Study of Water Quality and Water Born Diseases Through Betwa River in Vidisha District (M.P.)

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Abstract: The rapid growth of the population, the technological and industrial development has brought enormous problems and degradation of the environment and public health also. Effective management, maintenance and regulations of river water are critical problem in a developing country like India. A general study of Betwa river water has been taken for the research work. This research paper highlights the effect of excess amount of heavy metals present in water, water quality of Betwa River in Vidisha district and management aspects in this area. An attempt has been made to identify the relevant management strategies to improve the river water management in this area. The suggestions could be made for utilizing the river water for growing greens, vegetables and for agriculture and public health.

Keywords*: Critical, Heavy Metals, Excess, Strategies, Aspects, Relevant.*

I. INTRODUCTION

India is a land of many large and short rivers. The total length of all our major rivers together with their tributaries is 27,359 km. "Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principle measure of how we live on the land" – Luna Leopold (1915-2006), Water is an essential requirement of human and industrial developments and it is one the most delicate part of the environment (Das and Acharya, 2003). Water Quality is an important factor to judge environment changes, which are strongly associated with social and economic development [4].

Rivers are the most important fresh water resources and most developmental activities are still dependent upon them.[1] Rivers play a major role in assimilating industrial and municipal waste water, manure discharge and runoff water from agricultural field, road ways and other sources which are responsible for river pollution[3].

Water born diseases due to Environmental pollution are one of the most dangerous problem that we are facing today.[2] Due to the increased urbanization and industrialization surface water pollution has become a big problem. Hence the cases of water born diseases are increased. It is necessary to obtain appropriate observation of any water resources and the development of some useful tools, watch on the quality of water resources to keep river water safe for human health and to retain their excellence for various beneficial uses.

The Betwa is a river of Northern India, and tributary of the Yamuna which is originating in the Kumra village in Raisen district of Madhya Pradesh, India. [6] The River Betwa plays an important role in the human life of the villages located around of it and in its ecosystem. It has become polluted at some places of Vidisha due to anthropogenic activities and the confluence of sewage, domestic wastes with various types of organic substances which are responsible for deterioration to human health and aquatic life.

II. OBJECTIVES OF THIS RESEARCH WORK

- To analyze different physico-chemical parameters of Betwa river water by chemical and instrumental methods.
- To study the effects of such parameters which are exceed in limit.

The purpose of the study was to investigate the water quality of Betwa River in the Vidisha district and its factors like chemical and biological properties affecting the communities.

III. FACTORS AFFECTING THE COMMUNITIES

Water is one of the nature's most essential and priceless gifts to mankind. The basic need for human being survival is water. Our body needs water in many different forms in order to keep functioning and clean water is absolutely essential for healthy living. It is necessary for digestion, absorption of food, supplies oxygen and nutrition to cells, helps to get rid of body's wastes etc. Most of the ill health of our country is due to unsafe drinking water.[7]

Water is polluted due to many different substances like organic and inorganic chemical material and other contaminants which infect the body consequently numerous dangerous diseases occur. Water is required for many purposes so it should be safe and healthy. There are some important factors which affects the communities.

A. p^H

The pH level is a measure of the acid content of the water. Most forms of aquatic life tend to be very

sensitive to p^H. Since most of the human body consists of (50-60%) water, the p^H level has profound effect on all body chemistry, health and disease.

B. Dissolved Oxygen

The dissolved oxygen test measures the amount of life sustaining oxygen dissolved in the water. Natural water contains dissolved oxygen concentration ranging from about 5 to 10.5 mg O_2 per liter depending on the water Temperature, salinity, and flow rate. The optimum value for good water quality is 4 to 6 mg/L of DO, which ensures healthy aquatic life in a water body. Sufficient amount of oxygen indicate the purity of water. If it is less, it means different chemical and biological abnormalities can be generating in water**.**

C. Biochemical Oxygen Demand

The Biochemical Oxygen Demand is a measure of the amount of food for bacteria that is found in water. Indirectly it also indicates the presence of biological communities in water which are one of the major causes of different dangerous diseases in human community.

D. Microorganisms

In drinking water microorganisms can cause sensory defects. Various health related problems due to contaminated waters are Amoebiasis, Cholera, Dysentery Diarrhea, Hepatitis, Lead poisoning, Malaria SARS (severe acute respiratory syndrome) Polyomavirus infection, Polio. Abdominal cramps and vomiting due to salmonella, cholera is due to vibro cholerae, infection of lungs due to mycobacterium (Adarsh and Mahantesh).
Different types of infections may be produced in water. These are

- Protozoal infection
- Parasitic infection
- Bacterial infection
- Viral infection

E. Total Dissolved Solids

This is a measure of the solid materials dissolved in the river water. This includes salts, some organic materials, and a wide range of other things from nutrients to toxic materials and metals which can cause immense harm to public health. Organo-chlorinated pesticides such as DDT are very toxic compounds. Exposure to high doses can affect the central nervous system, Provoking paralysis of the tongue, lips, and, face, irritability, dizziness etc.

F. Fluoride

In certain parts of the world groundwater naturally contains high fluorides levels, intake of fluoride through drinking water exceed that food. Water fluoridation has been adopted by several countries as a cost effective public health measure for the prevention of dental care. The dental health benefits are obtained when the concentration of fluoride in drinking water is 0.8-1.0mg/l.Excess amount of fluoride in drinking water can causes Enamel fluorosis and skeletal fluorosis.

