CHAPTER-I

INTRODUCTION
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Pollution means the addition of any foreign material (inorganic/organic, biological or radiological) or any physical changes brought into the natural environment which may harmfully affect the life (human, agricultural or biological) directly or indirectly, irrespective of time and space (Kudesia, 1990). It can also be defined as the deterioration in the chemical, physical and biological properties of a medium brought about mainly due to the continuous addition of pollutants of any type.

The world 'Pollution' is derived from the latin word 'Pollutionem' meaning defilement (Huney, 1966). Today, water resources are being exploited since man stood on the Earth. Wide spread of human activities and industrialization with rapid population growth and increase in living standards are recurring problems are one hand and development in technical knowledge and self stability in some of the fields on other. are the net results of present century. However, if we don't balance with natural conditions, time is perhaps not too far, when pure and clean water may be scare and inadequate for maintaining normal life.

Therefore, study of pollution on different aspects has to be considered as a basic unit not only in the public health, but also in
conservation of desthetics and preservation of natural beauty and resources.

Modern agricultural practices pollute the soil to a large extent. Today, with the advancement of agro-technology, huge quantities of fertilizers, pesticides, herbicides, weedicides, and soil conditioning agents are being employed to increasing the crop yield.

A number of industries like textile, pesticides, paint, dyes, soap and detergents, tanneries synthetic drugs, paper and pulp, sugar, steel, electroplating and metal industries, releases their hazardous effluents in water and soil and induce indirectly disastrous effects on living organism.

Source of Pollution

(A) Water

Water is one of the prime necessities of life, and essential constituent of all living organisms on one hand, and essential for the sustainable growth of physical matters, and other human activities, on the other

All over the country, industries are established invariably in the proximity of major rivers, streams and lake systems and at the same time, concurrent human populations are also settled around these industrial zones. Right from the beginning of the industrialisation, it was
excepted in principle that, the industrial growth should go hand in hand with purity of environmental quality, but due to lack of environmental planning, it has been resulted in pollution explosion.

Day by day, and discharge of domestic waste, sewage and untreated industrial effluent into aquatic media or on open land, sea problems becoming more acute. It is observed that, most of the Indian rivers receives pollutant from different sources like industries, and sewage waste. Lakes in the vicinity of urban areas, receive heavy load of domestic sewage and industrial effluents, and resulted in forming algal blooms, abnoxious odours and finally eutrophication and of death of aquatic animals. Dolar et al.;(1972); Abdul and Anderson (1973), Baver and Gardner (1972), Bose et.al;(1973), Hodces (1973) and Ghosh (1966).

Sources of water pollution can be categorised as:

(1) Ooz of decomposed animals and vegetable materials.

(2) Industrial effluents and

(3) Sewage and Municipal wastes.

Keeping the view of public health in mind, present study has been formulated to know the present status of water being used for different purposes, and soil texture in the vicinity of Aurangabad. This would help to establish working model in pollution studies and to measure the level of pollution load in water resources of the city. There
are many incidences of the casualties occured in ships, goats, fishes, and birds, during last few years. No efforts however, have been made either by the Government or private agencies to have any preventing measures, or at least ready information about.

For the present study, twelve water and 7 soil sampling stations are selected to study the physico-chemical parameters, planktonic population and bacterial count. Water samples are collected every month for the period of two years, from different places like, industrial area, Chikalthana (Surface and underground water), municipal sewage, salim Ali lake (Delhigate Talab), T.B. Hospital Pond (Aamkhas reservoir), Slaughter house, Paper and pulp mill and sugar factory (Paithan).

Among 12 water sampling stations, some of them are located on the Nullah flowing through the industrial area Chikalthana, (Naregaon, Powerloom, Chaudhari Nagar and Chikalthana Bridge). A distance about 1 Km was kept between two stations during the sample collection. Beside these 10 sampling stations, Number 11 and 12 are located in the industrial area of Paithan (Aurangabad).

Following are the sampling stations selected for water analysis:

1. Naregaon nullah, MIDC Chikalthana,
2. Powerloom Nullah, MIDC, Chikalthana,
3. Chaudhari nagar Nullah, MIDC Chikalthana,
4. Chikalthana Bridge near Chikalthana,
5. Babanrao Dhakne High School (Well) near Chikalthana,
6. Tube well (Naregaon) MIDC, Chikalthana,
7. Salim Ali lake (Delhi gate talab),
8. T.B. Hospital pond (Aamkhas reservoir),
9. Municipal nullah, near Bus Stand,
10. Slaughter house, near Padegaon,
11. Paper and pulp mill (APM) MIDC, Paithan,
12. Sugar factory, MIDC, Paithan.

