ABSTRACT

Water is one of the supreme valuable natural resources known on earth. It is important to all living organisms, most ecological systems, human health, food production and economic development. Today industrialization, negligence of water sources combined with ever growing population has been responsible for water pollution as it is increasingly contaminated with sewage, agricultural chemicals, oils, heavy metals, radioactive material, detergents and many other synthetic products. Information on and understanding of changes in aquatic systems is necessary for the protection and remediation of water bodies. Current investigation was carried to study physical, chemical and biological characteristics of surface water of Buddha Nallah stream and ground water of the villages located in its vicinity. Buddha Nallah is a natural water stream which originate from village Raipur in Rupnagar district. It runs parallel to river Sutlej and after crossing Machhiwara and Ludhiana (industrial city), it joins the river near village Wallipur and Manewal. Water samples were collected for physical, chemical and biological analysis in four different seasons i.e., monsoon, autumn, spring and summer, both from surface and ground water of 10 villages located on the banks of stream. It was observed that stream water quality had deteriorated to such an extent that it has lost its self-purification capacity. There was an increase in concentration of various physico-chemical parameters as there was addition of pollutants at each site. It was observed that total dissolved solids, alkalinity, total hardness, chloride, phosphate, biochemical oxygen demand and heavy metals reached at highest level in stream within Ludhiana city, and after crossing the city there was no further noticeable increase in quantity of parameters indicating that maximum pollution sources are due to Ludhiana city. It was also noticed that concentration of magnesium and sulphate decreased as stream moved from mid-stream sites to down-stream sites. There was no significant variations due to season in ground water. Results revealed that ground water of mid- and down-stream was having higher concentration of various physico-chemical parameters as compared to upstream sites. The concentration of electrical conductivity, total dissolved solids, total hardness, potassium and calcium was less in the last site Manewal as compared to mid- and down-stream sites. Except for first two upstream sites (Raipur and Birguru), surface water quality is poor for irrigation purposes. Similarly, ground water from site Dhanansu onwards was of poor quality. The water quality index (WQI) showed that except
at site Raipur, stream water was unsuitable for drinking purpose. The ground water in the first three sites (Raipur, Birguru and Behlolpur) was of good quality but all other sites were of marginal and poor quality and require prior treatment if to be used for drinking purposes. Overall it was found that most of the physico-chemical parameters had higher limits compared to prescribed limits by WHO, ICMR etc. Health survey through questionnaire was also conducted to know the health status of inhabitants of study area. Results revealed that mid- and down-stream population is suffering from various health issues, like diarrhea, jaundice, hepatitis, fever, etc. The study concluded that there is a need is to undertake awareness campaigns and to check dumping of pollutants into the stream.

Keywords: Buddha Nallah, surface water, ground water, pollution, water quality index, seasonal variations, physico-chemical analysis, water borne diseases.