G. Copper

People who drink water containing Cu in excess of the action level may with short term exposure causes gastrointestinal distress and with long term exposure may causes liver or kidney damage. Imbalanced quantity of copper may result Wilson's disease and Alzheimer's disease**.**

H. Zinc

Zinc is a trace element that is essential for human health. When people have deficiency of zinc, They can suffered from loss of appetite, decreased sense of taste and smell, slow wound healing and skin sores. On the other hand too much amount of zinc can still cause stomach cramps, skin irritations, vomiting, nausea and anemia. Very high levels of zinc can damage the pancreas and disturb the protein metabolism, and cause arteriosclerosis. Zinc can be a danger to unborn and newborn children. When their mothers have absorbed large concentrations of zinc the children may be exposed to it through blood or milk of their mothers.

I. Mercury

Mercury cause harmful effects such as nerve, brain and kidney damage, DNA damage, lung irritation, eye irritation, skin rashes, vomiting and diarrhea. Damaged brain functions can cause degradation of learning abilities, personality changes, vision changes, deafness, muscle in coordination and memory loss. Chromosomal damage is known to cause mongolism.

J. Arsenic

Excess amount of Arsenic is very harmful for human health. Arsenicosis is the effect of arsenic poisoning, if arsenic-rich water is used for drinking over a long duration results in various health effects including skin, skin cancer, cancers of bladder, kidney and lung, and diseases of the blood vessels of the legs and feet, and possibly also diabetes, high blood pressure and reproductive disorders. Arsenicosis is caused by the chemical arsenic. Natural arsenic salts are present in all waters but usually in only very small amounts. Most waters in the world have natural arsenic concentrations of less than 0.01 mg/liter.

K. Chromium

The human body contains approximately 0.03 ppm of chromium. Chromium uptake is 0.5-1%, in other words very small. The placenta is the organ with the highest chromium amounts.
Trivalent chromium Together with insulin removes glucose from blood, and it also plays a vital role in fat metabolism. Chromium deficits may enhance diabetes symptoms. Chromium can also be found in RNA.

Hexavalent chromium is known for its negative health and environmental impact, and its extreme toxicity.
It causes allergic and asthmatic reactions, is carcinogenic. Health effects related to hexavalent chromium exposure include diarrhea, stomach and intestinal bleedings, cramps, and liver and kidney damage. Hexavalent chromium is mutagenic. Toxic effects may be passed on to children through the placenta. Chromium (VI) oxide may cause cramps and paralysis. The lethal dose is approximately 1-2 g. Most countries apply a legal limit of 50 ppb chromium in drinking water.

L. Nickel

Nickel induces embryo toxic and nephrotoxic effects, allergic reactions and contact dermatitis. Nickel alloy and nickel compounds are among the most common causes of allergic contact Dermatitis.

M. Lead

Too much lead can damage various systems of the body including the nervous and reproductive systems and the kidneys, and it can cause high blood pressure and anemia.Lead accumulates in the bones and lead poisoning may be diagnosed from a blue line around the gums. Lead interferes with the metabolism of calcium and Vitamin D. At very high levels, lead can cause convulsions, coma and death.

IV. EXPERIMENTAL WORK

In the present study, physical and chemical parameters of River Betwa were studied at three stations (A) Triveni ghat in Vidisha city, (B) Ganj Basoda and (C) Kurwai town. The sampling done on summer season May 2014.Three sampling stations were selected. The samples were taken from below the water in plastic bottles of 1.5 L capacity. The samples were analyzed for 16 different parameters.

V. RESULT AND DISCUSSION

As per this study, it is found that from all parameters under studied, TDS and Acidity were not in limit. These parameters were exceeding from range. The causes behind excess of acidity may be extra growth of aquatic plants and micro-organisms. Due to increment of biological activities amount of CO_2 is also increased which may be reason of excess value of pH and acidity. Less flow of river water and more anthropogenic activities in water may be causes of excess Amount of TDS.

VI. SOLUTIONS

It is very important to aware the people for the adverse effects of these factors present in Water and their sources. Basically these elements are mixed in water sources by domestic or industrial wastes and other anthropogenic activities. Consequently dangerous diseases are occurred in People who use this water for drinking purpose. Suspended solids (which is a part of total dissolved solids) such as slit and coal may injure the gills of the fish and cause asphyxiation. It may also cause bad odour and taste and promote conditions favorable for growth of pathogenic bacteria.

To overcome this problem first of all it is necessary to develop individually efforts to make water clean and safe for health. On the other hand government and management authority should be responsible about it.Sevage or effluent should not mix in water body without a proper treatment. Agricultural runoff bring a large amount of pesticides residue in water body which are responsible for different health hazards so there are need to appropriate techniques and management.

Table 1: Different Physico-Chemical Parameters of Betwa River Water

Parameters	***Stations***		
	A	**B**	**C**
Temperature	36	36	33
pH	6.7	7.2	6.6
Ca	76.95	76.95	89.77
Mg	76.64	57.44	70.22
Total Hardness	153.6	134.4	160.0
Chloride contents	92.3	109.34	92.3
Acidity	40	40	48
Alkalinity	80	80	80
DO	8.98	7.48	7.48
COD	130	135	138
BOD	4.3	2.6	3.5
TDS	790	770	880
Cu	0.005	0.001	0.003
Fe	‹0.01	0.01	0.02
Zn	0.01	0.02	0.01
F	0.01	‹0.01	‹0.01

CONCLUSION

This research paper highlights the factors of the river water which affect the related community, Physico-chemical characteristics of Betwa river in Vidisha city. Proper management of present and future water supply demand is necessary. An attempt has been made to intellect the relevant chemical properties of water and water born diseases and management strategies also. The suggestions could be made for awareness among the people about water born diseases utilizing through proper management.

The chief objective of this study is to link the quality of water in river Betwa through Water quality assessment and to make people aware about water related diseases. This shall be helpful for making people aware the efficient improvement in water quality management and policy making.

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