The Impact of Urbanization on Tumkur Amanikere

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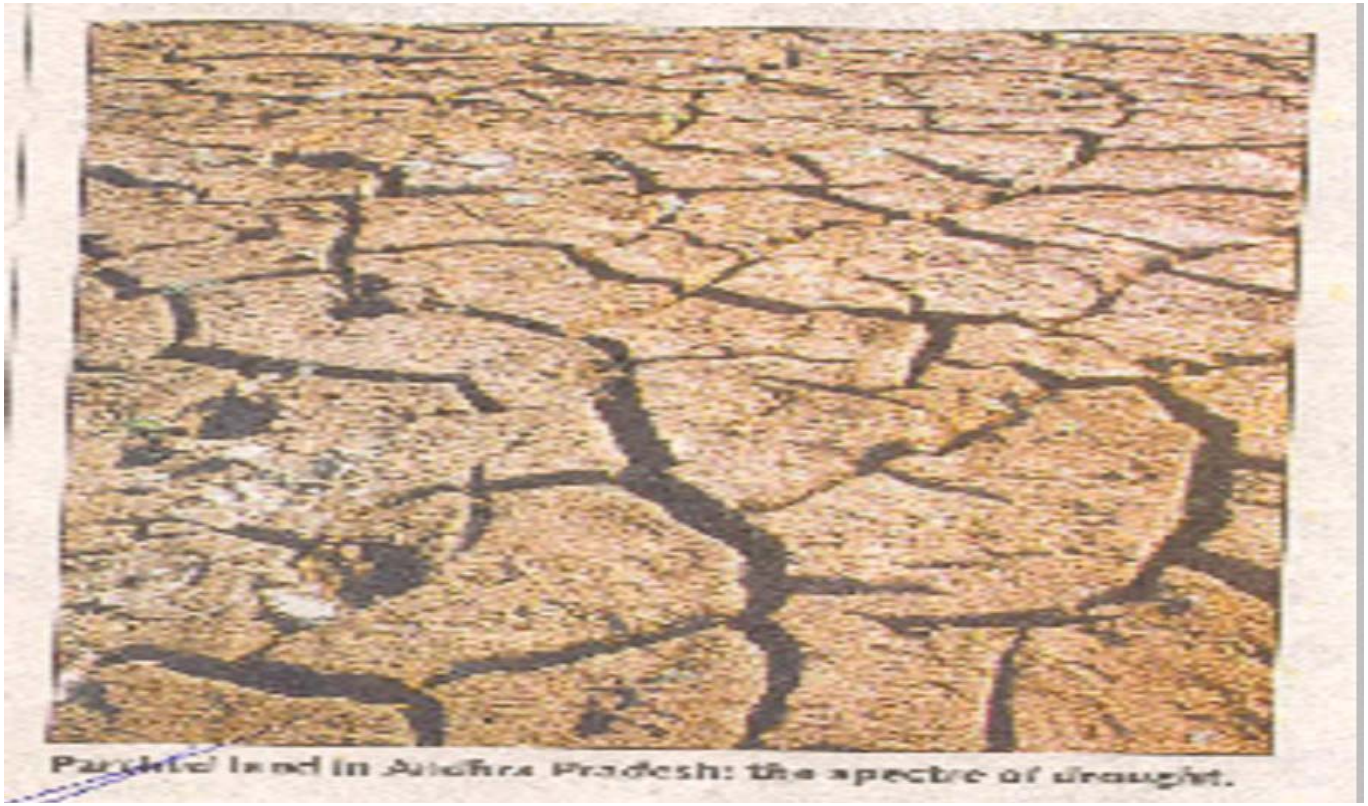
The fury of Brahmaputra

Fury of Brahmaputra

Face of south India



Parched land in Andhra Pradesh: the spectre of drought.

