

## CONCLUSION:

Hence, we can concluded that mouth of Haldi river is seriously polluted due to discharge of toxic metals from the point and non-point sources. Generally, these toxic substances directly contaminate, they mostly remain continuous in the environment which leads to bioaccumulation in the food chain that may create severe problems in future. Water is one of the leading part for microorganisms, which cause health problems. From the experimental results, the quality of water changes according to the seasons. From the present study, the comparative analysis of the mouth of Haldi river in the study area was found be acceptable according to water quality standards proposed by (WHO, 2012), USEPA and USPHS for most of the physico-chemical parameters and heavy metals residues except few.

- Ø On the basis of experimental findings it was observed that the soil of the mouth of the Haldi river seasonally showed different level of fluctuation in various physico-chemical parameters of soil like; pH, Organic carbon, Available Nitrogen, Phosphorus, Potassium was found maximum in summer and minimum in winter and intermediate in rainy season.
- Ø Values of Site 1 various physico-chemical parameter like Organic carbon, Available Nitrogen, Phosphorus, Potassium were recorded above the permissible limit established by WHO. This indicates that water of these rivers can be uses for irrigation and various economically purposes. However, it needed to be treated properly for use.

- Ø On the basis of experimental findings it was observed that the water of the mouth of the Haldi river seasonally showed different level of fluctuation in various physico-chemical parameters of water like; Temperature, pH, BOD, COD, Salinity, Nitrate and Phosphate was found maximum in summer and minimum in winter and intermediate in rainy season. While Alkalinity was recorded highest in winter lowest in rainy and intermediate in summer season.
- Ø Values of Site 1 various physico-chemical parameter like pH, BOD, COD, Phosphate, Nitrate were recorded above the permissible limit established by WHO and USPHS whereas the DO below the permissible limit. This indicates that water of these rivers can be used for irrigation and various economically purposes. However, it needed to be treated properly for use.
- Ø The study expose that there is a considerable variation in the concentration of heavy metals in soil and water of the permissible limits these rivers from place to place in different seasons. These variations was noted due to the change in the volume of industrial and sewage waste being added to river at different sites of the stretch.
- Ø Concentration of heavy metals like Cd, Cr, Cu, Ni, Pb in water for Site 1 recorded exceed permissible limit at all the seasons. And Site 3 heavy metals are Cd, Ni, Pb, Zn were below permissible limits.
- Ø The analysis of the results revealed that neither temporal , nor spatial distribution pattern was found, perhaps due to the presence of multiple and haphazard sources. River mouth receives intermittent input of heavy metals along with their isomers, which are the main contributors to the heavy metal pollution of river mouth.

- Ø At all the sites summation of all heavy metals concentration was found to be higher in summer than winter. This could be due to transport of maximum amount of contaminants from the sampling locations to the Site 1 where industrial effluents released of the mouth of Haldi river during summer.
- Ø Cadmium ,Chromium, Lead , Nickel are carcinogenic and restricted. However they were still detected in the present study. However, their contaminating level was above the permissible limits. This could be attributed to growing awareness among the advancement of human civilization and fisherman, common people about the hazard due to toxic substances.
- Ø A study conducted on the river fish , Arius sp. showed the accumulation of six heavy metals , Zn, Cu, Cd, Pb, Cr, and Ni it's the body tissues. It also be crossed the permissible limit.
- Ø Totally 24 species plankton species were identified from study locations: Seven species were of phytoplankton community and seventeen species zooplankton community.
- Ø Community structural analysis was carried out with the help of various indices like Margalef species richness index, Pielou's evenness index, Shannon Wiener diversity index and Simpson dominance index. These indices revealed that the plankton diversity and richness were greatly dependant on the levels of physico-chemical factors and thus the level of inorganic pollution of the river.
- Ø Hence it is suggested that a bioremediation unit is essential as a component of every effluents treatment plant, to reduce the pollution load prior to discharge.

This will also help to recover the heavy metals from the effluent, otherwise wasted and deteriorating the environment.

- Ø Regular monitoring of mouth of Halsi river water quality is necessary to have a check on surface water quality for the sake of human life and to maintain a balanced aesthetical value of religious. Strict law enforcement is needed to develop a strategy to manage the environmental hazards due ti these elements and to improve environmental protection of this area.
- Ø New technologies should be developed and its proper ,Knowledge- transfer should be conducted to ensure reduced the effluents discharge from industries and agriculture.