : Throughout India, Sri Lanka, Myanmar, Malaysia, Indo-China and South China.

Source : Fraser (1933); Prasad and Varshney (1988).

Subfamily : ISCHNURINAE

9. ****Aciagrion occidentale*** Laidlaw.

Locality : Ujani Wetland, Shaha village, 27.8.1988. 1♂; 28.8.1988; 1♂ Coll. P. P. Kulkarni.

Habitat : Found in foot hills in marshes and jungle in early months of year. Takes to migration.

Status : Common

External Distribution : Throughout South India and Sri Lanka.

Remarks : Though delicate and light built, takes to migration. Specimens recorded to be collected over 60 kms. out at sea off the Western Shores of India and Sri Lanka.

Source : Fraser (1933).

10. ****Ischnura aurora aurora*** (Brauer)

Locality : Shaha village, Indapur, 27.8.1988, Coll. P. P. Kulkarni; 1♀; 20.1.1991, Coll. R. M. Sharma 1♂ and all locatities near Ujani Wetland.

Altitude : Upto 2,300 mts. from plains.

Habitat : Widely distributed

Status : Common

External Distribution : Widely distributed throughout Southern Asia, India; silent valley, Sri Lanka, Burma, Malaysia, Borneo, Australia, Philipines and Samoa.

Source : Fraser (1933), Prasad and Thakur (1981), Lahiri (1987).

11. ****Ischnura senegalensis*** (Rambur)

Locality : Shaha, Indapur, 6.9.1989, Coll. R. M. Sharma, 1♂; Sogaon, Indapur, 26.9.1990, Coll. M. S. Pradhan, 2♂♂, Khanota Indapur 20.1.1991; 2♂♂ 1♀; Rajewadi, 21.1.1991, all Coll. R. M. Sharma, 2♂♂; all Localities near Ujani Wetland.

Altitude : From sea level to over 2,200 mtrs.

Habitat : Widely distributed.

Status : Common

External Distribution : Throughout India, Myanmar, Sri Lanka, Japan, Phillipines and African continent.

Source : Fraser (1933); Prasad and Varshney (1988).

Subfamily : AGRIOCNEMIDINAE

12. ***Agriocnemis pieris*** Laidlaw.

Habitat : Found in grassy marsh-lands.

Status : Common.

External Distribution : Western Ghats of India; North and South Kanara, Silent Valley, Bombay, Western Ghats of India, Malabar, Niligiri Wynaad, and Coorg.

Source : Fraser (1933).

13. ****Agriocnemis pygmaea*** (Rambur)

Locality : Shaha village, Indapur, 21.1.1991. Coll. R. M. Sharma; 2♂♂ ; Rajewadi, Indapur, 22.1.1991. Coll. R. M. Sharma, 2♀♀ : Bhigwan, Indapur, 23.1.1991, Coll. R. M. Sharma, 5♂♂, 3♀♀ (all localities near Ujani Wetland).

Habitat : Widely distributed, Found in grassy marsh lands.

Status : Common.

External Distribution : Throughout oriental region, Australia and Pacific Islands.

Source : Fraser (1933); Prasad and Varshney (1988), Prasad (1976), Lahiri (1987).

Subfamily : COENAGRIONINAE

14. ***Cercion calamorum*** Fraser.

Habitat : On vegetation, on the side of tanks and water bodies.

Status : Common.

External Distribution : Throughout Peninsular India.

Source : Fraser (1933); Prasad and Varshney (1988).

Superfamily : CALOPTERYGOIDEA
Family : CHLOROCYPHIDAE

15. ***Libellago lineata indica*** (Fraser.)

Habitat : Found near river banks.

Status : Common.

External Distribution : Western Ghats, Deccan, Poona, Coorg, Kanara and Malabar.

Source : Fraser (1934).

Suborder : ANISOPTERA
Superfamily : AESHNODEA
Family : GOMPHIDAE
Subfamily : GOMPHINAE

16. ***Cyclogomphus ypsilon*** Selys.

Habitat : Found near marsh lakes and rests on long grass. Its flight is short and weak.

Status : Locally Common.

External Distribution : India, Deccan, Poona.

Source : Fraser (1934).

17. ***Cyclogomphus heterostylus*** Selys.

Habitat : Found near marsh lakes & rests on long grasses (similar to *C. ypsilon*).

Status : Locally Common.

External Distribution : India, Poona, Madras.

Source : Fraser (1934).

18. ***Macrogomphus annulatus*** (Selys)

Habitat : Found breeding in streams and pearches on Accassia trees.

Status : Locally Common.

External Distribution : India, Western Ghats, Poona, Satara.

Source : Fraser (1934).

19. ***Microgomphus torquatus*** (Selys)

Habitat : On vegetation bordering streams and common in mansoon.

Status : Common Locally.

External Distribution : Locally distributed India, Western Parts of Deccan, Poona and Satara Districts.

Source : Fraser (1934).

Subfamily : LINDENIINAE

20. ****Ictinogomphus rapax*** (Rambur)

Locality : Shaha village, Indapur, 27.8.1988. Coll. P.P.Kulkarni, 2♂♂ 2♀♀; Khanota, Indapur, 5.9.1989, Coll. R. M. Sharma, 1♂; Khanota, Indapur, 22.9.1990, Coll. M. S. Pradhan, 2♂♂; all localities around Ujani Wetland.

Habitat : Found along rivers, stagnant water, pools, running and still water. If disturbed returns to its resting place again & again. Pairing takes place over water.

Status : Very Common

External Distribution : Occurs throughout India, Myanmar; Sri Lanka and Malaysia except desert region.

Subfamily : GOMPHOIDINAE

21. ***Gomphidia T. nigrum*** Selys.

Habitat : It patrols the borders of the lake for long distance.

Status : Localised and found in good number.

External Distribution : India, Katraj Lake, Poona.

Source : Fraser (1934).

Family : AESHNIDAE
Subfamily : AESHNINAE

22. ***Anax immaculifrons*** Rambur.

Locality : Old Bhigwan village, Indapur, Ujani Wetland 22.9.1990, Coll. M. S. Pradhan,1♂.

Altitude : 450-2,280 mtrs.

Habitat : Breeds in all montane streams, specially in sluggish streams, Larvae found in muddy bottom.

Status : Common.

External Distrubution : India, Western and Eastern Ghats, Sikkim, Himalayas, Sri Lanka and Hongkong.

Source : Fraser (1936); Prasad and Ghosh (1984).

23. ***Anax parthenope parthenope*** (Selys)

Habitat : Crepuscular in habits, found hawking in swarms in dusk.

Status : Common.

External distribution : Extends across South Europe, North Africa, Asia; India, Kashmir, West coast.

Source : Fraser (1936).

24. ***Gynacantha millardi*** Fraser.

Habitat : Found hiding in hedges or trees and on wing during warmer parts of day, flying low in shady lanes.

Status : Common locally.

External Distribution : India, Poona, Coorg.

Source : Fraser (1936).

25. ***Hemianax ephippiger*** (Burmeister).

Habitat : Found breeding in shallow ponds and marshes. Some specimen taken 40 miles off the Kathiawar coast (India).

Status : Common.

External Distribution : From South Europe to North Asia to India.

Source : Fraser (1936).

Superfamily : LIBELLULOIDEA
Family : CORDULIIDAE
Subfamily : CORDULIINAE

26. ***Macromia flavicincta*** Selys.

Habitat : Breeds in stream and found in bushes.

Status : Locally common.

External Distribution : Recorded from India, Poona, Mahabaleshwar, type indicated from Bengal.

Source : Fraser (1936).

Family : LIBELLULIDAE
Subfamily : TETRATHEMISTINAE

27. ***Hylaeothemis fruhsterferi*** (Karsch).

Habitat : Found breeding in marshes along banks.

Altitude : Upto 630 mtrs.

Status : Common.

External Distribution : Western India and Sri Lanka.

Source : Fraser (1936).

Subfamily : LIBELLULINAE

28. ****Potamarcha congener*** (Rambur).

Locality : Rajewadi, Indapur, 21.6.1991, Coll. S. V. Mulay, 1 ♀

Habitat : Breeds in small weedy ponds and marshes.

Status : Common.

External Distribution : Widely distributed from Sri Lanka to Tibet and from Nilgiris, West coast of India to the Philippines.

Source : Fraser (1936), Prasad and Varshney (1988).

29. ***Orthetrum pruinosum neglectum*** (Rambur).

Altitude : From plains upto 2,200 mtrs.

Habitat : Breeds in small tanks and also river beds and pools.

Status : Most Common.

External Distribution : Throughout plains of India, Ooty, Nilgiris, Silent valley, Sri Lanka, Tibet, Myanmar and Hongkong.

Source : Fraser (1936).

30. ****Orthetrum sabina sabina*** (Drury)

Locality : Rajewadi, Indapur, 28.8.1988, Coll. P. P. Kulkarni,1 ♂ 1 ♀; Rajewadi, 24.9.1990, Coll. M. S. Pradhan, 1 ♂ ; Bhigwan, Indapur, 10.3.1991, Coll. S. G. Patil 1 ♂

Altitude: From sea level to over 2,130 mtrs.

Habitat : In scrub jungle, along the hills.

Status : Common.

External Distribution : Enormous distribution from Somali land, .Mesopotamia, Persia to Samoa; Australia, All parts of India, Sri Lanka, Myanmar and Siam.

Source : Fraser (1936); Prasad and Varshney (1988) Prasad (1976) Lahiri (1987).

Subfamily : BRACHYDIPLACTINAE

31. ***Brachydiplax sobrina*** (Rambur).

Habitat : Found hovering on tanks with vegetation.

Status : Common.

External Distribution : Bombay to Travancore and Assam; Sri Lanka; Myanmar.

Source : Fraser 1936.

Subfamily : SYMPETRINAE

32. ****Acisoma panorpoides panorpoides*** Rambur.

Locality : Palasdeo, Indapur, 6.9.1989, Coll. R. M. Sharma; 1♂; Rajewadi, Indapur, 21.1.1991. Coll. R. M. Sharma; 1♀

Habitat : Found close to reeds in heavily weeded tanks. Not found away from water. Has a very weak and short flight.

Status : Common.

External Distribution : From Western India, Sri Lanka to Philippines and China.

Source : Fraser (1936); Prasad and Thakur (1981).

33. ***Diplacodes nebulosa*** (Fabricius).

Habitat : Found near marshes, heavily weeded tanks and close to water.

Status : Comparatively rare & localised.

External Distribution : From Western India to Sri Lanka to Australia and Java.

Source : Fraser (1936).

34. ****Diplacodes trivialis*** (Rambur)

Locality : Shaha village, Indapur, 27.8.1988, 1♀; Rajewadi, 28.8.1988 all collection P. P. Kulkarni 1♂; Khanota, Indapur, 22.9.1990, 1♂; Sogaon, Indapur 26.9.1990 all collection M. S. Pradhan 1♀; Khed, Indapur, 20.1.1991 1♂; Khanota, Indapur, 20.1.1991 1♂; Rajewadi, Indapur, all collection R. M. Sharma 1♂; (all localities near Ujani Wetland).

Altitude : From plain to 2,140 mtrs.

Habitat : Commonest dragonfly, also found far from water.

Status : Very Common.

External Distribution : Silent valley, Khasi hills, Kangra, Meghalaya, India; Sri Lanka, Burma, South Asia to Formosa.

Source : Fraser (1936); Prasad (1976) Lahiri (1987).

35. ***Neurothemis fulvia*** (Drury).

Altitude : Upto 900 mtrs.

Habitat : Found near weedy ponds and marshes.

Status : Common.

External Distribution : Throughout India, Sri Lanka, Myanmar, Malacca and Siam.

Source : Fraser (1936), Prasad and Varshney (1988).

36. ***Neurothemis tullia* tullia** (Drury).

Locality : Khanota, Indapur, 20.1.1991, Coll. R. M. Sharma, 1♀

Altitude : Found mainly in plains.

Habitat : Near water bodies and marshy ponds.

Status : Common.

External Distribution : From West coast of India, Peninsular India, Silent Valley to Burma, Malacca and Hongkong.

Source : Fraser (1936).

37. ***Brachythemis contaminata*** (Fabr.)

Locality : Rajewadi, 28.8.1988, Coll. P. P. Kulkarni 1♀1♂; Palasdeo, Indapur, 6.9.1989, 2 ♀♀ Saha, Indapur, 6.9.1989, 3♂♂, Bhigwan, 7.9.1989, 1♂. All Coll. R. M. Sharma. Khanota, Indapur, 22.9.1990 1♀, 5♂♂; Rajewadi, 24.9.1990, 2♀♀, 1♂; Near Palasdeo, 24.9.1990, 7♀♀, 2♂♂; Sogaon, Indapur, 26.9.1990, 2♀♀ 5♂♂ ; All Coll. M. S. Pradhan; Rajewadi, 22.1.1991, Coll. R. M. Sharma 1♀; Khanota, Indapur, 11.3.1991, Coll. S. G. Patil, 4♀♀♂. All localities around Ujani Wetland.

Habitat : Found along sluggish streams, over weedy ponds, tanks and lakes.

Status : Common.

External Distribution : Throughout plains of India. Sri Lanka and Myanmar, China, Formosa, philippines, Java and Sumatra.

Source : Fraser (1936).

Subfamily : TRITHEMISTINAE

38. ***Trithemis aurora*** (Burmeister)

Locality : Shaha vill., Indapur, 28.8.1988, Coll. P. P. Kulkarni, 1♀; Bhigwan, Indapur, 10.3.1991, Coll. S. G. Patil, 1♂♀

Altitude : From plains upto 1,200 mtrs.

Status : Common.

External Distribution : Throughout India, Myanmar, philippines, and Java.

Source : Fraser (1933), Prasad & Varshney (1988) Singh and Prasad (1977), Prasad (1976), Lahiri (1987).

39. ***Trithemis kirbyi kirbyi*** Selys.

Habitat : Males found flat on rocks and females on bushes far from water.

Status : Locally Common.

External Distribution : India, Bombay, Coimbatore, Khandala, Mysore, Poona, Satara and Periyar River.

Source : Fraser (1936).

40. ****Trithemis pallidinervis*** (Kirby).

Locally : Shaha village, Indapur, 17.8.1988 4♂♂, 4♀♀; 27.8.1988. 2♂♂; Rajewadi Indapur, 28.8.1988, all collection P. P. Kulkarni 1♀; Shaha village, Indapur, 6.9.1989, 1♂ , 1♀; Bhigwan, Indapur, 7.9.1989, all collection, R. M. Sharma, 1♀; Khanota, Indapur, 22.9.1990, ♂; 26.9.1990 all collection M. S. Pradhan 1♂ 1♀

Habitat : Breeds in stagnant water.

Status : Common.

External Distribution : Throughout India, Sri Lanka and Myanmar.

Source : Fraser (1936); Prasad and Thakur (1981), Prasad and Ghosh (1984), Prasad (1976).

Subfamily : TRAMEINAE

41. ***Pantala flavescens*** (Fabricius)

Habitat : In marshy tanks, among foot hills.

Status : Common.

External Distribution : Throughout India, Sri Lanka, Myanmar and Tibet.

Source : Fraser (1936); Prasad and Thakur (1981); Prasad and Ghosh 1984; Lahiri (1987); Prasad and Varshney (1988).

42. ****Rhyothemis variegata variegata*** (Linn.)

Locality : Rajewadi, Indapur, 28.8.1988, Coll. P. P. Kulkarni 1♀

Habitat : Found in swarms over weedy tanks.

Status : Common.

Extranal Distribution : India, Sri Lanka and Malaysia.

Source : Fraser (1936).

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AQUATIC AND SEMIAQUATIC HETEROPTERA (INSECTA)

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INTRODUCTION

The importance of wetlands as areas of natural productive ecosystem, environmental diversity, hydrological utility, recharge of aquifers, flow stabilization of streams and rivers, providing natural flood control, improved water quality and habitat for fishes, insects and wildlife resources has received increasing recognition in recent years the world over.

Wetlands support a variety of invertebrates especially insects, of which some are wholly aquatic e.g. Hemiptera and Coleoptera while others are dependent on wetlands for completing their life cycle e.g. odonates, mosquitoes etc. The sizable and diverse insect population of a given waterbody serves as a potential source of food for fishes and other animals living in it. Therefore, the inventorisation of insect diversity of any such wetland becomes imperative to provide the baseline data required for developing a strategy for the effective conservation and management of a particular wetland.

The knowledge of waterbugs is essential due to their important role in freshwater ecosystem. Many of them constitute the natural food for fishes (however, some species live by plundering fish fry), some could be utilised in biological control especially of mosquitoes, while some corixids could be used as indicators of water quality.

Out of fifty one families of extant Hemiptera today, seventeen are associated with wide variety of aquatic and semi-aquatic habitats ranging from salt water Pools to mountain lakes and from hot springs to cold water rivers. The Pelagic genus *Halobates* lives upon the surface of the oceans. Approximately 288 genera and 3556 species of aquatic bugs are known from the world over. Our knowledge of Indian aquatic Heteroptera is limited to the taxonomic preliminaries such as describing or recording the species from different parts of the country. Recent comprehensive studies on the group reveal the occurrence of 53 genera and 190 species spread over 14 major families in Indian region (Thirumalai, 1989, 1992, 1994a & b 1996, 1997 Thirumalai & Dam, 1996).

PREVIOUS STUDIES

Barring a few notes of Annandale (1919) and Paiva (1919) there was no detailed information available on aquatic bugs from Maharashtra State. Thereafter, Tonapi (1959) studied the group at length by making collections from the tributaries of the River Bhima on which the Ujani dam was constructed later on.

Based on the surveys carried in the Ujani wetland from 1988 to 1992 and incorporating the

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earlier study by Tonapi, (1959), the present inventory is prepared enumerating a total of 23 genera and 31 species contained in 11 families. Species actually collected have been indicated by an asterik (*).

SYSTEMATIC LIST

Phylum : ARTHROPODA
Class : INSECTA
Order : HETEROPTERA
Family : OCHTERIDAE

1. *Ochterus marginatus* (Latreille)

Family : CORIXIDAE
Subfamily : CORIXINAE

†2. *Cymatia apparens* (Distant)

†3. *Corixa* (*Tropocorixa*) *distorta* (Distant)

Subfamily : MICRONECTINAE

4. *Micronecta quadristrigata* Breddin

Family : PLEIDAE

5. *Plea frontalis* (Fieber)

Family : NOTONECTIDAE
Subfamily : NOTONECTINAE

†6. *Notoneacta glauca* Linnaeus

7. *Enithares ciliata* (Fabricius)

Subfamily : ANISOPINAE

8. *Anisops niveus* (Fabricius)

9. *Anisops sardea* Herrich-Shaffer

Family : NEPIDAE
Subfamily : NEPINAE

10. *Laccotrephes elongatus* Montandon

*11. *Laccotrephes griseus* (Guerin)

12. *Laccotrephes maculatus* Fabricius

*13. *Laccotrephes ruber* (Linnaeus)

Note : The occurrence of the 3 species marked by † needs (Tanapi : 1959) further investigation as they are known to be typical Himalayan species.

Subfamily : RANATRINAE

*14. *Ranatra elongata* Fabricius

*15. *Ranatra filiformis* Fabricius

Family : BELOSTOMATIDAE
Subfamily : BELOSTOMATINAE

*16. *Diplonychus rusticus* (Fabricius)

17. *Diplonychus molestum* (Dufour)

Subfamily : LETHOCERINAE

18. *Lethocerus indicus* (Lepeletier & Serville)

Family : NAUCORIDAE
Subfamily : NAUCORINAE

19. *Naucoris scutellaris* Stal

Subfamily : LACCOCORINAE

20. *Heleocoris breviceps* Montandon

21. *Heleocoris indicus* Montandon

22. *Heleocoris vicinus* Montandon

Family : HEBRIDAE
Subfamily : HEBRINAE

23. *Hebrus bombayensis* Paiva

Family : HYDROMETRIDAE
Subfamily : HYDROMETRINAE

24. *Hydrometra greeni* Kirkaldy.

Family : GERRIDAE
Subfamily : GERRINAE

*25. *Aquarius adelaidis* (Dohrn)

*26. *Limnogonus* (*Limnogonus*) *fossarum fossarum* (Fabricius)

27. *Limnometra fluviorum* (Fabricius)

Subfamily : EOTRECHINAE

28. *Onychotrechus rhexenor* Kirkaldy

Subfamily : PTILOMERINAE

29. *Ptilomera* (*Ptilomera*) *agroides* Schmidt

Subfamily : HALOBATINAE

30. *Metrocoris indicus* Chen & Nieser

Family : VELIIDAE
Subfamily : RHAGOVELIINAE

31. *Rhagovalia (Rhagovelia) ceylanica* Lundblad

INVENTORY

Family : OCHTERIDAE

1. ***Ochterus marginatus*** (Latreille)

Habitat : Shores of rivers, streams, lakes, Ponds and dams.

Status : Common.

Distribution : Abyssina; China; France; India; Indonesia; Japan; Myanmar; Spain; Syria; Philippines; Taiwan; Thailand; Vietnam.

Source : Tonapi (1959) Kormilev (1971).

Remarks : A widely known species.

Family : CORIXIDAE
Subfamily : CORIXINAE

2. ***Cymatis apparens*** (Distant)

Habitat : lakes, ponds & swampy parts.

Status : Yet to be ascertained, appears to be common in Kashmir.

