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Effects of Dumping Solid Waste on Water Quality of Surface Water Bodies

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ABSTRACT

Water pollution has been a hot debate for government and scientists. in addition, protecting river water quality is exceedingly immediate because of serious water pollution and global scarcity of water reservoir. This study was conducted to assess the effect of solid waste dumping on surface water quality. In return to achieve this, water samples were obtained in different months from site. Below site was selected due to the dumps on surface water. Water parameters pH, turbidity conductivity and temperature were determined using pH/conductivity meter, Most the values are within the permissible limits, but all the samples do not fulfill WHO requirements, site may have effects on human health due to waterborne diseases and on soil fertility.

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INTRODUCTION

Pakistan is blessed with copious water resources which includes natural and artificial reservoirs. Natural resources are oceans, rivers, lakes, streams, canals, glaciers while artificial such as dams and rainfall. Water contamination usually occurs from two sources point sources and non-point sources, most important sources of pollution are urbanization, agro-chemicals, industries, thermal pollution, oil spillage and many more. Urbanization generally leads to higher phosphorus concentrations in urban catchments leaching phenomena from urbanized surfaces, and municipal and industrial discharges all may cause increased loadings of nutrients to urban streams (Paul and Meyer 2001). This reason makes urbanization second and first to agriculture as the major cause of stream contamination. In section of agriculture, water and electricity for irrigation purposes are subsidized for political reasons. This technique encourages and leads to wasteful flood irrigation instead of adoption of updated optimal practices such as sprinkler and drip irrigation. Cropping practice and farming pattern also do not necessarily encourage the equitable use of water. Plenty of water is lost due to breaches and seepage which results in water logging and salinity. Agro-chemical wastes can be fertilizers, insecticides which may be herbicides and insecticides broadly consumed in crop fields to increase productivity, inefficient disposal of pesticides from field farms and agricultural practices shares a lot of pollutants to water bodies and soils. Many of the agrochemical includes are: DDT, Aldrin, Dieldrin, Malathion, Hexachloro Benzene etc. Pesticides travels to water bodies through surface discharge from agricultural areas, moving from spraying, washing down of rainfall and direct dusting, and spraying of pesticides in low lying areas degrading the water quality. Many of these are non-biodegradable and long lasting in the environment for long period of time. These chemicals can enter to human beings through food chain which cause diseases. (Haseena, Malik *et al*., 2017).

Oil leaking into the surface of ocean by any accident or leakage from cargo tankers that may have weighted by petrol, diesel and oil substitutes pollute sea water extensively at high level. Expsure of oil from offshore also lead to oil pollution in water. The rest of oil spreads over

the water surface forming a thin layer of water and oil mixed (Abd Aziz, Toriman *et al*., 2017). Global warming has also an effect on water reservoirs through intensified evaporation, geographical alterations in precipitation intensity, duration, and frequency (collectively affecting the average discharge), soil moisture, and the speedy and strictness of droughts and floods. Future predictions using climate models declared out that there will be a high in the monsoon rainfall in many parts of India, with increasing greenhouse gases and sulphate aerosols. comparatively small climatic changes can have tremendous effect on water resources, specifically in arid and semiarid regions such as North-West India. This will have effects on drinking water, and on development of hydroelectric power. consequently, in limited water supply and land degradation. Except for monsoon rains, India consumes perennial rivers which was created in the Hindukush and Himalayan ranges and rely on glacial melt-waters. Since the melting season happens at the same time with the summer monsoon season, any strengthening of the monsoon give rise and promote to flood disasters in the Himalayan catchment. Increasing temperatures will also lead towards to a rise in the snowline, declining the ability of these natural reservoirs, and enhancing the risk of flash floods (Singh and Gupta 2016). Ground and Surface water bodies are at serious risk of contamination due to leachate of dumping sites. (Naveen, Sumalatha *et al*., 2018). Soil fertility is being influenced by pollutants present in waste. Crop growth is directly linked with soil characteristics (Wijesekara, Mayakaduwa *et al*., 2014). Secondly open release of obnoxious smells are playing their role to increase in greenhouse gases. Generation of leachate degrades the excellent quality of ground water and soil. Due to perilous impacts of waste, it is collapsing with the human health of people near the dumping site (Ferronato, Torretta *et al*., 2017). Current study was conducted in north-east side Jamke Cheema, village of pakistan's city Sialkot (Figure 1). The one single site serves as means for inhabitants to dispose-off their waste along the outside edges of water body. Waste of bottles, cans, plastics, leather, wrappers, rags, food waste, toys, and. yard waste were found after judgmental assessment. Government girl's degree college located near the site is of concern for their direct disposal of wastes. The main objectives of this study were to assess the impacts of activities by people related to disposing solid waste on water quality to determine physical parameters of water and comparing it with the national quality standards.

Figure 1. Satellite view of north-east side Jamke Cheema, village in city Sialkot, Pakistan.

METHODS AND MATERIAL

Samples was carried out in January, February, and march of 2020. The reason behind sampling in these three months was cold temperature. Pollutants Tends to be in more concentrated and stable form in cold temperature. In total four of samples were collected for being testing in

laboratory. Sample A was collected in January sample B in February while C and D sample was collected in the starting week of March due to rainy weather at the mid and end of march. Every month three samples were collected. Sampling points were selected randomly with the purpose of getting water sample that truly represents the site contamination. Sample were collected with distance in each of sample 2m, 5m, 9m, respectively. Each of sample was tested three times in laboratory for various parameters to obtain accurate results. Chlorine free water washed bottles were used for collecting samples. Samples were stored in the refrigerator at temperature of 4°C before analysis. Parameters like turbidity, electric conductivity pH, temperature, total dissolved solids were determined by using calibrated instruments.

RESULTS AND DISCUSSION

The parameters of water quality shows difference from one place to another. Physical characteristics of water were analyzed, Turbidity (NTU) of water in four samples from all sites ranged from 1.76 - 6.51 while permissible limit of WHO is 5NTU but by the results sample C of water has above turbidity than allowable limit furthermore turbidity of other samples remained under recommended value. Electric conductivity (µm/cm) ranged from 1252 – 1531 which is much higher value than permissible limit 400 by WHO. None of the any sample was under or near to allowable limit. The Ph ranged between 5.76 – 8.87 it did not relatively remain within the permissible WHO range 7 -8.5. Sample C was observed with the highest PH of any other sample.

Table 1. Surface water analysis of selected parameters.

Total Samples	Sites	Turbidity (NTU)	Electric conductivity (µs/cm)	Temperature °C	pH
Sample A	S1 S2 S3	1.76 3.66 5.28	1531 1487 1462	24.1 24 24.6	5.76 7.24 8.29
Sample B	S1 S2 S3	2.57 2.99 2.40	1302 1252 1301	23.9 23.6 23.6	6.27 6.22 5.89
Sample C	S1 S2 S3	6.04 6.36 6.51	1447 1415 1392	21.2 21.7 22.1	8.33 8.67 8.87
Sample D	S1 S2 S3	3.54 4.86 4.12	1425 1392 1391	26.2 26 26.9	6.57 7.45 7.78

CONCLUSIONS

Water quality parameters were measured to assess the level and degree of waste in water. This was done mainly due to promiscuous dumping of waste into water. Therefore, analysis was carried in three different months. The highest extent of correlation exists between electric conductivity and pH of water indicates the contamination of water associated with that particular site. As a result, it is recommended that there must be a productive mechanism for dumping waste in Jamke village of Sialkot. Moreover, a proper system for continuous monitoring of water should be installed.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHORS CONTRIBUTIONS

All the authors contributed equally to this work.