Problem in a city

ATE

Govt blind to the cry of a thirsty city

WATER SHORTAGE MAY HIT BY 2012

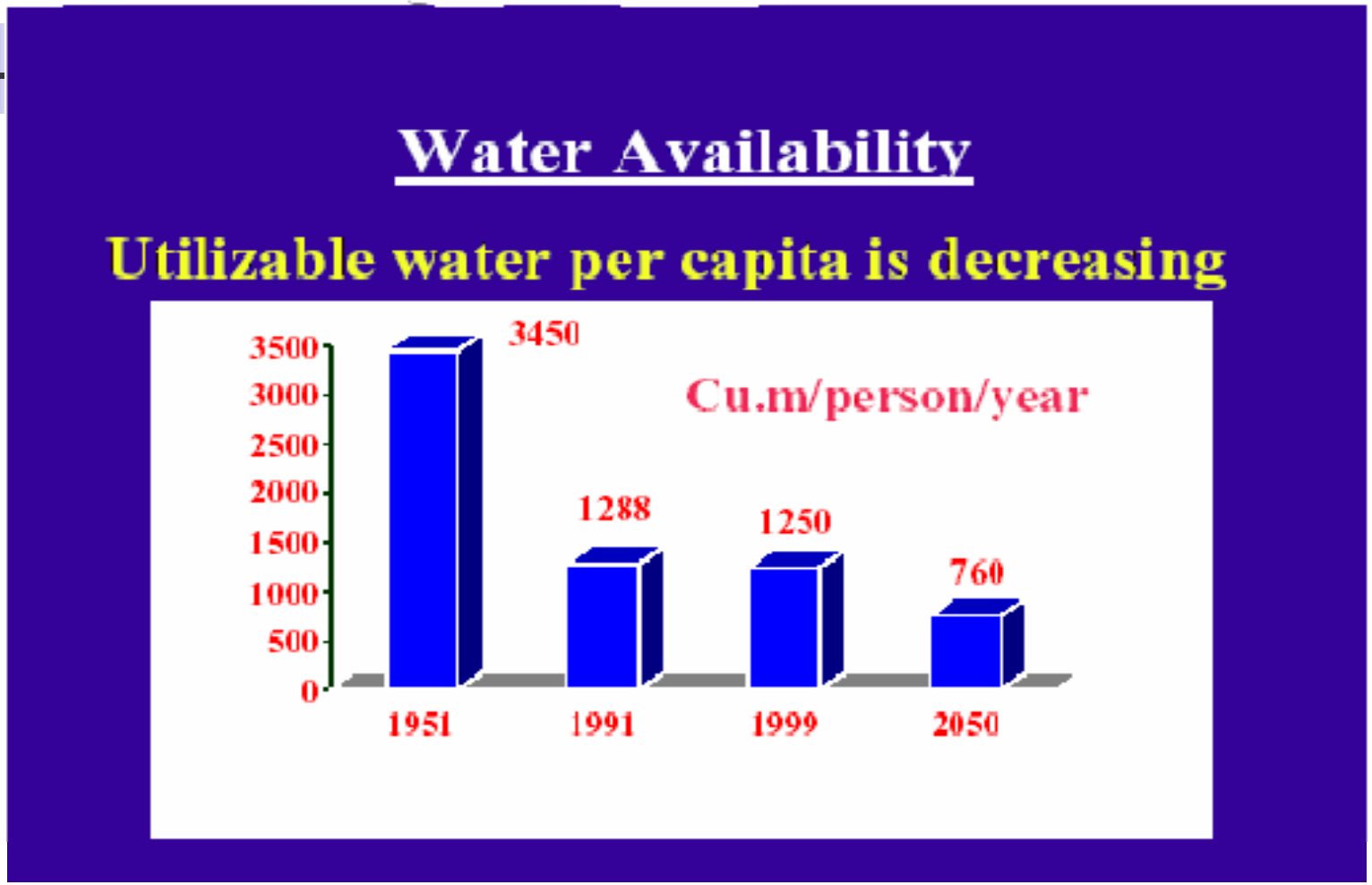
Drinking water shortage will assume serious proportions by 2012 when all storage in all the reservoirs of Cauvery basin will be needed to meet the Bangalore city's requirements alone

FACTS AND FIGURES

Water scarcity

- In Karnataka the number of districts susceptible to draught are in the range of 20-27
- The number of districts which receives less than state average rainfall are 21.
- The number of villages facing shortage of water in Karnataka are more than 1500

Decreasing utilizable water



FACTS AND FIGURES
Water Pollution

1. About 70% of India water pollution is due to untreated Sewage

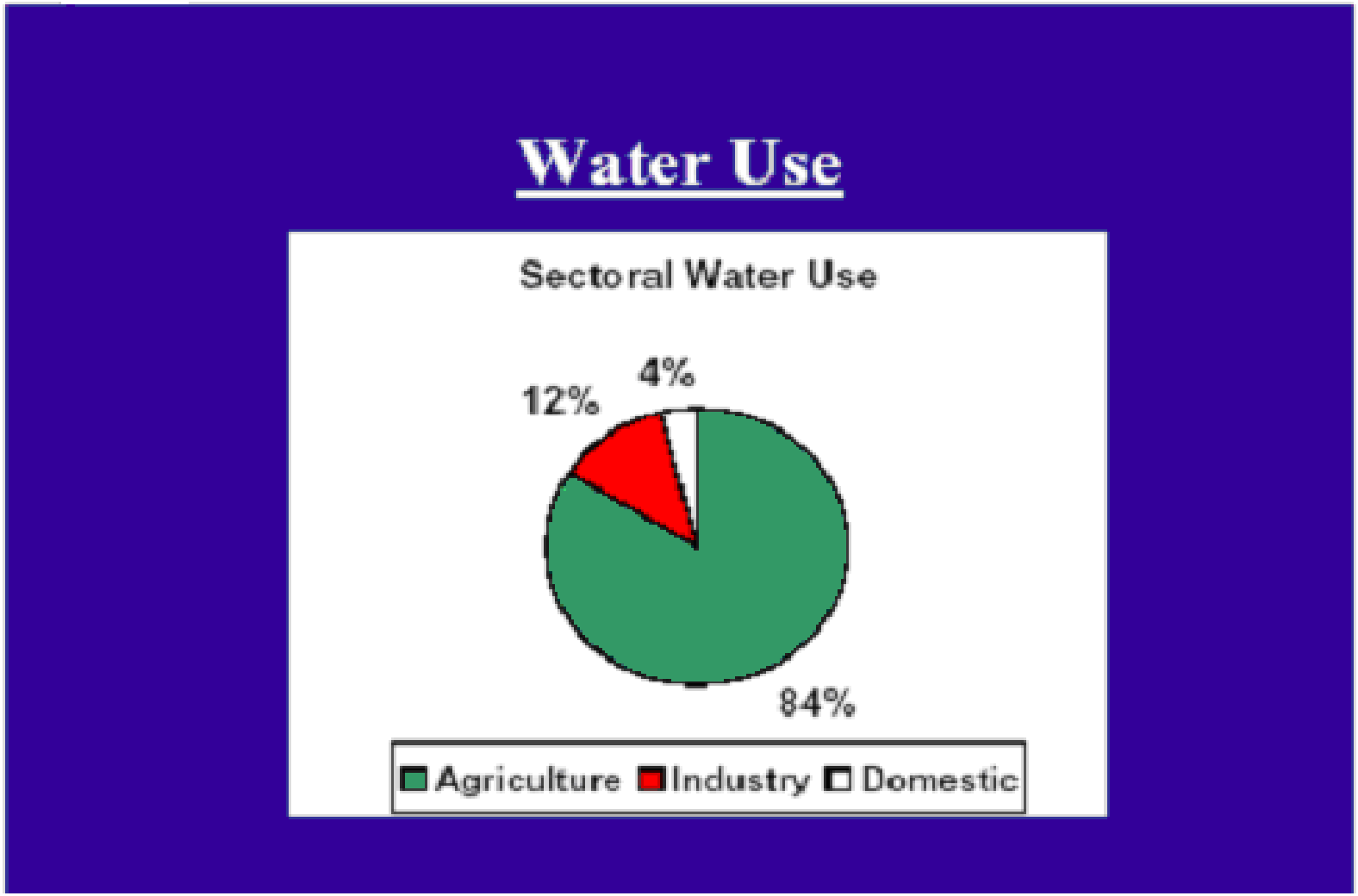
2. 2.4 billion people around the world do not have access to sanitation facilities