Distribution : China; India.

Source : Hutchinson (1940).

Remarks : In Peninsular India it is evidently rare or narrowly restricted in distribution.

3. ***Corixa (Tropocorixa) distorta*** (Distant)

Habitat : Stagnant water bodies with aquatic macrophytes.

Status : Locally common.

Distribution : China; India; (Central), Nepal, Pakistan.

Source : Hutchinson (1940).

Remarks : A widespread species in Northern & Central India; a sub-Himalayan type of Far Eastern origin.

Subfamily : MICRONECTINAE

4. ***Micronecta quadristrigata*** Breddin

Habitat : Lentic and lotic.

Status : Common locally and elsewhere.

Distribution : India (widely distributed); Indonesia; Iran; Malaysia; Philippines; Sri Lanka.

Source : Thirumalai, (1994).

Remarks : A very common species in Sourhtern and Eastern India.

Family : PLEIDAE

5. ***Plea frontalis*** (Fieber)

Habitat : Living at the bottom, sedentary.

Status : Common.

Distribution : China; India; Indonesia; Malaysia; Taiwan.

Source : Thirumalai (1989).

Remarks : Restricted to Oriental region.

Family : NOTONECTIDAE
Subfamily : NOTONECTINAE

6. ***Notonecta glauca*** Linnaeus

Habitat : Lentic

Status : Locally rare.

Distribution : India; Pakistan.

Source : Tonapi (1959)

Remarks : Generally distributed throughout Palaeartic region. This could refers to *Enithares* sp.

7. ***Enithares ciliata*** (Fabricius)

Habitat : Lentic.

Status : Common.

Distribution : Bhutan; India; Indonesia; Malaysia, Mauritius; Sri Lanka; Vietnam.

Source : Lansbury (1968).

Remarks : A very common species in South East Asian Region.

Subfamily : ANISOPINAE

8. ***Anisops nivea*** (Fabricius)

Habitat : Lentic.

Status : Common.

Distribution : India; Indonesia; Malaysia; Myanmar; Singapore; Sri Lanka.

Source : Thirumalai (1989).

Remarks : Recorded from Eastern Palaeartic regions and North Africa also.

9. ***Anisops sardeus*** Herrich-Shaffer

Habitat : Slow moving mountain streams.

Status : Locally rare, common elsewhere.

Distribution : Afghanistan; Africa; Albania; Canary Islands; India; Myanmar; Syria; Turkey.

Source : Tonapi (1959) Thirumalai (1994a).

Remarks : Widely distributed in Ethiopian, Oriental and Southern Palaeartic regions.

Family : NEPIDAE
Subfamily : NEPINAE

10. ***Laccotrephes elongatus*** Montandon

Habitat : Lentic.

Status : Scarce.

Distribution : India.

Source : Distant (1910). Tonapi (1959)

Remarks : A scarce species not reported from out side India.

*11. ***Laccotrephes griseus*** (Guerin)

Habitat : Lentic

Status : Common.

Material examined : Ujani wetland, Khed nr. bridge 1♂. S. G. Patil & Party, 7.i.1990.

Distribution : India; Malaysia; Myanmar; Seychelles; Sri Lanka; Thailand.

Source : Tonapi (1959) Thirumalai (1994a).

Remarks : Found to occur under the bottom of permanent water bodies near the edges.

12. ***Laccotrephes maculatus*** (Fabricius)

Habitat : Lentic.

Status : Scarce.

Distribution : India; Myanmar; Sri Lanka.

Source : Distant (1906). Tonapi (1959)

Remarks : A species with poor distribution records; so far known from Orient.

*13. ***Laccotrephes ruber*** (Linnaeus)

Habitat : Lentic and lotic.

Status : Common.

Material examined : Ujani wetland; Khed nr. bridge 1♂ 1♀ S. G. Patil & Party, 7.i.1990;

Saha, 1♂ R.M. Sharma & Party 22.i.1991.

Distribution : China; India (widely distributed); Japan; Nepal; Pakistan; Taiwan.

Source : Tonapi (1959) Thirumalai (1994a)

Remarks : A larger species reported from a wide variety of habitats like rivers, streams, tanks, etc.

Subfamily : RANATRINAE

*14. ***Ranatra elongata*** Fabricius

Habitat : Deeper parts of temporary pools, puddles etc.

Status : Common.

Material examined : Ujani wetland, Saha 1♂ R.M. Sharma & party, 21.i.1991.

Distribution : Austrialia; India (widely distributed); Nepal; Sri Lanka.

Source : Tonapi (1959) Lansbury (1972), Thirumalai (1994a).

Remarks : Reported to feed on tadpoles, nymphs of dragonflies, mayflies, aquatic heteropterans etc. Migrates to suitable aquatic medium during unfavourable seasons.

*15. ***Ranatra filiformis*** Fabricius

Habitat : Lentic and lotic.

Status : Common.

Material examined : Ujani wetland; Khandar vill. 1♂ 1♀ S. G. Patil & Party, 8. iii.1991; Khanota 3♀♀, S. V. Mulay & Party, 22.vi.1991.

Distribution : India (widely distributed); Nepal; Pakistan; Philippine Island; Sri Lanka.

Source : Tonapi (1959) Lansbury (1972), Thirumalai (1994a).

Remarks : Mostly occurs among vegetation fringing in the shallower parts of water bodies, clinging to submerged vegetation and is scarce in deeper areas.

Family : BELOSTOMATIDAE
Subfamily : BELOSTOMATINAE

*16. ***Diplonychus rusticus*** (Fabricius)

Habitat : Lentic.

Status : Common.

Material examined : Ujani wetland; Palasdeo, 1♂ 2♀♀ R. M. Sharma & Party, 22.i.1991; Saha 1♂ 2♀♀ R. M. Sharma & Party, 21.i.1991; Palasdeo 2♀♀ and several immature stages, S. G. Patil, & 7 party. 1991; Khanota, 5♀♀ and several immature stages, S. G. Patil & Party, 11.iv.1992.

Distribution : Australia; China; India (widely distributed); Indonesia; Japan; Malaysia; Myanmar; New-Guinea; Newzealand; Sri Lanka; Thailand.

Source : Tonapi (1959) Thirumalai (1994a).

Remarks : Commonly found in ponds, reservoirs and are voracious feeders on the fish fry.

17. ***Diplonychus molestus*** (Dufour)

Habitat : Lentic.

Status : Rare.

Distribution : India; Indonesia; Malacca Island.

Source : Tonapi (1959) Distant (1906).

Remarks : A species with poor distributional records.

Subfamily : LETHOCERINAE

18. ***Lethocerus indicus*** (Lepeletier & Serville)

Habitat : Lentic & lotic.

Status : Locally scarce.

Distribution : Japan; India; Indonesia; China ; Malaysia; Myanmar; Philippine Islands; Sri Lanka.

Source : Tonapi (1959) Lundblad (1934).

Remarks : This 'giant water bug' known to feed on large sized insects; known to attract towards light.

Family : NAUCORIDAE
Subfamily : NAUCORINAE

19. ***Naucoris scutellaris*** Staål.

Habitat : Benthic.

Status : Common.

Distribution : India; Indonesia; Philippine Islands; Sri Lanka.

Source : La Rivers (1971).

Remarks : Often quite specific as to its preferred habitat.

20. ***Heleocoris breviceps*** Montandon

Habitat : Benthic

Status : Common.

Distribution : India.

Source : Tonapi (1959) Thirumalai (1989)

Remarks : Commonly found in calm pools, clinging to solid substrata.

21. ***Heleocoris indicus*** Montandon

Habitat : Benthic

Status : Common.

Distribution : India.

Source : Tonapi (1959) La Rivers (1971).

Remarks : Found on deeper partss of reservoir, tanks etc.

22. ***Heleocoris vicinus*** Montandon

Habitat :Benthic

Status : Scarce.

Distribution : India.

Source : Tonapi (1959) La Rivers (1971).

Remarks : Known from Eastern & Southern India only.

Family : HEBRIDAE
Subfamily : HEBRINAE

23. ***Hebrus bombayensis*** Paiva

Habitat : Moist places at shore lines & floating plants.

Status :Yet to be determined.

Distribution : India.

Source : Tonapi (1959).

Remarks : Not so far reported out side India.

Family : HYDROMETRIDAE
Subfamily : HYDROMETRINAE

24. ***Hydrometra greeni*** Kirkaldy

Habitat :Lentic and lotic.

Status : Common.

Distribution : India; Japan; Malaysia; Myanmar; Philippine Islands; Sri Lanka.

Source :Thirumalai (1994a).

Remarks : Widely distributed all over India and also reported to have been attracted towards light.

Family : GERRIDAE
Subfamily : GERRINAE

*25. ***Aquarius adelaidis*** (Dohrn)

Habitat : Permanent water bodies.

Status : Common.

Material examined : Ujani wetland; Back waters nr. sogaon, 1♂ (winged), 1♂ (apterous) 7♀♀ (apterous) and several immature stages; M. S. Pradhan & Party, 26.ix.1990; Saha, 3♂♂, 1♀ (winged) 2♀♀ (apterous) and several immature stages; S. G. Patil & Party, 10.x.1991.

Distribution : Bangladesh; China; India (widely distributed); Indonesia; Myanmar; Nepal; Philippine Islands; Sri Lanka; Thailand; Vietnam.

Source : Andersen (1990)

Remarks : Commonly found in lentic water bodies in tropical parts.

*26. ***Limnogonus (Limnogonus) fossarum fossarum*** (Fabricius)

Habitat : Lentic and lotic.

Status : Common.

Material examined : Ujani wetland : Khed nr. bridge, 1♂, 1♀ (apterous) 1♀ (winged); S. G. Patil & Party 7.i.1990.

Distribution : China; Hongkong; India (widely distributed); Indonesia; Japan; Malaysia; Myanmar; Philippine Islands, Singapore; Taiwan; Thailand; Vietnam.

Source : Thirumalai (1994a).

Remarks : Reported to occur in hot springs, brackish pools, from sea level to about 1000 metres.

27. ***Limnometra fluviorum*** (Fabricius)

Habitat : Lentic and lotic.

Status : Common.

Distribution : India; Philippine Islands; Sri Lanka.

Source : Tonapi (1959) Thirumalai (1994a).

Remarks : Commonly found to occur in a wide variety of freshwater habitats.

Subfamily : EOTRECHINAE

28. ***Onychotrechus rhexenor*** Kirkaldy

Habitat : Hygropetric.

Status : Not very common.

Distribution : India.

Source : Tonapi (1959) Andersen (1980).

Remarks : Only genus of the family which is known to live on hygropetric habitats.

Subfamily : PTILOMERINAE

29. ***Ptilomera (Ptilomera) agroides*** Schmidt

Habitat : Running streams.

Status : Locally scarce, common elsewhere.

Distribution : India.

Source : Thirumalai (1994a).

Remarks : A very common gerrid found on flowing mountain streams, rivers etc; not so far known outside Western Ghats.

Subfamily : HALOBATINAE

30. ***Metrocoris indicus*** Chen & Nieser

Habitat : Lentic & Lotic.

Status : Common.

Distribution : India.

Source : Chen & Nieser (1993).

Remarks : The most commonest of gerrids found in mountains and higher altitudes; recorded from reservoirs, rivers etc.

Family : VELIIDAE
Subfamily : RHAGOVELIINAE

31. ***Rhagovelia (Rhagovelia) ceylanica*** Lundblad

Habitat : Running streams, rivers.

Status : Locally scarce.

Distribution : India, Sri Lanka.

Source : Thirumalai (1994b).

Remarks : Commonly found in running streams, rivers etc.

The present study of the aquatic and semi-aquatic Heteroptera shows the overall rich biodiversity of the aquatic bugs in the Ujani Wetland.

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AQUATIC COLEOPTERA (INSECTA)

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INTRODUCTION

Wetlands are created by making reservoirs, canals, ditches, ponds and gravel pits. They are economic reserves and great natural productive ecosystems. They are important transitional areas between aquatic and terristrial ecosystems, supporting a wide variety of invertebrates especially insects, which serve as a potential source of food for fishes and other animals living in and around the water bodies, including aquatic birds.

Coleoptera (beetles and weevils) is one of such major insect orders whose members belonging to families *viz.* Haliplidae (crawling water beetles); Dytiscidae (predacious diving beetles); Gyrinidae (whirligig beetles); Hydrophilidae (water scavenger beetles) and Amphizoidae are wholly or partially aquatic. These beetles show various degrees of adaptations to aquatic life. They are found in streams, rivers, ponds, pools, lakes, tanks and shallow waters where hydrophytes and detritus are in abundance.

PREVIOUS STUDIES

Our knowledge on taxonomy and distribution of Indian aquatic beetles has remarkably been increased due to assiduous collections and comprehensive revisionary studies by Vazirani (1967 onwards). He enumerated regional aquatic beetle fauna through series of papers. As such the information on the group from Maharashtra State especially Western Ghats and Poona district was presented in the past by Vizirani (1967 & 1977) and Tonapi and Ozarkar (1969).

The present study is based on surveys carried out in the Ujani Wetland from 1988 to 1992 incorporating earlier records of the aquatic beetles from the waters of Poona district, which resulted in a total of 44 species belonging to 24 genera spread over three families. Species actually collected from Ujani wetland have been indicated by an astrik (*). The other species taken into consideration are in all likelyhood to occur in Ujani wetland.

SYSTEMATIC LIST

Order : COLEOPTERA
Suborder : ADEPHAGA
Family : DYTISCIDAE
Subfamily : NOTERINAE

1. *Canthydrus luctosus* (Aube)
2. *Hydrocoptus subvittulus* Motschulsky

Subfamily : LACCOPHILINAE

3. *Laccophilus anticatus* Sharp.
4. *Laccophilus chinensis inefficiens* Walker.
5. *Laccophilus flexuosus* Aube.
6. *Laccophilus parvulus* Aube.
7. *Laccophilus sharpi* Regimbart.

Subfamily : HYDROPORINAE

8. *Clypeodytes* (*Lioclypeus*) *indicus* (Regimbart)
9. *Guignotus flammulatus* (Sharp).
10. *Guignotus inconstans* (Regimbart).
11. *Hydrovatus fractus* Sharp.
12. *Hyphydrus* (*Apriophorus*) *intermixtus* Walker.
13. *Hyphydrus* (*Apriophorus*) *renardi* Severin.
14. *Hyphydrus nilghiricus* Regimbart.
15. *Microdytes belli* Balfour - Browne.
16. *Peschetius quadricostatus* (Aube)
17. *Peschetius toxophorus* Guignot.
18. *Uvarus livens* (Regimbart)
19. *Yola consanguinea* (Regimpart).

Subfamily : COLYMBETINAE

20. *Rhantus (Rhantus) taprobanicus* Sharp.

Subfamily : DYTISCINAE

21. *Cybister cognatus* Sharp
22. *Cybister confusus* Sharp.
*23. *Cybister limbatus* (Fabricius)
*24. *Cybister posticus* Aube.
*25. *Cybister rugulosus* Redtenbacher.
*26. *Cybister tripunctatus asiaticus* Sharp.
27. *Cybister ventralis* Sharp.
*28. *Eretes sticticus* (Linnaeus).
29. *Hydaticus fabricii* MacLeay.
30. *Hydaticus incertus* Regimbart.
31. *Hydaticus luczonicus* Aube.

32. *Hydaticus vittatus* (Fabricius)

33. *Rhantaticus congestus* (Klug).

34. *Sandracottus dejeani* Aube.

35. *Sandracottus festivus* (Illiger).

Family : GYRINIDAE
Subfamily : ENHYDRINAE

36. *Dineutes (Protodineutes) indicus* Aube.

Subfamily : ORECTOCHILINAE

37. *Orectochilus (Patrus) similis* Ochs.

*38. *Orectochilus (Patrus) discifer* (Walker)

39. *Orectochilus (Patrus) limbatus* Regimbart.

Suborder : POLYPHAGA
Family : HYDROPHILIDAE
Subfamily : HYDROPHILINAE

40. *Hydrophilus indicus* (Bedel).

*41. *Hydrophilus olivaceous* (Fabricius).

42. *Regimbertia attenuata* (Fabricius)

*43. *Sternolophus* (S. str.) *rufipes* (Fabricius)

Subfamily : HYDRAENINAE

44. *Hydraena quadricollis* Wallaston.

INVENTORY

Family : DYTISCIDAE
Subfamily : NOTERINAE

1. ***Canthydrus luctosus*** (Aube).

Habitat : Bottom of ponds and pools; sometimes in running waters.

Status : Abundant.

Distribution : In India known from Andhra Pradesh, Bihar, Karnataka, Kerala, Maharashtra, Orissa and West Bengal. Extends from Arabia to Indo-China, Iran and Sri Lanka.

Source : Vazirani (1967, 1968 and 1970).

Remarks : This species shows colour variations on its dorsal surface, even in specimens from the same locality.

2. ***Hydrocoptus subvittulus*** Motschulsky

Habitat : Pools, quarries, streams, wells and temporary water courses.

Status : Abundant.

Distribution : Widely distributed in the Oriental Region. In India, reported from Bihar, Maharashtra, Uttar Pradesh and West Bengal. It occurs throughout China (Southern), Indonesia and Sri Lanka.

Source : Tonapi & Ozarkar (1969); Vazirani (1967 & 1968).

Subfamily : LACCOPHILINAE

3. ***Laccophilus anticatus*** Sharp

Habitat : Pools and quarries.

Status : Rare.

Distribution : In India known from Assam, Bihar, Maharashtra, Manipur, Orissa and West Bengal. Recorded from Bangladesh and Sri Lanka.

Source : Tonapi & Ozarkar (1969); Vazirani (1968).

Remarks : A rare species usually found in association with partially submerged floating vegetation on the banks of ponds. It's elytra is brown with five yellow fascia.

4. ***Laccophilus chinensis inefficiens*** Walker

Habitat : Quarries, pools and river banks ; more common on sides of the ponds.

Status : Abundant.

Distribution : In India known from Assam, Bihar, Goa, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal. Outside reported from Nepal, Pakistan, Myanmar and Sri Lanka.

Source : Tonapi & Ozarkar (1969) ; Vazirani (1967, 1968 and 1970).

Remarks : Most common species amongst the small sized beetles. They hop with agility outside the water. Elytra with irrotations less marked.

5. ***Laccophilus flexuosus*** Aube.

Habitat : Ponds, lakes, pools, tanks and river beds.

Status : Common.

Distribution : In India : Andhra Pradesh; Bihar; Himachal Pradesh; Karnataka; Madhya Pradesh ; Maharashtra; Orissa; Rajasthan; Tamil Nadu; Uttar Pradesh and West Bengal. Outside : Myanmar; Nepal; Pakistan; Sri Lanka and Sumatra.

Source : Vazirani (1967 & 1968).

Remarks : This species shows variations in elytral markings ; excessively irregular and covering the entire surface excepting the lateral margins. The shape of the penis provides a more reliable character for its identification.

6. ***Laccophilus parvulus*** Aube.

Habitat : Quarries, pools, lakes and river banks.

Status : Common.

Distribution : Widely occurrs in the Oriental Region. In India known from the states of Andhra Pradesh; Assam; Bihar; Goa; Madhya Pradesh; Maharashtra; Manipur; Orissa; Rajasthan; Tamil Nadu; West Bengal and Andaman Islands. Outside : China; Indonesia; Pakistan; Sri Lanka & Thailand.

Source : Tonapi & Ozarkar (1969); Vazirani (1967, 1968 & 1970).

Remarks : This species is little larger and stouter than *L. chinensis inefficiens* Walker. General body colour testaceous to ferruginous with faint black lines on elytra.

7. ***Laccophilus sharpi*** Regimbart.

Habitat : Hill streams; pools, ponds and lakes.

Status : Common.

Distribution : Widely distributed species in South East Asia. In India known from Bihar; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Tamil Nadu and Uttar Pradesh. Outside reported from Australia, China, Indonesia, Iraq, Japan, Myanmar, Nepal, New Guinea and Pakistan.

Source : Vazirani (1967, 1968).

Remarks : Elytral markings consists of zigzag double lines, clear and thick but never coalescent.

Subfamily : HYDROPORINAE

8. ***Clypeodytes (Lioclypeus) indicus*** (Regimbart).

Habitat : Streams and rivers.

Status : Uncommon.

Distribution : Restricted in its distribution. In India known so far from Assam, Bihar, (Type locality), Madhya Pradesh, Maharashtra and Uttar Pradesh.

Source : Vazirani (1967, 1968 & 1971).

Remarks : Identified on the basis of discal striae on the elytra being distinctly smaller than latero-basal plica on the pronotum.

9. ***Guignotus flammulatus*** (Sharp).

Habitat : Lakes, ponds and streams.

Status : Common.

Distribution : In India : Bihar; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Uttar Pradesh and West Bengal. Outside : Indo-China (Tonkin) and Pakistan.

Source : Vazirani (1967, 1968 & 1970).

10. ***Guignotus inconstans*** (Regimbart)

Habitat : Ponds, pools, tanks and streams.

Status : Common.

Distribution : In India : Known from Bihar, Maharashtra ; Orissa ; Rajasthan. Outside : Nepal and Sri Lanka.

Source : Vazirani (1967, 1968 & 1970).

Remarks : It's elytral punctation being moderately strong and less dense.

11. ***Hydrovatus fractus*** Sharp.

Habitat : Ponds, tanks, streams and rivers.

Status : Rare.

