CHAPTER 5

CONCLUSIONS AND RECOMMENDATION
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5.1 CONCLUSIONS:

The river Ganga in Kanpur suffers from myriad problems. Most significant ones being the lean flow during summer season due to dumping of untreated or partially treated sewage from the city and toxic waste from industrial units in to the river. The Ganga river in Uttar Pradesh demands treatment of sewage and minimum ecological flow for survival as a river. Since a river is a living ecosystem and therefore the ultimate goal should be to protect the functioning of the river ecosystem. An assessment of flow as well as wastewater is necessary. Central Pollution Control Board, Ministry of Environment And Forests standard parameters for Ganga river water is useful for drinking and outdoor bathing. The standard set by Central Pollution Control Board is the value of river water pH in between 6.5 to 8.5, D.O. 0.5 mg/l or more and BOD 5 days 20°C is, 3 mg/l or less. The class of water is designated as 'B' on most of the stations.

The following other conclusions are drawn out:

- The Ganga river water is alkaline in nature. The pH of river water was as per the desirable limits of BIS of WHO standard at all ghat except at Siddhnath ghat.
- The study reveals that from Bithoor ghat to Siddhnath ghat the water samples shows a considerable variation in the concentration of Dissolved Oxygen (DO), Biological Oxygen Demand, Nitrate, Phosphate and Chromium metal. These variations may be due to the
change in the volume of industrial waste being added to the river at different sampling Ghats.

- Chromium metal in river water was recorded highest in the industrial belt Siddhnath ghat. The High Chromium content observed in Siddhnath ghat is due to the discharge of tannery wastewater from the town into the river.

- Among all sampling ghats in Ganga river GH4, GH5 & GH6 ghats of Ganga river were found to be the most contaminated because TDS, BOD values observed were higher than those of the permissible limits of BIS and WHO.

- The concentration of BOD of the sample in the river Ganga at Siddhnath ghat & at Kanpur were found high in all seasons due to toxic metal and increase of human activity in such area.

- The river is highly polluted at Siddhnath ghat because of high Total dissolved solids containing domestic waste and tannery effluent discharge as compared to other ghats indicated by lower levels of DO.

- The value of DO is 2.6 mg/l at Siddhnath ghat (June) Jajmou, in Kanpur. The results of present investigation reveal that at Siddhnath ghat (GH6) DO has lowest value. From correlation analysis, the negative relationship of DO with other parameters exhibits the high organic pollution with anthropogenic activities in the river basin. The higher levels of all the indicator parameters above the standards are a serious concern for thousands of people living in Jajmou area.

The study shows that at the upstream of the Ganga River in Kanpur at Bithoor ghat, the water sample is good, but after entering the industrial belt it gets polluted mainly from industrial effluent. As a result it becomes
grossly polluted, when it leaves the industrial belt, self purification process gets into action with a slight trend to improve but it still remains polluted. The river ecology is also subjected to higher risk of pollutants exposure. Stretch of the river from GH4 (Sarsaiya ghat) to GH6 (Siddhnath ghat) is highly polluted and is not suitable for most of the beneficial uses of water except for irrigation, fish culture and industrial cooling.

Physico-chemical characteristics of surface water varied according to season. Variations amongst the ghats did not adhere to any specific trends. It is alarming that the pollution in river Ganga is escalating over the years in this stretch at Jajmau town due to tannery effluent discharged along the river, continuous immersion of idols of God, Goddess and Tazias are among other remarkable factors. The pollution level of the river is on the rise and can cause serious problem in near future. From this study of the surface water quality of the river, it is observed that the water of Ganga is fast losing its quality from Bithoor to Siddhnath ghat.

The correlation analysis on water quality parameters revealed that all parameters are more or less correlated with each other Pearson’s Correlation matrix. It is observed that some of the parameters do not have significant correlation between them indicating the different origin source of pollution. The correlation study and correlation coefficient values can help in selecting a few parameters which could be frequently measured to determine the status of water quality regularly. This will help the regulatory bodies to issue a warning on the deteriorating water quality and taking steps to implement control measures correlation between them indicating the different origin and source of pollution.

Thus it can be concluded that the water of the river Ganga at GH6 (Siddhnath ghat) represents serious threat to the ecosystem due to
anthropogenic pollution. Since river Ganga is lifeline for people of Kanpur who use its water for bathing and other purposes are at risk.

The correlation study and correlation coefficient values can help in selecting a few parameters which could be frequently measured to determine the status of water quality regularly. This will help the regulatory bodies to issue a warning on deteriorating water quality and taking steps to implement control measures so that proper treatment of effluent could be done to minimize contaminants in Ganga river water from Bithoor to Siddhnath ghat in Kanpur.