3. WHO estimates 5 million die from polluted water every year

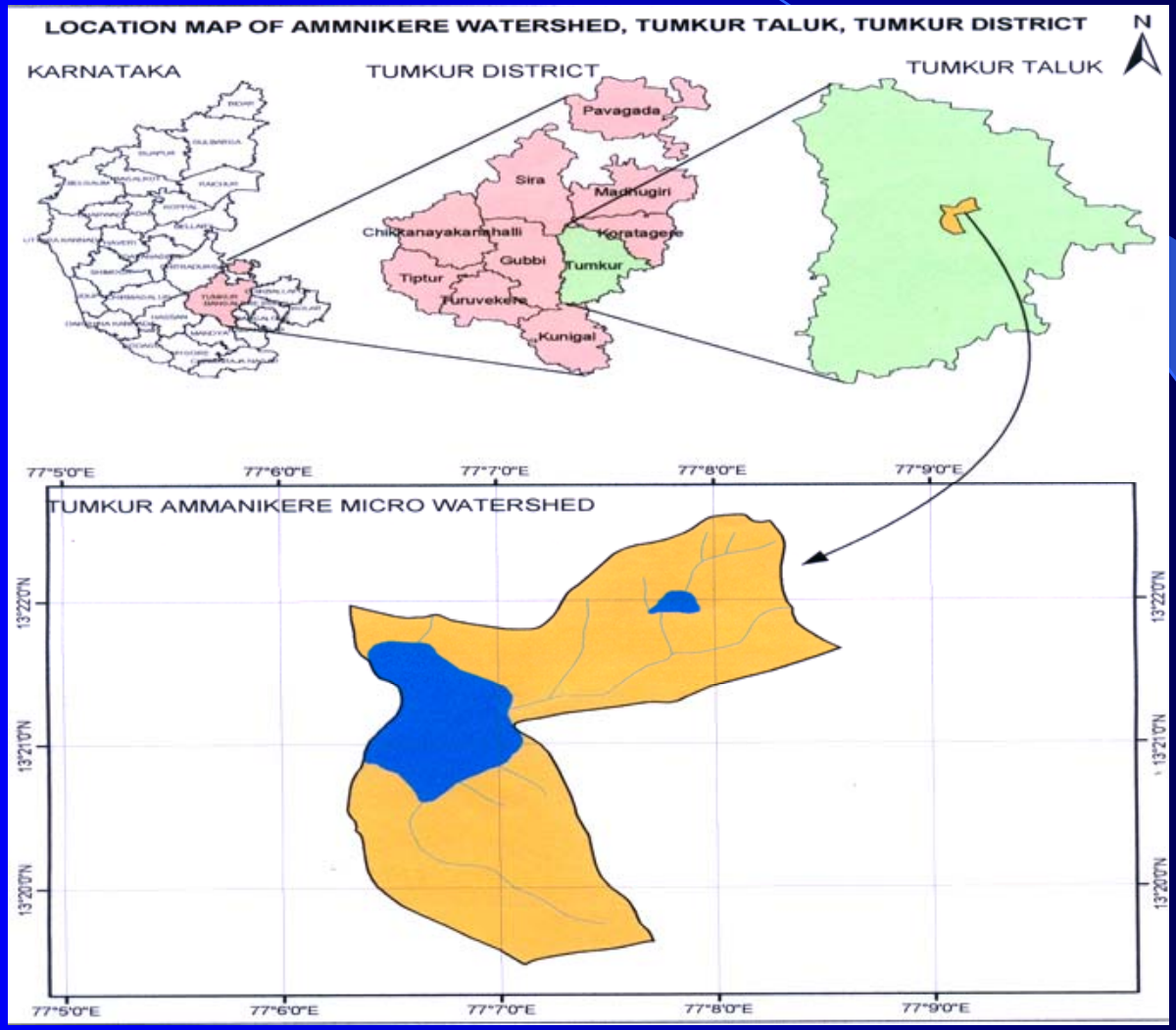
4. The socio-economic costs of water pollution are extremely high: 1.5 million children under 5 yrs age die each year due to water related diseases.

5. 200 million person days of work are lost each year and the country loses about Rs.36, 000 crores each year due to water related diseases.

Water use


Water Use
Sectoral Water Use
4%
12%
84%
Agriculture
Industry
Domestic

Location map of Tumkur Amanikere



Salient features of Tumkur Amanikere

- Location : Tumkur town
- Latitude : 13o 21’ 30” N
- Longitude : 77o 06’ 30” E
- Nearest raingauge station : Tumkur
- Average annual rainfall : 865.0 mm
- Catchment area : 31.86 Km2
- Gross command area : 334 ha
- Storage : 4.68 M cu.m
- Water spread area : 508 acres

Environmental Status of the Lake

Sanitary sewage overflows inside the Lake

Strom/Drain water flowing into the lake

Over growth of aquatic plants

Over growth of aquatic plants

Dumping construction wastes into the lake

Drains leading to lake

Toxic and plastics wastes dumped along the drain/stream banks

Livestock in the lake

Soil erosion adjacent to Lake

Encroachment

Pollutants from fixed point sources

- Nutrients from municipal and domestic wastewater effluents
- Organic, inorganic and toxic pollution from industrial effluents
- Storm water runoff