Similarly, out of seven sampling stations selected for the study of soil quality, two sampling stations are located in the industrial area of Chikalthana, one at the out skirt of city, the slaughter house near Padegaon village, and another a botanical garden of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

People residing around the sampling stations, are using this effluent as water for vegetables cultivation as well as for other agriculture purposes. Recently, casualties are recorded in goats and fishes in the vicinity of Chikalthana industrial area on consumption of such effluent (water).

The degree of pollution can generally be assessed by estimating physico chemical characteristics such as biochemical oxygen demand (BOD) which is widely recognized as one of the important parameters. pH, Total Solids (TS), Hardness, Chloride, Carbon dioxide, Heavy
metals, Phenol, Cyanide, Sulphate, Phosphate, Nitrate are also important parameters in water pollution studies.

The present work went through the periodical check up of variations in pH, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Carbon dioxide, Hardness, Chloride, Sulphate Phosphate, Nitrate, Total Solids, Total Dissolved Solids and Total Suspended solids etc. of water samples and exchangeable calcium, exchangeable magnesium, organic carbon, organic matter, free calcium carbonate, available phosphorus and nitrates of soil samples at the sampling stations mentioned in the text.
TOPOGRAPHY OF THE SAMPLING STATIONS:

(1) Naregaon Nullah, MIDC, Chikalthana:

The sampling site (No. 1-W) is about 10 Km away from the University Campus. The Nullah is famous due to its worst conditions and its use (effluent) by the people residing around, for the agricultural purposes. This Nullah carries mixed type of effluents discharged by different industries located.

(2) Powerloom Nullah, MIDC, Chikalthana:

Powerloom Nullah ((No. 2-W)) is located in the East about 11 Km from the University campus, carries effluents of different industries like metal industry, hard board making, baking industry, Ellora steel and Pharmaceutical industry. Population which is settled around, facing many health problems. Some time casualties are also recorded on consumption of water (effluent) flowing through.

(3) Chaudhari Nagar Nullah, MIDC, Chikalthana:

Sampling point at Chaudhari Nagar Nullah ((No. 3-W)) is located in the industrial area Chikalthana about 12 Km away from the University campus and receives mixed industrial effluents of the industries like, Maharashtra Distillaries, Paper Mills, Pharmaceutical industries and Domestic waters.
Station No. 1-W. Naregaon Nullah, MIDC Chikalthana,

Station No. 2-W. Powerloom Nullah, MIDC, Chikalthana,
Station No. 3-W.  Chaudhari Nagar Nullah, MIDC Chikalthana,

Station No. 4-W.  Chikalthana Bridge Near Chikalthana,
(4) Chikalthan Bridge, near Chikalthana:

Chikalthana Bridge (No. 4-W) is located in the industrial area and about 24 Km away from University campus. It carries enormous amount of sewage along with industrial wastes from city and industrial area of Chikalthana.

(5) Babanrao Dhakne High School, near Chikalthana:

The sampling point (Well) (No. 5-W) is located about 15 Km away from the University campus, on Aurangabad - Jalna high way near Chikalthana village.

(6) Tube well, Nargeaon, MIDC, Chikalthana.

The sampling point tube well (No. 6-W) is located in the industrial area Chikalthana (Naregaon), and about 10 Km away from the University. The station has been chosen to study of ground water quality.

(7) Salim Ali Lake, (Delhi Gate Talab):

The sampling point (No. 7-W) is about 5 Km from the University Campus. Now a days it has became a store house for municipal waste along with the detergents washars. However, during the last few years, many casualties have been recorded in aquatic life. No care, till today, has been taken by the municipal authority however, it is declared a picnic spot.
Station No. 5-W. Babanrao Dhakne High School (Well) near Chikalthana,

Station No. 6-W. Tube well (Naregaon) MIDC, Chikalthana,
(8) **T.B. Hospital Pond (Amkhas reservoir):**

It is located in North-East direction at a distance about 3 Km. The T.B. Hospital pond ((No. 8-W)) is very shallow and encircled by slums. It receives the feacal matter along with waste of medical materials (usage) and garbages.

