Water Pollution and Treatment

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Abstract

Water is sustenance of the life cycle. It must be preserved and protected from all type of pollutant. The human body and other living organisms require it, but in its pure form any type of contamination. But man is disturbing water bodies viz. rivers, wells, streams, seas. On land the natural water system is being polluted by the addition of Industrial wastes, urban wastes, pesticides and related pollutant. Sea water specially that close to land or continent, is likewise being polluted by industrial and urban wastes mostly brought by rivers. With the fast growing human population and rapid industrialization it is doubtful whether we will be able to get enough and pure water for our consumption for long.

Drinking water is directly essential for human life. Water is also indirectly essential, for instance, as an indispensable input in agriculture. Yet, despite the central role that water has always played in sustaining life, human lives and human economies, the development of formal water law has been relatively slow and often patchy. At the domestic level, colonial legislation first focused on the regulation of water for economic reasons, for instance, through the development of...
legislation concerning irrigation and navigation. Over the past few decades, increasing water pollution and decreasing per capita availability have led to the development of other measures such as water quality regulation and an emphasis on water delivery, particularly in cities, as well as environment-related measures.

1. Introduction

Water is sustenance of the life cycle. It must be preserved and protected from all type of pollutant. The human body and other living organisms require it, but in its pure form any type of contamination, but man is disturbing water bodies viz. rivers, wells, streams, seas. On land the natural water system is being polluted by the addition of Industrial wastes, urban wastes, pesticides and related pollutant.

In India, water law is made of different components. It includes international treaties, federal and state acts. It also includes a number of less formal arrangements, including water and water-related policies as well as customary rules and regulations. This working paper maps out the relevant legal framework concerning water in India. The first section delineates water law as it evolved until recently. The second section then examines proposed and ongoing water law reforms that are in the process of completely redrawing India’s water legal framework.

The level of water pollution in the country can be gauged by the status of water quality around India. The water quality monitoring results carried out by CPCB particularly with respect to the indicator of oxygen consuming substances (biochemical oxygen demand, BOD) and the indicator of pathogenic bacteria (total coli form and faecal coliform) show that there is gradual degradation in water quality (CPCB 2009). During 1995–2009, the number of observed sample with BOD values less than 3 mg/l were between 57–69 per cent; in 2007 the observed samples were 69 per cent. Similarly, during this period of 15 years between 17–28 per cent of the samples observed BOD value between 3–6 mg/l and the maximum number of samples in this category were observed in 1998.

2. Water Pollution

2.1 What is water pollution?

Water is good solvent. Therefore it is rarely found, except in chemical laboratory, free from ‘impurities’. Even rain water has dissolved some gases in it. The practical and rational definition of water can thus be following-

“The presence of deleterious matter in such quantities to make the water unsuitable for its designated use.”

In Scientific sense, “water pollution is a distortion of the aquatic ecosystem. Hence, water pollution is such a change which ‘adversely affect the aquatic ecosystem in terms of the living organism, Oxygen content, the presence of toxins and so on.”

In legal sense, strictly speaking, pollution of water means a departure from normal state (rather than a pure water, for ideally unpolluted water is misconception) of water by human activities in such a manner to prevent it from being used for the purposes thought as normal. Normal areas of use include domestic, agricultural, industrial, fish, and other aquatic life and wild life including recreation and aesthetics.

The water (Prevention and control of pollution) act 1974 makes a legal definition of water pollution as –

"Such contamination of water or such alteration of the physical, chemical, or biological properties of water or such discharge of any sewage or trade effluent or any other liquid, gaseous or solid substance into water 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 aquatic organism."

2.2 Types of Water Pollution

Pollutants of water come in many forms, including:

a) Deoxygenating materials, for example, sewage and other organic wastes, such as silage, farm wastes from a number of heavily polluting industrial processes (e.g., food processing and the production of smokeless fuel, textiles, paper and dairy products);

b) Nutrient enrichment by such things as fertilizers, which may give rise to eutrophication, causing an accelerated growth of plants and algae and leading to a decline in water quality.

c) Solids, which may impede flows or block out light for growth;

d) Toxic materials: some materials, such as heavy metals, pesticides or nitrate, are toxic to humans, animals, plants, or all three, often depending on the level of the dose received;

e) Materials which cause an impact on amenity, such as car tyres or shopping trolleys, or old boots in canals;

f) Disease-carrying agents, such as bacteria;

g) Heat, which may affect biological conditions and also deoxygenates water.

