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### Health Hazards of Water Pollution and its Legal Control with Special Reference to State of Punjab

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*The article focuses on the various causes of water pollution that render the drinking water either 'less fit' or 'not fit' for consumption by human beings and animals. The author illustrates the pollution caused to 14 major Indian rivers that include Ganga, Gomti, Cauvery, Damodar, Mahi and others. For instance, the waters of Ganges, once considered to be sacred, is the most polluted in India due to large scale discharge of sewage and industrial effluents into it. The earlier attempts to regulate and control pollution of water resources by application of criminal provisions of nuisance did prove to be vital only up to some extent. With emphasis on industrialization and globalization, the shift towards economic development has taken priority over environmental issues. However, due to the large scale water scarcity almost all the States are alarmed and concerned to provide safe and clean water to their citizens as its endeavor towards realizing the fundamental rights of its citizens.*

#### Introduction

The term water pollution has been used differently in various Indian Acts. Some described it as 'nuisance', while others as 'negligence'. 'Fouling' of water was also the way of describing water pollution. In some enactments, water pollution was described as 'poisoning' of water. Some Acts described it as rendering water 'less fit' or 'not fit' for consumption by human beings and animals. Interference with or alteration in flow of water to carry away rubbish or causing water to be corrupted in any waterway so as to endanger, damage or render it less useful, was another mode of explaining the term 'water pollution'. 'Discharge of oil', 'use of dynamite' and 'casting of blast' carries the same meaning.

Before the enactment of Water (Prevention and Control of Pollution) Act, 1974, almost all the statutes stressed upon the mode of causing pollution rather than explaining 'pollution' itself. In a simple sense, water pollution is "the adding of any substance to water or the changing of water's physical and chemical characteristics in any way which interferes with its use for legitimate purposes". It is also defined as introduction into water of substances of such character and quantity that its natural quality is so altered as to impair its usefulness or render it offensive to the senses of sight, taste or smell. According to Water (Prevention and Control of Pollution) Act, 1974, water pollution means "such contamination of water or such alteration of the

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physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may or is likely to create a nuisance or render such water harmful or injurious to public health or safety or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms".

The various inorganic and organic compounds that cause pollution include fertilizers, pesticides, biocides, detergents, phenolic substances, and carboxylic acids. When these compounds negligently or inadvertently are thrown into the sea or a river, water resources are contaminated threatening the aquatic animals and human life. Excess of chemical nutrients also stimulates the luxuriant growth of algae and other plant life to such an extent as to choke waterways and is termed as eutrophication.

All the 14 major rivers of the country, including Cooum, Ganga, Gomti, Cauvery, Damodar and Mini Mahi have become polluted. The waters of Ganga, which were once considered sacred, are no longer so because of the discharge of sewage and industrial effluents. The industrial effluents are considered more dangerous than the household wastes.

Normally, water is never pure in a chemical sense. It contains impurities of various kinds—both dissolved and suspended. These comprise, dissolved gases, e.g., H<sub>2</sub>S, CO<sub>2</sub>, NH<sub>3</sub>, N<sub>2</sub>; dissolved minerals, e.g., salts of calcium, magnesium, sodium; suspended impurities, e.g., clay, silt, sand and mud; and microscopic organisms. These are the natural impurities derived from the atmosphere, catchment area and the soil but are in such a low concentration that they do not pollute water normally; rather their presence is sometimes essential for maintaining the potable and other useful properties of water. Polluted waters are turbid, not pleasant for drinking, sometimes smell bad, and are not suitable for bathing, washing or other human activities. They are generally harmful and diseases like typhoid, dysentery and cholera spread through polluted water.

The effects of water pollution are far-reaching and affect not only the environment, but human beings and animals as well. Water pollution affects our oceans, lakes, rivers and drinking water, making it a widespread and global concern. Numerous diseases, health problems and even fatalities have been associated with water pollution.

Water is considered polluted when chemicals, pathogens, or contaminants are detected. Human beings have the most crucial impact on our water resources. They also have the ability to control or eliminate water pollution.

#### 2. Sources of Water Pollution and Health Problems

The following are the major sources of water pollution:

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

- Sewage and other oxygen demanding wastes, which contain decomposing organic matter and pathogenic agents;
- Industrial waste, which contains toxic agents ranging from metal salts to complex synthetic organic chemicals;
- Agricultural waste, which comprises fertilizers, pesticides and biocides; and
- Physical pollutants, viz., heat, thermal pollutants and radioactive substances.

The waterborne diseases in human-beings and causative organisms are shown in Table 1.

Table 1: Causative Organisms and Waterborne Diseases		
S. No.	Organisms	Diseases
1.	Viruses	Viral hepatitis, Poliomyelitis
2.	Bacteria	Cholera, Typhoid, Paratyphoid, Dysentery, Diarrhea
3.	Protozoa	Amebiasis, Giardiasis
4.	Helminths	Round worm, Hook worm, Thread worm

Waterborne infection is the common problem of India and the other developing countries. Nearly 8% of the diseases in these countries are linked with contaminated water.

