

Panchaganga River Pollution: A Geographical Study

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Introduction

Kolhapur city is known as Karveer Nagari. Kolhapur is located on the Sahayadri mountain range and south western part of the Maharashtra state. Kolhapur city is situated on the bank of Perennial river Panchaganga on the adjoining hill named as Bramhapuri. During the historic period from first century B.C to ninth century AD, Kolhapur was situated on the Brahmpuri hills. Adjacent to this high hill the settlements like Kesapur, Kholkhandoba, Rankala, and Padmala which are as old as Bramhapuri were located. Kolhapur city is established on the bank of perennial river Panchaganga. The river is getting polluted due to discharge of large amount of sewage carried out by four major sewers in the city such as Jayanti nullah, Dudhali nullah, Line Bazaar nullah and Bapat Camp nullah. Since most of the sewage is untreated, it increases the organic load of the river water. Kolhapur is blessed with the presence of Panchaganga river travelling along the city. However, water quality and quantity in the river is more cause of concern than pride. The river is getting polluted due to Mixing of untreated domestic sewage, Disposal of industrial effluent, Biomedical Sewage, Agrochemicals used in the field, Mixing of Crematorium ash, Religious activities, Other sources like Hotels, Restaurants, etc.

The present study deals with Panchganga river water quality due to growing incidence of domestic, agricultural and Industrial pollution which is causing environmental degradation in the river basin. Waterborne diseases, and associated health hazards among the population in Panchganga Basin have been reported for some time. Therefore by using Water Quality Index (WQI) that relates the health survey of the people in the study area along the banks of river Panchganga. This paper presents water quality data of river Panchganga during the period 2010 to 2012 and a health survey conducted in the study area to understand relationship between river water quality and water borne diseases in the study area.

Objectives

- 1. To identified causes of Panchanganga River Pollution.**
- 2. To suggest recommendations for minimize of Panchanganga River Pollution.**

Study Area

The study area is in the northern part of Kolhapur district, located at 15°43' and 17°17' North latitude and 73°40' and 74°42' East longitude. The western part i.e. 2/3 of the district is located in the Western Ghats and all the five major tributaries of river Panchganga originate in the Sahyadri mountain range to the west, the area of the district is 7746 sq. km. and catchment of Panchganga river is 2099.63 sq. km. length of Panchganga river is 81 Km including the tributaries the Panchganga river is 338 km. As per 2011 census Kolhapur had a population of 38, 74,015 (Kolhapur District Tourism Plan, 2012). There are 9 K.T. weirs, across the river Radhanagari major and some medium and minor dams make it a perennial river.

Result and Discussion

Discharge of large amount of untreated domestic sewage from the city:

The river is getting polluted due to discharge of large amount of sewage carried out by four major sewers in the city such as Jayanti nullah, Dudhali nullah, Line Bazaar nullah and Bapat Camp nullah. Since most of the sewage is untreated, it increases the organic load of the river water. The river water becomes highly polluted due to toxicants, bacterial contamination, plastic litters, solid waste, etc.

Panchaganga River	Total population of Kolhapur City (2011 census)	Water Use (per day)	Waste water without treatment (per day)
	5.49 lakhs	120 Million Litres	100 Million Litres

Disposal of industrial effluent

The industrial effluent coming from different small industrial units, foundries spray painting units in Udyamnagar and Tanneries from Jawahar Nagar alters the quality of river water. The ground water quality also changes due to the industrial effluent.

Panchaganga River Basin	Total No of Industries	Total waste water without treatment
	2953	1859302 million litre per day

Source: Panchganga Basin Pollution study report, 2009

Sewage from different hospitals, pathological laboratories:

There are total 498 hospitals and dispensaries (governmental, semi governmental and private) and 31 pathological laboratories in Kolhapur city. Only one hospital i.e. Chhtrapati.

Pramilaraje Hospital is planning for STP whereas none of the hospitals in Kolhapur city treat its waste water. The untreated sewage about 1,00,000 litres per day mixes in to the river through nullahs which is highly dangerous to the riverine ecosystem.

Effluent from other sources:

There are about 49 servicing stations in the city which generates 49,000 litres of waste water. The quality of water alters due to oil and grease content, various petrochemicals colours, etc. The waste water coming from slaughter houses and fish markets are having high organic load which is directly discharged into the nearby sewer which finally ends into the river through nullahs. The sources like hotels, restaurants, hawkers, etc. also contribute for water pollution.

