

## **ANTHROPOGENIC STRESS ON TONS RIVER WITHIN DEHRADUN DISTRICT OF UTTARKHAND STATE, INDIA**

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### **ABSTRACT**

With modernization and industrialization, a lot of pressure has been built on nature and natural resource hence the environment is facing adverse conditions. With human intervention the pollution level had been increased in last two centuries resulting in exploitation of soil, air and water environment. The present study focuses on the effect of human activities on Tons river in Dehradun district of Uttarakhand state. Hydrobiological alterations were observed in the form of water retention in small dams and also diversion of water through channels for the purpose of irrigation, drinking and washing. Construction of such small dams and water channel has disturbed the flow rate and volume of water as a result the path of fishes is blocked and difference in the plankton and biotic community took place. Anthropogenic activities affect the physico-chemical and biological nature of water. Agricultural activities and grazing by domestic animals near the bank of the river were observed to be one of the major causes of stress on river.

**KEYWORDS:** Human, Activities, Uttarakhand State, India

### **INTRODUCTION**

Species diversity is declining throughout the world due to over exploitation and habitat degradation caused by anthropogenic activities. The environmental changes brought about by various anthropogenic activities led to degradation of not only environment but also affected floral and faunal diversity. Over the past billion years, adaptation and diversification has tend to increase the number of species, with escalation of human population, their infringing into the wilderness and rapid industrialization, a decline in species diversity has been noticed. The water system do not always remains the same but with the time keep on fluctuating because of a number of factors like soil erosion, siltation, etc. caused either by natural phenomenon like cloud burst (which results in flood) and fire or by various anthropogenic activities like deforestation, construction, agriculture and domestic activities. Tons river flowing through Dehra dun is the lifeline of the people residing near to the river, but because of excessive human interference the geomorphology of the river is changing as a result biotic community is declining with due course of time. Hence present investigation has been undertaken to assess the anthropogenic stress on this river.

### **METHODOLOGY**

During the course of investigation various anthropogenic activities were observed visually and their impact on the river was analysed once in a month during the period of 2007 to 2009.

### **RESULTS**

During the course of investigation, hydro biological alterations were observed in the form of water retention in small dams and also diversion of water through channels for the purpose of irrigation, drinking and washing, which affected the normal level of water flow and hence consequently the biotic communities. It was observed that construction

of such small dams and water channel has disturbed the flow rate and volume of water as a result the path of fishes is blocked and difference in the plankton and biotic community took place.

Presence of picnic spot on the river bank also invited a lot of anthropogenic stress to the river which involved activities like bathing, washing and use of bleaching for catching fishes. It was observed that use of soaps and detergents affected the chemical composition of water. Use of bleaching powder not only affected the water chemistry but also resulted in mass killing of juveniles along with large fishes. This mass killing affected the quantity of fishes in river. Such activities affect the physico-chemical and biological nature of water. Agricultural activities and grazing by domestic animals near the bank of the river were observed to be one of the major causes of stress on river. Use of fertilizers in agricultural field for the purpose of better yield near the bank of river also affected the water chemistry. Extraction of pebbles, cobbles, sand, silt and clay from the river bed resulted in loss of spawning and breeding grounds for fishes and affected the plankton and benthic population.

Due to the construction of road, apartments and amusement park on the bank of the river a lot of sediment deposition was observed in the river basin which resulted in bar formation and diversion of water from the main course. Since the river has religious values a lot of litter is usually added during festive season. Various anthropogenic activities observed during the study were depicted in following figures.



**Figure 1: Extraction of Cobbles, Gravel and Sand from River Bed Leading to Loss of Fish Habitat**



**Figure 2: Channelization of Main River for the Extraction of Cobbles, Gravels and Sand**





**Figure 3: Removal of Gravel from River Bed**



**Figure 4: Diversion of Water Channel for the Irrigation as Well as Other Purposes**



**Figure 5: Temporary Alterations of Water Channel in the Middle of the River**



**Figure 6: Temporary Bar Formation by Local People for Bathing of Cattle during Summer Season**

## DISCUSSIONS

Large scale deforestation for ever increasing demand of agricultural land near the bank of river has been usually observed, this had also resulted in deposition of sediment in the river. This deposition affected the volume of water and also the normal migratory path of fishes and also affected the food source of fishes by affecting the plankton and benthic population.

Various researchers studied the effect of human activities on water system and observed similar results. Jones and Clark (1987) studied the negative co-relation between biological diversity and urban land cover, density of houses and human population density. According to Das (1992) the rapid overall development of the country and owing to ever increasing demand for fish as food, the aquatic systems are under constant pressure of man induced stresses which are detrimental to fishes and other biotic communities. Aadland (1995) studied that due to removal of riparian cover due to human activities destabilization of river banks took place which caused reduced water shed and increase in water temperature. Allan (1995) stated that anthropogenic activities such as river valley projects have drastically transformed the riverine ecosystems all over the world.

Sun et al., (1996) in support of present study observed that the formation of bars resulted in migration of channel to a new direction because of a variety of local activities caused by human activities like collection of cobbles, pebbles, sand, silt and clay for various purposes. Uniyal (2001) studied the Amlawa and Asan rivers of Dehradun and concluded that silt formation and soil erosion due to construction of road in the study area were responsible for turbidity of water which adversely affected the biotic communities of these rivers.

Xenopoulos and Lodge (2006) studied that freshwater ecosystems have been profoundly altered with industrial, agricultural and urban pollution, water abstraction, removal of natural vegetation and natural hydro-morphology. Similarly Edward and Jaffrey (2009) stated that most extinction events have been largely associated with habitat alterations, exploitation of fisheries and interaction with non-indigenous species.

Beau grand et al., (2010) studied that population pressure, urbanization, industrialization and increased agricultural practices have significantly contributed to the pollution and toxicity of aquatic ecosystems. Pollutants bring about a change not only in physical and chemical quality of water but also modified the biotic components resulting in the elimination of some, probably valuable species.

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