The toxic effects of some water pollutants are shown in Table 2.

Table 2: Water Pollutants and Their Toxic Effects on Health			
S. No.	Water Pollutants	Sources	Effects on Health
1.	Polychlorinated	Used for manufacturing transformers and other electric appliances; in production of plastic containers, epoxy resins; as ingredients in soap, cream, paint, paper, wax, etc.	Fatigue, vomiting, abdominal pain disorders of the intestine, temporary blindness, stillbirths.
2.	Vinyl chloride	Used in plastic	Damages to liver, bones and circulatory system; cancer of liver, brain and lymphatic system.
3.	Benzene	Used in detergents, moldings, insecticides	Anaemia and leukemia
4.	Aldrin/Dieldrin	Insecticide	Causes tumors, convulsions, damage to kidney

Health Hazards of Water Pollution and its Legal Control  
with Special Reference to State of Punjab 21

Table 2 (Cont.)

S. No.	Water Pollutants	Sources	Effects on Health
5.	DDT	Insecticide	Causes tremors, degradation of central nervous system
6.	Dioxin	Herbicide	Powerful carcinogen; causes chromosome malformation
7.	Nitrates and Nitrites	Come from septic tanks, heavily fertilized crops and sewage treatment plants; Nitrates get converted into nitrites in intestines	Nitrates combine with hemoglobin to form methaemoglobin, which interferes with the oxygen carrying capacity of the blood, producing a serious disease known as methaemoglobinaemia

The toxic effects of heavy metals on human health are shown in Table 3.

Table 3: Toxic Effects of Heavy Metals		
S. No.	Metal	Effects on Human Health
1.	Mercury	Minamata epidemic, the first major disaster of mercury poisoning occurred in 1953 at Minamata in Japan; the victims developed numbness of the limbs, lips and tongue and lost muscle control. Also caused deafness, blurring of vision, clumsiness, apathy and mental deterioration.
2.	Lead	Lead pollution causes liver and kidney damage, reduction in hemoglobin formation, mental retardation and abnormalities of fertility and pregnancy; children may suffer from macrocephaly or convulsions or both.
3.	Arsenic	Cause mental disturbance, liver cirrhosis, hyperkeratosis, lung cancer, ulcers in gastrointestinal tract, kidney damage.
4.	Calcium	Bone deformation, kidney damage, testicular atrophy, anaemia, injury of central nervous system and liver; hypertension; the Itai-itai first reported from Japan was shown to be due to cadmium toxicity.
5.	Copper	Hypertension, uremia, coma, sporadic fever
6.	Zinc	Vomiting, renal damage, cramps
7.	Chromium (Hexavalent)	Nephritis, gastrointestinal ulceration, cancer

22 The IUP Journal of Environmental & Healthcare Law, Vol. IX, Nos. 1 & 2, 2010

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

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### 3. Major Effects of Water Pollution

The effects of water pollution are numerous (as seen above). Some water pollution effects are recognized immediately, whereas others do not show up for months or years. Additional effects of water pollution include:

- The food chain is damaged. The toxins present in the water travel from the water the animals drink to humans when the animals' meat is eaten.
- Diseases can spread via polluted water. Infectious diseases such as typhoid and cholera occur by drinking contaminated water. This is called 'microbial water pollution'. The human heart and kidneys can be adversely affected if polluted water is consumed regularly. Other health problems associated with polluted water are poor blood circulation, skin lesions, vomiting and damage to the nervous system. In fact, the effects of water pollution are said to be the leading cause of death for humans across the globe.
- Acid rain contains sulfate particles, which can harm fish or plant life in lakes and rivers.
- Pollutants in the water will alter the overall chemistry of the water causing changes in acidity, temperature and conductivity. All these factors have an effect on the marine life.
- Marine food sources are contaminated or eliminated by water pollution.
- Altered water temperatures (due to human actions) can kill the marine life and affect the delicate ecological balance in bodies of water, especially lakes and rivers.

Water pollution effects have a huge impact on our environment and health. The delicate balance between nature and humans can be protected, but it will take efforts on all fronts to prevent and eliminate water pollution locally and globally.<sup>1</sup>

### 4. Effects of Water Pollution on Human Health

The following health hazards may be the result of water pollution:

- Increased incidence of tumors, ulcers due to nitrate pollution.
- Increased incidence of skin disorders due to contact with pollutants.
- Increased incidence of constipation, diarrhea and infections in intestine.
- Dangerous effects on growing fetus.
- Concentration of pollutants due to bio-accumulative pesticides. Through secondary and tertiary food chain in case of non-vegetarians.
- Still births, abortions and birth of deformed children.

