CHAPTER - II
REVIEW OF LITERATURE

Water pollution is a very serious problem now days. The seriousness of this problem has attracted various workers and authors in India and abroad.

Theriault, et al. (1932) described that the analysis of dissolved oxygen is important in water pollution.

Howard (1933) defined a well mixed sample is evaporated in a weighed dish and dried to constant weight in an oven at 103 Degree centigrade to 105 Degree centigrade. The increase in weight over that of the empty dish represents the total residue.

Ellis (1937) pointed out the breathing distress in fish resulted from clogging of the gills due to precipitated mucus in addition to direct damage caused by organic matter.

Ruchhoft, et al. (1942) studied that the dissolved oxygen is necessary for all aerobic biological waste water treatment processes.

Fry (1947) described that the favorable and unfavourable concentrations of environmental factors, such as DO, pH, Temperature, Turbidity for aquatic life.

Jullander (1949) described that the Turbidity of water is interested for two main reasons first, Turbidity is an important parameter for characterizing the water quality. secondly, knowledge to the Turbidity allows an estimate to be made of the concentration of undissolved substances.
Diehl, et. al. (1950) studied that the water hardness was understood to be a measure of the capacity of water to precipitate soap. Soap is precipitated chiefly by the calcium and magnesium ions present.

Mohlman, et. al. (1950) studied that the biochemical oxygen demand test is widely used to determine the pollutional load of waste waters.

Sawyer, et. al. (1950) described that the biochemical oxygen demand is an approximate measure of the amount of the biochemically degradable organic matter present in the sample.

West, et. al. (1950) described that the ratio of sodium to total cations is important in agriculture and human pathology. Soil permeability has been harmed by a high sodium ratio.

Barnes, et. al. (1951) described that the nitrite is an intermediate oxidation state of nitrogen, both in the oxidation of ammonia to nitrate and in the reduction of nitrates.

Doudoroff (1951) studied a factor applied to acute toxicity tests to estimate toxicant concentration that is safe for chronic or lifetime exposure of test organism.

Knight (1951) observed that the turbidity in water is caused by suspended matters, such as clay, silt, finely divided organic and inorganic matter.

Medallia (1951) studied that the limitation of chemical oxygen demand test lies in its inability to differentiate between the biologically oxidizable and biological inert material.
which changes its natural qualities.

Hildbrand (1953) studied that the concentration of sulfate in most fresh water is low although levels of 20-50 mg/l are common.

Rounsefell, et. al. (1953) that the fish may be collected by various methods such as seining, Trapping, Trawlnetting Electrofishing and use of chemicals.

Sawyer (1953) observed that the ammonia is naturally present in surface and waste water. Higher concentrations occurs in water polluted by sewage and some kinds of industrial waste containing organic nitrogen, free ammonia of ammonium salts.

Beck (1954) studied that in stream and river work, locate stations up stream and down stream from suspected pollution sources and major tributary streams.

Mckenzie, et. al. (1954) studied that the organic kjeldahl nitrogen is obtained by subtracting the value of Ammonia nitrogen from the Kjeldahl nitrogen value, alternatively it may be determined directly by removal of ammonia before digestion.

Larson, et. al. (1955) determined that the acids contribute to corrosiveness and influence chemical reactions rates. chemical speciation and biological processes. The measurement also reflects a change in the quality of the source water.

Degen, et. al. (1956) reported that the preservation of the sample is not practical, analysis should be carried out as soon as possible.
Moloche (1956) observed that the discharge of domestic and industrial effluents, is another important source of sodium.

Smith (1956) described that the field investigation consist of visual observation, sampling of fish, water and other biota and physical measurement of the environment.

Brown (1957) studied that the growth rate is an important response of fish to toxicant and environmental factors.

Kolthuff, et. al. (1958) studied that the pH determination helps in ascertaining the nature of impurity. The pH values much lower or higher of waste waters and polluted natural water.

Nusbaum (1958) defined the suspended solids are those solids which are retained on a standard glass fibre filter dish.

Beyers, et. al. (1959) described that in poorly buffered waters, pH can be sensitive property detecting variation in the system. As carbon dioxide is removed during photosynthesis, the PH rises. This shift can be used to estimate both photosynthesis and respiration.

Klein (1959) described when samples are collected from a river or stream, analytical values may vary with depth. Stream flow and distance from shore and from one shore to the other.

Rain water, et. al. (1960) reported that sample collected at mid-stream and the direction of flow.

Lagler, et. al. (1962) described that the fish as aquatic organisms are well known and also have economic value. They are the
most intelligible symbol of water quality to the general public and are important for public relations purposes as well as technical interpretations.

Lewis (1962) studied that the to use good quality water. Feed fish natural or prepared foods daily during acclimation.

Dobbs, et. al. (1963) described that the chemical oxygen demand test is widely used to determine the polluttonal loads.

King, et. al. (1964) studied that the biological methods used for measurements of metabolic activity rates and biomagnification of pollutants.