(9) **Municipal Nullah (Central Bus Stand, Aurangabad):**

The sampling station (No. 9-W) is a narrow and long tremied flow adjoining to central bus stand, located at about 5 Km from the University in the South-east, and receives and remain flooded with waste of the streamlets of drainages of Muncipal waste, domestic sewage and trade waste and refuses.

(10) **Slaughter House (Padegaon Village):**

The sampling station (No. 10-W) is located to the west of University at a distance about 5 Km near Padegaon. Bulls and Buffelows are being slaughted daily and the blood, washer and waste entrails are disposed in to the nearby flowing nullah flows in the North - South direction. The main effluent is blood and dicomposed materials (entrail material) which smell very unpleasant.

(11) **Paper and Pulp Mill (APM), MIDC, Paithan:**

The Aurangabad Paper Mill (No. 11-W) is located at Paithan industrial area about 50 Km away from the Aurangabad. The mill during paper making process, releases large volume of effluent which alters the physical, chemical and biological characteristics of surface and underground water (lentic and lotic) and land at higher extent.
Station No. 7-W. Salim Ali lake (Delhi gate talab),

Station No. 8-W. T.B. Hospital pond (Aamkhas reservoir),
Station No. 9-W. Municipal Nullah, near Bus Stand,

Station No. 10-W. Slaughter House, Near Padegaon,
(12) **Sugar Factory, MIDC, Paithan:**

Sampling station (No. 12-W) it is located at Paithan MIDC area about 50 Km to the South of the Aurangabad, contains a large amount of dissolved organic matter and mollases. The effluent is spreaded over open land causing serious damage to aquatic life when mix during runoff with nearby water body.
Station No. 11-W. Paper and Pulp Mill (APM) MIDC, Paithan.

Station No. 12-W. Sugar Factory, MIDC, Paithan.
(B) SOIL

Crux of the waste problem on land lies in the leachates and mounting amount of wastes. The leachates which oozes out, are known to move slowly through the layers of the soil beneath. However, the problem of soil pollution has been relatively became severe since long time.

As a result, hazardous chemicals that enters in to food chain through soil or water, finally leads to serious health problems to living organisms including humanbeings.

(1) Municipal Nallah, near Anjali Cinema.

This Nullah (No. 1-S) flow with the length of city. Its starts from industrial area CIDCO and joins river Khanin South-West direction. It carries domestic wastes of city

(2) Powerloom Nallah, MIDC, Chikalthana.

Sampling station (No.2-S) it receives effluents of various industries such as Radient agro, Metal casting industries, Ellora steel, Paper board industries and Pharmaceutical industries.

(3) Anil Chemicals, MIDC, Chikalthana.

Station (No.3-S) located in the industrial area Chikalthana about 10 km. from the University campus in North to South directions.
Station No. 1-S.  Municipal Nullah, Near Anjali Cinema.

Station No. 2-S.  Powerloom Nullah, MIDC, Chikalthana.
Station No. 3-S. Anil chemical, MIDC Chikalthana.

Station No. 4-S. Paper and Pulp Mill (APM) Paithan.
It receives effluents from Anil Chemicals Ltd. and other industries located around.

    Station (No.4-S) It is located at the 45-50 km away from Aurangabad in industrial area of Paithan.

(5) Sugar Factory, MIDC, Paithan.
    The sampling station (No. 5-S) is situated at the Paithan industrial area about 45-50 km away from Aurangabad. The effluent of the sugar factory is spread over in the open space.

(6) Slaughter House
    The sampling station (Slaughter house) (No.6-S) is about 3 km away from the University campus near the village Padegaon. Daily bulls and buffalows are slaughtered and the blood and washers alongwith entrails are thrown near into open area.

(7) The Botanical Garden, Dr. B. A. M.University, Aurangabad
    Station (No. 7-S) it is in the University Campus, and having no connection with either effluents or city refuses and hence, it is treated as a non-polluted site.
Station No. 5-S.  Sugar Factory, MIDC, Paithan.

Station No. 6-S.  Slaughter House, Padegaon Village.
Station No. 7-S. Botanical Garden, Dr. Babasaheb Ambedkar Marathwada University.
To concise the study, work has been divided into following chapters to elaborate the data recorded in detail, as follows:

Chapter : 1. **Introduction**

Chapter : 2. **Material and methods**

Chapter : 3. **Results**

Chapter : 4. **Discussion**

Chapter : 5. **Significance of effluent treatment plant (ETP).**

Annexure : **Summary.**