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<sup>1</sup> <http://scipeeps.com/effects-of-water-pollution> visited on January 3, 2010.

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Health Hazards of Water Pollution and its Legal Control 23  
with Special Reference to State of Punjab

- 'Blue baby' disease caused by methane globinemia—which results in asphyxia (reduced O<sub>2</sub> supply).
- Reduced activity of immune system.
- Loss of memory power and reduced mental sharpness.
- Waterborne diseases like jaundice, hepatitis, gastroenteritis will be more prevalent due to water pollution.
- Reduced bone development and muscular development.
- Reduced male fertility.
- Shifts in physiological cycles of human body.<sup>2</sup>

### 5. Water Supply, Wastewater Generation, Collection, Treatment and Disposal in Indian Cities

Since discharge of untreated domestic wastewater is the predominant source of pollution of aquatic resources in India, the Central Pollution Control Board (CPCB) is regularly inventorising the status of water supply, wastewater generation, collection, treatment and disposal in class I cities (Population > 100,000). These urban centers are responsible for more than 25% of the sewage generation in the country. The smaller towns and rural areas do not generate any significant amount of sewage obviously due to low per capita water supply. The wastewater generated from such areas, normally percolates in the soil or evaporates, and thus does not contribute to the pollution of water resources. Hence, the focus was laid on large urban centers.

A questionnaire survey was conducted by the CPCB on water supply and wastewater generation collection, treatment and disposal in 299 class I cities and 345 class II towns of the country. Most of the cities, except metropolis and few class I cities, do not have organized water supply, as well as wastewater collection and treatment facilities. In total, 644 cities/towns of the country generate 18,422 MLD (80% of water supply) of wastewater, of which, 12,785 MLD (69%) is collected. Although 12,785 MLD of wastewater is collected, only 409 MLD (22%) of wastewater get various levels of treatment. The survey indicates that Maharashtra, Delhi, Uttar Pradesh, West Bengal and Gujarat are the major contributors of wastewater (63%) with facility for treating only 200 MLD of the wastewater generated by these states.

A common feature in most of the towns is the nonexistence or poorly maintained sewage conveyance system. The sewage is not properly drained and accumulates within city's premises or on its outskirts and creates unhygienic conditions. There are a large number of cesspools observed in many towns which, apart from creating unhygienic conditions, are good ground for breeding of mosquitoes and other vectors. In most of the urban centers of India, due to inadequate arrangements for collection

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<sup>2</sup> <http://www.tutorvista.com/content/biology/biology-iv/environmental-pollution/water-pollution-effects> visited on January 3, 2010.

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

and disposal of garbage, garbage find its way into the sewage drains/sewer, sometimes it is deliberately put into the drains, thus, the sewage conveyance systems are blocked and the sewage overflows on streets.<sup>3</sup>

<sup>3</sup> The CPCB, in collaboration with State Pollution Control Boards (SPCBs), is monitoring the Indian Aquatic Resources globally under Global Environmental Monitoring and at the national level under MINARS since 1977. The monitoring program started with merely 17 monitoring stations on the river Yamuna and extended steadily over the years. By the year 1998, the monitoring network spread over 495 stations covering almost all the major river basins, few medium and minor basins, 35 lakes, 24 groundwaters, some creeks, canals, tanks and ponds. The water quality monitoring results, indicate that organic and bacterial pollution continues to be predominant pollution in the Indian aquatic resources. A large part of municipal sewage is still flowing in untreated form in nearby receiving water bodies thereby reducing dissolved oxygen required for supporting aquatic life, increasing organic pollution load in terms of Biochemical Oxygen Demand (BOD) and exponential increase in number of coliform bacteria—an indicator of the presence of disease-causing organisms in water.<sup>4</sup>

## 6. Status of Surface Water in the State of Punjab

The personal interviews of the author with the officers of the Punjab State Pollution Control Board, Patiala, have revealed that like other states of the country, Punjab is also facing acute problems of water pollution. All the rivers, streams, chos, drain and other natural water sources of the state are badly polluted due to the discharge of untreated trade effluents and municipal sewage. The Pollution Control Board has been trying to control the pollution and it has achieved a considerable success, so far as industrial pollution is concerned. However, there are certain problems due to which visible improvement in the quality of environment is not possible.

### 6.1 Rivers

There are four major rivers in the state, viz., Sutlej, Beas, Ravi and Ghaggar. The board has been continuously monitoring quality of river waters. The studies are conducted to bring out the existing water quality, causes for its deterioration and remedial measures. The results of the studies indicate that water quality of all the rivers is good when they enter Punjab.

The quality of water of River Sutlej after its entry into plains from Bhakhra Dam is very good, conforming to class 'X' (fit for drinking without conventional treatment but after disinfection) of water quality index but slowly as it progresses and receives effluents and sewage from Nangal Fertilizers Limited and Nangal Township, the water quality gets slightly affected. Further at Ropar Head Works, the water quality greatly regenerates

<sup>3</sup> Annual Report 1998-99, Ministry of Environment and Forests, Government of India, p. 83.