Distribution : Originally known from Thailand (Bangkok) and later reported from Saigaon. In India reported only from Maharashtra (Bombay, Poona, Satara and Thane districts).

Source : Vazirani (1967).

Remarks : Usually confused with *H. confertus* Sharp but can be separated by the uniform width of the antennal segments in male.

12. ***Hyphydrus (Apriophorus) intermixtus*** Walker

Habitat : Pools, ponds, quarries, wells and streams.

Status : Common.

Distribution : Well distributed in Maharashtra, Tamil Nadu and Rajasthan States. Outside, known from Sri Lanka.

Source : Tonapi & Ozarkar (1969); Vazirani (1967 & 1968).

13. ***Hyphydrus (Apriophorus) renardi*** Severin.

Habitat : Pools, ponds, tanks, streams and rivers.

Status : Common.

Distribution : Known from Indian states of Bihar, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh & West Bengal. Outside recorded from Myanmar.

Source : Vazirani (1967 & 1968).

14. ***Hyphoporus nilghiricus*** Regimbart.

Habitat : Ponds and streams.

Status : Uncommon.

Distribution : Restricted in its distribution. Known from type locality Nilgiris ; a few places in Maharashtra (Poona & Satara districts) and Rajasthan.

Source : Vazirani (1967 & 1970).

Remarks : Legs completely testaceous is a distinct character to identify this species. Structure of penis also facilitates identification.

15. ***Microdytes belli*** Balfour–Browne.

Habitat : Pools.

Status : Uncommon.

Distribution : Known only from a few places in Maharashtra (Bombay, Khandala and Poona).

Source : Vazirani (1967 & 1968).

Remarks : Another allied species *M. sabitae* Vazirani (1967) also described from Maharashtra (Panchgani, Satara district) indicates the existence of more than one species of genus *Microdytes* in the state.

16. ***Peschetius quadricostatus*** (Aube)

Habitat : Pools, dams, streams and waterfalls.

Status : Rare.

Distribution : India : Bihar, Goa, Kerala, Maharashtra, Nilgiris, Orissa, Tamil Nadu and Uttar Pradesh.

Source : Tonapi & Ozarkar (1969); Vazirani (1967 & 1970).

Remarks : This species is usually confused with *P. toxophorus* Guignot with which it co-exists. It's elytra is testaceous, sculptured throughout with brwon patches and two ridges on each side.

17. ***Peschetius toxophorus*** Guignot.

Habitat : Small to large streams.

Status : Common.

Distribution : India : Bihar, Karnataka, Maharashtra, Orissa, Rajasthan and Tamil Nadu.

Source : Vazirani (1967 & 1970).

Remarks : This species can be distinguished from the preceding one by the balck and less emarginate clypeus; the dull and much more finely punctured apical abdominal segment.

18. ***Uvarus livens*** (Regimbart)

Habitat : Pools and streams.

Status : Uncommon.

Distribution : Known in India from Bihar, Maharashtra and Orissa states.

Source : Vazirani (1967 & 1968).

19. ***Yola consanguinea*** (Regimbart).

Habitat : Pools, ponds, tanks and streams.

Status : Uncommon.

Distribution : Restricted in its distribution. Known from Bihar, Maharashtra and Orissa within Indian Union.

Source : Tonapi & Ozarkar (1969); Vazirani (1967 and 1968).

Remarks : Small obovate beetles mostly associated with partially submerged rooted aquatic vegetation.

Subfamily : COLYMBETINAE

20. ***Rhantus (Rhantus) taprobanicus*** Sharp.

Habitat : Lakes and streams.

Status : Common.

Distribution : Widely distributed in Indo-Gangetic plains ; Eastern & Western Himalayas ; Himachal Pradesh, Karnataka, Maharashtra, Rajasthan, Sikkim, Tamil Nadu and West Bengal. Outside : known from Sri Lanka.

Source : Vazirani (1967, 1970 & 1970 C).

Remarks : Highly dominant species within range of its distribution.

Subfamily : DYTISCINAE

21. ***Cybister cognatus*** Sharp.

Habitat : Pools, quarries, rivers, tanks, etc.

Status : Uncommon.

Distribution : Restricted in its distribution. Known from a few places in Bihar and Maharashtra (Nasik, Poona & Satara districts) States.

Source : Vazirani (1968).

22. ***Cybister confusus*** Sharp.

Habitat : Pools, quarries, rivers, tanks and wells.

Status : Common.

Distribution : In India : Bihar, Karnataka, Manipur, Maharashtra & Orissa. Outside reported from Pakistan.

Source : Tonapi & Ozarkar (1969); Vazirani (1968).

Remarks : Appropriately called *confusus* since it very closely resembles *limbatus* and *guerini.* Smaller in size and lack black patches on front and middle femora.

* 23. ***Cybister limbatus*** (Fabricius).

Habitat : Ponds, pools, quarries, tanks and streams.

Status : Abundant.

Material examined : Ujani wetland : Khanota, 1 ex. 20. i. 1991, R. M. Sharma & party.

Distribution : Widely distributed in South East Asia extending to Formosa, Japan and the Philippine Islands. In India reported from Bihar, Kerala, Madhya Pradesh, Maharashtra, North Eastern States ; Orissa & West Bengal.

Source : Tonapi & Ozarkar (1969), Vazirani (1967 & 1968).

Remarks : This species can easily be distinguished from *confusus* and *guerini* on the basis of middle claws being longer than the apical tarsal segment.

* 24. ***Cybister posticus*** Aube.

Habitat : Ponds, pools, tanks and streams.

Status : Common.

Material examined : Ujani wetland, Rajewadi, 2 ex., 21.i.1991. R. M. Sharma & party; Rajewadi, 3 ex. 21.vi.1991, S. V. Mulay & party.

Distribution : In India known from Assam, Manipur, Maharashtra ; Sikkim, Uttar Pradesh & West Bengal. Outside : reported from Bangladesh and Pakistan.

Source : Vazirani (1967 & 1968).

* 25. ***Cybister rugulosus*** Redtenbacher

Habitat : Pools, quarries, rivers, tanks & wells.

Status : Uncommon.

Material examined : Ujani wetland, Rajewadi, 1 ex. 12. iv.1992, S. G. Patil & party.

Distribution : Restricted to India and reported from Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra and West Bengal.

Source : Tonapi & Ozarkar (1969); Vazirani (1968).

Remarks : Recognised by its swollen anterior metasternum ; curved series of deep and coarse punctures parallel to the inner margin of the mid coxal cavities.

* 26. ***Cybister tripunctatus asiaticus*** Sharp.

Habitat : Pools, quarries, rivers and streams.

Status : Abundant.

Material examined : Ujani Wetland : Khanota, 1 ex. 20.i.1991 R. M. Sharma & party ; Rajewadi, 1 ex. 21.vi.1991, S. V. Mulay & party; Bhigwan, 1 ex. 14.iv.1992, S. G. Patil & party; Kandar, 1 ex. 10.iv.1992, S. G. Patil & party.

Distribution : Widely distributed in the Oriental Region. In India knwon from almost all the states and Union Territories.

Source : Tonapi & Ozarkar (1969) ; Vazirani (1967 & 1968).

Remarks : A number of geographical subspecies and aberrations have been described. Balfour Browne (1945) considers this subspecies confined to the Oriental Region and accepted by the coleopterists.

27. ***Cybister ventralis*** Sharp.

Habitat : Rivers and streams.

Status : Common.

Distribution : In India reported from Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Orissa and Sikkim. Outside known from Pakistan and Sri Lanka.

Source : Vazirani (1967 & 1968).

Remarks : Males of this species show variations in the prominence of tubercles on the elytra.

* 28. ***Eretes sticticus*** (Linnaeus)

Habitat : Lakes, pools, ponds, quarries & reservoirs.

Status : Common.

Material examined : Ujani wetland; Khanota, 2 ex., 20. i. 1991; R. M. Sharma & party.

Distribution : Most cosmopolitan species and occurs throughout the world in the Tropical and Subtropical Regions. In India also it is very common and widely distributed in all the states including Andaman Islands.

Source : Tonapi & Ozarkar (1969); Vazirani (1967, 1968 & 1970).

Remarks : Extremely variable in size, colour, form and shape of the posterior angles of the pronotum. Frequents muddy and brackish waters. Shows tolerance to salinity.

29. ***Hydaticus fabricii*** Macleay

Habitat : Lakes, ponds, quarries, streams and wells.

Status : Common.

Distribution : In India : Andaman Islands, Assam, Bihar, Goa, Himachal Pradesh, Manipur, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim and West Bengal. Outside reported from Myanmar, Nepal and Sri Lanka.

Source : Tonapi & Ozarkar (1969); Vazirani (1967, 1968 and 1970).

30. ***Hydaticus incertus*** Regimbart

Habitat : Lakes, Pools, streams, tanks & wells.

Status : Common.

Distribution : Outside India known from Myanmar and Thailand. In India, recorded from a few districts (Bhir & Poona) of Maharashtra State.

Source : Vazirani (1968). Reference collection at Western Regional Station, Pune (Z. S. I.).

31. ***Hydaticus luczonicus*** Aube.

Habitat : Lakes, pools, quarries, streams, tanks & wells.

Status : Common.

Distribution : A widely distributed species in South East Asia and extends to the Philippine Islands. In India, known from Bihar, Gujarat, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal.

Source : Tonapi & Ozarkar (1969); Vazirani (1967, 1968 & 1970).

32. ***Hydaticus vittatus*** (Fabricius)

Habitat : Dams, tanks, rivers and streams.

Status : Common.

Distribution : Widely distributed in India, known from Andhra Pradesh, Assam, Bihar, Kashmir, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu & Uttar Pradesh. Outside recorded from Australia, China, Formosa, Indonesia, Japan, Myanmar, Nepal, Phillippine Islands and Sri Lanka.

Source : Vazirani (1967, 1968 & 1970).

Ramarks : This species is variable in size & shape of the longitudinal yellow markings.

33. ***Rhantaticus congestus*** (Klug)

Habitat : Pools, quarries, temporary water courses and wells.

Status : Uncommon.

Distribution : In India known from Andhra Pradesh, Bihar, Himalayan region, Maharashtra, Orissa, Rajasthan and West Bengal. Outside reported from Arabia, Australia, China, Formosa, Madagascar, Nepal, New Guinea and Philippines.

Source : Tonapi & Ozarkar (1969); Vazirani (1968 and 1970).

Ramarks : The black marks on the head and thorax (Pronotum) and the condensation of black spots on the elytra are variable in this species.

34. ***Sandracottus dejeani*** Aube.

Habitat : Lakes, pools and tanks.

Status : Common

Distribution : This is the commonest species of this genus occurring in India and recorded from Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Uttar Pradesh and West Bengal, Outside reported from Pakistan.

Source : Vazirani (1967, 1968 & 1970).

35. ***Sandracottus festivus*** (Illiger)

Habitat : Hill streams, pools, quarries, wells and temporary water courses.

Status : Uncommon.

Distribution : Known in India from Andhra Pradesh, Bihar, Maharashtra, Orissa, Punjab & Tamil Nadu. Otuside from China, Pakistan & SriLanka.

Source : Tonapi & Ozarkar (1969); Vazirani (1968).

Family : GYRINIDAE
Subfamily : ENHYDRINAE

36. ***Dineutes (Protodineutes) indicus*** Aube.

Habitat : Streams and temporary water courses. Prefers clear waters of rocky pools and rapidly flowing streams.

Status : Common.

Distribution : Widely distributed in India and known from Andhra Pradesh, Bihar, Gujrat,

Himachal Pradesh, Karnataka, Kashmir, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Punjab, Rajasthan, Tamil Nadu; Uttar Pradesh, West Bengal. Outside known from Pakistan.

Source : Tonapi & Ozarkar (1969); Vazirani (1977 & 1984).

Subfamily : ORECTOCHILINAE

37. ***Orectochilus (Patrus) similis*** Ochs.

Habitat : Clean & flowing waters of streams and rivers.

Status : Common.

Distribution : Restricted in its distribution, known in Indian Union from Karnataka, Maharashtra, Meghalaya and West Bengal.

Source : Vazirani (1977 & 1984).

*38. ***Orectochilus (Patrus) discifer*** (Walker).

Habitat : Rivers, streams and temporary water courses. Prefers fast flowing mountain streams.

Status : Common.

Material examined : Ujani Wetland : Saha, 1 ex., 25.vi.1991., S. V. Mulay & Party.

Distribution : India : Andhra Pradesh, Bihar, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu & West Bengal. Outside : SriLanka.

Source : Tonapi & Ozarkar (1969); Vazrani (1977 & 1984).

39. ***Orectochilus (Patrus) limbatus*** Regimbart.

Habitat : Rivers and streams.

Status : Common.

Distribution : India; Bihar, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and Uttar Pradesh. Outside : SriLanka.

Source : Vazirani (1977 & 1984).

Suborder : POLYPHAGA
Family : HYDROPHILIDAE
Subfamily : HYDROPHILINAE

40. ***Hydrophilus indicus*** (Bedel)

Habitat : Pools, ponds and river banks.

Status : Uncommon.

Distribution : North India; South India (Salem district); Maharashtra (Poona).

Source : Tonapi & Ozarkar (1969); Vazirani (1953).

Remarks : The colour of this species is black. It is more stocky and stouter than *H. olivaceous* (Fab.)

*41. ***Hydrophilus olivaceous*** (Fabricius)

Habitat : Crevices of ponds and pools, quarries and river banks.

Status : Common.

Material examined : Ujani Wetland; Rajewadi, 1 ex. 6.i.1990, S. G. Patil & party; Khanota, 1 ex. 20.i.1991, R. M Sharma & party.

Distribution : Maharashtra (India).

Source : Tonapi & Ozarkar (1969).

Remarks : Colour dark brown with a tinge of olive green. It's metasternal keel produced into a long spine.

42. ***Regimbartia attenuata*** (Fabricius)

Habitat : Pools, river banks and wells.

Status : Common.

Distribution : Widely distributed in South East Asia and Australia. In India recorded from Maharashtra & West Bengal.

Source : Tonapi & Ozarkar (1969); De, *et. al.* (1989).

Remarks : Colour dark brown; head projecting downward. Sternum keeled but not produced into a spine.

*43. ***Sternolophus*** (S. str.) ***rufipes*** (Fabricius)

Habitat : Pools, river banks, wells and temporary water courses.

Status : Very common.

Material examined : Ujani Wetland; Rajewdi, 6 ex., 6.i.1990; 9 ex. 7.4.1990; S. G. Patil & Party; 21.i.1991, 25 ex. R. M. Sharma & party; 1 ex. 12.4.1992, S. G. Patil & party; Khanota, 2 ex. 20.i.1991; 6 ex. 23.i.1991, R. M. Sharma & party, 1 ex. 10. 3. 1991, S. G. Patil & party.

Distribution : Widely distributed in the Oriental Region. In India known from South India & Maharashtra.

Source : Tonapi & Ozarkar (1969); Vazirani (1953).

Remarks : The abdomen often projects a little from beneath the elytra. The abdominal sternal plates have yellow spots on their lateral sides. The sternum keeled and provided with a spine.

Subfamily : HYDRAENINAE

44. ***Hydraena quadricollis*** Wallaston.

Habitat : Pools, wells and river banks.

Status : Uncommon to rare.

Distribution : Atlantic Oceanic Islands on the West coast of Africa. In India first reported from Maharashtra.

Source : Tonapi & Ozarkar (1969 b & c).

Remarks : Small testaceous beetles. Found to be associated with rotten twigs or grass and crawls among such hollow floating stem.

The present study reveals the rich diversity of aquatic beetles in the waters of Poona district, where the Ujani dam is located.

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MOLLUSCA

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INTRODUCTION

The phylum Mollusca includes soft bodied animals generally protected by a shell. The phylum is second largest group in the animal kingdom while considering the number of species. They occupy different habitats from deeper waters in the sea to high altitude and are divided into marine, freshwater and terrestrial. Out of the seven classes in the phylum, only five classes, i.e. Polyplacophora, Gastropoda, Bivalvia, Scaphopoda and Cephalopoda occur in Indian subcontinent. A general introduction on mollusca covering all the aspects of the group including general organisation, function, abundance and diversity was given by Subba Rao (1991b). Only two classes Gastropoda and Bivalvia are included under freshwater mollusca. As per the recent estimate, out of 415 families in the phylum, only 257 families are represented in the Indian subcontinent (Subba Rao, 1991a). Of these, freshwater mollusca are represented by 210 species under 52 genera and 21 families (Subba Rao, 1993).

Our knowledge on Indian freshwater molluscs is based on contributions made by several earlier workers. The earliest consolidated work by Preston (1915), and a recent comprehensive work by Subba Rao 'Handbook on Freshwater Molluscs of India' (1989) are worth to mention. Subba Rao (1993) dealt in brief in general the aspects like, habitat, distribution, zoogeographical significance, importance of malacological studies, their role in Medical, Veterinary, Public Health, aquaculture etc. in his article 'Freshwater Molluscs of India.'

GENERAL OBSERVATIONS

Freshwater molluscs are mainly divided into two groups i.e. those found in static water bodies like, ponds, lakes, tanks, ditches etc. and those found in flowing waters like, rivers, streams, canals etc. Some of the species especially *Pila globosa, Bellamya bengalensis, Angulyagra oxytropis* etc. are also found in the wet paddy fields. The distribution pattern of the families in relation to their habitat is given by Subba Rao (1993). According to the list, rivers and streams are inhabited by more number of families (17). Since all the bivalves (8 families) are exclusively found in the bottom, some of these *viz.*, Unionidae, Amblemidae, Corbiculidae and Pisidiidae are also found in ponds and lakes. Whereas majority of gastropods are found attached to the vegetation, freshwater limpets of the family Ancylidae are found attached under surfaces of the stones and boulders or submerged twigs etc. in the slow moving waterbodies.

The stagnant water bodies are more productive than moving water bodies in terms of biomass. Temperature, Chemical factors, vegetations and nature of substratum play an important role in distribution of these molluscs. Subba Rao and Mitra (1991) studied briefly the systematics

and ecology of freshwater molluscs of parasitological importance. These molluscs can withstand the unfavourable conditions by burrowing themselves under dead weeds or mud. They are also found to occur in temporary water pools where aquatic vegetations are present.

Though freshwater molluscs of India are fairly worked out, there is no comprehensive data on faunal resources of wetland ecosystems of India, which are being conserved. In total there are 16 wetlands selected by the Govt. of India for conservation. These include freshwater, brackish and also saline water bodies. A list of wetlands proposed to be conserved has been given by Ramkrishna (1990).

Under this scheme, priority has been given for thorough survey of the faunal resources and conservation. So far studies on the Chilka Lake (brackish water) in Orissa by Subba Rao, Surya Rao and Manna (1995) and Kabar Lake (freshwater) in Begusarai district in Bihar by Surya Rao and Mitra (in press) have been completed. Molluscan resources of Ujani wetland in Maharashtra is third in the series.

Ujani wetland is a reservoir formed by damming on the river Bhima a tributray of the river Krishna near the village Ujani in Sholapur district in Maharashtra (lat. 18°03" N; Long. 74°38" E) covering an area of 35,700 hectares. Ecological and social dynamics of this wetland have been studied by Prakash Gole (1992).

SOCIO-ECONOMIC ASPECTS

Freshwater molluscs play a significant role in the aquatic ecosystem. Many species are serving as food for aquatic animals as well as man. Species like, *Bellamya bengalensis, Pila globosa, Brotia costula, Angulyagra oxytropis, Lamellidens marginalis* etc., play an important role as human food. Observations are made in the eastern and north-eastern parts of India and it was found that these species of snails are being sold in the markets. A list of edible molluscs with their price was given by Subba Rao and Dey (1989) and Subba Rao (1993). No information is however, available about consumption of these molluscs in the region under study.

In addition, some of the freshwater molluscs such as, *Lamellidens marginalis, L. corrianus* are found to produce pearls as reported in some parts of India. Other species of the genus *Parreysia* are largely used in the manufacture of shell buttons and also in the manufacture of poultry feeds.

Not only the freshwater molluscs benefit the human beings, they also cause harm to man as well as live stock. Many species, especially gastropods are the intermediate hosts for trematode parasites, thus causing several diseases. Most important among the diseases is human Schistosomiasis. A list of important trematode parasites and their intermediate hosts is given by Subba Rao (1993).

Freshwater molluscs also play an important role in choking public water distribution system. A list of species responsible for this is given by Subba Rao (1993). Some of the molluscs are used as indicator species in polluted waters and more details are yet to be studied. Some work has been done by Central Pollution Control Board.

Abbreviations used

Coll. — Collector
Dt. — Date
ex./exs. — Example/Examples
Loc. — Locality.

MATERIAL

The present study is based on the collections received from the Western Regional Station, Pune. It included a total of 11 species (including infra-specific forms) under 8 genera and 7 families. All the families are having distribution throughout India. Keys are given to the families, genera and species, wherever necessary.

