CHAPTER – 7

SUMMARY

Pollution is undesirable change in physical or biological characteristic of environment that may be harmful to human being and other organisms. In short pollution is nothing but “Environmental disturbance”. Pollution is a problem of serious concern ever since untreated sewage and industrial effluents are directly discharged into water bodies and on land. This trend is on an alarming increase with the growth of industries as well as of human population.

Poisonous substance in industrial sewage waters, pesticides, chemical fertilizers and agricultural drainage waters on reaching water bodies have a fatal effect on fish fry and eggs, destroy spawning grounds and feeding areas, restrict migrations of fish, reduce fish resistance to disease and deteriorate the quality of fish production.

Water, like air is one of the most important natural resources of man, without which life cannot exist. In India inspite of the fairly good rainfall in many parts of India, the stream flows in many areas are inadequate for continuous use throughout the year. Besides, domestic, agricultural and industrial uses, water sources have been used for fishing, navigation etc. India has largest coastline of about 6500 km offering a large potential for exploitation of coastal and estuarine waters for fishing and production of salt, chemicals etc.

Industrial waste is generally loaded with toxic substances. They include acids, alkaline and ions of heavy metals. When such poisonous wastes are discharged into water bodies, they produce alarming results at the point of junction. These become steadily diluted as rivers meander further because of neutralization, precipitation, adsorption or simple dilution.

The extent of pollution is also related to the tidal region. The most unfavorable hydro biological conditions are noted during neap tidal phases especially during summer
months. The transitional period when the water movement is negligible and the effluents spread in a wider area upsetting the whole ecosystem.

The most harmful metallic pollutants are Mercury, Lead, Zinc, Cadmium and Copper, Nickel, Cobalt. The seriousness and persistence of heavy metals in water are compounded by fact that generally they are water soluble, nondegradable, vigorous, oxidizing agents and strongly bounded to many biochemical especially polypeptides and proteins. The precise mode of toxic action of heavy metal on aquatic life is poorly understood and no theory of heavy metals toxicity is completely convincing till today.

Cadmium is distinctively toxic and occurs with zinc in nature. A comparative study on the toxicity of cadmium on air breathing fish *Clarius batrachus* and non-air-breathing fishes are far more refractive toward toxicity than their counterpart.

Heavy metals may be contributed by soluble materials chemically weathered from soil and rocks due to geochemical alterations. Heavy metals which are selectively concentrated by vegetation may also find their way to surface mainly due to the existence of individual gardens, lawns and their cuttings.

Environmental pollution by heavy metals is intently recognized with the Minamata diseases in Japan, when several thousand of people suffered mercury poisoning by consuming the fish caught in Minamata bay, which was the recipient of mercury released from vinyl chloride plant, between 1953 and 1960. Similarly, the high level of cadmium in local foodstuffs in parts of Japan, attributed to irrigation water from soil heaps of an abandoned mine, caused Itai-Itai Byo disease in 1955, mainly in females over forty.

Heavy metals are continuously released into aquatic environment from natural processes, i.e., volcanic activity and weathering of rocks. Industrial processes have greatly enhanced the mobilization of many metals. Heavy metals, as well as pesticides, have a unique property of accumulation over a period of time, along a food chain and very high level can be accumulated in organisms from very low concentrations in water and sediment.
Effects of copper, chromium and mercury are enumerated on respiratory, feeding, breeding and production rates of the fish *Tilapia mossambicus*, primary productivity of water and population of zooplankton, chironomids and snails of the ponds. The sources of mercury compounds, their presence in water bodies, their effects on plants, animals and man and their control in the environment have been extensively dealt.

The concentration of chromium and other heavy metals present in the discharged effluents of the tanning industry, i.e., leather industry, effluent, treatment methods and the toxic effects of these effluents in the environment have been discussed in general. Biological treatment methods for petrochemical waste have been advocated by first allowing algae or fungi to grow on them so that heavy metals, i.e., Al, Co, Cu, Hg, Mo, Pb and Zn can be removed and then treated with bacteria, which ultimately breakdown the organic waste.

There are number of definitions of pollution in current usage. A recent dictionary of life science defined pollution as “the presence in the environment of significant amounts of unnatural substances or abnormally high concentration of natural constituent at a level that causes undesirable effects, such as bronchial irritation, corrosion, or ecological change” such a definition is probably too broad to be useful.

Pollution is a problem of serious concern ever since untreated sewage and industrial effluents are directly discharged into water bodies and on land. This trend is on an alarming increase with the growth of industries as well as of human population.

The national water commission stated (1993) that “Water gets polluted if it had been not of sufficient high quality to be suitable for the highest use for people who wish to make all out of it in present or in the future”.

A very important source of information about water pollution is that it affects aquatic life. Tens of millions of fish are killed each year by a wide variety of different pollutions from different sources municipal and industrial.
In last twenty years, the coastal areas of South Gujarat and adjoining areas have been converted into a huge industrial belt with establishment of several complex industrial estates like Rayon factory, Textile factory, Paper mills, Fertilizer factory, fluoride manufacturing factory etc. The Rivers and Estuaries namely Auranga, Kaveri, Mindhola and Vishwamitri have become partially or completely polluted.

Toxicity is biological property but not a biological function “it’s wide spread use in industry and its high toxicity distinguish copper as the most potential hazardous metal released in the environment”. Copper is an essential element for living organisms and as a result of evolution humans and other higher animals have elaborated mechanisms for the absorption compartmentation and metabolism of copper that minimize its toxic effects.

We have the largest fresh water available for the fisheries. But due to increased industrialization and its toxic effect on the environment there is depletion in the fish catch day by day.

River coastal areas tend to be heavily polluted due to industrialization. It is polluted with a wide variety of toxicants, pollution and pollutants are resultants of the technological society with high standards of living. There are many types of pollution on the Globe by heavy metals particularly Zn, Cd, Cu, Al, Ni etc.