<sup>4</sup> *Ibid.*, p. 89.

Health Hazards of Water Pollution and its Legal Control 25  
with Special Reference to State of Punjab  
due to self-purification aided by stony terrain/bed of river upstream but becomes again affected by the effluents from the industries situated in the Taansa belt. The water quality is the worst at the confluence point of River Sutlej with Buddha Nallah that carries the industrial effluents and sewage of Ludhiana City. After the confluence point, the quality drops down to class 'D' (not fit for drinking with even conventional treatment or for bathing but suitable for propagation of wild life) and sometimes, even to class 'E' (fit only for irrigation, industrial cooling, controlled waste disposal) depending upon the quantity of the water flowing in the river. However, by the time the river reaches Harike, the water quality improves to a great extent due to self-purification process, which is evident not only from chemical analysis but also from the availability of a diverse range of Flora and Fauna in Harike area.

The water quality of river Beas after it leaves Pong Dam in Talwara Township is very good conforming to class 'X' and remains so till it receives effluent and sewage from Mukerian Paper Mill (which has now been directed for irrigation) and Mukerian Town and drops down to class 'C' (drinking water source with conventional treatment followed by disinfection) or 'D' (propagation of wild life). Further, after slight improvement due to self-purification, the sewage from Beas City again affects the quality of water. Further downstream, the water quality gets affected at Goindwal Sahib Industrial Complex due to the discharge of sewage and industrial effluents into the river. However, the quality of water in the river improves to a great extent by the time it reaches Harike as is proved by chemical quality and Biological diversity in the areas and the abundance of fish available in Harike Area.

River Ravi is comparatively clean along its entire length in the Punjab since there is little human activity around the river.

River Ghaggar has bad water quality due to meager flow in the river, in addition to the discharge of industrial effluents and sewage at various points, the main industries being Sukhna Paper Mills and Patiala Distillery that have now diverted the effluent to forestry and irrigation. The municipal councils discharging their untreated sewage through various drains in Ghaggar include Rajpura, Patiala, SAS Nagar and Chandigarh.

### 6.2 Canals

The Punjab Pollution Control Board undertook the survey of canals in the Malwa region in 1997. The main Canal system in this region is Sirhind Canal System, Rajasthan Feeder and Bikaner Canal. The water of Sirhind Canal System is mainly used for irrigation and drinking water purposes. There is no mass bathing in any of these canals. The water quality in this Canal System is 'C' class (with Dissolved Oxygen [more than 4mg/l], BOD [ $<3\text{mg/l}$ ] and Total Coliform [ $<5,000\text{ MPN}/100\text{ ml}$ ]).

### 6.3 Drains

The State of Punjab is crisscrossed by a number of chos, *nallahs* and drains, most of which are natural and some man-made. Almost all these drains carry storm water

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

during rains to the various rivers and almost remain dry during the most part of the year. But, these drains are now being used as carriers of sewage of Municipal Corporations/Councils and certain industrial units. As they have no fresh water for dilution, these have got highly polluted.

In order to verify the exact pollution status of these drains and identify the sources of pollution, the board has recently started carrying out study on the various drains of the state. The monitoring of these drains, viz., Hudiaara *Nallah*, East Bein and Buddha *Nallah* has so far been carried out.

#### 6.4 Hudiaara *Nallah*

Hudiaara *Nallah* in Amritsar district originates from village Heir on Amritsar-Ajnala Road, Amritsar and is joined by a number of small and large drains. It carries the discharge of Amritsar city and a number of industries and flows down across the border in Pakistan where it joins river Ravi.

The study report of Hudiaara *Nallah* reveals that the Dissolved Oxygen is 0.3 mg/l near village Dauke, BOD is 110 mg/l, Total Suspended Solids are 128 mg/l, Sodium is 130 mg/l, and DDT is 4,794 pg/l. The sediment samples taken from the *Nallah* also contain high concentrations of Zinc 96.4 ug/g. Maximum concentration of Chromium has been found to be 53.4 ug/g in sediments near new building of Government Dental College on G.T. Road. Sodium concentration in sediments has also been found out to be 231 ug/g near village Dauke.

#### 6.5 East Bein

The study of East Bein reveals that at the point of its origin, the concentration of BOD is 8.0 mg/l and DO is 6.0 mg/l. However, due to domestic and industrial pollution loads contributed by different drains and choes to East Bein, these concentrations of BOD and DO reach a maximum of 96 mg/l and a minimum of 1.6 mg/l, respectively, at different points. The maximum DDT and BHC concentrations were observed to be 4.4 mg/l and 1.5 mg/l, respectively. The concentration of nitrates and phosphates are 7.8 mg/l and 8.8 mg/l, respectively, indicating high inputs from agricultural activities due to excessive use of fertilizers and pesticides.

