FISH HOMICIDE BY CIVIC AUTHORITIES: LATEST EPISODE OF EUTHANASIA

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ABSTRACT

An episode of fish mortality reoccurred recently in the Yennehole tank, situated on Ooty-Mysore road, leading to agitation from local people. This subsequently led to detailed field investigations involving the characterization of the water body and socio-economic implications of the episode. Water samples were collected from different locations and subjected to physico-chemical and biological analyses to investigate the causative factors. The results revealed low level of dissolved oxygen (1.6-2.4 mg/L) and high concentrations of most of the chemical parameters such as sodium, potassium, etc. This led to asphyxiation and resulted in large-scale fish mortality, affecting the livelihood of the economically backward fishing community. Further field investigations revealed that sewage from the surrounding urban area contributed significantly to the change in water quality of the tank. This necessitates immediate and appropriate policy measures to restore and manage these fragile ecosystems all over the state to ensure that the livelihood of the poor fishermen and other dependents is not affected by similar episodes. The paper also highlights the strategies, which could be followed for managing the water bodies.

INTRODUCTION

Fisheries play an important role in augmenting food supply and raising nutritional levels, generating employment and foreign exchange. Water bodies with fish communities, relatively unaffected by man, have tremendous genetic significance. Fishes have a key role in monitoring water quality. All too often, the first sign of pollution is dead fish. Fish species composition of any lake is related to the water quality, chemistry and morphology of the lake as well as the characteristics and productivity of the watershed.

Fishes by far play the most important role in aquatic ecosystems. They occupy a high position in the trophic level of aquatic organisms, depend much on the quality of primary producers, consumers of lower order and the water quality. They are quite susceptible to sudden or drastic changes in the physico-chemical properties of water, which occur due to natural or anthropogenic activities. Natural events include the seasonal variations but in most cases of fish mortality reported so far, the main agents are sewage, industrial effluents and spraying of various biocides etc. Fish kills are classified into minor, moderate and major types, and it was noticed that a significant correlation exists between the extent of fish kill and status of water quality.

Previous investigations report that low dissolved oxygen levels are mainly responsible for fish kill. Benjamin et al. (1995) carried out an intensive study of the water, soil and fish samples after a large-scale fish mortality in Sankey tank, Bangalore during June-July 1995. Investigations revealed that the sewage let into the tank caused a drastic decrease in the dissolved oxygen levels (avg. 3.026 mg/L).

Surveys on the impact and evaluation of water pollution on the reservoir fisheries with special

reference to microorganisms were conducted in Kumaun (Himalayas. India) by several investigators (Jhigran 1990. Wilson 1976, Pant et al 1985, Pathak & Bhatt 1995. Khulbe et al 1988) Water quality in this area deteriorated due to the inflow of sewage and industrial effluents and construction activities in the catchment area. The decrease in water quality has incontestably brought a massive increase in fish mortality. Contaminated waters harbour diverse microorganisms. which act as potential pathogens to aquatic organisms, especially fish. Microbiological analysis revealed the presence of coliforms due to faecal contamination

India is endowed with both inland and marine fisheries. This resource potential is estimated at approximately 8 4 million tonnes/annum. In the marine sector. India has a long coastline of 8085 km. The inland fishing sector comprises a water-spread of about 6 87 million hectares (brackish water - 1 4 million hectares. reservoirs - 1.97 million hectares, tanks and ponds - 2 2 million hectares, oxbow lakes and derelict waters - 1.3 million hectares) and 0 16 million km of rivers and canals with immense scope and potential for capture and culture fisheries

The state of Karnataka has about 2000 perennial and 30.000 seasonal tanks with a total water spread area of 3,000,000 hectares. The average annual fish yield from these tanks is estimated to be about 350 kg per hectare per year

Mysore district is located between latitude 11°45' to 12°40' N and longitude 75°57' to 77°15' E. The district covers an area of about 6940 sq km. There are about 86 major tanks and 921 minor tanks with a total water spread of 11,230 hectares. The lake water is mainly used for agriculture. fishery and drinking. As the district has no coastline, fishing is confined to inland waters. The district contributes 5,322 metric tonnes of inland fish out of the state total of 40,000 tonnes per year

The climate of the district is moderate throughout the year. temperature ranging from 16 1°C to 31 1°C during winter and 19 7°C to 35 1°C in summer. The rainy season extends from May to October with a maximum annual rainfall of 620-880 mm

Yennehole or Dadadahallikere is situated on the Ooty - Mysore main road in Mysore taluk. The lake covers an area of 485 8 hectares with a mean depth of 10m. The water of this lake is mainly used for agriculture and fishery. Figs 1 to 4 show some features of the lake including the fish mortality

METHODOLOGY

An integrated approach involving the determination of the present status of water body and socio-economic conditions of the households dependent for day to day needs (fuel, food. fodder, etc) was undertaken to evolve appropriate restoration, conservation strategies and better management policies

Physico-Chemical and Biological Analyses

The samples were collected from the outlets (two outlets - samples 1 and 2). center (sample 3) and inlet (sample 4) of the Yennehole tank and analyzed for various physico-chemical-biological parameters according to the methods of APHA (1985) and NEERI (1998).