Pollutants from non- point sources

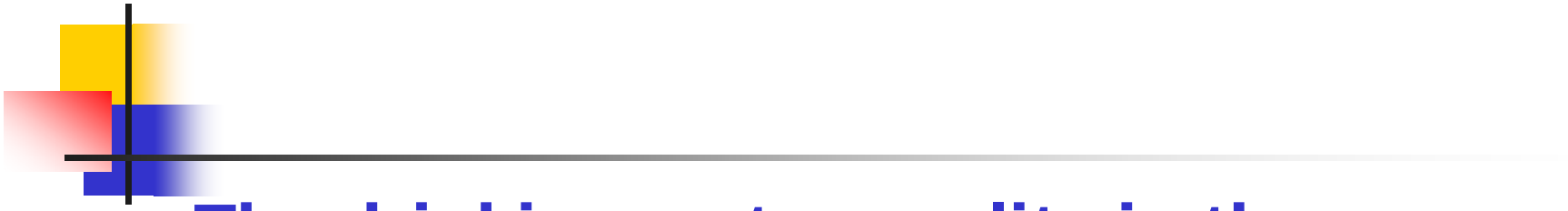
- Nutrients through fertilizers, toxic pesticides and other chemicals, mainly from agriculture runoff
- Organic pollution from human settlements spread over area along the periphery of the lake

Digital image of Amanikere

Identified problems

- The human settlements and public effluent sources are the chief factors for degradation

- Degradation of the catchment area due to deforestation, extensive agricultural use and consequent erosion and increased silt flows



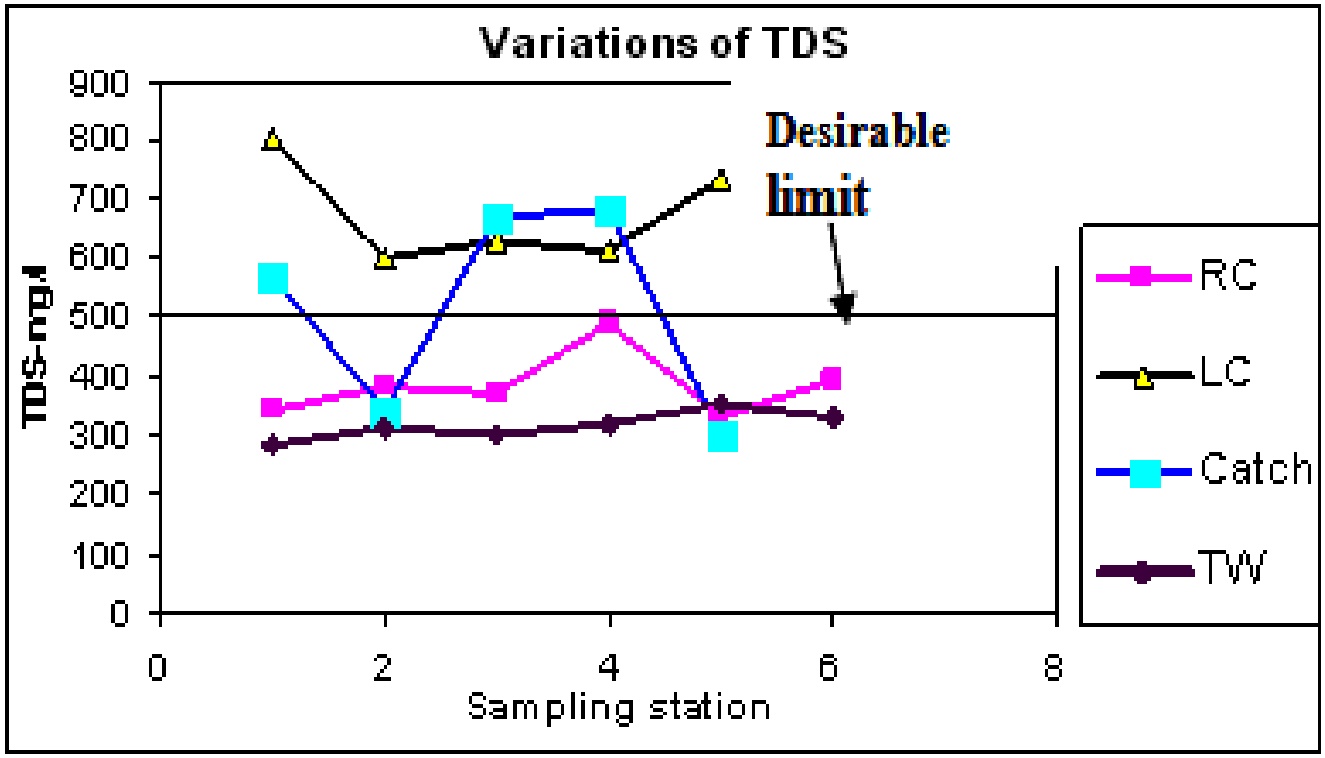
- **The drinking water quality in the downstream has been substantially reduced or become totally nonpotable**
- **Bio-diversity threatened, and livelihood of fisher folks affected**
- **Growth of water hyacinth has been prolific in the lake resulting in breeding of vectors**

- **Apathy of the executives in preventing the discharge of domestic effluents into the Lakes**
- **lack of proper sewerage system**

