FISH MORTALITY IN A WETLAND OF SOUTHERN RAJASTHAN DHAND POND, MENAR, DISTRICT UDAIPUR (INDIA)

Darshana Dave[1] and Abhimanyue Singh Rathore[1]*
[1]Wildlife Research Laboratory, Department of Zoology,
Bhupal Noble University, Udaipur, Rajasthan, India

ABSTRACT :-

This paper briefly describes fish mortality in a wetland of Menar bird village in the district Udaipur, Rajasthan during May-2018. Menar village attracts good number of local and migratory birds of about 150 types. Therefore,, this village is popularly called bird village. Dhand Pond is one of the prominent wetland in this village, which is harbouring large number of aquatic and semi aquatic floral and faunal species including fish due to drastic decline in the water level. Several isolated shallow water bodies were created in summer and this resulted into large scale predation of small fish by the birds. The water quality was also declined specially with respect to dissolved oxygen (1.9mg/ liter) which caused large scale fish mortality. However, even under these highly stressed environmental conditions relatively hardy air breathing fishes (*Channa striatus and Heteropneustes fossilis*) survived in sizable number. This paper underlines some technical suggestions for conservation of aquatic species.

Keywords: Dissolved oxygen, Fish Mortality, Hardy air breathing fish,

INTRODUCTION:-

Fish kills occurred due natural change in water quality (Welcomme, 1985) and have been credited to several physicochemical factors like O_2 depletion, accumulation of H_2S and Al toxicity (Calheiros & Hamilton, 1998; Brinkmann & Santos, 1973; Kushlan, 1974; Townsend, 1994). Fish kills give chance to study fish mortality in relation to adverse environmental conditions (Sargent & Galat, 2002; Lowe et al., 1967; Kushlan, 1974; Mundahl, 1990).

Water is an elixir of life so it is an essential component of any eco-system. Fresh water ecosystems are one of the most common and stable habitats of biosphere have their own physical, chemical and biological characteristics, which are affected by local conditions and physiographic features (Goel, 1997).Fresh water has been great importance to human being and other organisms of environment for substance of life and maintaining the balance of nature (Dhawan and Kaur, 2002).Similar type of study on fish mortality was carried out by Benjamin et al. (1996) on the lakes of Bangalore, India.

The state of Rajasthan has rich tradition to harvest rain water in seasonal and perennial water bodies. There are more than 15,000 such water bodies with water spread ranging from <1 ha to vast area of more than 20,000 ha. Such water bodies thus also comprise of large number of relatively shallow and small water bodies in the form of wetlands. This wetland have significant role to play as these are helpful for recharging ground water resources and also support large number of animal and plant species. In some cases wetland also serves as a source of water for domestic and other human needs. In the present study observations on selected water quality parameters and fish mortality have been made on a wetland of Udaipur Rajasthan.

MATERIALS AND METHODS:-

The wetland selected for this study is situated in Menar bird village which lies along Udaipur -Chittorgarh NH 76 about 40 Km from Udaipur city in Rajasthan. This pond is situated at Lat: 246039 N, Long: 74.10581E (fig.1). This wetland has a water spread area of 304.6 ha. at FTL(full tank level) . The earthen dike of this pond is located on the Eastern side. On other three sites lie agricultural fields. The main source of water for this wetland is form catchment area and also from the adjoining wetland Brahma sarovar (Pond). As

this wetland receives sizable amount of organic matter form nearby agricultural fields and catchment area, there is rich supply of organic matter and biogenic nutrients into this wetland. These help in enhancing aquatic productivities, therefore, ample amount of aquatic food resources are available in this wetland. Obviously, this helps to attract several types of local and migratory birds some of which are listed below-

1. Greater Flamingo
2. White Tailed lapwing
3. Pelican
4. Marsh Harrier
5. Black Kite
6. Green Sandpiper
7. Wood Sandpiper
8. Little Ringed Plover
9. Red Wattled Lapwing
10. Northern Pintail etc.