#### 6.6 Buddha *Nallah*

Similarly, the study of Buddha *Nallah* Distt., Ludhiana, reveals that it contains BOD up to 18 mg/l, Chrome 0.12 mg/l, Zinc 0.32 mg/l, Lead 0.12 mg/l, and Cadmium 0.07 mg/l besides Coliforms up to 2,400, which are much beyond the limits prescribed for fresh water streams.

#### 6.7 Wetlands

Harike, Kanjali and Ropar have been designated as wetlands. The area of Harike is about 28.5 sq km, which was initially about 42 sq km in 1952. The maximum depth recorded is 4.5 m. Kanjali wetland is located near Kapurthala, which has 42 ha of area with a maximum-recorded depth of 8.3 m. Ropar wetland is fed by river Sutlej and

Health Hazards of Water Pollution and its Legal Control 27  
with Special Reference to State of Punjab  
some drains and choes in the Shivalik ranges and is spread over 1,365 ha of area. Maximum-recorded depth of water is 2.7 m.

About 32 ha Harike wetland and 19 ha area of Kanjali wetland has been brought under the local tree plantation. About 6,400 linear feet fence in Harike wetland and 7,119 linear feet fence in Kanjali wetland have already been erected. Water hyacinth, a noxious weed, has almost covered 3/4<sup>th</sup> of the water surface in Harike and Kanjali wetlands, though it is not a serious problem at Ropar.

The Punjab Pollution Control Board undertook a study of water quality monitoring of Harike Wetland and found to be of 'B' category indicating efficient purification of pollutants entering the Harike Ecosystem. Water quality of Kanjali wetland is, however, of poor class.

#### 7. Status of Groundwater

The groundwater of Punjab State is under heavy exploitation for agricultural and industrial uses. Once the groundwater gets polluted, it is very difficult to restore its quality to its original status because the groundwater is devoid of all the natural forces of purification. Thus, constant watch and measures are essential to ensure that quality of groundwater reserves protected against anthropogenic contamination.

The Board started systematic monitoring of the groundwater quality in 1992. The study was restricted to certain parts of Ludhiana City, suspected to be affected. A report on 'Groundwater Quality of Ludhiana City' was published giving the status of groundwater quality in the area recommending certain preventive measures. The report reveals that water of handpumps situated in places like Industrial Area-A, Industrial Area-B, Focal Point, Janta Nagar, Dashmesh Nagar and some areas along G.T. Road was found to be highly contaminated with toxic heavy metals because of electroplating and dyeing units using heavy metals like Chromium, Nickel and Chrome-based dyes. Highest values were recorded in Industrial Area-B, which showed a maximum of 2.25 mg/l and a minimum of 0.135 mg/l of chromium, respectively. Values recorded in mix use areas (Janta Nagar and Dairy Chilling Center) were 1.8 mg/l and 0.08 mg/l, respectively. Maximum value of Nickel was 1.8 mg/l, which was found in the handpumps situated in Dashmesh Nagar.

Further, ground water samples were found to have high TDS values (Maximum values of 11,822,500 and 892 mg/l) were reported from industrial area, mixed-use areas, and residential areas, respectively.

The groundwater of Ludhiana is quite hard, as the total hardness values in (approximately 50%) samples analyzed was above 300 mg/l. The maximum value of around 650 mg/l was reported in Janta Nagar area. The water quality of deep tubewells is, however, unaffected.

During 1993 and 1994, the study was extended to certain areas of other cities like Amritsar, Jalandhar, Nangal and Ropar. The remaining areas of Ludhiana were also

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

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studied. A report on "Monitoring of Bacteriological, Health-Related and Aesthetic quality of groundwater in the cities of Ludhiana, Jalandhar, Amritsar, Ropar and Nangal" was published in 1995.

The groundwater of Ropar shows high concentration of fluoride (over 1.5 mg/l) and Nangal shows high concentration of nitrate, TDS (8,697 mg/l), total hardness (1,616 mg/l) and chloride. Thus, it is essential to keep a constant watch on the groundwater quality of these areas.

The Board intends to continue to monitor the groundwater quality in the above areas and other areas suspected to be affected. The Board will also review the monitoring stations and parameters from time to time.

## 8. Prevention and Control of Water Pollution

Control of water bodies and organisms serving the purpose of water protection should be reinforced and carried out by all available means including legal enforcement under the provisions laid down in Water (Prevention and Control of Pollution) Act, 1974 and the Environment (Protection) Act, 1986. Some ways/techniques suggested for prevention and control of water pollution are as follows:

## 9. Stabilization of Ecosystem

This is the most reliable way to control water pollution. This would involve reduction in waste input, harvesting and removal of biomass, trapping of nutrients, fish management and aeration. Various physical and biological methods can be adopted to restore species diversification and eco-balance in the water body to prevent pollution. Some species of algae, such as *Chlorella*, *Scenedesmus* and *Spirulina* are excellent biological oxidants and are commonly found in polluted waters and stabilization pond effluents in India. These can be used to reduce pollution load in a water body.