Socio-Economic Valuation

Socio-economic valuation was undertaken to quantify the aquatic system values and to determine the economic dependency of the people living in the surrounding areas on the lake. Approximate valuation of resources based on their use values (human interactions with the aquatic resources, mainly

fisheries) and non-use values (no human interactions with the aquatic resources) were determined by conducting interviews with local communities A random survey of the houses around the lake was carried out using a standard questionnaire designed for this purpose

RESULTS AND DISCUSSION

Investigations of the various limnological parameters (Table 1) revealed the temperature was around 28 5 °C The dissolved oxygen values varied from 1 6 to 2 4 mg/L The lowest DO values were recorded in the inlet due to the heavy inflow of sewage at that point These low values when compared with the optimum values for aquatic growth (5 to 6 mg/L) have contributed to mass death. pH (8 5 to 9) and alkalinity (448 to 492 mg/L) values reveal alkaline nature of the water body. pH and ammonia are critical factors in the survival of fishes and aquatic plants As the photosynthesis progresses there is an increase in the oxygen values and decrease in the carbon dioxide levels in the water, accompanied with some rise in pH Most adult fishes may not suffer from the adverse effect of high pH of 9 or more if exposed for a short period of 1-2 hours but young and juvenile fish are more susceptible to high pH Total solids were high in all the locations ranging from 800-950 mg/L

The eutrophic condition due to continuous inflow of sewage has led to profuse growth of algae The lake water was turbid (>50 NTU) indicating increased concentrations of finely divided organic and inorganic matter and silt etc Nitrate being consumed by algae is below detection limits The concentration of phosphates ranged from 0 041 to 0 054 mg/L The sodium (25 8 to 163 7 mg/L) and potassium (5 8 to 10 1 mg/L) values were high throughout the sampling points Samples collected at all points tested positive for coliforms indicating the presence of faecal contamination. Higher values of physical, chemical and biological parameters clearly demonstrate that lake water is being polluted due to sewage, indicating the callousness of the administrators and civic authorities towards the proper treatment of urban waste The common species of fish found in the Yennehole tank are Tilapia (*Tilapia mossambica*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*) and catla (*Catla catla*). The livestock dependent on the tank were also severely affected as a cow died after consuming water from the tank

The socio-economic study revealed that around 200 fishing families are dependent on this lake for their livelihood The main fishing season in this lake is from April to May and this unexpected episode has affected fish harvesting during this peak period The minimum catch per day is around 8 to 10 kg and the maximum catch is 100 kg The fishermen earn Rs 6 per kilogram of fish when supplied to the Mysore Fishery Federation.

RESTORATION MEASURES

The episode of fish kill and other environmental problems highlight the need for a holistic and integrated approach to the sustainable management of ecosystem Unplanned urbanization coupled with improper disintegrated and piecemeal approach adopted by the present day civic authorities and administrators are the root cause of most of the problems. which has led to degradation of the environment Lack of proper sanitation and treatment options has converted most urban areas into unhygienic places for breeding vectors (mosquito, etc).

Water is used for a variety of purposes The management aspects have to be viewed from the types of uses and the possibilities of loss of resource quality and quantity during the utilization process Fish and fisheries are an intrinsic part of the lives of a major percentage of the population in all parts of the globe So maintenance of the quality of the water bodies becomes a priority in the restoration measures Freshwater fish comprise about one-third of all fish species Since lakes are

Table 1: Results of the physico-chemical analysis of Yennehole tank water on 12.05.2001

Parameters	Outlet 1	Outlet 2	Center	Inlet
Temperature	28.5	28.6	28.5	28.6
PH	8.7	8.8	8.5	9.0
DO (mg/L)	2.2	2.4	2.4	1.6
Turbidity (NTU)	>50	>50	>50	>50
Conductivity (millimhos/cm)	0.602	0.608	0.576	0.640
Alkalinity (mg/L)	480	480	448	492
Total hardness (mg/L)	187	209	187	252
Calcium hardness (mg/L)	113	104	87	134
Magnesium hardness (mg/L)	74	105	100	118
Sulphates (mg/L)	50.02	49.81	44.07	51.73
Chlorides (mg/L)	135	139	153	167
Phosphates (mg/L)	0.041	0.049	0.053	0.054
Ammonia (mg/L)	>1	>1	>1	>1
Nitrates	BDL	BDL	BDL	BDL
Sodium (mg/L)	86.3	134.8	25.8	163.7
Potassium (mg/L)	8.8	9.5	5.8	10.1
Total solids (mg/L)	825	800	900	950
TDS (mg/L)	476	425	595	564
TSS (mg/L)	349	375	305	386

