“Water is the best of all things in twenty first century” The importance of this statement has become evident in the world. Throughout history the water has been considered a natural resource for human survival. No body can imagine life without water. Water is our basic need even animals and plants can’t survive without water. Water is our prime necessity but today our natural water resources which are the base of our life are polluting gradually. The main cause of water pollution is human activities. Today we are going fast towards the way of sources although the man is touching the nearest perfection yet on the side he is the prime accuse for the exploitation of the planet and its water resources. So that scientists of the world are seriously working in the field of water. Man’s interest in water is as old as the history of man himself on the earth people of ancient times seemed to be concerned about water quality as they had realized that it was one of the most absolute necessity for life various aspects of physico-chemical and biological characteristic of water bodies have been discussed from time to time by different workers from India and abroad. How ever it is hard to write the name of all scientists, Limnologists and Hydrologists who worked on various aspects of physico-chemical and biological characteristics of aquatic ecology.

This review includes some of important contributions made from various part of the globe. Several studies were carried out on the physico-chemical properties of water bodies to reveal their pollution status the important workers including. Dutta et. al., (2000) who studied the
physico-chemical status of a pools adjacent to the river Tawi. Shasteri and Panday (2001) carried out a study on Dahikhuta reservoir, near Malegaon, Maharashtra. Anupam Kumari et al., (2001) studied the concentration of organochlorine pesticide residues in Ganga water in Bihar, India. Jain (2002) has been carried out a hydro-chemical assessment of sediment and nutrient load to evaluate the current state of pollution through real time measurement of mountainous watershed: The Ganga, India. Gupta (2003) studied the impact of domestic water on water quality of four site along the corridors of river Ganga and Gaghra and concluded that the water of all targeted sites was unfit for drinking purpose. Sharma et al., (2003) studied environmental impact assessment in the Moradabad industrial area Ganga plain, India and observed significant concentrations of arsenic, chromium, copper, nickel, lead, zinc and organic carbon there.

Sing et al., (2004) studied the water quality of river Ganga at Ghazipur District and found high level of coliforms in water. Chakrampani (2005) studied the geochemistry of major and trace element in upper Ganga River in the Himalaya, India. Mishra (2005) presented a report on pollution status of river Ganga at Varanasi and observed very high level of B.O.D. and coliforms in river water. Kole et al., (2005) evaluate the water quality index of river Ganga in West Bangol and recorded Pb constants in 83% of water samples were far exceeded the permissible limit (0.05mg/l) prescribe by U.S.E.P.A. It was concluded that the water of river Ganga was not suitable for drinking purpose on this site. Dutta (2005) studied impact assessment of lead on water quality of river Ganga in West Bangal. Afreen Jaffer and Naheed Sultana (2006) carried out a study on seasonal variation in physicochemical parameter in river Ganga at Kanpur and reported pH, temperature and dissolved oxygen were observed maximum during summer season whether
turbidity and suspended solids were recorded maximum during monsoon season. T.D.S, alkalinity, hardness and chloride were recorded maximum during winter season. Sharma (2006) et. al., carried out a study on assessment of pollution load in holy lake Manasi Ganga at Goverdhan distt Mathura U.P and found frequent visiting of pilgrims, their bathing and pouring of pooja samgeri milk and unknown animal waste were major factor for deteriorating quality of the lake water. Nyano et. al., (2007) carried out a study on physic-chemistry of river Nun in the Nigeria delta.