## 10. Reutilization and Recycling of Waste

Various kinds of wastes, such as paper pulp, municipal and industrial effluents, sewage and thermal pollutants can be recycled to advantage. For example, urban waste could be recycled to generate cheaper fuel gas and electricity. Scientists at the NEERI, Nagpur, have evolved inexpensive 'know-how' for management of radioactive wastes and the chemical effluents of atomic power plants reclaimed waste water and have supplied cheaper piped gas and generated electricity by recycling urban waste. A new technology of waste recycling and disposal has been introduced by a distillery in Gujarat. This technology would not only help the distillery to treat 450,000 liters of waste daily before letting the effluent into streams but also generate energy equivalent to that given by 10 tons of coal every day.

## 11. Removal of Pollutants

The various physio-chemical techniques devised for removal of chemical, biological or radio-biological pollutants involve adsorption, electrodialysis, ion exchange and

Health Hazards of Water Pollution and its Legal Control 29  
with Special Reference to State of Punjab

reverse-osmosis. Of the various techniques, reverse-osmosis deserves a special mention. This technique is based on the removal of salts and other substances from water by forcing the latter through a semipermeable membrane under a pressure that exceeds the osmotic pressure so that flow is in the reverse direction to the normal osmotic flow. In practice, this technique involves the use of a porous membrane whose chemical nature is such that it has a preferential attraction for solvent while repulsion for the solute. Reverse-osmosis is commonly used to desalinate brackish water and has been found suitable, effective and economical method for the purification of water polluted by sewage effluents.

## 12. Legislative Control of Water Pollution

The control of water pollution is an extremely difficult task. The economic and administrative problems are an addition to this difficulty. India is a federal country where all the rivers are interstate and the water is a state subject. An upper riparian state may frustrate the attempts of a lower riparian state to control pollution of its rivers by using its river water for various purposes, which may have the adverse effect of changing the quality and quantity of water flowing to the lower riparian state. Secondly, as the position stands today, there are separate authorities all over the country dealing with irrigation and pollution which results in the administrative problems.<sup>5</sup>

## 13. Relevant Law and Its Adequacy

Though the most comprehensive legal attempt for prevention and control of water pollution is made by the Water (Prevention and Control of Pollution) Act, 1974, yet prior to that also, there were some other legal provisions for control of water pollution.<sup>6</sup>

The importance of the concern for the purity of water and environment is generally evident from Sections 277 and 278 of the Indian Penal Code, 1960. Section 277 of the IPC provides that whoever voluntarily corrupts or fouls the water of public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to Rs. 500, or both. Further, Section 278 says that whoever voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of the persons in general, dwelling or carrying on business in the neighborhood or passing along a public way, shall be punished with fine which may extend to Rs. 500.

Almost, since the beginning of the 19<sup>th</sup> century, some of our Municipal and Public Health laws, particularly those for large cities, on the pattern of United Kingdom's

<sup>5</sup> Dwivedi R C (1980), "Prevention and Control of Water Pollution", *Journal of I. L. P. A. I.*, Vol. 3, October.

<sup>6</sup> Leelakrishnan P (1979), "Statutory Control of Environmental Pollution", *C.U.L.R.*, Vol. 3, No. 2, p. 141.

Written by Administrator

Thursday, 10 June 2010 00:00 - Last Updated Wednesday, 13 October 2010 06:24

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**Local Authorities Act**, conferred powers on our local bodies for controlling water pollution caused by industrial effluents and necessary enforcement action against the erring industries. Our Municipal Acts generally prohibit persons from discharging any pollutant or industrial effluent from factories into Municipal drains, except in accordance with the relevant byelaws. Likewise, no sewage can be discharged into any water course until it has been treated so as not to contaminate the water. Sections 241, 242 and 250 of Delhi Municipal Corporation Act, 1957, can be referred to as an example in this regard.

<sup>17</sup> The Factories Act, 1948, also contains a provision with regard to the disposal of water and effluents by factories. Section 12 of the Act provides that effective arrangements shall be made in every factory for the disposal of wastes and effluents due to the manufacturing process carried therein. This section further says that the State Government may make rules prescribing the arrangements to be made in this regard. The punishment for the violation of the above provisions and rules made thereunder is imprisonment for a term which may extend to three months or fine which may extend to Rs. 500, or both.