The following species are recorded from Ujani wetland ecosystem :

Class : GASTROPODA
Order : MESOGASTROPODA
Family : VIVIPARIDAE

1. *Bellamya bengalensis* f. *typica* (Lamarck)

2. *B. bengalensis* f. *doliaris* (Gould)

Family : THIARIDAE

3. *Thiara* (*Thiara*) *scabra* (Mueller)

4. *T.* (*Tarebia*) *lineata* (Gray)

5. *T.* (*Melanoides*) *tuberculata* (Mueller)

Order : BASOMMATOPHORA
Family : LYMNAEIDAE

6. *Lymnaea* (*Pseudosuccinea*) *acuminata* f. *rufescens* Gray

7. *L.* (*P*). *luteola* Lamarck

Family : PLANORBIDAE

8. *Indoplanorbis exustus* (Deshayes)

Class : BIVALVIA
Order : UNIONOIDA
Family : UNIONIDAE

9. *Lamellidens marginalis* (Lamarck)

Family : AMBLEMIDAE

10. *Parreysia favidens* (Benson)

Order : VENEROIDA
Family : CORBICULIDAE

11. *Corbicula striatella* Deshayes

Key to the families

1. Shell with single valve 2
   Shell with two valves 5
2. Shell with operculum 3
   Shell without operculum 4
3. Shell elongate, turreted, whorls sculptured, Aperture Ovate ..... THIARIDAE
   Shell Conical, Whorls smooth, aperture circular ..... VIVIPARIDAE
4. Shell thin, conical, spire elevated, columella twisted ..... LYMNAEIDAE
   Shell thick, discoidal, spire depressed, columella not twisted .....PLANORBIDAE
5. Shell transversely elongate, ligament internal, outer surface of valves without concentric ribs, interior nacreous 6
   Shell tringularly ovate, ligament external, outer surface of valves concentrically ribbed, interior not nacreous ..... CORBICULIDAE
6. Posterior margin of valve beaked; outer surface with radial sculpture, all four gills marsupials AMBLEMIDAE
   Posterior margin not beaked, outer surface with concentric and radial striations, only outer two gills marsupials .....UNIONIDAE

Class : GASTRSPODA
Order : MESOGASTROPODA
Family : VIVIPARIDAE

Genus : ***Bellamya*** Jousseaume, 1886

Bellamya bengalensis* f. *typica (Lamarck, 1886)

Common name : Banded pond snail.

Material studied : 6 exs., Loc. Khander, dt. 6.1.90, Coll. S. G. Patil; 19 exs., Loc. Palasdeo, dt. 25.6.90, Coll. S. V. Muley; 3 exs., Loc. Rajewadi, dt. 21.1.90, Coll. R.M. Sharma; 21 exs., Loc. Khander, dt. 9.11.91 Coll. R. M. Sharma; 63 exs., Loc. Khanota, dt. 13.1.92, Coll. G.M. Yazdani; 5 exs., Loc. Khanota, dt. 11.4.92, Coll. S. G. Patil.

Status : Most common throughout.

Distribution : India : Maharashtra, Ujani Lake; Khandar, Palasdeo, Khanota, Rajewadi. Common throughout rest of India. Elsewhere : Bangladesh, Myanmar, Sri Lanka.

Remarks : Annandale (1921) recognised 11 forms under this species basing mainly on difference in shell characters. Of these. 3 forms, viz. *doliaris, mandiensis* and *incrassatus* are recorded from Pune district in Maharashtra.

This species is consumed by the people in some parts of eastern India, especially in Bihar, West Bengal. There is a regular sale of these snails in the markets, being sold at Rs. 1 to 2 per kg. (Subba Rao & Dey. 1989).

Bellamya bengalensis* f. *doliaris (Gould, 1943)

Common Name : Banded pond snail.

Material examined : 4 exs., Loc. Khander, dt. 6.1.90, Coll. S. G. Patil; 1 ex., Loc. Khanota, dt. 22.1.90, Coll. R. M. Sharma; 4 exs., Loc. Palasdeo, dt. 25.6.91, Coll. S. V. Muley.

Status : Common in Pune, Nasik in Maharashtra and parts of West Bengal, Orissa, Assam and Madhya Pradesh.

Distribution : India : Maharashtra : Ujani Lake, Khander, Rajewadi, Palasdeo; Madhya Pradesh, Orissa.

Elsewhere : Myanmar.

Remarks : The form *doliaris* resembles *typica* very closely but differs in being smaller in size, more conical and also by being biangulate at the body whorl. As mentioned earlier this form is also sold in the market and is consumed by the people in Assam, Bihar and West Bengal. It is found to choke the water supply system in Calcutta and Nagpur causing damage (Subba Rao, 1993).

Family : THIARIDAE
Genus : ***Thiara*** ROEDING, 1786

Key to the species

1. Shell pagoda like, with spines ..... *T. scabra*
   Shell more elongate, without spines 2
2. Shell with more number of whorls (Up to 12), with striae and tubercles .... *T.tuberculata*
   Shell with less number of whorls (Up to 9) with dark bands and granules ..... *T. lineata*

Subgenus : ***Thiara*** s.s.

Thiara (Thiara) scabra (Muller)

Material examined : 4 exs., Loc. Khander, dt. 6.1.90, Coll. S. G. Patil; 1 ex., Loc. Khanota, dt. 22.1.91, Coll. R. M. Sharma; 3 exs., Loc. Khanota, dt. 13.1.92, Coll. G. M. Yazdani.

Status : Common throughout India.

Distribution : India : Maharashtra : Ujani Lake, Khandar, Khanota; throughout rest of India, except Kashmir (Subba Rao, 1989).

Elsewhere : Mauritius, Sri Lanka, Malay Archipelago, Myanmar, Indonesia, Philippines, Japan.

Remarks : It is distinguished by its whorls which gradually increase in size. Distinctly sculptured with vertical ribs and prominent spines directed obliquely and spiral striations.

It prefers flowing waters rather than stagnant, occurs in both fast and slow moving waters. Also found in ponds. It is a variable species and a number of varieties and subvarities were described under it. *T. scabra* var. *elegans* was ecorded from Pune district by Tonapi & Mulherkar (1963).

Subgenus ***Tarebia*** H. & A. Adams, 1854

Thiara (Tarebia) lineata (Gray. 1928).

Material studied : 9 exs., Loc. Bhigwan, dt. 14.4.92, Coll. S. G. Patil.

Status : Uncommon in survey areas. Common in Maharashtra and other states.

Distribution: Maharashtra : Ujani Lake : Bhigwan; Assam, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh, West Bengal.

Elsewhere : Sri Lanka, Bhutan, Myanmar.

Remarks : The species is recognised by its inflated bodywhorl, sculptured by dark spiral bands, shell has more number of whorls than in the former. It closely resembles *T. granifera* and is often treated under that species, but it differs in not having spiral rows of either granules or nodules.

Subba Rao & Mitra (1982) studied on its biological aspects population, growth rate, brood pouch counts etc.

Subgenus ***Melanoides*** **Olivier**, 1807

Thiara (Melanoides) tuberculata (Mueller, 1774)

Material studied : 40 exs., Loc. Khandar, dt. 9.11.91, Coll. R. M. Sharma; 30 exs., Loc. Khanota, dt. 11.4.92, Coll. S. G. Patil; 5 exs., Loc. Bhigwan, dt. 14.4.92, Coll. S. G. Patil.

Status : Very common throughout India.

Distribution : Maharashtra : Ujani Lake; Khandar, Bhigwan. Widely distributed in rest of the country except Kashmir.

Elsewhere : Its range extends from North Africa to Pacific islands, Australia, China and Japan.

Remarks : Shell linear, spire high, whorls rounded, body whorl moderately large, sculptured with both spiral striae and vertical ribs giving tubercular appearence; ornamented with reddish brown markings. Commonly ocurs in streams, rivers, canals, drains even in water mains, stagnant pools extending to brackish waters (Subba Rao, 1989 & 1991). Recorded from low saline water near sea level to freshwater at 1600 m. altitude (Benthem Jutting, 1956).

A widely variable species. It is observed that the shells collected from ponds or tanks are typically narrow, distinctly sculptured whereas those collected from streams and rivers are found to be usually worn out and are more prone to decollate with age (Subba Rao *et. al.* 1989).

Family : LYMNAEIDAE
Genus : ***Lymnaea*** Lamarck, 1799.
Subgenus : ***Pseudosuccinea*** Baker

Key to the species

Spire proportionately short, more acuminate, outer lip widely expanded .....*L. acuminata*
Spire proportionately longer, less acuminate, outer lip less expanded .....*L. luteola*

Lymnaea (Peudosuccinea) acuminata f. ***rufescens*** Gray, 1820.

Common name : Freshwater snail.

Material examined : 2 exs., Loc. Khandar, dt. 6.1.90, Coll. S. G. Patil; 31 exs., Loc. Khanota, dt. 22.1.91, Coll. R. M. Sharma; 19 exs., Loc. Palasdeo, dt. 25.6.91, Coll. S. V. Muley; 20 exs., Loc. Khandar, dt. 9.11.91. Coll. R. M. Sharma.

Status : Common throughout India.

Distribution : India : Maharashtra : Ujani Lake, Khandar, Khanota, Palasdeo, widely distributed in rest of India.

Elsewhere : Pakistan, Bangladesh, Myanmar.

Remarks : The species inhabits permanent waterbodies with abundant vegetations. Nine forms were recognised by Subba Rao (1989). It is readily recognised by its thin transparent shell, large and inflaated body whorl with a short, acuminate spire, aperture widely open, columella twisted.

The genus exhibits a great degree of plasticity and individual variations and hence a large number of varieties and forms have been created under this. Subba Rao (1989) discussed its taxonomy and other works related to the group; Larval forms of a large number of parasites have been recorded from this species, which acts as an intermediate host.

Lymnaea (Pseudosuccinae) luteola Lamarck, 1822

Common name : Freshwater snail.

Material studied : 2 exs., Loc. Palasdeo, dt. 25.6.91, Coll. S. V. Muley; 1 ex., Loc. Khanota, dt. 11.4.92, Coll. S. G. Patil.

Status : Common throughout India.

Distribution : India : Maharashtra : Ujani Lake; Khanota, Palasdeo. Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Remarks : There are 6 forms recognised under this species (Subba Rao, 1989), of which three forms viz. *succinea* Deshayes, *australis* Annandale & Rao, and *impura* Troschel are recorded from Pune district in Maharashtra in addition to the typical form. This species can be distinguished from the former by its more ovate shell with a narrower aperture and less pointed spire.

This species is not very particular about its habitat and is often found in temporary water bodies which may dry up in summer. They bury themselves in the mud during unfavourable

conditions. This species is also considered as a pest to paddy and *Azole* sp., a producer of biofertiliser in some parts of West Bengal (Subba Rao, 1989). It serves as an intermediate host of several parasites of livestock.

Family : PLANORBIDAE

Genus ***Indoplanorbis*** Annandale

Indoplanorbis exustus (Deshayes)

Material studies : 3 exs., Loc. Khandar, dt. 6.1.91. Coll. S. G. Patil; 5 exs., Loc. Khanota, dt. 22.1.91, Coll. R. M. Sharma; 3 exs., Loc. Rajewadi, dt. 22.2.91, Loc. Palsdeo, dt. 25.6.91, Coll. S. V. Muley; 3 exs., Loc. Khandar, dt. 9.11.91, Coll. R. M. Sharma; 1 ex., Loc. Khanota, dt. 13.1.92, Coll G. M. Yazdani; 1 ex., Loc. Khanota, dt. 11.4.92, Coll. S. G. Patil.

Status : Very common in stagnant ponds, tanks, pools etc.

Distribution : India : Maharashtra : Ujani Lake : Khandar, Khanota, Rajewadi, Palasdeo, Pune district. Throughout India in plains including Jammu & Kashmir.

Elsewhere : Ranges from Iran, Pakistan, Sri Lanka, Myanmar, Malaya, Thailand, Indonesia. Worldwide.

Remarks : It is distinguished by its discoidal shell with depressed spire, aperture ear shaped, sinistral; foot broad and short.

This spieces is thoroughly worked out on its breeding habit, host parasite relations, physiology, ecology, anatomy etc. and is recognised as an intermediate host for large number of cercarie of trematode parasites which cause various diseases in live stock.

Class : BIVALVIA
Order : UNIONOIDA
Family : UNIONIDAE
Genus : ***Lamellidens*** Simpson, 1900

Lamellidens marginalis (Lamarck, 1819)

Common name : Freshwater mussel

Material examined : 5 exs., Loc. Khandar, Coll. S. G. Patil.

Status : Common throughout.

Distribution : India : Maharashtra : Ujani Lake : Khandar. Throughout India.

Elsewhere : Sri Lanka, Bangladesh, Myanmar.

Remarks : Shell oblong ovate, outer surface brown with a light border along its ventral margin. Posterior margin roundedly angular. With a narrow wing, anterior margin short, narrow, round, ventral margin slightly contracted in the middle, interior nacreous.

In all 12 varieties were described under this species, of which two are recognised as distinct species and the rest are treated as simple varieties (Subba Rao, 1989). There are records of pearls being produced by this species (Raut & Biswas, 1989; Subba Rao & Dey, 1989). Production of culture pearls from freshwater mussels was studied by Janakiram (1989).

This species is consumed by the people of Bihar, West Bengal, and Manipur and is being sold in the market. It is commonly known as 'Jhinuk' in West Bengal and as 'Katli' in Bihar (Subba Rao & Dey, 1989).

Family : AMBLEMIDAE
Genus : ***Parreysia*** Conrad, 1953.

Parreysia favidens (Benson, 1862)

Common name : Freshwater mussel.

Material studied : 1 ex., Loc. Khandar, Coll. S. G. Patil.

Status : Common throughout India.

Distribution : India : Maharashtra : Ujani Lake : Khandar; Assam, Andhra Pradesh, Bihar, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Pakistan, Bangladesh, Myanmar.

Remarks : Shell heavy, broadly oval, umbo sculptured with corrugations, inequilateral, thick, both anterior and posterior margins angulate, interior nacreous, outer surface covered by brown periostracum. Four subspecies are recorded under this species, only variety *marcens* besides the typical form is recorded from Pune district in Maharashtra.

This species is used in shell fish industry in the manufacture of buttons, ornaments in Mehsi in North Bihar. Also used in manufacture of poultry feed, mozaic tiles etc.

Order : VENEROIDA
Family : CORBICULIDAE

Genus ***Corbicula*** Megerle Von Muehlfeld, 1811

Corbicula striatella Deshayes

Material examined : 1 ex., Loc. Khanota, dt. 11.4.92, Coll. S. G. Patil.

Status : Fairly common throughout India.

Distribution : India : Maharashtra : Ujani Lake : Khandar. Widely distributed in rest of India, also in Myanmar.

Remarks : Shell small, transversely ovate, outer surface sculptured with strong concentric ribs, umbo nearly central, ligament external, hinge with three cardinals in each valve, lateral elongate, finely serrate, pallial line entire, interior of valve violet in colour.

Prashad (1928) revised the Asiatic species including India of the genus and gave complete synonyms of this species.

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FISHES

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INTRODUCTION

During the faunistic survey of Ujani wetland between 1988-1992 fish samples were collected from 9 different collecting stations, namely, Bhigwan, Khanota, Khed, Palasdeo, Rajewadi, Sugaon, Saha, Kandar and Ujani dam (Fig. 1). Fish landing sites at Saha, Bhigwan and Khanota were also visited regularly to get a general profile of the fish fauna available in the wetland. The list of spp. has been prepared on the basis of actual sampling, using gill and cast nets. Bag nets were used where its aquatic vegetation hindered operation of gill nets. The present paper therefore incorporates the results of these surveys and attempts to show the fish diversity of this wetland. It is hoped that this information would be useful for fishery management as well as for the conservation of fishery resources of this wetland.

Yazdani & Singh (1990) published an account of fish resources of Ujani wetland and reported 42 species belonging to 14 families. They (op. cit) also recorded presence of freshwater grey mullet (*Rhinomugil corsula*) and a sp. of other river system and the cichlid fish Tilapia [*Oreochromis mossambica* (Peters)] an exotic species. Singh and Yazdani (1991) also made observations on Flamingo-fish interaction in the Ujani wetland and discovered a new species of cyprinid fish, *Osteobrama bhimensis* from the river Bhima, almost within the limits of the Wetland. We now report in this paper a total of 54 spp. belonging to 15 families from the same wetland. The sequence of families given is phylogenetic, following the scheme proposed by Nelson (1984) as adopted by Talwar & Jhingran (1991). A few modifications, however, based on recent studies and generic groupings have also been incorporated (Menon, 1993). The status of species given is restricted to Ujani wetland and it is based on visual observations in the field as well as fish landing sites. This may, therefore, not be in conformity with the IUCN definition.

LIST OF SPECIES

Order : OSTEOGLOSSIFORMES
Family I : NOTOPTERIDAE

1. ***Notopterus notopterus*** (Pallas)

Order : CYPRINIFORMES
Family II : CYPRINIDAE
Subfamily : CYPRININAE

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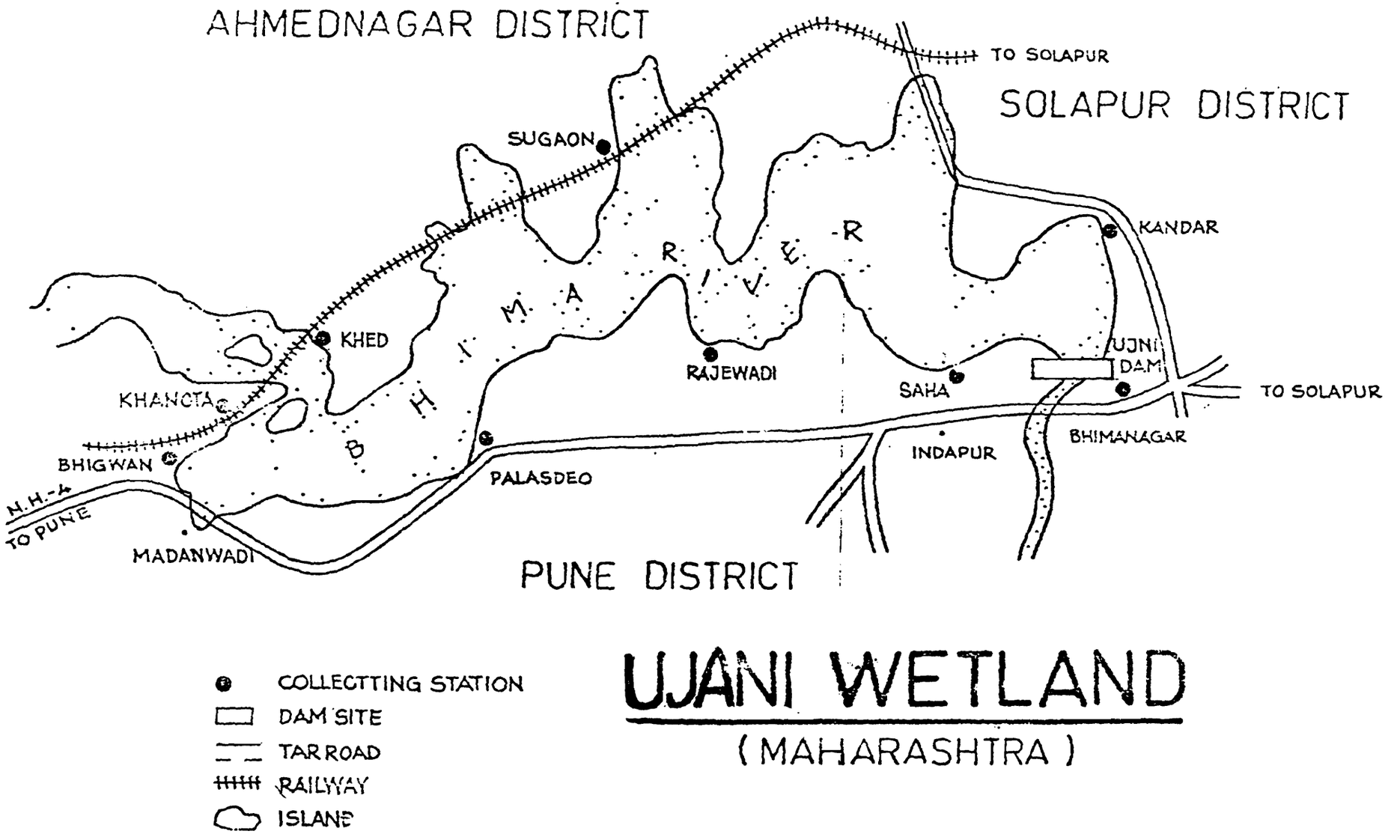
AHMEDNAGAR DISTRICT
TO SOLAPUR
SOLAPUR DISTRICT
SUGAON
KANDAR
BHIMA RIVER
KHED
RAJEWADI
UJNI DAM
SAHA
TO SOLAPUR
KHANDTA
BHIGWAN
PALASDEO
INDAPUR
BHIMANAGAR
N.H.-4
TO PUNE
MADANWADI
PUNE DISTRICT
COLLECTTING STATION
DAM SITE
TAR ROAD
RAILWAY
ISLAND
UJANI WETLAND
(MAHARASHTRA)

2. ***Catla catla*** (Ham-Buch)
3. ***Cirrhinus fulungee*** (Sykes)
4. ***Cirrhinus mrigala*** (Ham-Buch)
5. ***Cirrhinus reba*** (Ham-Buch)
6. ***Cyprinus carpio carpio*** (Linn.)
7. ***Ctenopharyngodon idellus*** (Val.)
8. ***Hypselobarbus curmuca*** (Ham-Buch)
9. ***Labeo boggut*** (Sykes)
10. ***Labeo calbasu*** (Ham-Buch)
11. ***Labeo fimbriatus*** (Bloch)
12. ***Labeo kawrus*** (Sykes)
13. ***Labeo potail*** (Sykes)
14. ***Labeo rohita*** (Ham-Buch)
15. ***Osteobrama bakeri*** (Day)
16. ***Osteobrama bhimensis*** Singh & Yazdani
17. ***Osteobrama cotio cunma*** (Day)
18. ***Osteobrama vigorsii*** (Sykes)
19. ***Osteobrama neilli*** (Day)
20. ***Puntius conchonius*** (Ham-Buch)
21. ***Puntius sarana*** (Ham-Buch)
22. ***Puntius sophore*** (Ham-Buch)
23. ***Puntius ticto*** (Ham-Buch)
24. ***Schismatorhynchus (Nukta) nukta*** (Sykes)
25. ***Tor khudree*** (Sykes)

Subfamily : CULTRINAE

26. ***Chela (chela) cachius*** (Ham-Buch)
27. ***Salmostoma bacaila*** (Ham-Buch)
28. ***Salmostoma boopis*** (Day)
29. ***Salmostoma untrahi*** (Day)

Subfamily : RASBORINAE

30. ***Barilius bakeri*** (Day)
31. ***Barilius bendelisis*** (Ham-Buch)
32. ***Barilius evezardi*** (Day)
33. ***Danio aequipinnatus*** (McClelland)

34. ***Parluciosoma daniconius*** (Ham-Buch)

Subfamily : GARRINAE

35. ***Garra mullya*** (Sykes)

Family III : BALITORIDAE

36. ***Nemacheilus botia*** (Ham-Buch)

37. ***Nemacheilus denisonii denisonii*** (Day)

Family IV : COBITIDAE

38. ***Lepidocephalus guntea*** (Ham-Buch)

Order : SILURIFORMES
Family V : BAGRIDAE

39. ***Aorichthys aor*** (Ham-Buch)

40. ***Aorichthys seenghala*** (Sykes)

41. ***Mystus bleekeri*** (Day)

42. ***Mystus malabaricus*** (Jerdon)

Family VI : SILURIDAE

43. ***Ompok bimaculatus*** (Bloch)

44. ***Wallago attu*** (Schneider)

Order : CYPRINODONTIFORMES
Family VII : BELONIDAE

45. ***Xenentodon cancila*** (Ham-Buch)

Family VIII : BELONIDAE

46. ***Aplocheilus lineatus*** (Val.)