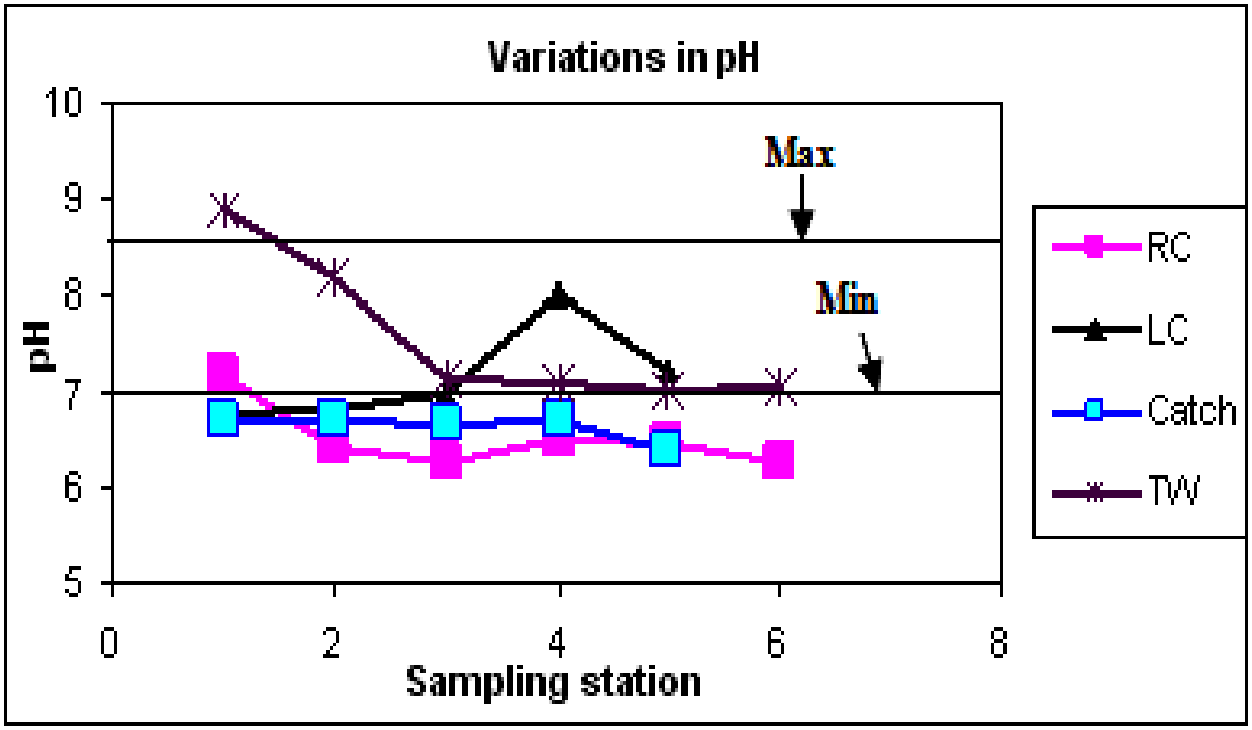
Lake water quality

Parameter	Mini	Maxi	AM	SD
pH	7.04	8.9	7.565	0.718
EC(µmohs/cm)	540	680	606.6	44.59
DO(mg/l)	1.4	7.5	5.06	2.08
BOD(mg/l)	12	54	27.66	16.7
Total coliform	300	1600	1016	587