Section 133 of the Criminal Procedure Code, 1973, empowers the Magistrate to order that any unlawful obstruction or annoyance should be removed from any way, river or channel, which is or may be lawfully used by the public. The Supreme Court in *Ratlam Municipality case*<sup>18</sup> has clearly shown that Section 133 of Cr.P.C. can be really potent in curbing the pollution. The facts of this case are as follows:

The residents of a locality of Ratlam, irritated by stench and stink caused by open drains and public excretion by nearby slum-dwellers moved the Magistrate under Section 133 of Criminal Procedure Code, 1973, to direct the Municipal Council to do its duty towards the public. The Magistrate gave the directions to the Municipality to draft a plan within six months for removing the nuisance. In appeal, Sessions Court reversed the order. The High Court upheld the orders of the Magistrate. The Supreme Court, in appeal, also affirmed the orders of the Magistrate.

The Supreme Court in its judgment has categorically and emphatically laid down that where there existed a nuisance in a locality due to open drains, heaps of dirt, pits and excretion by human for want of lavatories and consequential breeding of mosquitoes, the court could require municipality under Section 133 of the Cr.P.C. which provides for public nuisance, to abate the nuisance by taking affirmative action on a time-bound basis. When such order is made, the municipality cannot take the plea that notwithstanding the public nuisance, financial inability validly exonerated it from that Section. Section 133 of the Cr.P.C. was categorical although its language shows a discretion resting with the court, because judicial discretion, when facts for its exercise are present, has a mandatory import.

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<sup>18</sup> *Municipal Council, Ratlam vs. Vardhichand*, AIR 1980 SC 1622.

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Health Hazards of Water Pollution and its Legal Control 31  
with Special Reference to State of Punjab

In the same case, the Supreme Court further observed that nuisance because of pollutants being discharged by big factories, to the detriment of the poorer sections, is a serious challenge to the social justice component of the rule of law. The Court held that a responsible municipal council constituted for the precise purpose of preserving public health and environment cannot run away from its basic duty by pleading financial inability.

Chapter V of the Water (Prevention and Control of Pollution) Act, 1974, deals with the prevention and control of water pollution. Section 20 of the Act empowers the State Board to make survey of any area and obtain information required for control and prevention of the water pollution. Section 21 lays down the procedure for taking samples and empowers the State Board to take samples of water from any stream or well or any sewage or trade effluents. Section 22 says that the Analyst shall send the reports to the Central or State Board, as the case may be and the Board shall send the copy of the report to the occupier. Section 23 says that any person authorized by the State Board can enter any premises for performing any of the functions of the Board. Section 24 of the Act provides that no person shall knowingly cause or permit any poisonous, noxious or polluting matter into any stream or well. Section 25 provides for restrictions on new outlets and new discharges without the previous consent of the State Board. Section 26 says that provisions of Section 25 shall also apply to the existing discharge of sewage or trade effluent with the modifications that application shall be made within three months of the constitution of the State Board. Section 28 provides for appeal to the Appellate Authority within 30 days of any order passed under Sections 25, 26 or 27 of the Act. Under Section 29, the State Government is empowered to revise the orders of the State Board. Section 30 of the Act says that the Board may require any person to execute any work in the performance of the duties of the Board. Section 31 imposes a duty upon any person in charge of any place or industry from which there is discharge or apprehension of discharge of effluents causing water pollution of any stream or well, to intimate the occurrence of such accidental discharge.

Section 32 of the Act requires the State Board to take emergency measures in case of pollution of streams or wells. Under Section 33, the Board is empowered to make application to courts for restraining apprehended pollution of water of streams or wells. Section 33-A introduced by amendment of 1988, however, empowers the State Board to issue directions to close, prohibit or regulate any industrial operation or process and to stop or regulate supply of water, electricity or any other service. Before the 1988 amendment, the State Board could issue the restraint or prohibitory orders under Section 32 only to the polluters and not the government officials or other parties. Moreover, Section 32 empowers the State Board to issue such orders only in case of pollution resulting from an accident or other unforeseen act or event. Section 33(1), inserted by 1988 amendment, empowers the State Board to move an application to the court of Metropolitan Magistrate or Judicial Magistrate of first class for restraining the polluter from water polluting activity in any stream or well or sewer or land in case of apprehension by the Board of such activity. The power to obtain the restraint order

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of the court is confined only to the Board and excludes any other person, organization or authority. Section 33(2) of the Act further clarifies that the court may make such order, as it deems fit.

The above-mentioned provisions are not adequate as the power to restrain is not with the Board. The Board has to make an application to the court and the process of court is a lengthy one. Therefore, it cannot provide the immediate relief to the people. According to Section 49(1) of the Water Act, no court shall take cognizance of any offence under this Act except on a complaint made by (1) a Board or any officer authorized in this behalf by it; or (2) any person who has given notice of not less than 60 days in the prescribed form of the alleged offence and of his intention to make a complaint to the Board or Officer authorized in this behalf. The requirement of 60 days notice to the State Board mitigates the stringent effect of the punitive provisions of the Water Act. Section 49(2) of the Act requires the Board to make available the relevant reports in its possession to the complainant on his demand. This is followed by a proviso saying that the Board may refuse to make any such report available to such person if the same is, in its opinion, against the public interest.