Sakcali et. al., studied the pollution level of rivers of Edirne region- Turkey and found P, Cu, Pb, Ni, Mn and Co were found in high concentration at all sites. Sinha et. al., (2007) carried out a holistic study on mercury pollution in the Ganga river system in Varanasi U.P and concluded that the mercury in Ganga river followed a trend of : water > sediment > benthic macro invertebrates > fish , annual concentration in vegetation samples was recorded 2.00 ppm . Beg and Ali (2008) studied the status of chemical contaminants and toxicity of Ganga river sediment from up and down stream area at Kanpur, the study revealed that the seed germination bioassay may be used to differentiate contaminated and uncontaminated sediment. Mishra (2008) et. al., made a study on the mobility of heavy metals in the river Ganga at Mirzapur and concluded that the increase level of metals in river water might be due to absorption of cations by organic matter as a result of negative of collides and sedimentation. Sinha et. al., (2008) has done statistical regress analysis of water quality parameters of Ram Ganga river of Moradabad U.P. Beg and Ali (2008) carried out a study on microtox toxicity assay for sediment quality assessment of river Ganga. Saxena et. al., (2009) carried out physic-chemical and biological studies of dhamola river of Saharanpur and recoded the high level of B.O.D, C.O.D, T.D.S, T.S.S and M.P.N
there. Eisakhani and Malakahmed (2009) worked on water quality assessment of Bertam river and its tributaries in Cameron highland, Malaysia and concluded that the water of Bertam river was highly polluted and might be cause of some serious disease. Awasthi and Deepika Shikha (2009) studied the removal of hexavalent chromium content at the exit point of river Ganga at Kanpur. Panday, et. al., (2009) studied the metal contamination of river Ganga as influenced by atmospheric deposition. Jamir and Sing (2010) focused their work on physic-chemical studies and trace elemental analysis of some spring in some selected district of Nagaland, India and found at many sites the level of Pb, Fe, and Mg were in elevated values.


**Phytoplantonic Studies of River water**- Phytoplanktons are the health indicator of river, many workers worked on their presence and activities in river water. In this review we include some of important contributions as. Khanna et al., (2010) carried out study on phytoplanktonic status of river Ganga near Haridwar city. Twiss et al., (2012), Romenov et al., (2012), Lie Hong zhang et al., (2012), Altman et al., (2012) and Zhau Weihou et al., (2012) studied the community structure and seasonal variation of phytoplankton. Stankovic et al., (2012) studied the Phytoplankton functional and morpho-functional approach in large floodplain rivers and found Bacillariophyceae and Chlorophyceae species dominated the phytoplankton assemblages in all rivers.

Hu ChangWei (2012) worked on Phytoremediation of the polluted Waigang River and general survey on variation of phytoplankton population and found improvement in water quality enhance the diversity of phytoplankton. Wang Xiao Chen et al., (2012) study the Community structure of the phytoplankton and its relationship with environmental factor in lower reaches of the Yellow River. Ensign et al., (2012) carried out a study on Tidal geomorphology affects phytoplankton at the transition from forested streams to tidal rivers and suggested that the Future development of ecosystem and biogeochemical models for tidal freshwater rivers will benefit from the linkages between. Yu Hong Xian (2012) did a case study on Seasonal dynamics of phytoplankton functional groups and its relationship with the environment in river in northeast China and found Asterionella formosa, Cyclotella meneghiniana, Cocconeis placentula, Cymatopleara solea, Diatoma
vulgare, Ochromonas fragilis, Pinnularia major, Ulothrix variabilis, Fragilaria capucina, Fragilaris sp., Aulacoseira granulate, Aulacoseira granulate var. angustissima, Aulacoseira varians, Navicula exigua, Navicula radiosa, Chlamydomonas sp, Chroomonas acuta, Cryptomonas ovata, and Cryptomonas sp. were the dominant groups during the study period.

**Studies on fungal flora of rivers** - Fungi are the main component of ecosystem. Fungi break down the dead organic materials into simple and environment friendly components. So fungi play a very important role to make the environment clean by their activities. Fungi give a clear picture about the health of an aquatic ecosystem. So it is essential to monitor the abundance of fungi in our aquatic systems, many workers time to time focused their work on fungal flora of various aquatic systems, in this review we include some important contributions as Ulfig et.al., (1997) made a survey on seasonal changes of keratinolytic fungi in sediments of Catalonian river.

Grabinska et.al., (2004) demonstrated the contamination of water distribution system and studied the fungal flora of it. Archilla et.al., (2004) carried out a study on characterization of fungal populations of Tinto river, an extreme habitat with an extremely low pH and high concentration of heavy metals and revealed an unexpected level of microbial richness. Kiziewice et.al., (2004) conducted a study on water fungi occurrence in the river Supral – Jurowce bathing place near Bialystok. Samir et.al., (2008) conducted a study on microbioaota of surface sediments (with special reference of fungi) from Shatt al Arab River and its cruks at Basrah city, was surveyed by three isolation methods, one hundred and forty one species assigned to 70 genera were isolated from 40 sediments samples. Christian et.al., (2010) carried out a study to
highlight the presence of ecological role of fungi in lakes, the aims of this study was to stimulate research in aquatic mycology. Jaiswal et al., (2012) carried out a study to improved knowledge of diversity of micofungi in river environment and selected the Bithoor as research site. During the study 36 samples of Ganga River sediment were carried out during Jan-Dec in low and high tide, In all 14 genera and 23 species were observed on these samples. Agbabika et al., (2012) made a survey on microbial and physicochemical assessment of foma River Itanmo Ilorin, Nigeria: an important source of domestic water in Ilorin Metropolis.