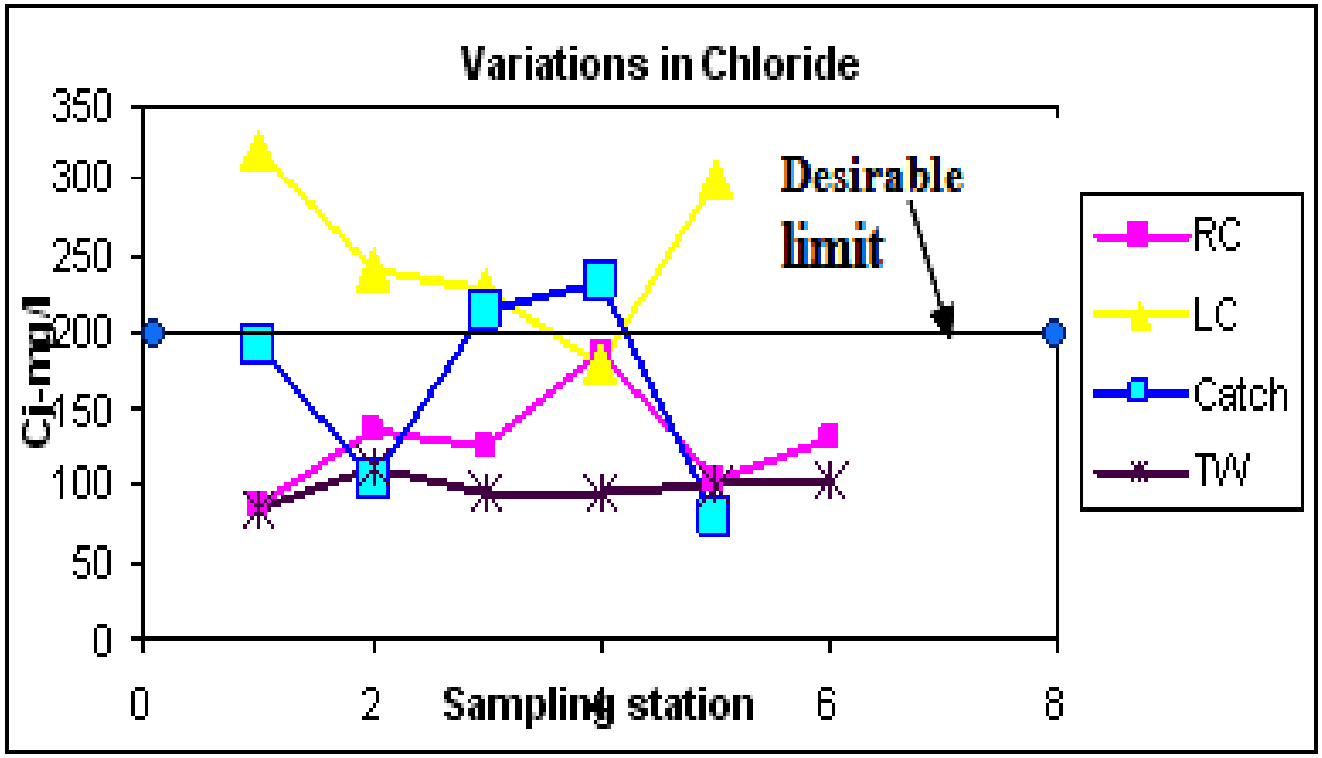
Variations inTDS



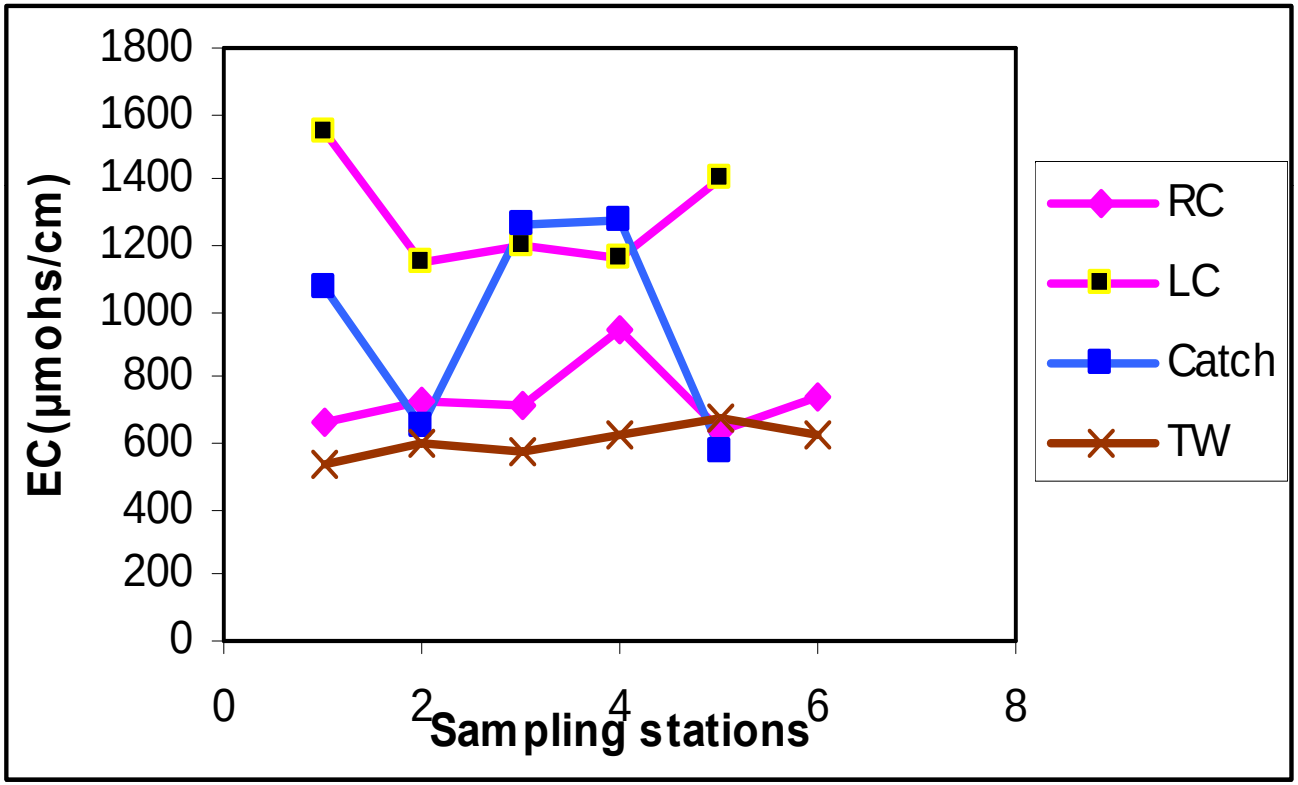
Variations in pH



Variations in chloride



Variations in EC



Water quality index

WQI value	Water quality	Percentage of groundwater samples (Command area)	Percentage of groundwater samples (Catchment area)
<50	excellent	-	-
50-100	good water	27.00	20.00
100-200	poor water	73.00	80.00
200-300	very poor water	-	-
>300	Water unsuitable	-	-