#### 14. Judicial Control

The role of judiciary in controlling the water pollution and conservation can be acknowledged very well in the leading cases. Some of those worth-mentioning cases are: *Pondicherry Paper Limited*,<sup>1</sup> *Aggarwal Textiles*,<sup>2</sup> *Ratlam Municipality*,<sup>3</sup> *Tata Tea*,<sup>11</sup> *Delhi Bottling*,<sup>12</sup> *Gwalior Rayon Company*,<sup>13</sup> *Dehradun Quarrying case*,<sup>14</sup> *Ganga Pollution (Tanneries case)*,<sup>15</sup> *Ganga Pollution (Municipalities case)*,<sup>16</sup> *A.P. Rayon*<sup>17</sup> and *Modi Industries*<sup>18</sup> cases. The judiciary, which forms the third important pillar of the State machinery, apart from the Executive and Legislature, as traditionally opted for a moderate role in the day to day functioning of the State. Of late, however, this watchdog of the Constitution has made its presence felt albeit with the assistance of media. It has played a very important role in the environmental protection and has applied

<sup>1</sup> *Pondicherry Papers Ltd. vs. Central Board for Control of Water Pollution*, Cri.M.P. No. 4662 4663 of 1979 Madras High Court.

<sup>2</sup> *Aggarwal Textile Industries vs. State of Rajasthan*, S.B.C. Writ Petition No. 1375 of 1980 Rajasthan High Court.

<sup>3</sup> *Municipal Council, Ratlam vs. Vardichand*, AIR 1980 SC 1622.

<sup>11</sup> *Tata Tea Limited vs. State of Kerala*, 1984 Kr. L.T. 845.

<sup>12</sup> *Delhi Bottling Co. Pvt. Ltd. vs. CBIWCP*, AIR 1986 Del. 152.

<sup>13</sup> *Kerala State Board for Prevention & Control of Water Pollution vs. Gwalior Rayon Silk Manufacturing (Weaving) Co. Ltd.*, AIR 1986.

<sup>14</sup> *Rural Litigation & Entitlement Kendra, Dehradun vs. State of UP*, AIR 1985 SC 652.

<sup>15</sup> *M.C. Mehta vs. Union of India*, AIR 1988 SC 1115.

<sup>16</sup> *M.C. Mehta vs. State of UP*, AIR 1988 SC 1037.

<sup>17</sup> *AP State Board for Prevention & Control of Water Pollution vs. Andhra Pradesh Rayon Ltd.*, AIR 1989 SC 511.

<sup>18</sup> *Modi Industries Ltd. vs. Union of India*, 1989, All C.J. 93.

Health Hazards of Water Pollution and its Legal Control

33

with Special Reference to State of Punjab

the principles of sustainable development while deciding the cases. While deciding the cases, the judiciary has tried to maintain a balance between the environmental protection and the sustainable development. The changing stance of the judiciary as epitomized by some recent judicial pronouncements, especially in the field of environment protection, has often being termed as 'activism' on the part of the judiciary or 'judicial activism'. It is also worthwhile to mention here that most of the environmental cases have come before the courts through Social Action Litigation or the Public Interest Litigation (PIL).

#### Conclusion

From the above discussion, it is clear that the water is so much a part of our daily life and existence, that we are inclined to take it for granted, believing that it will always be available in abundance. But this is not the true position. Our supplies of water are very limited.<sup>19</sup> It is the second essential element for the survival of the human beings on this planet, the Earth. The polluted water is the main source of diseases in our country. The surface and groundwaters of almost whole of India including the State of Punjab has been polluted. It is, therefore, need of the day to take steps for the prevention, control and abatement of water pollution through legislative as well as judicial measures. No doubt, the judiciary in India has done a great service by declaring the right to pollution-free air, water and clean environment as fundamental right, but the question remains to be determined is how to find out the quality of air and water or for that matter level of noise which would infringe the fundamental right of the persons. Can the legislative actions even through constitutional provisions and the courts alone by any method control the 'quality of the environment' and ensure the citizens 'safe environment'? These are the questions of great complexities, which cannot be solved by the legislature and the judiciary alone. In this regard, the cooperative efforts by the administrative wing of the state and realization of the fundamental duties of the citizens<sup>20</sup> regarding the safety of environment are required. The awareness about the control of the environmental pollution is essential. ♦

Reference # 13J-2010-01/04-04-01

<sup>19</sup> Rashmi Mayur (1990), "Noise: Silent Killer", *Indian Express*, May 1.

<sup>20</sup> Article 51(A) (g) of the Constitution of India.