Family IX : CYPRINODONTIDAE

47. ***Gambusia affinis*** (Baird & Girard)

Order : PERCIFORMES

Family X : AMBASSIDAE

48. ***Chanda nama*** (Ham-Buch)

Family XI : CICHLIDAE

49. ***Oreochromis mossambica*** (Peters)

Family XII : MUGILIDAE

50. ***Rhinomugil corsula*** (Ham-Buch)

Family XII : GOBIIDAE

51. ***Glossogobius giuris*** (Ham-Buch)

Suborder : MASTACEMBELOIDEI
Family XIV : MASTACEMBELIDAE

52. ***Mastacembelus armatus*** (Lacepede)

Order : CHANNIFORMES
Family XV : CHANNIDAE

53. ***Channa marulius*** (Ham-Buch)

54. ***Channa orientalis*** (Bloch & Schneider)

SYSTEMATIC ACCOUNT

The systematic account of fishes of Ujani wetland is given below. The term 'External distribution' denotes the known range of distribution of species.

Order : OSTEOGLOSSIFORMES
Family I : NOTOPTERIDAE

1. ***Notopterus notopterus*** (Pallas)
(Feather back)

External distribution : Large freshwater rivers of India, Nepal, Pakistan, Bangladesh, Burma, Malaya, Thailand and Indonesia.

Status : Common.

Order : CYPRINIFORMES
Family II : CYPRINIDAE

2. ***Catla catla*** (Ham-Buch)
(The Catla)

External distribution : Northern India : Pakistan, Bangladesh, Nepal and Burma.

Status : Common. Introduced.

3. ***Cirrhinus fulungee*** (Sykes)
(Deccan White carp)

External distribution : Maharashtra and Karnataka States of Peninsular India (Krishna and Cauvery river system).

Status : Uncommon.

4. ***Cirrhinus mrigala*** (Ham-Buch)
(The Mrigal)

External distribution : Northern India from Punjab to West Bengal and Assam ; Bangladesh, Pakistan.

Status : Common. Introduced.

5. ***Cirrhinus reba*** (Ham-Buch)
(Reba carp)

External distribution : Throughout India, Nepal, Bangladesh, Burma and Pakistan.

Status : Common.

6. ***Cyprinus carpio*** (Linn.)
(Common carp)

External distribution : Naturally found all through China, Korea, Japan, Taiwan, Europe and America.

Status : Common. Introduced.

7. ***Ctenopharyngodon idellus*** (Val.)
(Grass carp)

External distribution : Flat land rivers of China and the middle and lower reaches of river Amur in the U.S.S.R.

Status : Common. Introduced.

8. ***Hypselobarbus curmuca*** (Ham-Buch)
(The Kolus)

External distribution : Krishna, Godavary and Cauvery river systems in peninsular India.

Status : Uncommon.

9. ***Labeo boggut*** (Sykes)
(Boggot Labeo)

External distribution : Northern India and upto Cauvery river system in Peninsular India; Pakistan, Bangladesh.

Status : Uncommon.

10. ***Labeo calbasu*** (Ham-Buch)
(Kalbasu, Black rohu)

External distribution : Throughtout India; Pakistan, Nepal, Bangladesh, Burma, Thailand, Also S. W. China.

Status : Common. Introduced.

11. ***Labeo fimbriatus*** (Bloch)
(Fringed-lipped peninsula carp)

External distribution : West Bengal and Eastern Ghats in India; Pakistan, Nepal and Burma.

Status : Common.

12. ***Labeo kawrus*** (Sykes)
(Deccan Labeo)

External distribution : Western Ghats upto the Deccan in India.

Status : Ucommon.

13. ***Labeo potail*** (Sykes)
(Deccan Labeo)

External distribution : Maharashtra, the Deccan and the Cauvery river system in India.

Status : Rare.

14. ***Labeo rohita*** (Ham-Buch)
(The rohu)

External distribution : Northern India; Pakistan, Nepal, Bangladesh, Burma, Sri Lanka (Introduced).

Status : Common. Introduced.

15. ***Osteobrama bakeri*** (Day)
(Malabar osteobrama)

External distribution : Kerala State of India.

Status : Common. Introduced.

Remarks : This is the first record of this species from Krishna river system in Maharashtra.

16. ***Osteobrama bhimensis*** Singh & Yazdani

External distribution : This species is so far known from **Ujani** wetland (the Bhima river).

Status : Common.

17. ***Osteobrama cotio cunma*** (Day)

External distribution : Manipur valley in india and Burma.

Status : Common.

Remarks : A new record from the Krishna river system and an example of discontinuous distribution showing closer affinity to fishes of eastern part of India as well as Burma.

18. ***Osteobrama vigorsii*** (Sykes)
(Bheema osteobrama)

External distribution : Orissa and Maharashtra states and Krishna and Godavari river systems of India.

Status : Common.

19. ***Osteobrama neilli*** (Day)
(Sittang barb)

External distribution : Burma.

Status : Common.

Remarks : This is the first record of this species within Indian limits. It is another example of discontinuous distribution showing closer affinity to fishes of Burma and the east.

20. ***Puntius conchonius*** (Ham-Buch)
(Rosy barb or Red barb)

External distribution : Ganga, Brahmaputra and Mahanadi and Cauvery river systems of India. Afghanistan, Pakistan, Nepal and Bangladesh.

Status : Common.

21. ***Puntius sarana sarana*** (Ham-Buch)
(Olive barb)

External distribution : Throughout India north of Krishna river. Afghanistan, Pakistan, Nepal, Bangladesh and Bhutan.

Status : Common.

22. ***Puntius sophore*** (Ham-Buch)
(Spot fin swamp barb)

External distribution : Throughout India, Bangladesh, Nepal, Pakistan, Burma and Yunnan (China).

Status : Common.

23. ***Puntius ticto*** (Ham-Buch)

External distribution : Throughout India; Pakistan, Nepal, Bangladesh, Burma, Thailand and Sri Lanka.

Status : Common.

24. ***Schismatorhynchus (Nukta) nukta*** (Sykes)
(Nukta)

External distribution : Maharashtra and Karnataka States of India.

Status : Rare.

25. ***Tor khudrae*** (Sykes)
(Yellow Mahseer, Deccan Mahseer)

External distribution : Peninsular India, Sri Lanka.

Status : Uncommon.

Subfamily : CULTRINAE

26. ***Chela cachius*** (Ham-Buch)
(Silver hatchet chela)

External distribution : Throughout India; Pakistan, Bangladesh and Burma.

Status : Common.

27. ***Salmostoma bacaila*** (Ham-Buch)
(Large razorbelly minnow)

External distribution : Ganga-Brahmaputra drainage in Northern India to Mahanadi drainage (Orissa).

Status : Common.

28. ***Salmostoma boopis*** (Day)
(Boopis razorbelly monnow)

External distribution : Western Ghat areas of karnataka (South Canara) and Maharashtra (Poona) States of India.

Status : Common.

29. ***Salmostoma untrahi*** (Day)
(Mahanadi razorbelly minnow)

External distribution : Mahanadi (Orissa) and Cauvery (Karnataka) rivers of India.

Status : Common.

Subfamily : RASBORINAE

30. ***Barilius bakeri*** (Day)
(Malabar baril)

External distribution : Western Ghats of Kerala (India).

Status : Common.

Remarks : This is the first record of this species from Krishna river system of Western Ghats.

31. ***Barilius bendilisis*** (Ham-Buch)
(Hamilton's baril)

External distribution : Throughout India ; Pakistan, Nepal, Bangladesh and Sri Lanka.

Status : Common.

32. ***Barilius evezardi*** (Day)
(Day's baril)

External distribution : Maharashtra state of India.

Status : Rare.

33. ***Danio aequipinnatus*** (McClelland)
(Giant danio)

External distribution : Throughout Northern India, Nepal, Sri Lanka, Bangladesh, Burma and Thailand.

Status : Common.

Remarks : This species is being recorded here from Krishna river system of Peninsular India.

34. ***Parluciosoma daniconius*** (Ham-Buch)
(Blackline rasbora)

External distribution : Throughout India ; Pakistan, Sri Lanka, Nepal, Bangladesh, Burma and Thailand.

Status : Common.

Subfamily : GARRINAE

35. ***Garra mullya*** (Sykes)
(Mullyagarra)

External distribution : Throughout Peninsular India.

Status : Uncommon.

Family III : BALITORIDAE

36. ***Nemacheilus botia*** (Hum-Buch)

External distribution : Northern-India – Brahmaputra and Ganga river systems

Status : Common.

Remarks : The occurrence of this species in Krishna river system extends its range of distribution to Peninsular India.

37. ***Nemacheilus denisoni denisoni*** (Day)

External distribution : Peninsular India, Chota Nagpur plateau (Bihar) and Bastar (Madhya Pradesh).

Status : Common.

Family : COBITIDAE
Subfamily IV : COBITINAE

38. ***Lepidocephalus guntea*** (Ham-Buch)
(Gunteo loach)

External distribution : Northern India; Pakistan, Bangladesh, Nepal, Burma and Thailand.

Status : Common.

Remarks : The occurrence of this species in Peninsular India extends its distributional range.

Order : SILURIFORMES
Subfamily V : BAGRIDAE

39. ***Aorichthys aor*** (Ham-Buch)
(Long-whiskered catfish)

External distribution : Northern India upto Krishna river system in the south ; Pakistan, Nepal, Bangladesh and Upper Burma.

Status : Common.

40. ***Aorichthys seenghala*** (Sykes)
(Giant river cat-fish)

External distribution : Ganga, Yamuna, Krishna, Godavari and Cauvery river systems of India; Afghanistan, Pakistan, Nepal and Bangladesh.

Status : Common.

41. ***Mystus bleekeri*** (Day)
(Day's mystus)

External distribution : Northern India (Southern limit upto Mahanadi river), Pakistan, Nepal, Bangladesh and Burma.

Status : Common.

Remarks : The occurrence of this species in the Krishna river system extends its range of distribution further southward.

42. ***Mystus malabaricus*** (Jerdon)
(Jerdon's mystus)

External distribution : Western Ghats of Kerala, Karnataka and Maharashtra States of Peninsular India.

Status : Common.

Family VI : SILURIDAE

43. ***Ompok bimaculatus*** (Bloch)
(Indian Butter catfish)

External distribution : Throughout India ; Pakistan, Nepal, Bangladesh, Sri Lanka, Burma, Thailand, Java, Sumatra, Borneo, China (Yunnan).

Status : Common.

44. ***Wallago attu*** (Schneider)
(Boal)

External distribution : India; Pakistan, Sri Lanka, Nepal, Bangladesh, Burma, Thailand, Vietnam, Kampuchea, the Malay Peninsula, Sumatra and Java.

Status : Common.

Order : CYPRINIDONTIFORMES
Subfamily VII : BELONIDAE

45. ***Xenentodon cancila*** (Ham-Buch)
(Freshwater garfish)

External distribution : Throughout India ; Sri Lanka, Bangladesh, Pakistan, Burma, Malay Peninsula & Thailand.

Status : Common.

Family VIII : APLOCHEILIDAE

46. ***Aplocheilus lineatus*** (Valenciennes)
(Malabar Killie)

External distribution : Widely distributed in Peninsular India.

Status : Common, abundant.

Family IX : CYPRINODONTIDAE

47. ***Gambusia affinis*** (Baird & Girard)
(Mosquito fish)

External distribution : South-eastern United States of America, introduced into India in several states.

Status : Common.

Order : PERCIFORMES
Subfamily X : AMBASSIDAE

48. ***Chanda nama*** (Ham-Buch)
(Elongate glass-perchlet)

External distribution : India ; Pakistan, Nepal, Bangladesh and Burma.

Status : Common.

Family XI : CICHLIDAE

49. ***Oreochromis mossambica*** (Peters)
(Mozambique achlid, Tilapia)

External distribution : East Africa, an introduced species in India, Pakistan, Sri Lanka, etc.

Status : Common.

Family XII : MUGILIDAE

50. ***Rhinomugil corsula*** (Ham-Buch)
(Corsula mullet)

External distribution : Fresh and brackish water of India, Bangladesh, Nepal and Burma.

Status : Common.

Family XIII : GOBIIDAE

51. ***Glossogobius giuris*** (Ham-Buch)
(Tank Goby)

External distribution : India, East coast of Africa, Sri Lanka, Pakistan, Bangladesh, Andamans, Malay Peninsula, Thailand, China, Japan, Philippines, Australia, the Indio-Australian Archipelago and South Pacific Islands.

Status : Common.

Suborder : MASTACEMBELOIDEI
Family XIV : MASTACEMBELIDAE

52. ***Mastacembelus armatus*** (Lacepede)
(Tire-track spiny eel)

External distribution : India ; Pakistan, Sri Lanka, Nepal, Burma, Thailand, Malay to South China.

Status : Common.

Order : CHANNIFORMES
Family XV : CHANNIDAE

53. ***Channa marulius*** (Ham-Buch)
(Giant snake head)

External distribution : India, Pakistan, Sri Lanka, Bangladesh, Nepal, Burma, Thailand, Sumatra, Borneo and China.

Status : Common.

54. ***Channa orientalis*** (Bloch & Schneider)
(Asiatic snake-head)

External distribution : India, Afghanistan, Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand, Yunnan, Malaya, Malay Archipelago, Hainan and Taiwan.

Status : Common.

SUMMARY

The fish fauna of Ujani wetland contains most of the fishes occurring in the Krishna river system. This is expected because the river Bhima where on this wetland is formed is a tributary of the river Krishna. Of the 54 spp. recorded in this paper 34 spp. belong to carps (Cyprinidae), 6 spp. of catfishes (Siluriformes), 3 spp. to loaches (Cobilidae & Balitoridae). The remaining 11 spp. belong to other groups, such as perches (Perciformes), murrels (Channiformes), Cyprinodonts, gobies (Gobiidae) and mullet (Mugilidae). As expected among the freshwater fish fauna, the cyprinids, dominate the ichthyofauna of this wetland. However, the composition of fish species shows that it contains both riverine and lacustrine forms, some of them being introduced spp. Four spp. namely, *Cyprinus carpio carpio, Ctenopharyngodon idellus, Gambusia affinis,* Tilapia *(Oreochromis) mossambica* are exotic and were introduced in different rivers and river system in the past. The freshwater grey mullet (*Rhinomugil corsula*) has been noticed here in very large numbers. Pradhan & Singh (1984) reported this species for the first time from Bhima river. Earlier this species was known to occur in the Gangetic river system (Day, 1889) and the Cauvery river systems (Menon & Jayaram, 1977). As a matter of fact spawns & fry were initially procured from Calcutta for releasing in the Ujani wetland, it is quite possible that small numbers of *Rhinomugil* spawn and fry might have come along with carp fry. Similar accidental stocking of this species has been reported from Krishnagiri and Sathanur reservoirs in Tamil Nadu (Ranganathan and Natarajan, 1969). Like all other mullets (Mugilidae) this fish swims in shoals near the water surface with its eyes, head and anterior portion of body out of water. The aerial vision which is an adaptive feature, gives it a fair chance of escaping

enemies as well as avoiding capture by nets.

The fish catch at Ujani wetland shows predominance of spp. like *Osteobrama, Channa, Wallago, Mystus* & major carps. The presence of exotic spp. in the fish catches of Ujani wetland is certainly a matter of concern for, these fishes are likely to adversely affect the growth and production of native spp. especially the carps. It would therefore be advisable to control the population of exotic spp. or eradicate them for proper utilisation and conservation of fishery resources of this wetland.

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AMPHIBIA

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INTRODUCTION

Ujani Wetland was formed when a vast piece of land was submerged under water due to the construction of Ujani dam on Bhima river. This Wetland is spread over three districts, viz. Sholapur in the East, Ahmednagar in the North and Pune in the South. The submergence area of Ujani Wetland is 357 sq. Km and there is a difference of only 5.80m. between the full reservoir level and the maximum draw down level, hence much of the portion of the reservoir is not so deep. This provides an ideal habitat for the amphibians which require shallow waters to complete their life cycle. Species like *Rana tigerina, Rana cyanophlyctis, Bufo melanostictus and Rana limnocharis* are seen in large numbers. Present studies are based on the material collected by the survey purties of ZSI, WRs, Pune, from Ujani wetland and surrounding areas.

LIST OF SPECIES

Phylum : CHORDATA
Class : AMPHIBIA
Order : ANURA

I) Family : BUFONIDAE

1) *Ansonia kamblei* Ravichandran and Pillai
2) *Bufo melanostictus* Schneider
3) *Bufo microtympanum* Boulenger
4) *Bufo stomaticus* Lutken

II) Family : MICROHYLIDAE

5) *Microhyla ornata* (Dumeril & Bibron)
6) *Uperodon globulosum* (Gunther)

III) Family : RANIDAE

7) *Rana hexad a ctyla* Lesson
8) *Rana cyanophlyctis* Schneider
9) *Rana tigerina* Daudin
10) *Rana limnocharis* Boie
11) *Tomopterna breviceps* Schneider

SYSTEMATIC ACCOUNT

Phylum : CHORDATA
Class : AMPHIBIA
Order : ANURA

I) Family : BUFONIDAE

1. ***Ansonia kamblei*** Ravichandran and Pillai

Torrent Toad

Reported from literature. (Ravichandran & Pillai 1990)

Distribution : A species known only from a single specimen which was collected from Ujani Wetland area i.e. Jeure, Dist. Sholapur. Known from original record only.

Status : Unknown.

2. ***Bufo melanostictus*** Schneider 1799

Common Indian Toad

Materials examined : 8 ex. collected from Dhiksal, Babulgaon and Rajewadi.

Distribution : Throughout the Indian Union and South-East Asia.

Status : Common

3. ***Bufo microtympanum*** Boulenger 1882

Southern Hill Toad

Reported from literature. (Yazdani & Mahabal 1976).
Distribution : Kerala, Malabar and Maharashtra. Known for Original Records.
Status : Uncommon.

4. ***Bufo stomatcus*** Lutken 1862

Marbled Toad

Reported from literature. (Yazdani & Mahabal 1976)

Distribution : India, Assam, West Bengal, Orissa, Maharashtra, Sri Lanka, Nepal and Pakistan.

Status : Uncommon.

II) Family : MICROHYLIDAE

5. ***Microhyla ornata*** (Dumeril & Bibron)

Ornate Microhylid

Materials examined : 1 ex. from Rajewadi, Bhigwan.

Distributon : South and South-East Asia.

Status : Common.

6. ***Uperodon globulosum*** (Gunther) 1864

Ballon Frog

Reported from literature. (Yazdani & Mahabal 1976).

Distribution : India, West Bengal, Orissa, Assam, Madhya Pradesh, Gujarat, Maharashtra, karnataka and Kerala.

Status : Uncommon.

III) Family : RANIDE

7. ***Rana hexadactyla*** Lesson 1834

Indian Pond Frog

Reported from literature. (Yazdani & Mahabal 1976).

Distribution : Peninsular India (Orissa, Tamil Nadu, Kerala, West Bengal) and Bangladesh and Sri Lanka.

Status : Common.