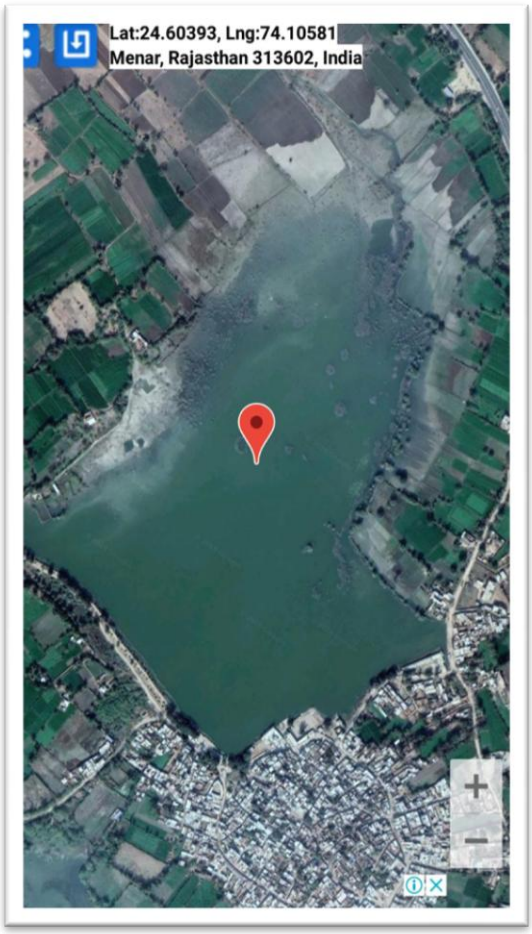

fig.1: (source:google earth) Location of Dhand wetland

fig.2: View of Dhand wetland in Pre monsoon

fig.3: Dhand wetland during may, 2018

Dhand wetland normally retains water throughout the year (fig.2) however, sometimes the water level in the pond declines drastically as it happened in May month of 2018 when several small water pools were created during the summer (fig.3).

For making observations water and fish samples were collected in May, 2018 by making repeated visits to Dhand wetland. A bucket was used to collect water sample for observing water quality parameters

such as temperature, pH, dissolved oxygen and total alkalinity following standard methods (APHS, 1989 and Goel et al. 1997). The depth visibility was noted with the use of standard secchi disc. For the analysis of remaining water quality parameters namely BOD_3, chloride, nitrate, sulphate and phosphate water samples were collected in the sampling bottles for the further analysis in the laboratory.

RESULTS :-

While making observations on fish mortality in May, 2018 the fish biodiversity was found to decline drastically as most of the relatively sensitive fish species were affected adversely due to low water depth, turbidity, high temperature and low dissolved oxygen (1.9 mg/liter). During this observation, following fish species were found to struggle for their survival (fig 4).

1.Heteropneustes fossilis,

2. Wallago attu

3. Puntius sarana

4. Sperata seenghala

5. Channa striatus

Fig.4: Struggling fishes in pond

On the other hand, large sized carps such as *Cirrhinus mrigala* (2kg) and *Puntius sarana* (0.6 kg) were found dead along the water pools of this wetland in large numbers (fig 5).

Fig 5 Dead *C.mrigala* in the pool, May, 2018

Surprisingly, small fishes or fish fingerlings were not observed during this extreme drought condition. The prevailing water quality parameters during fish mortality in May,2018 are indicated here below:

Table 1: Water quality of Dhand Wetland during May, 2018

Water Temperature	27 °C
Depth of visibility	23 cm
Water pH	7.9
Biological Oxygen Demand ($BOD_{3)}$	30 mg/l
Chloride	88 mg/l
Nitrate	5 mg/l
Sulphate	166 mg/l
Phosphate	0.05 mg/l
Total Alkalinity	150 mg/l

From the above data (table 1) it is evident that the visibility of water was very low due to shallowness wherein remaining fish stock was concentrated thus making the water muddy in the pools. Similarly, due to low depth and limited photosynthesis dissolved oxygen was also reduced drastically in relatively warm water. Cairns (1956) determined the effect of increased temperature on aquatic organisms.

It is seen that most of air breathing fish species were still surviving in the muddy warm and oxygen deficient water thus these were transferred to suitable habitat. In this connection efforts were made by the wild life lovers and local community people for relocating the threatened fish fauna to nearby Brahma sarover (Pond). For this purpose plastic drums of 100 liters capacity were mounted on a four wheeler for live fish transportation by making repeated rescue operations.

At this wetland the birds are normally found during the period of Nov to March especially the migratory birds which pick up food of their choice from this wetland or in turn produce bird excreta in large amount in and around the wetland. Therefore, birds do contribute to the enhancement of aquatic productivity in the form of primary producers such as macrophytes and phytoplankton. The excessive production of phytoplankton encourages production of zooplankton which is beneficial for the aquatic animals and fish in particular.

As the Dhand Wetland ecosystem is gaining increasing attention of birds' watchers and local community, it is of crucial importance to mange this ecosystem in a scientific manner so that this bird village may continue to attract bird watchers as well as cater the human needs.

In this context following technical suggestions are made for implementation:

1- In order to ensure adequate amount of water into this wetland, all the obstacles hindering entry of incoming water into this wetland should be removed.
2- During the drought period of summer efforts should be undertaken for massive desilting by human power or machines so that the original depth of this wetland can be restored.
3- In order facilitate easy bird watching around this water body without disturbing birds, watching platforms may be created at different locations.
4- For restoring the biodiversity of fish fauna lost due to decline in water and drought this summer, fingerlings of suitable fish species should be stocked in this wetland.
5- It is also necessarily to monitor water quality parameters and biota such as plankton, macrophytes, benthos and fish fauna is relation to avifauna regularly in this wetland.

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