CHAPTER - I

GENERAL INTRODUCTION
INTRODUCTION

Our world is full of poisonous substances. Many of these occur naturally, quite independently of any activity of man. Thus, the vapours from an active volcano may contain so much sulphur that plants cannot grow nearby. Rivers flowing through forests may become deoxygenated because so much natural organic matter is deposited in them, and when this decomposes the results are similar to heavy contamination with raw, man-made, sewage. Mercury, occurring naturally in the ocean, may be concentrated by fish to levels which give concern to public health authorities. But when we consider pollution we usually refer to the presence of toxic materials introduced into our environment by man. This does not mean that only man-made pollution is harmful, though the suddenness of the changes induced by him are often more dramatic than the long-term effects of naturally occurring poisons.

However, many of the rivers which are considered to be 'unpolluted' are in fact suffering from the results of man's activities, and they are, from the ecological point of view, degraded. A change in the flora and fauna is such an effect, and if the change is far the worse, then this is surely described as a symptom of pollution. Even a moderately polluted river can render safe water for human use; such rivers are sometimes classified as 'clean' by the water industry.
The effect of organic pollution clearly depends on the amount of organic matter discharged into a river, and the volume of the clean water present to dilute it. In an extreme case BOD will remain high, and the $O_2$ level low, and there will be no recovery before further pollution occurs. Then it will only contain bacteria, sewage fungus and particularly resistant animals like *Tubifex* worms, which have haemoglobin in their bodies and which are able to exist in almost $O_2$ free water. If only a little pollutant is discharged into a large volume of clean water, then little modification of the flora and fauna may occur. Intermediate amounts of pollution will produce intermediate results. The most commonly observed effect is a change in the types of plants and in the species of fish.

In an agricultural country like India, application of organic waste on load should issued a high priority. Hence, it is essential to involve a rational basis for fixing effluents standards for different types of agro based industries.

The prevalent effluent BOD limits forced the rural and agro based industries to spend huge amounts on the treatment of effluents rich in organic waste which otherwise could help in meeting the demand of much needed organic manures.

Domestic sewage is seldom acutely poisonous; its harmful effects are the encouragement at the wrong sorts or
organisms in water enriched by sewage effluent. Industry, on the other hand, may discharge highly poisonous substances. We often hear of fish killed from discharges of cyanide, but damage from metals such as copper, zinc, lead and mercury is not uncommon. The main trouble with some of these metals is that their effects may be cumulative, so repeated exposures to low levels may lead to concentration in the tissues of fish and at perhaps higher levels, in the birds and mammals which live on them.

The available natural fresh water resources today are threatened by hazards of pollution, particularly rivers are greatly polluted due to untreated release of effluents and waste materials from agriculture concerns and industries located around rivers. The poor living conditions of people in human settlements around rivers, non-availability of sewage treatment from urban areas and negligence of industries for treatment of effluents before release in water ways and rivers are the major reasons for pollution of Indian rivers. Government of India, after understanding gravity of river pollution has planned to launch a programme to purify Indian rivers and provide good quality water for domestic and agriculture purposes. The purification of Ganga was undertaken under the scheme at various stations. Water analysis was launched on large scale to assess the quality of water and to evaluate quantitatively
the various polluting compounds. The present investigation was undertaken to determine the water quality of one of the rivers.

Water is one of the most amazing compounds in nature. It consists of two common elements-hydrogen and oxygen. It is indispensable for life, both for plants and animals. It acts as a solvent for many more compounds than any other liquid providing ionic balance and nutrients which support life.

Water has many uses and since everybody uses it, a study of water from different aspects becomes important. The consideration of efficient utilization of the available water resources need maximum emphasis. There is also need to give serious consideration while making decisions relating to water management in future.

Pollution in general and particularly in relation to water, poses burning problem to human populations; water quality degenerates and water is said to be polluted due to sewage, industrial discharge, degeneration of protein materials and surface run off water entering ponds, lakes and rivers from lands treated with chemical and pesticides to protect crops.

The pollution of Indian rivers if goes beyond certain limit then cost of water treatment for maintenance of water quality becomes an extra burden of the country. This may adversely affect
all uses of water, such as domestic, agriculture, aquaculture, industrial, recreational, aesthetic, navigational, power generation, etc. The condition may be more worst if entire aquatic system is thrown out of gear which leads to biological imbalance causing ecological disaster in the biosphere.

Ecological deficit occurs when economic exploitation exceeds nature's carrying capacity and its delicate balance is disturbed. The quality of riverine water is most important to population near about, as most needs of population are fulfilled by riverine water in Indian situations. Indian villages and towns are mostly located near river or streams.

The present investigation has been undertaken to assess quality of Sukhana river water at Chikalathana near Aurangabad to study physico-chemical characteristics of water which determine water quality essential for human use. The water is used for domestic, industrial agriculturals and recreational purposes.

The effect of pollution on trophic and toxic levels of water can be detected, estimated and quantified by physico-chemical methods. The changes in trophic and toxic conditions of water are reflected in community structure and its biota, like occurrence, diversity and abundance pattern of species which can be easily assessed in biological monitoring programmes. Biomonitoring
studies are essential to understand structural changes in biological communities to evaluate whether water body has in it resilient capacity to absorb stress and strain. Hydrobiological studies regarding rivers are scarce but few studies on river hydrobiology in Indian regions have been done by many workers from time to time: Pahwa and Mehrotra (1966), Rai (1974, 1975), Agarwal et al. (1976), Prasad and Saxena (1980), Gunale (1981), Param Sivam and Sreenivasan (1981), Prasad and Sing (1981), Sivasubramani and Madhevan (1995), Ajmal et al. (1992), Ansari (1993), Krishnamurthy and Bharti (1995), Ragothaman and Jaiswal (1995), Hostti et al. (1995 and 1996). The studies were carried on Cavery, Mula, Mutha, Ganga, Gomati, Yamuna, Brahmani, Chambal, Godavari, Kshipra, Brhampautra, Tunga, Kali, Tapi, Swaliyar, etc.

Sukhana River :–

The name Sukhana means, dry; the river bed of Sukhana river is almost dry with meager amount of flowing water during monsoon specially from June to September. The river begins at village Naregaon, where two tributaries join which originate from north east side, of Aurangabad city and terminate into Sukhana river.

The present investigation was undertaken to evaluate the physico-chemical parameters of polluted riverine and other water. The study was divided into two parts. First part includes, collection and analysis of nalla and well/handpump water samples in the vicinity of Sukhana river. Second part consists collection and analysis of soil nearby Sukhana river for various physico-chemical studies.

River is a natural stream of freshwater, which flows in a well defined channel formed over geological eras. Characteristics of river are mainly determined by the amount and spread of precipitation in the catchment area throughout the year; geography and geology of the river basin, topography of the terrain, and land use of the water shed. Across the length and the breadth of a land, most of the people live on or near stream, the most important source of water.
The studies clearly indicated the severely condition of Sukhana river water as well as soil sample at most of the monitoring stations and the degree of pollution was very high which made it unsuitable for human utilization like industrial, domestic and agriculture. Present investigation revealed that water quality of Sukhana river deteriorated and unsafe for human consumption, domestic, industries and agricultural purposes.