8. ***Rana cyanophlyctis*** Schneider 1799

Indian Skipper Frog

Materials examined : 26 ex. from Dhiksal, Babulgaon, Rajewadi, Khanota, Kandhar, Saha, Palasdeo and Rawadi.

Distribution : South and South-East Asia.

Status : Common

9. ***Rana tigerina*** Daudin 1802

Indian Bull Frog

Materials examined : 1 ex. from Dhiksal.

Distribution : Throughout India and Sri Lanka.

Status : Common.

10. ***Rana limnocharis*** Boie. 1835

Indian Crcket Frog

Materials examined : 4 ex. from Palasdeo, Bhigwan and kandhar.

Distribution : South-East Asia from Pakistan to Japan.

Status : Common.

11. ***Tomopterna breviceps*** Schneider 1799

Indian Burrowing Frog

Materils examined : 1 ex. from Dhiksal.

Distribution : Throughout the Indian Union, Nepal, Myanmar and Sri Lanka.

Status : Common.

SUMMARY

Eleven Species of amphibians belonging to 6 genera under 3 families occur in the Ujani Wetland area. Most of them are common, except for *Ansonia kamblei* which is a recently discovered species recorded from a single specimen collected from Jeur, Dist. Sholapur, which forms a part of Ujani wetland.

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HIGHER CHORDATES

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INTRODUCTION

Ramsar convention (1971) on wetlands has clearly defined wetlands of international importance as areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt including areas of marine water where a depth at low tide is less than six metres. Further, Vijayan (1986) opines that wetlands are areas having sufficient water, long enough to support the growth of hydrophytic vegetation. The growth of the vegetation in any waterbody ultimately helps to increase aquatic faunal diversity. Ujani wetland in Maharashtra State is one of the such wetlands in India. Ujani reservoir has been formed due to construction of a dam in 1980 across the river Bhima, one of the tributories of river Krishna, and located on the border of Pune, Ahemadnagar and Sholapur districts in Maharashtra State.

It can be classified as a permanent artificial freshwater body. Prior to construction of this dam, Bhima river was traversing through semi-arid tract of the Deccan plateau and its faunal component was dominated by the semi-arid aquatic species. Mahabal (1989) had then reported that the aquatic avifauna was poorly represented due to water scarcity in the region. However, present scenario surrounding the backwaters is entirely different and is dominated by different ecosystems varying from reservoir to agricultural crops through marshy areas. Such man-made creations have always brought about far reaching effects in plant and animal communities. Extremely large waterspread (about 357 sq. kms.) of Ujani reservoir supports a wide variety of fauna and flora.

Inventorization of the biotic communities of any artificial waterbody, like Ujani reservoir, always, will help to keep a watch on the changes occurring in the communities and also to adopt proper conservation measures for the protection of the wetland.

PREVIOUS STUDIES

Ornithologists got attracted towards this reservoir since its formation due to number of migratory species visiting the backwaters. The avifauna from the Ujani wetland area and its surroundings has been studied in details by Mahabal & Lamba (1987), Mahabal (1989), Bharucha and Gogate (1990) and Gole (1992).

About 75 aquatic bird species were occurring in the past. Unfortunately, unlike aves, other faunal groups were neglected and remained unrecorded. In view of this, an attempt has been made here to prepare systematic list of higher Chordate species from Ujani wetland area.

The present communication reports systematic list of 112 higher Chordate species alongwith brief account on their distribution, habitat, status etc. Obviously the focus is on the aquatic,

semi-aquatic and transitional species only. The account on physiography, climatology, vegetation, etc. on Ujani wetland area is already available (Gole, 1992 and Bharucha & Gogate, 1990).

The systematic list and the inventory has been prepared with the help of the following group-wise publications :

1) Reptilia (Murthy, 1985 and Daniel, 1983).

2) Aves (Mahabal & Lamba, 1987; Mahabal, 1989; Bharucha & Gogate, 1990).

3) Mammalia (Pradhan, 1996).

Species collected and / or actually sighted by the ZSI survey parties have been marked with asterik (*) in the list as well as in the inventory.

LIST OF HIGHER CHORDATES

Phylum : CHORDATA
Class : REPTILIA
Order : TESTUDINES
Family : EMYDIDAE

*1. Sail Terrapin : *Kachuga kachuga* (Gray)
2. Deccan saw-back Terrapin : *Kachuga tentoria* (Gray)
3. Indian pond Terrapin : *Melanochelys trijuga* (Schweigger)

Family : TRIONYCHIDAE

*4. Indian Mud Turtle : *Lissemys punctata granosa* (Schoeff)
*5. Deccan soft-shelled Turtle : *Trionyx leithi* Gray.

Order : SQUAMATA
Sub-order : SERPENTES (OPHIDIA)
Family : NATRICIDAE

*6. Checkered keel-back snake : *Xenochrophis piscator* (Schenider).

Family : COLUBRIDAE

*7. Rat Snake or Dhaman : *Ptyas mucosus* (Linn.)

Family : ELAPIDAE

*8. Common Cobra : *Naja naja* (Linn.)
*9. Common Indian Krait : *Bungarus caeruleus* (Schneider)

Class : AVES
Order : PODICIPEDIFORMES
Family : PODICIPEDIDAE

*10. Little Grebe or Dabchick : *Podiceps ruficollis* (Pallas)

Order : PELECANIFORMES
Family : PHALACROCORACIDAE

*11. Large Cormorant : *Phalacrocorax carbo* (Shaw)
*12. Little Cormorant : *Phalacrocorax niger* (Vielliot)
*13. Indian Shag : *Phalacrocorax fuscicollis* (Stephens)
*14. Darter or Snake Bird : *Anhinga rufa* (Pennant)

Order : CICONIIFORMES
Family : ARDEIDAE

*15. Grey Heron : *Ardea cinerea* Linn.
16. Purple Heron : *Ardea purpurea* Var.
*17. Pond Heron : *Ardeola grayii* (Sykes)
*18. Night Heron : *Nycticorax nycticorax* (Linn.)
*19. Cattle Egret : *Bubulcus ibis* (Linn.)
*20. Large Egret : *Egretta alba* (Gray)
21. Median Egret : *Egretta intermedia* (Wagler)
*22. Little Egret : *Egretta garzetta* (Linn.)

Family : CICONIDAE

*23. Painted Stork : *Ibis leucocephalus* (Pennant)
*24. Openbill Stork : *Anastomus oscitans* (Boddaert)
25. White Stork : *Ciconia ciconia* (Linn.)
*26. White-necked Stork : *Ciconia episcopus* (Boddaert)
27. Black Stork : *Ciconia nigra* (Linn.)
28. Black-necked Stork : *Xenorhynchus asiaticus* (Latham)

Family : THRESKIORNITHIDAE

29. White Ibis : *Threskiornis melanocephala* (Latham)
*30. Black Ibis : *Pseudibis papillosa* (Temminck)
31. Glossy Ibis : *Plegadis falcinellus* (Linn.)
*32. Spoonbill : *Platalea leucorodia* Linn.

Family : PHOENICOPTERIDAE

*33. Greater Flamingo : *Phoenicopterus roseus* Pallas
34. Lesser Flamingo : *Phoeniconaias minor* (Geoffrey)

Order : ANSERIFORMES
Family : ANATIDAE

35. Lesser Whistling Teal : *Dendrocygna javanica* (Horsefield)
36. Large Whistling Teal : *Dendrocygna bicolor* (Vieillot)
*37. Bramhminy Duck : *Tadorna ferruginea* (Pallas)
38. Marbled Teal : *Anas angustirostris* Menetries

*39. Pintail : *Anas acuta* Linn.
*40. Common Teal : *Anas crecca* Linn.
*41. Spot billed Duck : *Anas poecilorhyncha* J. R. Forster.
*42. Gadwall : *Anas strepera* Linn.
*43. Wigeon : *Anas penelope* Linn.
*44. Garganey Teal : *Anas querfuedula* Linn.
*45. Shoveller : *Anas clypeata* Linn.
*46. Common Pochard : *Aythya ferina* (Linn.)
*47. White-eyed Pochard : *Aythya nyroca* (Linn.)
*48. Tufted Duck : *Aythya fuligula* (Linn.)
*49. Cotton Teal : *Nettapus coromandelianus* (Gmelin)
50. Comb Duck : *Sarkidornis melanotus* (Pennant)

Order : FALCONIFORMES
Family : ACCIPITRIDAE

*51. Pariah kite : *Milvus migrans* (Boddaert)
52. Large Indian kite : *Milvus (migrans) lineatus* (Gray)
*53. Bramhminy kite : *Hilastur indus* (Boddaert)
54. Bonelli's Eagle : *Hieraaetus fasciatus* (Vieillot)
55. Tawny Eagle : *Aquila rapax* (Temminck)
56. Eastern Steppe Eagle : *Aquila nipalensis* (Hodgson)
57. Large spotted Eagle : *Aquila pomarina* (Lesson)
58. Grey-headed fishing Eagle : *Ichthyophaga icthyaetus* (Horsefield)
59. Montagu's harrier : *Circus pygargus* (Linn.)
*60. Marsh Harrier : *Circus aeruginosus* (Linn.)
61. Short-toed Eagle : *Circaetus gallicus* (Gmelin)
*62. Osprey : *Pandion haliaetus* (Linn.)

Order : GRUIFORMES
Family : RALLIDAE

*63. White-breasted Waterhen : *Amaurornis phoenicurus* (Picnnant)
*64. Indian Moorhen : *Gallinula chloropus* (Linn.)
*65. Purple Moorphen : *Porphyrio porphyrio* (Linn.)
*66. Coot : *Fulica atra* Linn.

Family : GRUIDAE

67. Common Crane : *Grus grus* (Linn.)
*68. Demoiselle Crane : *Anthropoides virgo* (Linn.)

Order : CHARADRIIFORMES
Family : JACANIDAE

*69. Pheasant-tailed Jacana : *Hydrophasianus chirurgus* (Scopoli)

Family : CHARADRIIDAE

70. Sociable Lapwing : *Vanellus gregarius* (Pallas)
*71. Redwattled Lapwing : *Vanellus indicus* (Boddaert)
*72. Yellowwattled Lapwing : *Vanellus malabaricus* (Boddaert)
73. Golden Plover : *Pluvialis dominica* (Muller)
74. Ringed Plover : *Charadrius hiaticula* (Linn.)
*75. Little-ringed Plover : *Charadrius dubius* (Linn.)
76. Kentish Plover : *Charadrius alexandrinus* (Linn.)
77. Curlew : *Namenius arquata* (Linn.)
78. Black-tailed Godwit : *Limosa limosa* (Linn.)
79. Bar-tailed Godwit : *Limosa lapponica* (Linn.)
80. Spotted Redshank : *Tringa erythropus* (Pallas)
81. Common Redshank : *Tringa totanus* (Linn.)
82. Greenshank : *Tringa nebularia* (Gunnerus)
*83. Spotted Sandpiper : *Tringa glareola* (Linn.)
*84. Common Sandpiper : *Tringa hypoleucos* (Linn.)
85. Green Sandpiper : *Tringa ochropus* (Linn.)
86. Sanderling : *Calidris alba* (Pallas)
87. Temminck's Stint : *Calidris temminckii* (Leisler)
*88. Little stint : *Calidris minutus* (Leisler)
89. Ruff and Reeve : *Philomachus pugdnax* (Linn.)

Family : ROSTRATULIDAE

*90. Painted Snipe : *Rostratula benghalensis* (Linn.)
91. Fan-tailed Snipe : *Capella gallinago* (Linn.)

Family : RECURVIROSTRIDAE

*92. Black-winged stilt : *Himantopus himantopus* (Linn.)

Family : BURHINIDAE

93. Great Stone Plover : *Esacus magnirostris* (Vielliot)

Family : GLAREOLIDAE

94. Large Indian Pratincole : *Glareola pratincola* (Linn.)
*95. Small Indian Pratincole : *Glareola lactea* Temminck

Family : LARIDAE

96. Herring Gull : *Larus argentatus* Bree
97. Brownheaded Gull : *Larus brunnicephalus* Jerdon
98. Blackheaded Gull : *Larus ridibundus* (Linn.)
*99. Whiskered Tern : *Chlidonias hybrida* Stephens
100. Gullbellied Tern : *Gelochelidon nilotica* (Gmelin)
101. Caspian Tern : *Hydroprogne caspia* (Pallas)
*102. Indian River Tern : *Sterna aurantia* J.E.Gray
103. Blackbellied Tern : *Sterna acuticauda* J. E. Gray
*104. Little Tern : *Sterna albifrons* Pallas

Order : CORACIIFORMES
Family : ALCEDINIDAE

*105. Indian Pied Kingfisher : *Ceryle rudis* (Linn.)
*106. Small blue Kingfisher : *Alcedo atthis* (Linn.)
*107. White-breasted Kingfisher : *Hylcyon smyrnensis* (Linn.)

Order : PASSERIFORMES
Family : MOTACILLIDAE

*108. Yellow Wagtail : *Motacilla flava* (Linn.)
109. Indian White Wagtail : *Motacilla alba* Linn.
110. Grey Wagtail : *Motacilla caspica* (Gmelin)
111. Large-pied Wagtail : *Motacilla maderaspatensis* Gmelin

Class : MAMMALIA
Order : CARNIVORA
Family : MUSTELIDAE
Subfamily : LUTRINAE

112. Otter : *Lutra perspicillata* Geoffroy

SYSTEMATIC ACCOUNT

Class : REPTILIA
Order : TESTUDINES
Family : EMYDIDAE

*1. *Kachuga kachuga* (Gray)
Sail Terrapin

Locality : Sighted under Khed bridge near Bhigwan in Sept. 1990.

Habitat : Aquatic. Lives in river near marshy areas.

Status : Occassional.

External Distribution : Krishna, Godavari and Gangetic river systems.

Source : Murthy (1985) and Daniel (1983).

2. ***Kachuga tentoria*** (Gray)

Deccan Saw-back Terrapin.

Locality : Bhima-Krishna river system; *Habitat* : Aquatic. Lives in rivers, but comes to the shores at night.

External Distribution : Mahanandi and Godavari river systems.

Source : Murthy (1985) and Daniel (1983).

Remarks : Due to religious feelings, the trapped terrapins are released back in the water by the local fisherman.

However, instances of illegal poaching and sell of the terrapins in the nearby markets have also been reported.

*3. ***Melanochelys trijuga*** (Schweigger)

Indian Pond Terrapin.

Locality : Bhima river system, Pune Dist.

Material Examined : Two specimens collected from Pune Dist. registered in Western Regional Station (WRS) collection (R/211 and R/212).

Habitat : Aquatic. Lives in water but comes to the shores at night.

Status : Not known.

External Distribution : Maharashtra, Bihar, West Bengal and South India.

Source : Murthy (1985) and Daniel (1983).

Family : TRIONYCHIDAE

*4. ***Lissemys punctata granosa*** (Schoeff)

Indian Mud Turtle

Locality : Pune Dist.

Material Examined : One specimen collected from Pune Dist. registered in WRS collection (R/213).

Habitat : Lives in rivers, lakes, ponds, tanks, etc.

Status : Common (Daniel, 1983).

External Distribution : Peninsular India.

Source : Murthy (1985) and Daniel (1983).

*5. ***Trionyx leithi*** Gray

Deccan Soft-shelled Turtle

Locality : Mula-Mutha river, a tributory of river Bhima, near Loni, Pune Dist. (R\236).

Habitat : Lives in stagnant water of large rivers, tanks, ponds etc.

Status : Common (Daniel, 1983).

External Distribution : Ganges and other rivers of Peninsular India.

Source : Murthy (1985) and Daniel (1983).

Order : SQUAMATA
Suborder : SERPENTES (OPHIDIA)
Family : NATRICIDAE

*6. ***Xenochrophis piscator*** (Schneider)

Checkered Keel-back snake

Locality : Bhima river system in Pune Dist.

Material Examined : Four WRS registgered examples collected from the tributories of river Bhima (R\125, R\130, R/154 and R/136).

Habitat : Freshwater rivers, ponds, lakes, etc.

Status : Common.

External Distribution : Throughout India.

Source : Daniel (1973) and Murthy (1985).

Remarks : Non-poisonous snake.

Family : COLUBRIDAE

*7. ***Ptyas mucosus*** (Linn.)

Rat snake or Dhaman

Locality : Khed Bridge near Bhigwan.

Material Examined : One specimen registered in WRS collection (R/226).

Habitat : Snake of plains, radily takes to water, excellent swimmer.

Status : Common.

External Distributor : Throughout Indian.

Source : Daniel (1983) and Murthy (1985).

Remarks : Non-Poisonous snake. This snake is being killed indiscriminately for its skin by the poachers. Hence, the species has been included in the schedule II of Indian Wildlife Act.

Family : ELAPIDAE

*8. ***Naja naja*** (Linn.)

Indian Common Cobra

Locality : Palasdeo near Indapur, Pune Dist.

Material Examined : One specimen registered in WRS collection (R/233).

Habitat : Eclectic in habitat, frequently found near water, excellent swimmer.

Status : Common.

External Distribution : Throughout India.

Source : Daniel (1983) and Murthy (1985).

Remarks : Poisonous snake. Cobras are being killed for various reasons. Illegal killing of this snake for its skin has forced the Govt. to include this species in the Wildlife Act Schedule.

*9. ***Bungarus caeruleus*** (Schneider)

Common Indian Krait

Locality : Close to the backwaters of Ujani wetland.

Material Examined : One specimen registered in WRS collection (R\207).

Habitat : It can live in any biotope, prefers to stay near water, good swimmer.

Status : Common (Daniel, 1983).

External Distribution : Throughout India.

Source : Daniel (1983) and Murthy (1985).

Remarks : Deadly poisonous snake amongst the Indian land snakes.

Class : AVES
Order : PODICIPEDIFORMES
Family : PODICIPEDIDAE

*1. ***Pocideps ruficollis*** (Pallas).

Little Grebe or Dabchick

Locality : Sighted near Khanota, Bhigwan.

Habitat : Aquatic. Found in rivers and lakes, species of shallow and deep water.

Status : Common/Local Migratory (Bharucha & Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

Order : PELECANIFORMES
Family : PHALACROCORACIDAE

*2. ***Phalacrocorax carbo*** (Shaw).

Large Cormorant

Locality : Sighted in Bhigwan area.

Habitat : Aquatic. Found in rivers and lakes, species of shallow and deep water.

Status : Common/Local Migratory (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*3. ***Phalacrocorax niger*** (Vieillot).
Little Cormorant

Locality : Sighted in Bhigwan area.

Habitat : Aquatic. Found in rivers and lakes.

Status : Common/Resident (Mahabal and Lamba, 1987).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Mahabal (1989).

*4. ***Phalacrocorax fuscicollis*** (Stephens.)
Indian Shag

Locality : Sighted in Bhigwan area.

Habitat : Aquatic. Found in rivers and lakes, lives in shallow & deep water.

Status : Common/Local Migratory (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*5. ***Anhinga rufa*** (Pennant).
Snake bird or Darter

Locality : Sighted near Bhigwan and other places around wetland area.

Habitat : Aquatic. Found near rivers, lakes ponds, etc., very good swimmer, feeds on fishes.

Status : Occassional/Resident (Mahabal and Lamba, 1987).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

Order : CICONIIFORMES
Family : ARDEIDAE

*6. ***Ardea cinerea*** Linn.
Grey Heron

Locality : Sighted near Bhigwan and other places around wetland.

Habitat : Aquatic. A wader seen near river banks.

Status : Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*7. ***Ardea purpurea*** Var.
Purple Heron

Locality : Bhigwan region and other places around wetland.

Habitat : Aquatic. Lives near river, lakes, ponds, etc. A wader.

Status : Common/Local Migratory (Bharucha & Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*8. ***Ardeola grayii*** (Sykes)
Pond Heron

Locality : Sighted in Bhigwan and other places around wetland.

Habitat : Lives in rivers, lakes, ponds or even the well-watered fields.

Status : Very common Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*9. ***Nycticorax nycticorax*** (Linn.)
Night Heron

Locality : Sighted in Khanota area near Bhigwan.

Habitat : Terrestrial (aquatic). Lives near Jheels, inland water etc. Nocturnal.

Status : Common/Resident (Mahabal & Lamba, 1987).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

*10. ***Bubulcus ibis*** (Linn.)
Cattle Egret

Locality : Sighted at number of places around the wetland.

Habitat : Terrestrial (aquatic). Gregarious, Mostly seen with grazing catles in the field.

Status : Very common/Rsident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal Lamba (1987) and Bharucha & Gogate (1990).

*11. ***Egretta alba*** (Gray)
Large Egret

Locality : Sighted at Bhigwan and other places around wetland.

Habitat : Aquatic (terrestrial). Seen in large stretches of water like rivers, backwaters, lakes etc.

Status : Very common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*12. ***Egrtta intermedia*** (Wagler)
Median Egret

Locality : Bhigwan region.

Habitat : Aquatic (terrestrial). Lives near shoreline of stretches of water.

Status : Uncommon/Local Migratory (Bharucha & Gogate, 1990).

External Distribution : Indian Union; *Source* : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*13. ***Egretta garzetta*** (Linn.)

Little Egret

Locality : Sighted near Khanota, Sugaon, Rajewadi, etc.

Habitat : Aquatic (terrestrial). Gregarious, seen near shoreline of large stretches of waterbodies, roosts in trees.

Status : Very common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha and Gogate (1990).