Lennon, et al. (1964) considered in fish, true growth occurs only when there is an increase of protein.

Burdick (1965) studied that the fish kills may be caused by such natural events as acute temperature change and snow covers, decomposition of natural materials, salinity change, parasites and bacterial and viral epidemics. Human caused fish kills may be attributed to municipal or industrial water, agricultural activities and water control activities.

Ingram. et. al. (1966) described the biological methods used for measuring water quality include the collection, counting and identification of aquatic organisms. Measurement of toxicity, pollutants and processing interpretation of biological data.

Shannon et. al. (1966) studied that the phosphates promote eutrophication and is indicative of pollutional conditions.
West, et al. (1966) observed that the nitrate generally occurs in trace quantities in surface water, but may attain high levels in some ground water.

Mackenthum, et. al. (1967) believed that gill damage and copious secretion of mucus restricted the respiration and were responsible for death in fresh water fish.

Mackeown, et. al. (1967) reported that the dissolved oxygen levels in natural and waste water depends on the physical, chemical and biochemical activities in the water body.

Mount, et. al. (1967) determined the effects of environment factors on waste toxicity.

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Johnson (1968) pointed out that it is the cellular damage of gill that cause the respiratory distress and not the mucus coagulation. Fish death is caused due to suffocation.

Carlander (1969) studied that the weight in grams and total length in centimeteres of each fish. Total length is defined as the distance from the anterior end to the top of fins.

Sprague (1969) studied that the suitability of environment conditions of aquatic life.

Winter, et. al. (1969) described the acidity is a measure of an aggregate property of water and can be interpreted in terms of
specific substances only when the chemical compositions of the sample is known.

American society for testing and materials (1970) published the alkalinity is significant in many uses and treatments of natural and waste waters. Because the alkalinity of many surface water is primarily a function of carbonate, bicarbonate, and hydroxide content it is taken as an indication of the concentration of these constituents.

Ecken, et. al. (1970) described that the chemicals are very toxic and their presence in water.

Hynes (1970) studied that the Toxicants may interfere with survival, growth, reproduction emergence and metabolism of aquatic organisms.

Sprague (1970) concluded that most of heavy metals precipitated in mucous and formed constituents in the body of fish. They also concluded that fish gills contained seven and eight times more heavy metals then the whole body of fish.

Kemp. et. al. (1971) described that the fish have been used more widely for bioassays then any other group of aquatic organisms.

Ricker (1971) studied that the fish production in a given body of water is indicative of water quality.

Sprague (1971) observed a decrease in the oxygen consumption of guppies (Lebistes reticulata) in the toxic concentration of some organic matter.
Tarzwell (1971) described the bioassays are necessary in water pollution evaluations because chemical and physical tests alone are not sufficient to assess potential effects of aquatic biota.

Warren, et. al. (1971) studied the effect of chemicals on digestive system of teleost fish.

Hach (1972) observed that the turbidity may be caused by a river domestic and industrial wastes are added.

Talley, et. al. (1972) reported that do not store sample for long period because irreversible changes in turbidity may occur, vigorously shake all samples before examination.

Sladecek (1973) studied that the age and growth rates are useful for determining the effects of water quality on fish populations.

Sprague (1973) studied that the death is the adverse effect most often used to reflect toxicity. The usual criterion for death is no movement, especially no gill movement in fish.

Vandunn (1973) studied, when large numbers of organisms are retained in a relatively small space, undesirable growths, diseases and parasites become a problem.

Chakrabarty, et. al. (1974) observed that decrease of oxygen consumption was mainly due to reduced efficiency of gills.

Hoffman, et. al. (1974) described if fish are severely diseased destroy the entire lot.
Benoit, et. al. studied that the chronic toxicity related to changes in appetite growth, metabolism, reproduction and even death or mutations.

Brown (1975) recorded that increased gill ventilation, decreased oxygen tension in the arctic blood and slower rate of oxygen consumption of fish.

Committee on methods for toxicity tests with aquatic organisms (1975) published that in any one series of tests, use fish from the same year classes. The length of the largest fish should not be more than 50% greater than that of the shortest fish.

Basak, et. al. (1976) concluded that the death of a fish under experimentation, is caused due to suffocation.

Doudoroff (1976) explained that an interaction between the mucus and heavy metal ions takes place resulting in the formation of coagulated on the surface of gills, which interferes with the process of gaseous exchange.

Kopperdhal (1976) studied that do not use static test for high B.O.D wastes because D.O. depletion may stress test organisms.

Sarcar et. al. (1977) explained a biological method for monitoring water pollution level.

Slobadan (1977) worked on the metabolism of toxic chemicals in growing organisms.

Bates (1978) studied that the pH is used in alkalinity and Carbon dioxide measurement and many other acid-base equilibria.
Shastry, et. al. (1979) studied that the effect of methyl mercury on protein synthesis in liver of European carp.