Note: BDL - Below Detection Limit TDS - Total Dissolved Solids
TSS - Total Suspended Solids

lentic systems, fish have no means of escaping from their deterioration, and are therefore vulnerable to ecosystem differences Routine monitoring and reporting on the water quality and habitat conditions should be conducted with the involvement of local groups, schools, colleges and technical experts, and specific environmental quality criteria should be maintained to ensure the health of the ecosystem and its inhabitants Active monitoring should be undertaken for predicting the likelihood of occurrence of similar events in the future. Appropriate physico-chemical parameters along with plankton and microorganisms should be analyzed at regular intervals The sampling and analyses should be carried out monthly or bimonthly, although the latter is preferable.

Ancient scripts and most religions strongly advocate the necessity of sustainable water management strategies and their implementation However, the present policy makers with fragmented approaches and a narrow vision are converting most of the ecologically sensitive regions, urban areas into slums and continuously encourage the encroachment of public areas (parks, tank beds, common lands, etc)

Major pollutant in Yennehole tank is sewage from the surrounding urban areas The sewage must be treated properly before being let into the water body Most of the lakes in urban areas have become cesspools This demands an appropriate, timely decision and sincere implementation to restore the quality of the water body Constructed wetlands can be used for the treatment of sewage, which involves the use of engineered systems that are designed and constructed to utilize natural processes They are designed to mimic natural wetland systems, utilizing aquatic plants, soils and their associated microorganisms to remove contaminants from sewage Use of treated sewage provides an opportunity to successfully restore valuable wetland habitat for numerous uses (aquatic flora and fauna, wildlife, etc) and environmental quality enhancement Although selfish human beings can render the whole exercise futile The contaminated sediment should be removed from the water bodies, which can be used for building bunds and islands with appropriate treatment. The Madivala and Hebbal tanks in Bangalore are some examples of successfully restored wetlands, where the water quality has improved significantly along with biodiversity and the health of the local ecosystem

POLICY MEASURES

Sustainable management strategies should include:

a Systematic review of the schedules of the prevailing acts for conservation of ecosystems with emphasis on land, water, forestry, wildlife, etc

b Setting up Joint Protected Areas Management Committees (active participation of local people, schools and colleges and all stakeholders) to oversee conservation and management of aquatic and terrestrial habitats

c Strict enforcement of the 'polluter pays' principle to protect the health of fresh waters.

d Empowering local Panchayath Raj institutions to conserve aquatic systems, regulate fishing and maintain traditional methods of sustainable fishing, and rewarding them for maintaining the diversity through special grants

e Restoration of affected ecosystems on a priority basis through ecologically sound management practices

f Provision of laboratory facilities at selected lakes in each city/village for continuous status monitoring, through involvement of local schools and colleges [amendment of curriculum (if required) to ensure participation of schools and colleges]. Active monitoring should be undertaken for predicting the likelihood of occurrence of similar events in the future. Appropriate physico-chemical parameters along with plankton and microorganisms should be analyzed at regular intervals. The sampling and analyses should be carried out monthly or bimonthly, although the latter is preferable

g Evolving a strategy to educate the general public Based on scientific evidence, a regional task
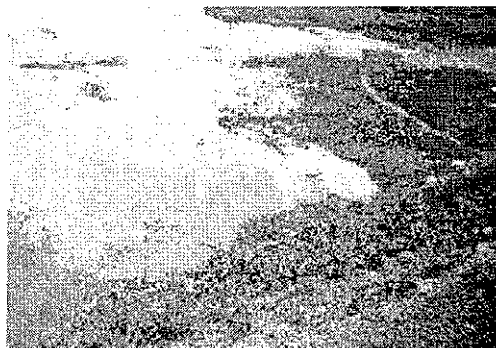

Fig 1. Polluted lake on eastern side

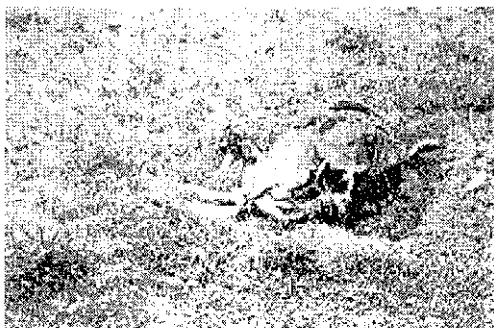
Fig 2. Weeds, weeds everywhere

Fig 3: Fish Homicide

Fig 4.Civic authorities negligence - innocent victim

force should prepare messages for the public. These messages must be clear to reduce economic consequences (pollution and any such environmentally unsound practices)

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