Family : CICONIDAE

*14. ***Ibis leucocephalus*** (Pennant)

Painted Stork

Locality : Sighted near Bhigwan, Khanota etc.

Habitat : Aquatic. Seen generally near shoreline, however 8 can swim in deeper water.

Status : Common/Resident, population trend increasing (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha and Gogate (1990).

*15. ***Anastomus oscitans*** (Boddaert)

Openbilled Stork

Locality : Sighted near Bhigwan, Khanota, etc.

Habitat : Aquatic. Can be seen, like any other storks, on shoreline and/or shallow and deeper water.

Status : Very common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha and Gogate (1990).

*16. ***Ciconia ciconia*** (Linn.)

White Stork

Locality : Waterbodies near Ujani Wetland area.

Habitat : Aquatic (terrestrial). Lives near waterbodies.

Status : Rare/Migratory winter visitor (Mahabal and Lamba, 1987).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

*17. ***Ciconia episcopus*** (Boddaert).
White necked Stork

Locality : Sighted near Bhigwan, Khanota etc.

Habitat : Aquatic (terrestrial). Inhabits well watered plains, partial to well water-logged ground, can be seen anywhere on the shoreline, can swim in deeper water.

Status : Very Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*18. ***Ciconia nigra*** (Linn.)
Black Stork

Locality : Waterbodies near Ujani wetland area.

Habitat : Aquatic (terrestrial).

Habits : Like any other stork species.

Status : Rare/Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : Indian Union.

Source : Mahabal and Lamba (1987).

19. ***Xenorhynchus asiaticus*** (Latham)
Black necked Stork

*Locality :*Waterbodies near Ujani wetland areas.

Habitat : Aquatic (terrestrial).

Habits : Like any other stork species.

Status : Rare/Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : East Asia.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

Family : THRESKIORNITHIDAE

*20. ***Threskiornis melanocephala*** (Latham)
White Ibis

Locality : Tanks and lakes around Ujani Wetland area.

Habitat : Aquatic (terrestrial). Walking about actively in marshy land, feeds in shallow water.

Status : Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha and Gogate (1990).

*21 ***Pseudibis papillosa*** (Temminck)
Black Ibis

Locality : Sighted near Khanota.

Habitat : Aquatic (terrestrial). Seen generally in the neighbourhood of rivers, lakes, tanks, etc., feeding in the surrounding fields and/or fallow land.

Status : Common/Resident (Bharucha & Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

22. ***Plegadis falcinellus*** (Linn.)
Glossy Ibis

Locality : Around Ujani wetland area.

Habitat : Aquatic (terrestrial). Other conditions same as Black Ibis.

Status : Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*23. ***Platalea leucorodia*** Linn.
Spoon Bill

Locality : Sighted in areas between Khed Bridge and Palasdeo.

Habitat : Aquatic (terrestrial). Seen in marshes and mudbanks, can swim in shallow and deep waters.

Status : Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Family : PHOENICOPTERIDAE

*24. ***Phoenicopterus roseus*** Pallas
Greater Flamingo

Locality : Sighted at Khanota, Bhigwan, Palasdeo, etc.

Habitat : Aquatic. Found in shallow water with aquatic plants.

Status : Common/Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*25. ***Phoeniconaias minor*** (Geoffroy)
Lesser Flamingo

Locality :Lakes near Ujani Wetland.

Habitat : Aquatic seen with greater flamingoes.

Status : Rare/Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : Within Indian limits, Indian Union.

Source : Mahabal and Lamba (1987).

Order : ANSERIFORMES
Family : ANATIDAE

26. ***Dendrocygna javanica*** (Horsefield)
Lesser Whistling Teal or Tree Duck

Locality : Ujani Wetland area and around.

Habitat : Aquatic. It lives in flocks on vegetation covered tanks, found in all sizeable stretches of water.

Status : Uncommon/Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

27. ***Dendrocygna bicolor*** (Vieillot)
Large Whistling Teal

Locality : Waterbodies around Ujani Wetland.

Habitat : Aquatic. Other habits same as those of lesser Whistling teal.

Status : Uncommon/Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : India.

Source : Mahabal & Lamba (1987).

*28. ***Tadorna ferruginea*** (Pallas)
Bramhany Duck or Ruddy Shelduck

Locality : Sighted at Khanota, Bhigwan, Palasdeo, etc.

Habitat : Aquatic. Often seen on mud spits and sand banks, however, can go in deeper water also.

Status : Common/Migratory, winter visitor (Bharucha and Gogate), 1990).

External Distribution : In winter, throughout India.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

29. ***Anas angustirostris*** Menetries
Marbled Teal

Locality : Tanks near Ujani Wetland.

Habitat : Aquatic.

Status : Non known.

External Distribution : Not Known.

Source : Mahabal and Lamba (1987).

*30. ***Anas acuta*** Linn
Pintail

Locality : Sighted near Bhigwan, Khanota, Palasdeo, etc.

Habitat : Aquatic. A shallow water species.

Status : Common/Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*31. ***Anas crecca*** Linn.
Common Teal

Locality : Sighted in Bhigwan, Palasdeo areas.

Habitat : Aquatic. Can swim in shallow water.

Status : Common/Migratory, winter visitor (Bharucha & Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*32. ***Anas poecilorhyncha*** J. R. Forster.
Spotbill or Grey Duck

Locality : Sighted in Bhigwan, Palasdeo, areas.

Habitat : Aquatic. Can swim in shallow water.

Status : Common/Resident (Bharucha & Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*33. ***Anas strepera*** Linn.
Gadwall

*Locality :*Sighted in Bhigwan, Palasdeo areas.

Habitat : Aquatic. Lives in flocks in association with other ducks.

*Status :*Very common/Migratory, winter visitor (Bharucha and Gogate,1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*34. ***Anas penelope*** Linn.
Wigeon

Locality : Sighted in Bhigwan area.

Habitat : Aquatic. Lives in shallow and grassy water.

Status : Very Common/Migratory, winter visitor (Bharucha & Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*35. ***Anas querquedula*** Linn.
Garganey or Blue-winged Teal

Locality : Sighted in Bhigwan, Palasdeo areas.

Habitat : Aquatic. Species of shoreline and shallow water, can invade nearby fields flooded with water for food.

Status : Common/Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*36. ***Anas clypeata*** Linn.
Shoveller

Locality : Sighted in Bhigwan, Palasdeo, etc.

Habitat : Aquatic. Species of shoreline and shallow water.

Status : Common/Migratory, winter visitor (Bharucha & Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*37. ***Aythya ferina*** (Linn.)
Common Pochard

Locality : Sighted in Khanota, Bhigwan, Palasdeo areas.

Habitat : Aquatic. Species of shoreline and shallow water, flies inland after dusk for food.

Status : Very Common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*38. ***Aythya nyroca*** (Linn.)
White-eyed Pochard

Locality : Sighted in Khanota, Bhigwan, Palasdeo areas.

Habitat : Aquatic. Spends day time in shallow water and flies inlands after dusk for food.

Status : Very Common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

39. ***Aythya fuligula*** (Linn.)
Tufted Duck

Locality : Bhigwan, Palasdeo.

Habitat : Aquatic. Species of shoreline and shallow water, can swim in deep water.

Status : Very Common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*40. ***Nettapus coromandelianus*** (Gmelin)
Cotton Teal of Quacky Duck

Locality : Sighted in Bhigwan, Palasdeo areas.

Habitat : Aquatic. Lives on shoreline and in shallow water.

Status : Common / Migratory, winter visitor (Bharucha & Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

41. ***Sarkidornis melanotus*** (Pennant)
Comb Duck

Locality : Waterbodies near Ujani Wetland areas.

Habitat : Aquatic. Inhabits all the zones of the waterbodies ranging from shoreline to deeper waters.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Order : FALCONIFORMES
Family : ACCIPITRIDAE

*42. ***Milvus migrans*** (Boddaert)
Pariah Kite

Locality : Sighted around Bhigwan areas near back water.

Habitat : Terrestrial (aquatic). Commonest raptor species feeding in the zones varrying from terrestrial to shallow water.

Status : Common / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

43. ***Milvus (migrans) lineatus*** (Gray)
Large Indian Kite

Locality : Areas around backwater of Ujani Wetland.

Habitat : Terrestrial (aquatic). Similar to Pariah Kite.

Status : Rare / Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : Within Indian limits, Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha and Gogate (1990).

*44. ***Hilastur indus*** (Boddaert)
Bramhminy Kite

Locality : Sighted in Bhigwan, Khed areas.

Habitat : Aquatic. Keeps invariably to the neighbourhood of rivers, jheels, water-logged countries etc.

Status : Occasional / Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

45. ***Hieraaetus fasciatus*** (Vieillot)
Bonelli's Eagle

Locality : Localities close to Bhigwan, Khed, Sugaon etc.

Habitat : Terrestrial (aquatic). Common raptor with feeding zone varrying from terrestrial to deep water.

Status : Occassional / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

46. ***Aquila rapax*** (Temminck)
Tawny Eagle

Locality : Areas close to Bhigwan, Khed, Sugaon etc.

Habitat : Terrestrial (aquatic). Common raptor, inhabits drier plains close to rivers.

Status : Uncomon / Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

47. ***Aquila nipalensis*** (Hodgson)
Eastern Steppe Eagle

Locality : Areas close to Bhigwan, Khed, Sugaon etc.

Habitat : Terrestrial (aquatic). A raptor species seen in drier plains close to waterbodies.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

48. ***Aquila pomarina*** (Lesson)
Large Spotted Eagle

Locality : Areas around Bhigwan, Khed etc.

Habitat : Terrestrial (aquatic). A raptor species covering areas varrying from terrestrial to deep water in search of food.

Status : Common / Resident (Bharucha and Gogate, 1990).

External Distribution : Not known.

Source : Bharucha & Gogate (1990).

49. ***Ichthyophaga ichthyaetus*** (Horsefield)
Grey headed Fishing Eagle

Locality : Areas around Bhigwan, Khed etc.

Habitat : Aquatic. Feeding zone varrying from shoreline to deep water.

Status : Uncommon / Migratory (Bharucha and Gogate, 1990).

External Distribution : India.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

50. ***Circus pygargus*** (Linn.)
Montagu's Harrier

Locality : Areas around Palasdeo, Bhigwan, Khed etc.

Habitat : Terrestrial (aquatic). Feeding zone varrying from shoreline to deep water.

Status : Common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*51. ***Circus aeruginosus*** (Linn.)
Marsh Harrier

Locality : Sighted in areas like Saha, Bhigwan, Khanota, Khed, Sugaon etc.

Habitat : Aquatic. Seen near river, lakes, large waterbodies etc.

Status : Very common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

52. ***Circaetus gallicus*** (Gmelin)
Short toed Eagle

Locality : Areas around Saha, Bhigwan, Khed etc.

Habitat : Terrestrial (aquatic). Feeding zone varrying from terrestrial to deep water. The birds are wide-spread in open countries.

Status : Occasional / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Woodcock (1980) and Bharucha & Gogate (1990).

*53. ***Pandion haliaetus*** (Linn.)
Osprey

Locality : Sighted in Bhigwan, Khanota, Khed, Palasdeo, Rajewadi etc.

Habitat : Aquatic. Often seen on large rivers, lakes, irrigation dams etc. feeds on fishes from deep water zone.

Status : Common / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Order : GRUIFORMES
Family : RALLIDAE

*54. ***Amaurornis phoenicurus*** (Pennant)
White-brested waterhen

Locality : Sighted in Bhigwan, Khanota, Palasdeo areas.

Habitat : Aquatic (terrestrial). A waterside bird moving around the thick cover along the edges of waterbodies.

Status : Common / Resident (Mahabal & Lamba 1987).

External Distribution : India (Except arid zones).

Source : Woodcock (1980), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*55. ***Gallinula chloropus*** (Linn.)
Indian Moorhen

Locality : Sighted in Bhigwan, Palasdeo, Khed areas.

Habitat : A waterside bird moving around the thick cover along the edges of waterbodies.

Status : Common / Resident (Bhaucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*56. ***Porphyrio porphyrio*** (Linn.)
Purple Moorhen

Locality : Sighted in Bhigwan, Khanota, Khed areas.

Habitat : Aquatic (terrestrial). A waterside bird moving around the thick cover along the edges of waterbodies.

Status : Very Common / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*57. ***Fulica atra*** (Linn.)
Coot

Locality : Sighted in Bhigwan, Palasdeo, Saha, Sugaon areas.

Habitat : Aquatic. The bird frequents open water, gathering in large heads.

Status : Very Common / Resident (Bharucha and Gogate 1990).

External Distribution : Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

Family : GRUIDAE

58. ***Grus grus*** (Linn.)
Common Crane

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Inhabits cultivated country around waterbodies, seen in association with Demoiselle Crane.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, upto Mysore only.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*59. ***Anthropoides virgo*** (Linn.)
Demoiselle Crane

Locality : Sighted in Bhigwan, Khanota and Khed areas.

Habitat : Aquatic (terrestrial). Inhabits cultivated country around waterbodies.

Status : Occassional / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, upto Mysore only.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Order : CHARADRIIFORMES
Family : JACANIDAE

*60. ***Hydrophasianus chirurgus*** (Scopoli)
Phaesant-tailed Jacana

Locality : Sighted in Bhigwan, Khed, Palasdeo areas.

Habitat : Aquatic. Inhabits waterbodies with floating vegetation such as waterlily.

Status : Very Common / Resident (Bharucha and Gogate 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Family : CHARADRIIDAE

61. ***Vanellus gregarius*** (Pallas)
Social Lapwing

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Inhabits open country, ploughed fields and grazing lands surrounding waterbodies.

Status : Migratory, winter visitor (Mahabal, 1989).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Mahabal (1989).

*62. ***Vanellus indicus*** (Boddaert)
Redwattled Lapwing

Locality : Sighted in Bhigwan, Khanota, Khed, Sugaon, Kandar areas.

Habitat : Aquatic (terrestrial). Inhabits open country, ploughed fields and grazing lands surrounding waterbodies.

Status : Very Common / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*63. ***Vanellus malabaricus*** (Boddaert)
Yellowwattled Lapwing

Locality : Sighted in Bhigwan, Khanota, Khed, Sugaon, Saha areas.

Habitat : Aquatic (terrestrial). Inhabits open country, ploughed fields and grazing lands surrounding waterbodies.

Status : Very Common / Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

64. ***Pluvialis dominica*** (Muller)
Golden Plover

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Moves on moist grassland around waterbodies.

Status : Common / Migratory, winter visitor (Mahabal & Lamba 1987).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

65. ***Charadrius hiaticula*** (Linn.)
Ringed Plover

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Generally seen along the shoreline of a waterbody.

Status : Occassional / Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Bharucha and Gogate, (1990).

*66. ***Charadrius dubius*** (Linn.)
Little ringed Plover

Locality : Sighted in Khanota and other areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Bird of mudflats, sandpits by the side of large rivers and tanks.

Status : Very Common / Resident (Bharucha and Gogate 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

67. ***Charadrius alexandrius*** (Linn.)
Kentish Plover

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Bird of shoreline along the tanks and large waterbodies.

Status : Very Common / Resident (Bharucha and Gogate 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

68. ***Namenius arquata*** (Linn.)
Curlew

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Runs or stalks along the water's edge, marshes, moist grassland etc.

Status : Occassional / Migratory (Bharucha and Gogate 1990).

External Distribution : Within Ingian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

69. ***Limosa limosa*** (Linn.)
Black-tailed Godwit

Locality : Areas around Bhigwan, Khanota, Khed etc.

Habitat : Aquatic (terrestrial). Seen in small parties in marshy areas and mudflats along rivers.

Status : Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

70. ***Limosa lapponica*** (Linn.)
Bar-tailed Godwit

Locality : Areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Keeps to marshy areas alongwith other waders.

Status : Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

71. ***Tringa erythropus*** (Pallas)
Spotted Redshank

Locality : Areas around Ujani Wetland and other nearby Waterbodies.

Habitat : Aquatic. Keeps to marshy areas alongwith other waders.

Status : Occassional / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

72. ***Tringa totanus*** (Linn.)
Eastern or Common Redshank

Locality : Areas around Ujani Wetland.

Habitat : Aquatic. A wader found along shorelines.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

73. ***Tringa nebularia*** (Gunnerus)
Greenshank

Locality : Areas around Ujani Wetland.

Habitat : Aquatic. A wader, often met singly in winter at river banks.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*74. ***Tringa glareola*** (Linn.)
Spotted Sandpiper

Locality : Sighted in Khanota, Palasdeo and other areas around Ujani Wetland.

Habitat : Aquatic. A wader living near in land waters and at marshes, flooded crop fields and tidal mudflats.

Status : Common / Resident (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

*75. ***Tringa hypolieucos*** (Linn.)
Common Sandpiper

Locality : Sighted at shoreline areas near Khanota, Bhigwan, Palasdeo etc.

Habitat : Aquatic. Earliest immigrant species keeping itself to shoreline alongwith other waders.

Status : Very Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

76. ***Tringa ochropus*** (Linn.)
Green Sandpiper

Locality : Marshy areas around Ujani Wetland.

Habitat : Aquatic. A Wader seen singly near inland waters and at marshes.

Status : Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

77. ***Calidris alba*** (Pallas)
Sanderling

Locality : Areas around Ujani Wetland.

Habitat : Aquatic. A Bird of shoreline.

Status : Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Bharucha & Gogate (1990).

78. ***Calidris temminckii*** (Leisler)
Temminck's Stint

Locality : Inland marshy and mudflat areas of Ujani Wetland.

Habitat : Aquatic. A wader seen near inland marshy and mudflat areas.

Status : Doubtful (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*79. ***Calidris minutus*** (Leisler)
Little Stint

Locality : Sighted in Khanota, Bhigwan, Palasdeo, Rajewadi etc. areas.

Habitat : Aquatic. Seen in flocks on mudflats, shoreline and at marshes.

Status : Very Common / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

80. ***Philomachus pugdnax*** (Linn.)
Ruff & Reeve

Locality : Marshy and muflat areas around Ujani Wetland.

Habitat : Aquatic. Lives in flocks and marshes and mudflats, feeds on weed seeds. A wader.

Status : Uncommon / Migratory, winter visitor (Bharucha and Gogate 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

Family : ROSTRATULIDAE

*81. ***Rostratula benghalensis*** (Linn.)
Painted Snipe

Locality : Sighted in Bhigwan, Khanota, Khed etc. areas.

Habitat : Aquatic (terrestrial). Lives singly or in small groups in reedy swamps or cut fields.

Status : Common/Resident (Mahabal and Lamba, 1987.

External Distribution : Throughout India.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

82. ***Capella gallinago*** (Linn.)
Fan-tailed Snipe

Locality : Marshy areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Keeps to cover in marshy reedy beds and cut fields.

Status : Common/Migratory, winter visitor (Mahabal & Lamba, 1987).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

Family : RECURVIROSTRIDAE

*83. ***Himantopus himantopus*** (Linn.)
Black-winged Stilt

Locality : Sighted in Bhigwan, Khanota, Khed, Palasdeo etc. areas.

Habitat : Aquatic (terrestrial). A wader. Lives in marshes & mudflats surrounding waterbodies.

Status : Common/Migratory, winter visitor (Mahabal and Lamba, 1987).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Mahabal & Lamba (1987).

Family : BURHINIDAE

84. ***Esacus magnirostris*** (Vieillot)
Great Stone Plover

Locality : Marshy and mudflat areas around Ujani wetland.

Habitat : Aquatic. (terrestrial). Lives along shoreline.

Status : Uncommon / Resident (Mahabal and Lamba, (1987).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

Family : GLAREOLIDAE

85. ***Glareola pratincola*** (Linn.)
Large Indian Pratincole

Locality : Marshy areas around Ujani Wetland.

Habitat : Aquatic (terrestrial). Lives in open along shoreline.

Status : Occassional/Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980) and Bharucha & Gogate (1990).

*86. ***Glareola lactea*** Temminck
Small Indian Pratincole

Locality : Marshy areas around Ujani Wetland.

Habitat : Aquatic. (terrestrial). Lives in open along shoreline.

Status : Occassional/Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980) and Bharucha & Gogate (1990).

Family : LARIDAE

87. ***Larus argentatus*** Bree
Herring Gull

Locality : Marshy and muflat areas of Ujani Wetland.

Habitat : Aquatic. Generally seen near large stretches of waterbodies, can be located in all the zones of the Wetland.

Status : Common/Migratory (Bharucha and Gogate, (1990).

External Distribution : Within Indian limits, Indian Union.

Source : Bharucha & Gogate (1990) and Gole (1992).

88. ***Larus brunnicephalus*** Jerdon
Brown headed Gull

Locality : Marshy and mudflat areas of Ujani Wetland.

Habitat : Aquatic. Generally seen near large stretches of waterbodies, can be locaated in all the zones of the wetland.

Status : Common/Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

89. ***Larus ridibundus*** (Linn.)
Black-headed Gull

Locality : Marshy and mudflat areas of Ujani Wetland.

Habitat : Aquatic. Generally seen near large stretches of waterbodies, can be located in all the zones of the wetland.

Status : Occassional/Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961), Woodcock (1980) and Bharucha & Gogate (1990).

*90. ***Chlidonias hybrida*** Stepherns
Whiskered Tern

Locality : Sighted in Bhigwan, Khanota, Sugaon, Palasdeo, etc. areas.

Habitat : Aquatic. Frequents the marshy and mudflat areas and can go in deeper water for feeding purpose.

Status : Common/Resident (Bharucha and Gogate, (1990).