Heavy metal analysis results of water samples

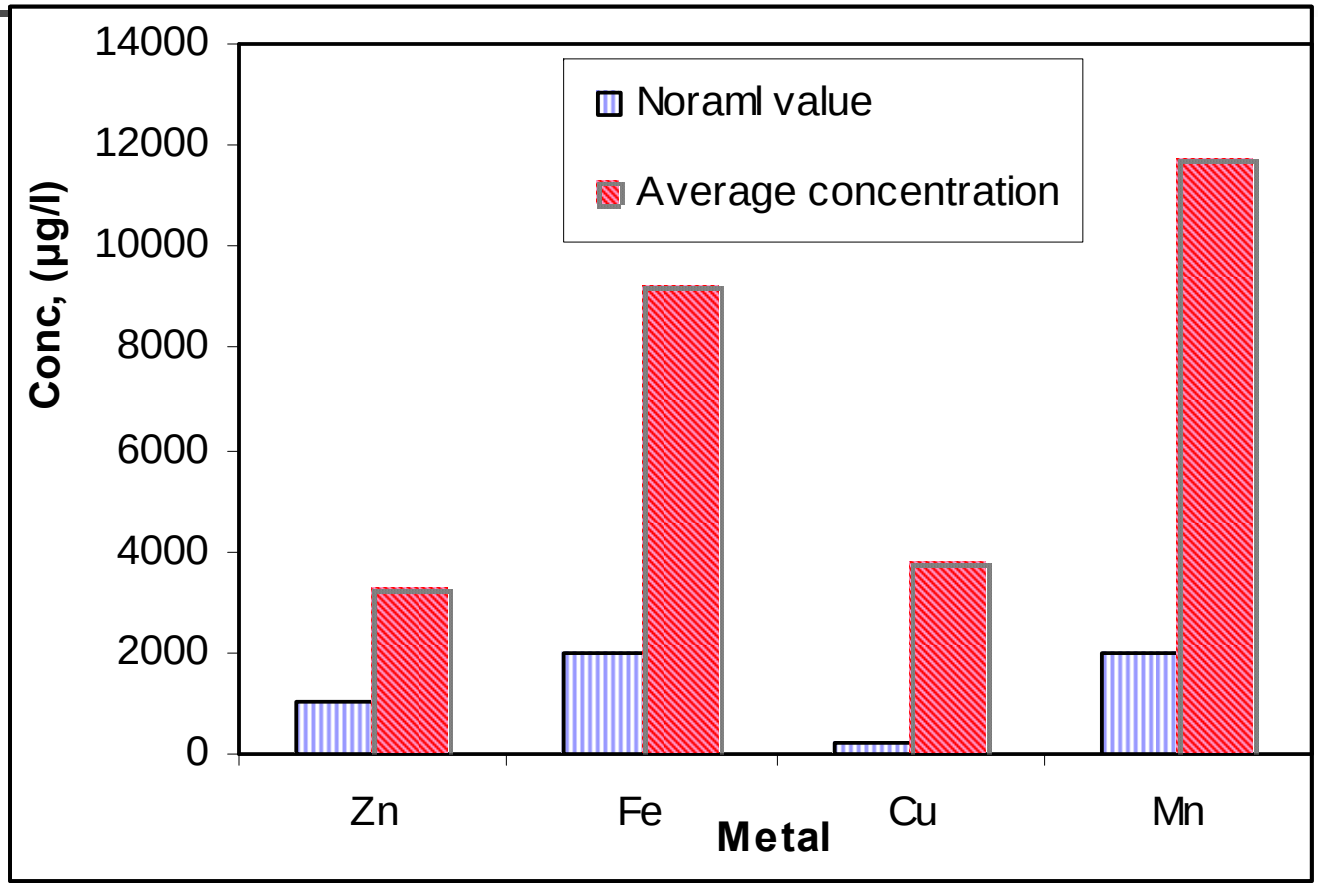
Water sample	Location	Cu, µg/l (desirable limit 50 µg/l)	Cd, µg/l (desirable limit 10 µg/l)	Cr, µg/l (desirable limit 50 µg/l)	Pb, µg/l (desirable limit 50 µg/l)	Zn, µg/l (desirable limit 5000 µg/l)
Tank water	N 13 20.645' E 77 06.555'	ND	1	ND	3.5	11.5
Tank water	N 13 20.627' E 77 06.042'	14.4	10.4	27	5.9	12.9
Tank water	N 13 21.338' E 77 6.265'	ND	9.6	10	35	5.4
Tank water	N 13 20.937' E 77 06.160'	ND	14.7	45	ND	13.3
GW from command area	N 13 21.264' E 77 05.985'	ND	4.7	ND	7.9	914
GW from command area	N 13 21.160' E 77 05.994'	ND	ND	59	ND	12
GW from command area	N 13 21.585' E 77 06.122'	ND	ND	ND	ND	1785
GW from Catchment area	N 13 21.253' E 77 6.955'	ND	ND	49	40.2	13.3
GW from Catchment area	N 13 20.723' E 77 06.773'	ND	26.7	ND	4	4.9
GW from Catchment area	N 13 20.719' E 77 06.723'	ND	ND	43	ND	ND