In a case study, Khwaja et al. (2001) reported that the tanneries of Kanpur (India) are polluting the holy Ganga river. To date the tanneries of Kanpur and adjacent Unnao region claim that the treated effluent released by them is within or around the permissible limits. However, our study proved that their treatment technology is not adequate and stresses for its revaluation prior to disposal. Common Effluent Treatment Plant (CETP) needs further expansion and upgrading to improve its treatment performance so that sustainable use of the water from the whole industrial belt and is ensured for the downstream users.

Thus findings are important, not only for clarifying the present physicochemical water pollutant levels of the river but also for the development of national river management plans.
5.2 RECOMMENDATIONS:

It was concluded that water quality of the Ganga river has been affected adversely by man's activities by overcrowding accompanied by inadequate treatment or non-existent sanitation and also by unregulated enormous discharge of waste waters into water system. It was observed that 50 to 70% of pollutants load of water is from domestic sewage. So obviously it is of no use to apply strict laws to industries only. Municipalities are given free hand to allow discharge of domestic wastes into water without any treatment. During our study we observed that the water pollution in Ganga river has become a huge problem, because of the population explosion and also due to the phenomenal growth in agricultural & industrial activities. The effluent discharge from the industry in localized areas due to this water pollution is creating situations which are dangerous to health. Thus the pollution in the river affects the economy of state as well as of country in several ways.

River Ganga water is the principal resource for the inhabitants of Bithoor to Jajmau region and is used for different purposes such as drinking, washing, bathing, irrigation and industries. The river water has huge religious, cultural and aesthetic values in this region. So, the river water has direct connection with health, environment and ecology and development. Therefore, the river quality classification and monitoring with this method is essential for planning and policy making as well as for the preservation and improvement of the river water quality.

The problem of water pollution in the Ganga river can be minimized by adopting the following techniques
Reutilization, Recycling, Renovation and recharge of the industrial Effluent should be done. Water consisting of industrial effluents, domestic sewage, sludge of municipal and other pollutants should be given some sort of treatment before getting mixed into the surface water of Ganga.

Sulabh Shauchalay (Public urinals and lavatories should be constructed near all the bathing ghats. These should be provided with adequate arrangements for proper disposal of waste water. Public should be educated to use them properly and not to pollute the water of the river.

Permat ghat has Electric crematorium for burning of dead bodies, there should be provision of waste water treatment plants [WWTP] to avoid pollution and eutrophicication.

All the drains discharging waste water, agriculture waste and industrial effluents should be diverted into main sewage system and sludge released by municipal bodies must be chemically and biologically treated before final disposal into rivers.

Proper garbage collection system & disposal arrangement should be provided on both banks of the river and, so that garbage is not dumped in the river. Garbage, corpses, solid organic wastes etc. must be banned from being dumped into fresh water of river Ganga

Adequate scientific methods should be developed so as to determine the pollution levels at source itself so that the exact effect of pollutants can be identified beforehand.

All the toxic metallic elements like chromium coming from the tanneries & other industries should be chemically treated before such wastes are released into water.
➢ Wastewater should be treated to meet pre-treatment criteria before discharging to the Common Effluent Treatment Plant (CETP). There is an urgent need for stringent Government policy and monitoring for effluent discharge from industries into the Ganga river of Kanpur.

➢ Promotion of effective and efficient implementation of water pollution control laws and regulations.

➢ Active role of environmental activists & ecologists to press the Government machineries for installation of more & more stringent rules for treatment of industrial waste, domestic waste & other wastes.

As the river Ganga has become highly unsafe, so there is a need of a Conservation and Management Plan to reduce the tannery waste & sewage waste impacts on the Ganga river. It was quite evident from the findings that the river is receiving a lot of organic waste, tannery waste & other industrial waste. The solution to this problem lies in the treatment of tannery waste & sewage and disposable of fully or partially treated sewage waste of tannery.

In the growing awareness of relationships between human health and geochemistry, further multidisciplinary studies involving biologists, biochemists, geologists and epidemiologists are essential to understand the biogeochemical cycle of individual metal and to assess urbanization impacts on the Ganga Plain rivers. With our advancing knowledge, we may soon be able to predict the toxicological effects of polluted sediments on human health.
5.3 RECOMMENDATIONS FOR FUTURE STUDENTS:
There are a number of different directions in which this research can be taken in the future. One would be to conduct another study of water quality, looking at the same parameters and may be some new ones, such as cadmium, another heavy metal found in tannery effluent waste. This would be a valuable study because it would show if and how the Ganga’s water quality is changing over time. Using this study as a reference it would be possible to formulate a more efficient research plan for time spent in Kanpur, hopefully avoiding some of the drawbacks faced in this study, such as using time in Kanpur to determine appropriate sampling sites.