External Distribution : Indian Union.

Source : Salim Ali (1961), Woodcock (1980) and Bharucha & Gogate (1990).

91. ***Gelochelidon nilotica*** (Gmelin)
Gullbeillied Tern

Locality : Edges of large stretches of Ujani back water.

Habitat : Aquatic. Frequents shallow and deeper water of the reservoir.

Status : Common/Migratory, winter visitor (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Salim Ali (1961) and Bharucha & Gogate (1990).

92. ***Hydroprogne caspia*** (Pallas)
Caspian Tern

Locality : Edges of large stretches of Ujani back water.

Habitat : Aquatic. Frequents shallow and deeper water of the reservoir.

Status : Uncommon/Migratory (Bharucha and Gogate, 1990).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980) and Bharucha & Gogate (1990).

*93. ***Sterna aurantia*** J. E. Gray
Indian River Tern

Locality : Sighted in Bhigwan, Palasdeo, etc. areas.

Habitat : Aquatic. Frequents shallow and deeper water of the reservoir.

Status : Very Common/Resident (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Salim Ali (1961); Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

94. ***Sterna acuticauda*** J. E. Gray
Blackbellied Tern

Locality : Edges of large stretches of Ujani back water.

Habitat : Aquatic. Frequents shallow and deeper water of the reservoir.

Status : Common/Resident? (Bharucha and Gogate, 1990).

External Distribution : Indian Union.

Source : Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

*95. ***Sterna albifrons*** Pallas
Little Tern

Locality : Sighted in Khanota, Bhigwan, Palasdeo, Rajewadi etc. areas.

Habitat : Aquatic. Frequents shallow and deeper water of the reservoir.

Status : Common/Resident (Bharucha & Gogate, 1990).

External Distribution : Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Bharucha & Gogate (1990).

Order : CORACIIFORMES
Family : ALCEDINIDAE

*96. ***Ceryle rudis*** (Linn.)
Indian Pied Kingfisher

Locality : Sighted in Khed, Khanota, Sugaon, Kandar, etc. areas.

Habitat : Terrestrial (aquatic). Seen by the side of Canals, lakes, reservoirs, ponds, etc. A

specialist at fishing from the air. Usually seen perched on a favourite rock near water flicking its tail.

Status : Resident/Local Migratory (Mahabal, 1989).

External Distribution : India.

Source : Salim Ali (1961), Woodcock (1980) and Mahabal (1989).

*97. ***Alcedo atthis*** (Linn.)
Small Blue Kingfisher

Locality : Sighted in Bhigwan, Khanota, Khed, Sugaon, etc. areas.

Habitat : Terrestrial (aquatic). The bird sits on an overhanging branch scanning the water for fish. It nests in a tunnel by the waterside.

Status : Common/Resident (Mahabal, 1989).

External Distribution : Indian Union.

Source : Salim Ali (1961), Woodcock (1980) and Mahabal (1989).

*98. ***Halcyon smyrnensis*** (Linn.)
White-brested Kingfisher

Locality : Sighted in Khanota, Khed, Sugaon, Kandar, etc. areas.

Habitat : Terrestrial (aquatic). Seen at ponds, puddles, rain affected fields etc. Lives singly in cultivated and wooded countries.

Status : Very Common/Resident (Mahabal, 1989).

External Distribution : Indian Union.

Source : Salim Ali (1961), Woodcock (1980) and Mahabal (1989).

Order : PASSERIFORMES
Family : MOTACILIIDAE

99. ***Motacila flava*** (Linn.)
Yellow Wagtail

Locality : Sighted in Khanota, Khed, Sugaon, Kandar, etc. areas.

Habitat : Terrestrial (aquatic). Fond of wetty grassy places or moist lush fields where entomofauna is disturbed.

Status : Common/Migratory, winter visitor (Mahabal, 1989).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Mahabal (1989).

100. ***Motacila alba*** (Linn.)
Indian White Wagtail

Locality : Khanota, Khed, Kandar, areas of Ujani Wetland.

Habitat : Terrestrial (aquatic). A bird of damp grassy places or of water edges. It frequents

the vicinity of all types of water tracks including flooded fields.

Status : Common/Migratory, winter visitor (Mahabal, 1989).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1989) and Mahabal (1989).

101. ***Motacila caspica*** (Gmelin)
Grey Wagtail

Locality : Khanota, Khed, Sugaon, Kandar, etc. areas.

Habitat : Terrestrial (aquatic). Frequents along the water tracks, hill side patches, roads, etc.

Status : Common/Migratory, winter visitor (Mahabal, 1989).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Mahabal (1989).

102. ***Motacila maderaspatensis***
Large Pied Wagtail

Locality : Khanota, Khed, etc. areas of the wetland.

Habitat : Terrestrial (aquatic). Resident of well-watered country-side, lives by shoreline in marshy areas.

Status : Common/Migratory, winter visitor (Mahabal, 1989).

External Distribution : Within Indian limits, Indian Union.

Source : Woodcock (1980), Mahabal & Lamba (1987) and Mahabal (1989).

Class : MAMMALIA
Order : CARNIVORA
Family : MUSTELIDAE
Subfamily : LUTRINAE

1. ***Lutra perspiciliata*** Geoffroy
Otter

Locality : Khanota, Rajegaon bridge, Khed etc. areas.

Habitat : Terrestrial (aquatic). Lives in marshy and unapproachable areas where there are plenty of fishes, lives in small groups.

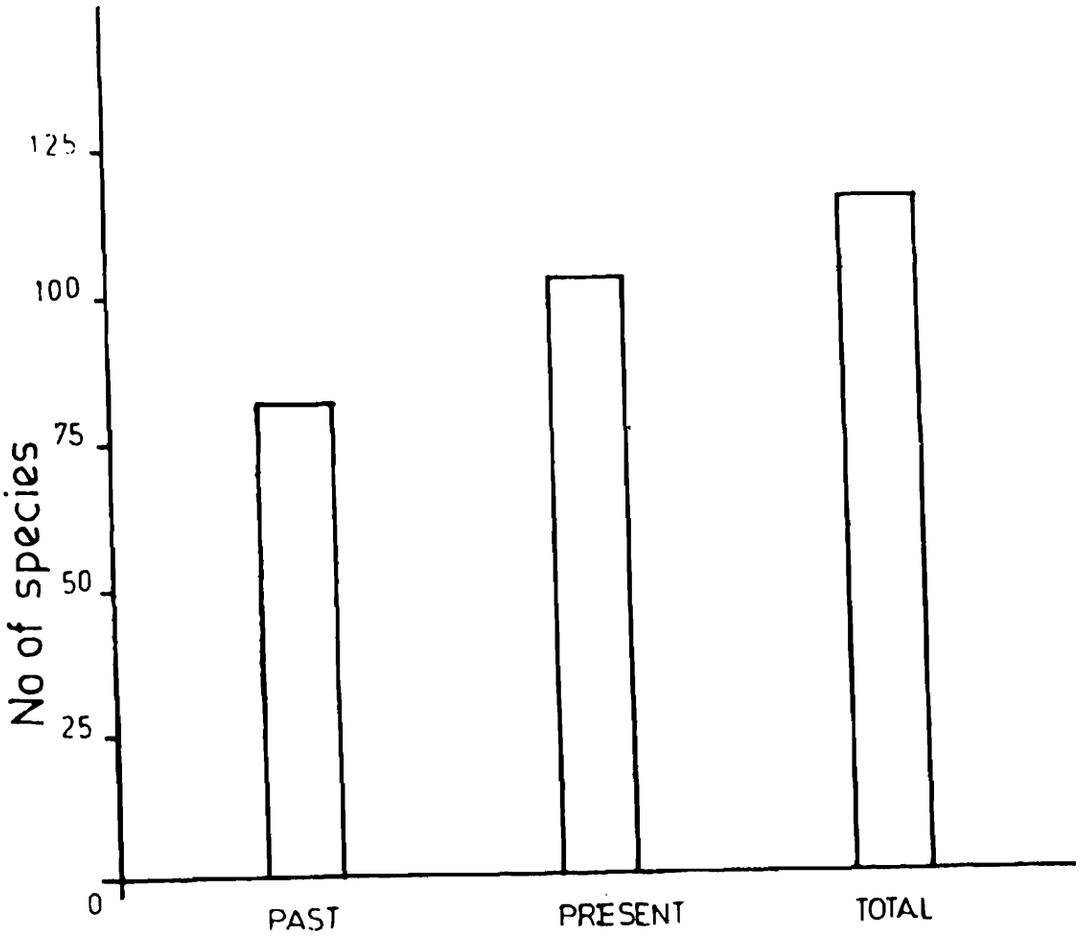
Status : Uncommon / Local Migratory (Bharucha and Gogate, 1990).

External Distribution : India.

Source : Prater (1980) and Bharucha & Gogate (1990).

HABITAT UTILIZATION

Ujani reservoir and its periphery possess typical characteristics of a wetland of international standards. This has, initially, favoured the local biotic communities resulting in the increase in biodiversity. Fig. 1 clearly shows a rise in the total number of higher chordata species from


125
100
75
50
25
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No of species
PAST
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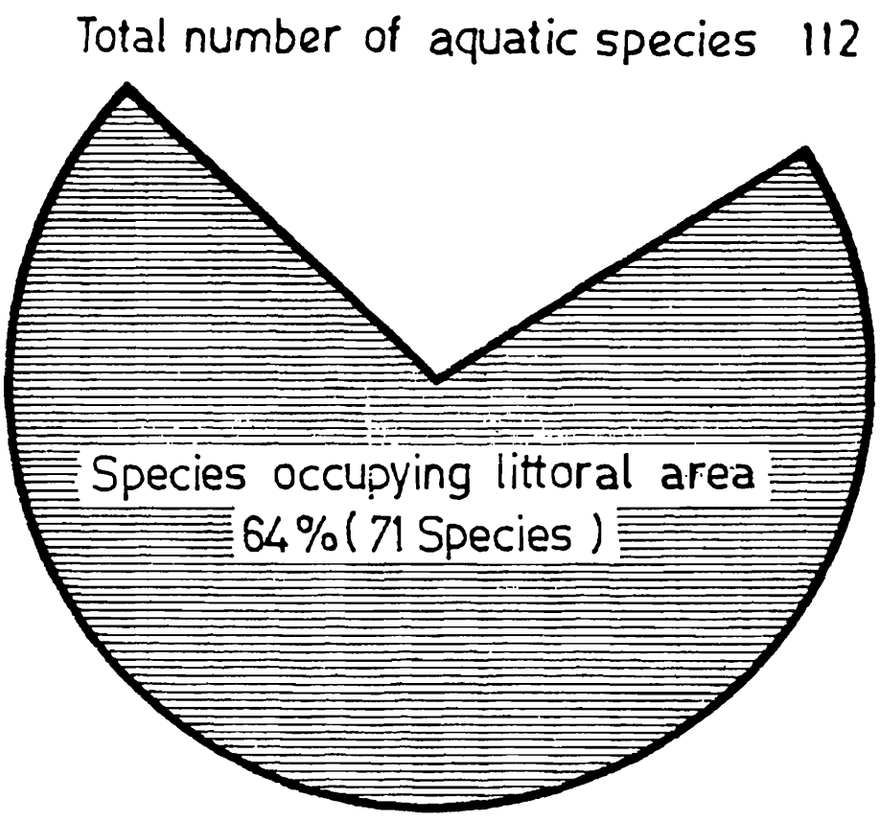
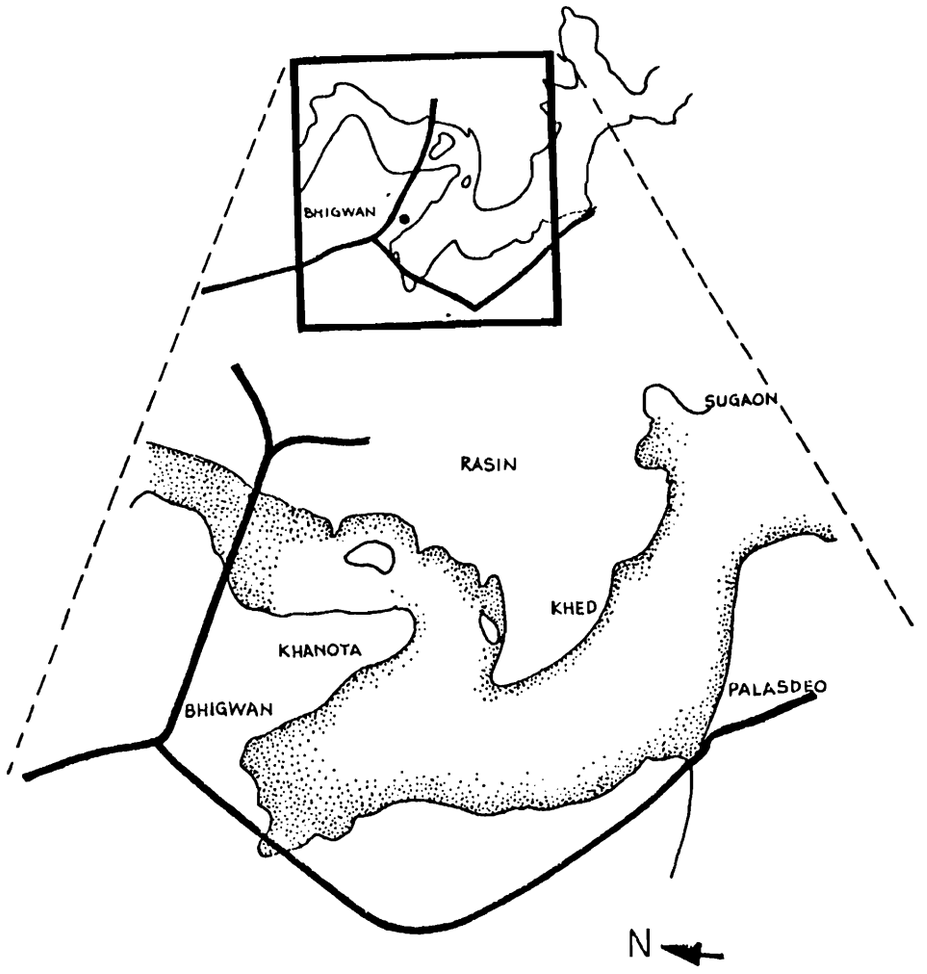
TOTAL


Total number of aquatic species 112
Species occupying littoral area
64 % (71 Species)


BHIGWAN
SUGAON
RASIN
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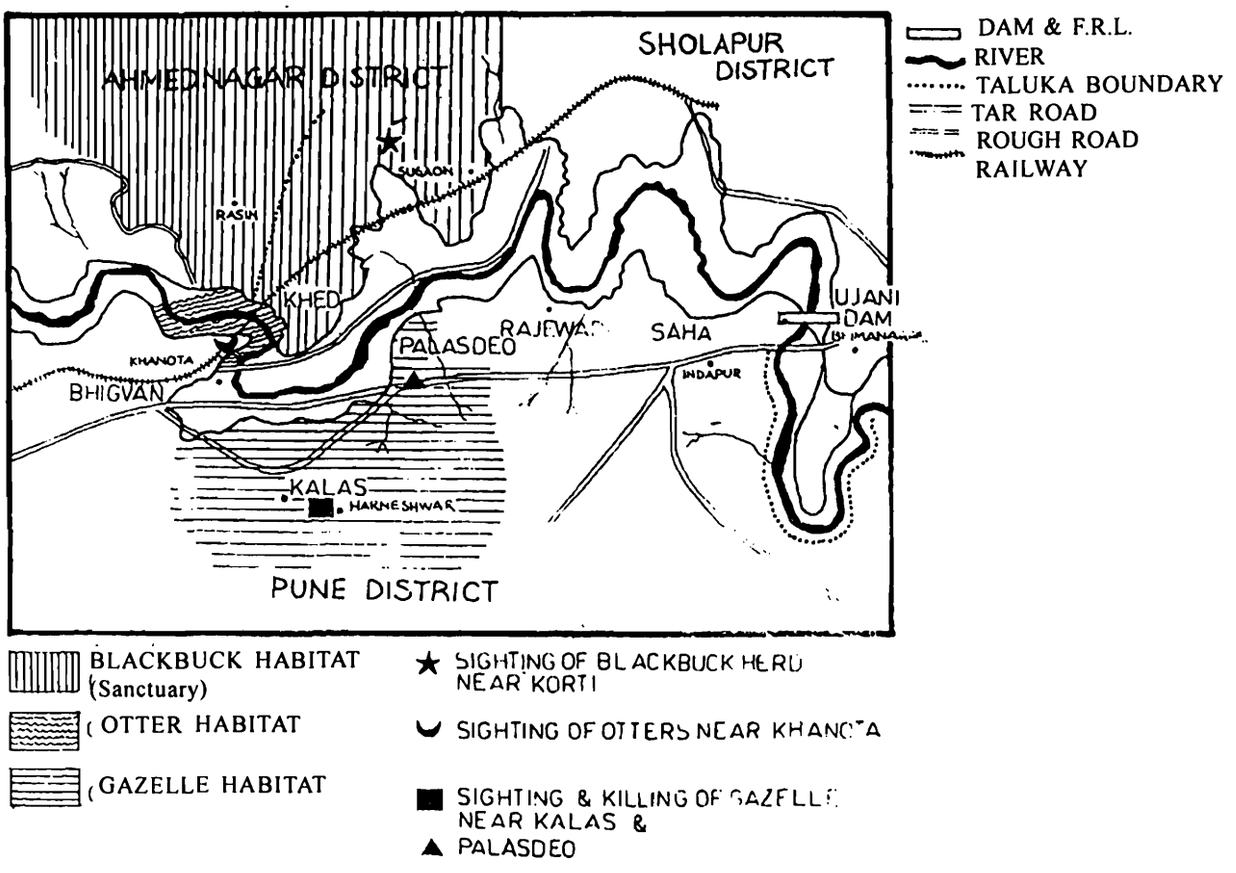
AHMEDNAGAR DISTRICT
SHOLAPUR DISTRICT
SUGAON
RASIN
KHED
KHANOTA
BHIGVAN
PALASDEO
RAJEWAR
SAHA
UJANI DAM
INDAPUR
KALAS
HARNESHWAR
PUNE DISTRICT
DAM & F.R.L.
RIVER
TALUKA BOUNDARY
TAR ROAD
ROUGH ROAD
RAILWAY
BLACKBUCK HABITAT (Sanctuary)
OTTER HABITAT
GAZELLE HABITAT
SIGHTING OF BLACKBUCK HERD NEAR KORTI
SIGHTING OF OTTERS NEAR KHANOTA
SIGHTING & KILLING OF GAZELLE NEAR KALAS &
PALASDEO

the region. Moreover, the reservoir's large expanse of shallow water along with the aquatic vegetation has also helped in the growth of the species living in the littoral zone about 64% of the total number of aquatic species (Fig. No. 2). This includes a substantial number of migratory bird populations.

Fig. 3, drawn on the basis of the present inventory, shows localized habitat utilization by the wader avian species in Bhigwan region. Similarly Fig. 4 shows the same for the scheduled mammalian species reported from this region (Pradhan, 1996). This clearly indicate rich & localized biodiversity in respect of higher chordates in these areas.

In recent years a change in the look of the habitat has been noticed near Khanota and Rajewadi bridge due to preponderous growth of weeds and also due to formation of land masses in the middle. This will, probably, pose a serious threat to the species of the littoral zone and heralds warning from conservation point of view. Bharucha & Gogate (1990) and Gole (1992) have studied this problem in details and suggested some valuable remedial measures.

ANTHROPOGENIC IMPACTS

Ujani Wetland and its surroundings are being used by all the biotic populations including that of *Homo sapiens*. The terrestrial component is being used for agriculture and domestic purposes, while the aquatic component for irrigation, fishing and communication purposes. The partially submerged and the adjacent land is being used exclusively by the local people for growing crops like sugarcane, onion, jowar, bajra, etc. Farmers are using pesticides and fertilizers indiscriminately for increasing the yield. In this process the residue of pesticides and fertilizers is mixing, unknowingly, with the water causing pollution. Such kind of poisoning of the fragile aquatic ecosystem may prove lethal to a number of biotic communities living in the Bhigwan area and may affect the food chain. Further, in the long run this may be hazardous to the human populations using the wetland.

The reservoir is being leased on contract to the fisheries societies for releasing the fish seeds in the reservoir from time to time. Exotic fish species like *Rhinomugil corsula* has been sighted in the wetland which may bring pressure on the local fish populations (Pradhan and Singh, 1984). It may affect the carrying capacity of the local ichthyofauna and, ultimately, reduce the diversified representation.

Incidents of illegal lift irrigation by farmers, uncontrolled grazing by the cattle and poaching of waterfowl, turtle and otter populations have occurred in the past after construction of the dam.

A systematic monitoring to prevent the adverse impacts due to the activities of human agencies is the need of the hour.

SUMMARY

The present communication enumerates the account of 112 higher chordate aquatic species. It contains 102 avian, nine reptilian and one mammalian species. Studies conducted in the past before construction of the dam had reported about only 60 avian aquatic species (Mahabal and Lamba, '987). With the change in the ecosystem due to the construction of a dam, more aquatic species have been attracted towards the new and favourable habitat raising the number to

about 85 species (Bharucha and Gogate, 1990). This includes a substantial number of migratory bird species also. It can, thus, be considered as a good example of overall positive effect of increasing biodiversity.

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