Singh, et. al. (1979) described that the respiration rates with increasing concentration of chemicals.

Sharma, et. al. (1980) reported that the large amount of water passes through the gills responsible for respiration and obviously the precipitation of organic matter in the gills.


Richey, et. al. (1981) studied fluxes or organic matter in rivers relative to the global carbon cycles in Lickens.

Akolkar, et. al. (1981) reported that low population of fishes at Phaphamau site may be due to the low DO. In this site which caused them to migrate to areas where DO concentration is higher. Central Board for the prevention and control of water pollution (1982).

Rowney, et. al. (1982) studied stimulation of isolated parameters.

Whitemore, et. al. (1982) prediction ability of varying complexity examined sensitivity by perturbing one parameter from a given value by a constant amount (i.e. 50%) while the others are kept constant.

Diezens, et. al. (1982) studied transport of carbon and minerals in major world rivers.
Chowdhury, et. al. (1982) studied carbon transport in Ganga and Brahmaputra. Preliminary results suggest that significant quantities of organic carbon are transported by these rivers during the flood periods.

Chowdhury, et. al. (1983) studied the development of Ganga basin because Ganga basin is the largest and can be utilized for overall development for irrigation covers to an area of 18 x 10 hectares.

Dray, et. al. (1983) studied the contribution of isotopes techniques in the determination of the relationship of surface water/ground in Bangladesh/Ganga and Brahmaputra areas.

Ittikot, et. al. (1983) collected some preliminary data on particulate and dissolved amino acids and Amino sugars, amino acid N, and Amino sugar N, and discharge of organic N load of the Ganga has been published.

Richet, et. al. (1983) collected data for mobilization of N.P.S. from land to the tributaries and them to the main channel and exchange of the fluxes with the flood plain.

Wollast, et. al. (1983) reported the increase of the dissolved nitrogen fluxes in rivers represent 30% of the nitrogen fixed annually during combustion processes and fertilizers production. For phosphorous the increase is only 15% of the total phosphorous mixed annually.

Walker, et. al. (1983) studied waste load allocation and general river water quality status identification.
Maron, et. al. (1983) described mutagenicity of water samples against Ames tester strains TA 97 and TA 102.

Higler, et. al. (1983) reported *Hydropshyche* larvae as bioindicator. Higher concentration of Lamillebranchs and Turtles were also observed at cremation sites, because these genera are reported to feed on dead organic matter.

Shukla, et. al. (1983) studied on algae and their significance.

Shanker, et. al. (1983) reported role of mycoflora or fungal composition of fresh water eco system (espically of Ganga water).

Tan, et. al. (1984) observed fungi play an important role as decomposers in maintaining the equilibrium in an ecosystem. It is a fact that fungal population is affected by variation in ecological conditions.

Mahadevan, et. al. (1984) reported the chironomid population of the sampling site was found to be directly proportional to the pollutional status of the site and may be used as a direct indicators of pollution at various levels.

Hamilton, et. al. (1984) observed that the river Ganga has carried the heavy metals from the point of discharge into the river and biota of the river has not been able to degrade/decrease the heavy metals studied. Metals are also released in the sediments through biochemical cycling and turbulence.

Mukherjee, et. al. (1984) surveyed the keeping of Ganga water at room temperaturn possibly due to intense activity of bacteriophages.
Whitehead, et al. (1984) revealed that through models are being developed and used by planning, design and operational management agencies in many countries on application of water quality models.

Incog, et al. (1984) evaluated the impact of the waste water treatment plant on rivers to which its effluents are being discharged.

Adoni, et al. (1985) reported that the quality of water also affected by the energetic values of the animals.

Bilgrami, et al. (1985) studied the impact of human activities such as throwing of burnt and half burnt bodies which results in the increases of the organic matter and growth of bacterial population which increase the zooplankton density.

Mathur, et al. (1987) reported that the very high concentration of metals in sediments as compared to river water may be due to the fact that at alkaline pH, the metals present in the water probably get hydrolysed and then deposited in the river bed.

Mukhopadhyay, et al. (1987) concluded that the deterioration of haematological condition in fish might be indicative of stress in the environment of the fish.

Khapalia, et al. (1988) reported the biological activities of different animals also play an important role in building up of the residues of non bio-degradable pesticides at various levels of food chain.

Shaha, et al. (1988) studied the water quality index between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) and concluded that higher
WDL at Jajmau & Shuklaganj pumping station maybe due to the discharges of effluent.

Tiwari, et al. (1989) reported that fishes collected from the selected sites. Sitewise variation in the concentration of proteins and carbohydrates in the tissues of selected animals indicating that the water quality plays an important role.

Yousuf, et al. (1989) studied the zooplankton density at selected sites and found that zooplankton density was maximum in summer and minimum in rainy season.

Pandey, et al. (1989) studied the physico-chemical aspect of Ganga water form Kannauj to Shuklaganj.