ND: Not Detected, GW-Groundwater

Metal concentration

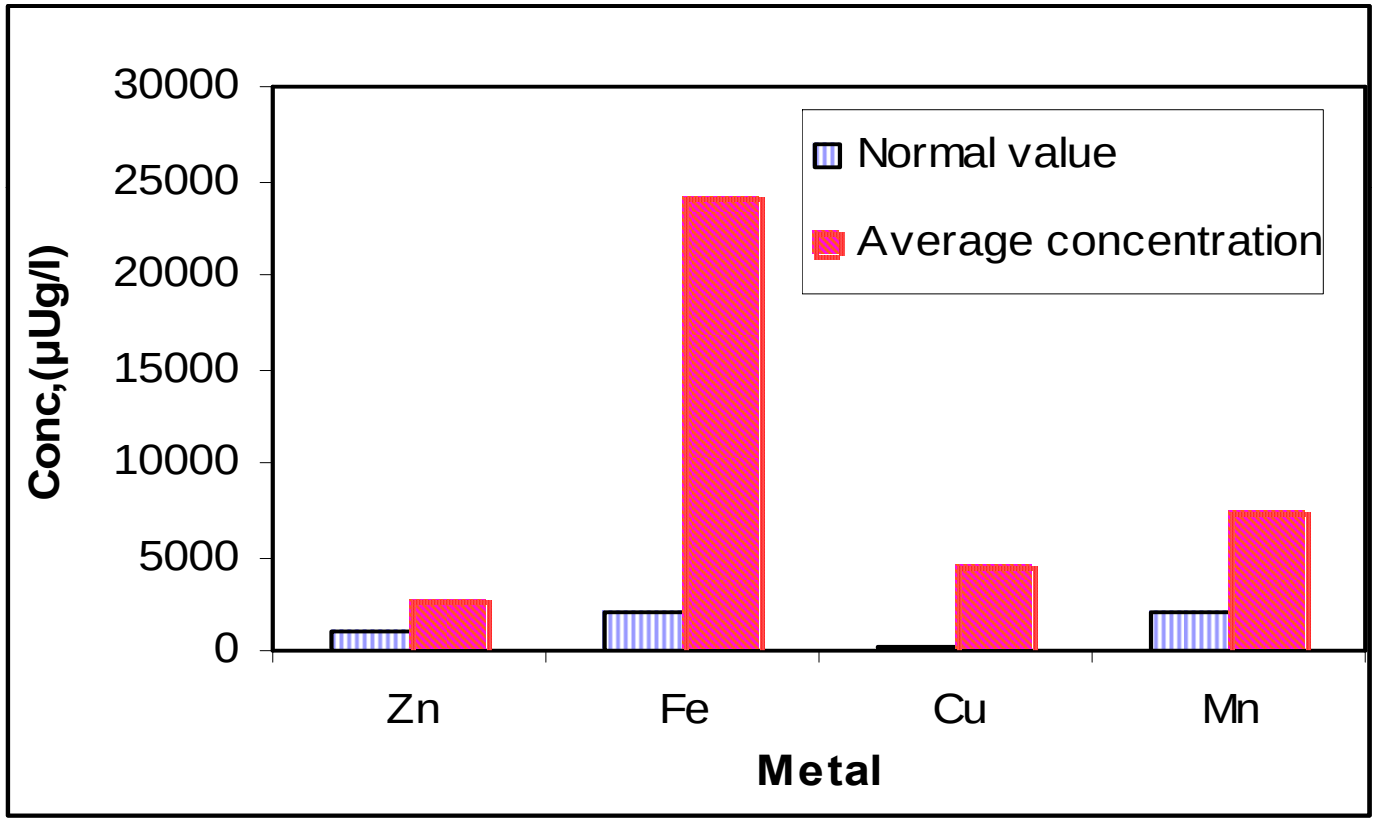
	Lake water	Catchment area groundwater	Command area groundwater
Cu (µg/l) **(DL-50µg/l)**	0-14µg/l	--	--
Cd (µg/l) **(DL-10µg/l)**	0-14.7	0-4.7	0-26.7
Cr (µg/l) **(DL-50µg/l)**	10-45	0-49	0-59
Pb (µg/l) **(DL-50µg/l)**	0-35	0-7.9	4-40.2
Zn (µg/l) **(DL-5000µg/l)**	5.4-13.3	4.9-13.3	12-1785

Concentration of metals in the catchment area soil



Fe, Mn, Cu and Zn was 4.59, 5.87, 18.93, 3.26 folds higher than the normal values in the catchment area

Concentration of metals in command area soil



Fe, Mn, Cu and Zn was 12, 3.7,22.16, 2.58 folds higher than the normal values in the command area

There is an urgent need for restoring and conserving the actual source of water

Lake management measures

- Source control
- In-lake treatment
- Water Quality Management
- Shoreline management
- People's participation
- Environmental education and awareness

- **Guidelines for Integrated Management Action Plans**
- **Institutional Mechanism**
- **National Lake Conservation Plan**
- **Role of International Institutions**
- **Sediment Management**
- **Buffer strip**

Lake management measures

Source control

- Treatment of watershed or catchment of the lake
- Soil conservation measures
- Bank/slope erosion control measures
- Afforestation
- Drainage improvements
- Diversion of silt carrying channels away from the lake
- control of sewage wastes
- participation of people in watershed management are important

lake treatment

- Dredging and de-silting
- De-weeding/hyacinth control or removal
- Bio-remediation
- Introduction of composite fish culture/larvivorous fish species to control mosquitoes

Water Quality Management

- Aeration systems: A natural, environmentally safe and cost-effective way to make sure that the pond maintains a healthy, aerobic state.

Shoreline management

- By banning construction activity to specific heights above the periphery of the lake
- Lake periphery should be declared as protected area.
- To prevent pollution from human wastes, community toilet facilities should be provided around the periphery of the lake.

- **Solid waste management measures should be introduced around periphery of the lake**

- **Demarcation of Lake Boundary should be done with fencing around the lake periphery**

- **Ecotourism facilities should be undertaken which will convert lake into a tourist centre**

- **Restrictions and guidelines should be imposed on idols immersions**

People’s participation

- Non-governmental organizations should act
- By establishing information centre for mass awareness and promoting public participation in the lake conservation programme

Environmental education and awareness

- Material for generating awareness on the importance of biodiversity and dependence of the local community on natural resources should be developed.
- Environmental education and awareness kits should be developed for school children and uneducated youth living around the lake.

Guidelines for Integrated Management Action Plans

The list of actions identified are

- Protection measures
- Watershed management
- Restoration measures
- Hydrological measures
- Pollution control measures
- Socio-economic development through community participation
- Monitoring and evaluation
- Public awareness and education, and
- Legislative and administrative measures.

Institutional Mechanism

- **Several organizations, both Government, Non-government and at Community levels, should participate in lake restoration.**

National Lake Conservation Plan

- The programme should include the following:

Prevention of pollution from point and non-point sources, catchment area treatment, desilting and weed control, research and development studies on flora and fauna. The central and state governments should share the costs.

- The Karnataka state budget (2008) had only 3.15 cr for the authority to take care of 40,000 lakes across the state.

- Six years back Govt spent 4 crore for beautification of Hebbal lake

Role of International Institutions

International institutions such as World Bank and many other agencies should provide technical and financial assistance to the state organizations responsible for the upkeep of the lakes.

Sediment Management

- **The watershed of the lake should be subjected to catchment area and soil conservation treatment to reduce the rate of silt flow.**

- **In order to protect the lakes from environmental degradation and pollution, the construction activity in close vicinity of the lakes should be limited and that all open areas shall be converted into green belts.**

Buffer strip

- A buffer strip of aquatic, nutrient loving plants should be planted around the lake. Planting these plants will stop heavy sediments and also absorb other nutrients and minerals before they enter the water.

Thank You