**Studies on effect of leather tanneries on physico-chemical characteristics of rivers** - The leather tannery industry besides being a major contributor to the Indian economy, is unfortunately also one of the major polluters. It is also leaving the adverse effects on the physico-chemical characteristics of river water and sediments, time to time many workers focused their studies on this issue, some of them are included in this review.

Khwaja (1998) carried out a study on monitoring of Ganga water and sediments vis-à-vis. Tannery pollution at Kanpur and concluded that the water of river Ganga has a great load of pollution due to leather tanneries and it was suggested that it is essential to develop more effective treatment techniques for tannery waste. Ahmed and Nasir (1999) carried out a study on water pollution and its impact on flora and fauna of a polluted stream of Lahore with special reference of leather tannery effluent. Alvarez et al., (2006) studied the effect of tanneries waste water on chemical and biological characteristics of soil and water and concluded that continued irrigation with water from the river Tubio might increase sodicity and salinity that could deteriorate soil and pose a

Studies on the effects of river, domestic and leather industries pollution on seed germination and growth plants:

- The rivers are getting more and more polluted day by day, the pollutants present in rivers also lefts many adverse effect on physiology and anatomy of plants. Unfortunately very few works has been done on this topic and we are including some of most important work in this review.

Haslam et.al.,(2000) conducted a study on evaluation of river pollution using vegetation in Maltese island. Gupta et. al.,(2003) carried out a study on physicochemical and biological study of polluted Ganga water and its effect on *Ricinus communis* and suggest 80% concentration of Ganga water at Allahabad was more beneficial for irrigation purpose than 100% concentration .Gupta et. al., (2005) studied the effect of polluted Yamuna water on *Arachis hypogea* Backtypaeva et.al., (2011) studied the effect of heavy metal pollution on plant communities of the Tanalyk River, the Bashkir transural region. Diaz et.al.,(2010) made a survey on assessment of trace metal bioaccumulation and plant growth on river sediments and biosolids mixtures.Sahu et.al.,(2011) made a study on uptake of heavy metals by different spontaneous plant species grown along LanaRiver,Albania.

Domestic effluents and wastes are the main cause of point pollution in rives. High supply of sewage changes the physic-chemical nature of water and lefts many adverse effect on the health of rivers ecosystems. This type of polluted water causes many health threats on the plants when it used for irrigation purpose, many workers evaluate the effects of sewer water on plants in their study some of works are reviewed here as Mishra and Jha (1997) who observed the effect of polluted water of a drain on germination of *Avena sativa*. Fazeli et. al., (1998) studied the sewage

Naddaf et. al., (2005) made a study on effect of waiste water stabilization point on agriculture crops. Hussain et. al., (2006) conducted a study on hazards assessment of crops irrigated with raw sewage, spinch, bitter guard, avbegine, pumpking & Okara were selected as research plant to evaluate metal concentration in root shoots and fruits. Almost all the metal ions were observed above the safe limits in edible part of mentioned vegetables. Hence untreated effluent irrigation will not only make the soil unproductive but also have adverbs effects on human health through introducing metals into food chain. Shashikala et. al., (2010), Damasceno et. al., (2011) Barros et. al., (2012), studied the effect of domestic effluent on plants and found the domestic effluent has many organic substance due to which it has some fertilizer nature for plants but with this nature it also has some pathogens which were found more active at particular concentration of effluents. So they have suggested low concentration of domestic effluent for plant irrigation purpose. Nobre et. al., (2010) studied the Production of the sunflower under different depths of irrigation using domestic effluents and organic manure and found 60% concentration of effluent has given better result.
Huang Guan Hua et. al., (2011) studied the Effect of irrigation of turfgrass with treated domestic effluent on nitrogen contents in soil and plant and found average content of TN in plant after irrigation with effluent is approximately 50% higher than that after irrigation with potable water. The contents of NO$_3$-N in soil layers especially in the layers of 15-30 cm and 30-45 cm below surface with sub-drip irrigation of effluent are higher than that after subsurface irrigation with porous pipe with effluent, but there are no differences in contents of TN, NH$_4^+$-N and AN in soil between the two irrigation methods.