Sources	Total No	Total amount of waste generated
Servicing Stations	41	200000 litres
Hotels, restaurants and hawkers	1044	149400 litres / day
Slaughter houses waste	02	800 Kg / day
Meat shops and fish markets waste	76	1000 Kg / day

Agrochemicals used in the field:

Large quantities of agrochemicals are used in the agricultural sector in the upstream as well as in surrounding areas of the river. The residues of these chemicals mix in to the river due to excess use, flooding, heavy rainfall, excess irrigation, etc. Many pesticides and chemicals when dissolved in the river water enter in the food chain. Studies have shown that many vegetables and fruits contain harmful residue of agrochemicals.

Sr.No	Type of agrochemical	Solid state (per year)	Liquid State (per year)
1	Chemical fertilisers	78244 Tonnes	-
2	Pesticides	141764 Tonnes	22068 litres
3	Weedicides	34995 Tonnes	21664 litres
4	Fungicides	6771 Tonnes	1828 litres

Source: Panchganga Basin Pollution Study MPCB report, 2009

Crematorium ash:

Crematorium ash is becoming one of the reasons of water pollution. There are about four crematorium sites present in the city. Each year approximately 130 tonnes of crematorium ash pollutes the river water. The crematorium which is most affecting the quality of river water is Vaishvadharm Crematorium located near Prince Shivaji Bridge and Bapat Camp crematorium. After burning of the dead bodies, as a ritual, the ash is disposed in

the river water, which forms a layer on water surface. It traps the sunlight and prevents mixing of oxygen into the water. There is change in the physicochemical parameters of the water body. The amount of total solids, total dissolved solids, toxic heavy metals, phosphate and nitrate level increases. At the same time, amount of dissolved oxygen decreases. The aquatic ecosystem gets harmed as well as water becomes unsuitable for drinking purpose. The downstream areas of the river also get affected as well as the aesthetic beauty of the site decreases.

Religious activities:

Various religious activities during festivals produce solid waste in the form of nirmalya and idols. The idols made up of Plaster of Paris changes the physicochemical composition of water body. There are 12 sites in the city where the Nirmanlya and idols are disposed. The idols are made up of Plaster of Paris or Shadoo and coloured with chemicals. When these idols immersed in water the chemicals dissolve in water body altering water quality. The paints are having heavy metals such as copper, zinc, lead, chromium and iron. The other constituents of the idol like bamboo, flowers, cotton, clothes and other pollutants such as eatables like prasada, coir, plastic, etc increase the nutrients in the lake and lead to eutrophication. The water column is disturbed completely during idol immersion.

Discharge of nullahs in the river basin:

There are four nullahs in the city viz. Jayanti Nullah, Dudhali Nullah, Line Bazaar nullah and Bapat Camp Nullah. Jayanti nullah starts flowing from eastern part of the city. During its course through the heart of the city, it receives waste water from tanneries from Jawahar Nagar, domestic waste from the city, effluent from fabrication units, spray painting units and foundries from Udyamnagar. Jayanti nullah basin covers 2357 ha of the city. The pH of all the nullahs shows slightly acidic trend. The nullahs carry sewage with high organic load, generated during domestic as well as industrial activities in the city. As the temperature increases due to seasonal changes, the oxygen dissolved in water decreases. At the same time, the Biochemical Oxygen Demand increases. The BOD is the amount of oxygen required to oxidise the organic load by the micro organisms in any aquatic body. The increased level of BOD is an indicator of organic pollution. The Chemical Oxygen Demand also measures the organic matter with chemical oxidation. In the rainy season, all the values except the solids shows decreasing trend due to dilution. The total solids, dissolved and suspended solids shows increased values due to mixing of mud. In comparison with Line bazaar and Bapat camp nullahs, Jayanti nullah and Dudhali nullahs are the highly polluted.

Conclusion

- Wastewater and sewage line should be underground in all area. Sewage treatment plant should be provided for treatment of domestic wastewater.
- Industries causing water pollution should consist of effluent treatment plant or common effluent treatment plant.
- Hospitals should consist of effluent treatment plant in their premises.
- Wastewater should be treated separately (DEWATS) that is wastewater in Kolhapur city should be treated at different location.
- There should be ban on washing clothes, vehicles, animals and disposal of crematorium ash in river water.
- Improve public participation for avoid pollution from ganapati visarjan in Panchaganga river.
- Continuous flow is required to reduce pollution level in Panchaganga River to some extent.

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