We are leaving in the age of rapid industrialization. The industrial revolution marked a major turning point in the earth ecology and human relationships with their environment. The Industrial revolution dramatically changed every aspect of human and plants lifestyles. The leather industry is one of the biggest industries in world, it greatly affects the economy of world beside this it is also accused for many environmental hazards. The industrial waste of these industries causes various lethal effects on plants growth and germination. Many workers and scientist has worked in this field. However it is difficult to give the name of all workers and scientist who worked on various aspect of pollution effect on plants. But few of them has been including in this review including Bera et. al., (1999) studied the effect different concentrations of tannery effluent on seed germination sedling growth and chloroplast in mung bean (vigna radiate) and suggested tannery effluent not be used in high concentration in the field but can be utilized as a liquid fertilizer for certain crops at 25% dilution level. Chauhan et. al.,(2001) found the leachates from tannery solid waist inhibit the mitotic division of plant with special reference of Viciafaba. Singh et. al., (2001) studied the effect of tannery complex effluents on the composition of raw sewage water for irrigation of crops. Amannath et. al., (2001) conducted
a study on relationship between productivity input and environmental quality in tanneries affected farm of Tamil Nadu. Costa et al., (2001) studied the tannery sludge effect on soil chemical properties matter yielding and nutrient uptake by soybean and found sludge addition at 500mg Cr/kg increase metal contains in soil not showing negative effect on soybean dry matter production. Castihos et al., (2002) conducted a study to evaluate the effect of leather tannery effluent on yield of wheat, lettuce and raddish and found leather tannery effluent causing adverse effect on these plants in high concentration. Tangavel et al., (2003) observed the effects of tannery sludge on content of chromium in soil and in different part of ground nut crop (Arachis hypogea) Mondal et al., (2005) studied the impact of leather tanneries on the nature of ground and river water and detected many carcinogens in water table. Gondikk (2005) carried out a study on the influence of soil treatment by untreated and composted tannery sludge on yield nutrient status and chromium content in maize crop. Nath et al., (2005) studied the chromium in leather tannery effluent and its effect on plants metabolism and growth with special reference of Raphanus sativa and suggested that the low concentration showed better growth than other higher concentration. Sinha et al., (2006) carried out their study on physic-chemical properties of the soil irrigated with tannery effluent and distribution of the metal in the edible plants grown at Jajmou Kanpur and found metal in some fruit part of vegetable such as bittergourd, egg plant, jack tree, maize and okra the Cr accumulation was not found.

Marti et al., (2007) did a ecological test assessment of soil polluted by chromium (VI) in this study carbon mineralization, plant germination and growth test have been performed and Lactus sativa was selected as research plant the highest toxicity considering the minimum concentration with toxic effects has been found in PCP (0.01 mg kg-1)
and for Cr it has been (0.1Mg kg\(^{-1}\)). Khannan and upriti (2007) made a study on impact of untreated and treated tannery effluents on seed germination and growth characteristics of Mung bean (Vigna radiata).

Nagy (2008) focused their study on effect of heavy metal on seed germination and root length in mining waste compost mixture and conclude that the enhanced ratios of compost caused phytotoxicity possibly due to its relatively high bioavailable Cu, Zn contents therefore it is not recommended. Araujo et al., (2008) conducted a study to investigate development of maize and soil fertility after application of tannery sludge and rock phosphate and found association of residue with rock phosphate increased maize development with the increase of available Phosphate in soil.

Sinha Sarita et al., (2008) observed the comparative growth responses of two varieties of Vigna radiate grown on different tannery sludge application: effect of treated waste water and ground water used for irrigation. Tayyar et al., (2008) studied the influence of tannery waste water on seed germination of some field crops wheat, Maize, rice, Chickpea, bean, sunflower and in the result found undiluted (0:1) tannery effluent significantly decreased and inhibited seed germination compare to other concentration. Alheiros et al., (2008) carried out a study on the effect of tannery wastewater on the development of different plants species and chromium accumulation in Phragmites australis and suggested that this plant might not be considered a chromium hyper accumulator.

Kadar and Morvani (2009) studied the effect of leather factory waiste water slug load on B, Ba, Ni, Co and Cu cycle in spring barely in pot experiment. Kaznina et al., (2009) were investigated the effect of high zinc concentration on the growth and photosynthetic apparatus of Setaria viridis under laboratory conditions and a vegetation experiment. The
experiments showed that zinc concentrations of 10-6 to 10-3 m did not influence seed germination but moreover zinc concentration (160 and 320 mg/kg substrate) inhibits shoot biomass, leaf area inflorescence length and biomass. Akan et al. (2009) conducted a study on physico-chemical pollutants in Kano industrial area, Kano state Nigeria and studied the physico-chemical properties of leather tanneries effluents collected from different site from June 2007 to May 2008 to relate the seasonal factor. Baby Skakila and Usha (2009) conducted a study on effect of tannery effluent on soil properties and plant growth.

Indera and Mycin (2009) carried out a study on germination changes of varieties of Vigna mungo under tannery effluent stress, in the result found that the low concentration of effluent promote the germination percentage. Nand Lal (2009) focused his study on the effect of acute tannery effluent toxicity on some biochemical parameter in Lemma minor by using different concentration of tannery effluent i.e 0 to 50%(V/V) in modified Hoagland solution and exposure duration of 48 and 96 hour and observd L.miner plant faild to survive at tannery effluent concentration beyond 25%. Alam et. al., (2010) studied the mutagenicity and genotoxicity of tannery effluent used for irrigation purpose at Kanpur. Khan and Khan (2010) has measured the effect of varing concentration of nickhel and cobalt on the growth and yield of Cicer arietinum. The plate has treated with six concentrations 0, 50, 100, 200, and 400 ppm in the result higher concentration found harmful for plant.

Baston and Carval (2010) considered leather tanneries solid waste as nitrogen source for growth of common bean plants. Morwani et.al., (2010)carried out a pot experiment to evaluate the effect of effluent of leather factory waste water sludge on the B ,Ba , Ni ,Co, and Cu cycle in spring barley in a pot experiment and found grain and straw yield of
crops increased 3-3.5 times than there previous value. The sludge load did not cause depression.

Kumari Manorma and Ansari (2010) did an experiment to evaluate the effect of leather tannery effluent on seed germination and survival of plant with reference of Capsicum annum and found 10% concentration of effluent showed highest germination percentage and plant growth expect 25%, 50%, 75%, 100%. Shiva et. al., (2010) studied the effect of different tannery sludge compost amendment rate on growth biomass accumulation and yield response of capsicum plant and suggested that capsicum may be good option to be grown on composted tannery amended soil. Firdaus – E- Bareen and Tahira (2010) focused their study on efficiency of seven different cultivated plant species for phytoextraction of toxic metals from tannery effluent contaminated soil using E.D.T.A and suggested lower doses of E.D.T.A are suitable for phytoextraction. Yadav and Ram Chandera (2011) studied the heavy metal accumulation and ecophysiological effect on Typha angesustifolia L. and Cyperus esculentus L. growing in distillery and tannery effluent polluted natural wet lend site, Unnao, India. Shiva et. al., (2011) carried out a study on germination and initial growth of ornamental capsicum and celosia in substrate composed tannery sludge and suggested that the leather tannery sludge compote may be a potential alternative for use as substrate in seedling production of ornamental capsicum and celosia.

Yadav (2011), Sing (2010), Nath (2009) and Shiza Khilji has given their view on effect of tannery effluent on physic-chemical properties of soil and its good and bed effect on some specific species of plants. Taghizadeh et. al., (2012) studied the potential of turf grass tolerance, regarding seed germination and plant establishment were evaluated in different concentrations of lead. In the initial stage the application of Pb (No₃)₂ at 0, 200, 400, 800 and 1000 mg/L was tested on germination.
Result revealed that the germination percentage, shoot and root length increased with increase in lead concentrations in comparison with control while there was an inhibition effect observed on root growth. Gupta et al., (2012) focused their studies on Phytogenetic assessment of tannery effluent and its effect on Allium cepa and found plant shows pyknosis condition after 168 Hour at high concentration of effluent and Cr. Wolinska et al.,(2013) focused his work on influence of old leather tannery on chromium contamination of soil water and plants.