The effect of any potential pollutant will vary according to the size, temperature, rate of flow and oxy gen content of the receiving waters, as well as the local geology and the presence of other pollutants and any resulting synergistic effects. The use made of a stream is also a enormous importance in deciding whether it can be said to be polluted, and third factor has a large impact on the attitude of the regulatory bodies towards the setting of standards and their enforcement. It is not sufficient to look only at pollution of surface waters, since e 30 percent of public water supply is taken from ground waters. As a result the control of water pollution encompasses the control of liquid discharges to land.
3. Legal Frame Work for Water Pollution Control

In India purity of water has been always emphasized from time immemorial. In the Rig-Veda, and the Yajur Veda, we find many verses in praise of lord varun (God of Water) and Lord Indra. In the Yajur Ved water was regarded as a source of life and grain. The pollution of water is tortuous act. It is covered by the tort of nuisance as it causes injury to person and property, comfort of health. In Pakkle v. P. Aiyasami it was declared by the madras High Court that altering the natural quality of water whereby it is rendered less fit for any purpose for which in its natural state it is capable of being used gives cause of action in nuisance. Action can also be brought against statutory authority for nuisance by private Individual for water pollution. Legal control for water pollution was available in British India also, the first act concerning water pollution in India is the Shore Nuisance (Bombay and Kolaba)Act of 1853. It authorized the Collector to issue notice to party concerned requiring it to remove nuisance any where below high water mark or get it abated or removed himself.

In general, water law is largely state based. This is due to the constitutional scheme, which since the Government of India Act, 1935 has in principle given power to the states to legislate in this area. Thus, states have the exclusive power to regulate water supplies, irrigation and canals, drainage and embankments, water storage, hydropower and fisheries. Thus, with regard to water pollution, Parliament did adopt an act in 1974, The Water Act of 1974 (Amendment, 1988). This is the first law passed in India whose objective was to ensure that the domestic and industrial pollutants are not discharged into rivers, and lakes without adequate treatment. The reason is that such a discharge renders the water unsuitable as a source of drinking water, for the purposes of irrigation and to support marine life. This Act paved the way for the creation of Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs).

The main function of the CPCB ‘shall be to promote cleanliness of streams and wells in different areas of the states’. The term stream includes river, watercourse, inland water, subterranean waters, and sea or tidal waters to such extent or such point a state government may specify in this behalf. The Board may perform functions such as

a) Lay down, modify or annul in consultation with the state government concerned, the standards for a stream or well;

b) Plan and cause to the executed a nationwide programme for the prevention, control and abatement of water pollution;

c) collect, compile and publish technical and statistical data relating to water pollution and the measures devised for its effective prevention and control and prepare manuals, codes or guides relating to treatment and disposal of sewage and trade effluents and disseminate information connected therewith;

d) Advise the central government on any matter concerning the prevention and control of water pollution;

e) Coordinate the activities of the SPCBs and provide technical assistance and guidance to the SPCBs; and
f) Carry out and sponsor investigation and research relating to problems of water pollution and prevention, control or abatement of water pollution.\textsuperscript{ix}

In order to achieve its objective Pollution Control Boards at Central and State levels were created to establish and enforce standards for factories discharging pollutants into bodies of water. The State Boards are empowered to issue Consent for Establishment (CFE) whenever a firm wanted to establish a new factory and also issue Consent for Operation (CFO) for existing factories. They were also given the authority to close factories or, in the case of disconnecting power and water supply, issue directions to the concerned Departments for enforcement of Boards standards\textsuperscript{x}.

4. Water Act and Ground Water

This act seeks to prevent and control water pollution and maintain and restore the wholesomeness of water. It gives powers to water boards to set standards and regulations for prevention and control of pollution.

Besides statutory frameworks, a number of common law principles linking access to water and rights over land are still prevailing in India. These include separate rules for surface and groundwater. With regard to surface water, existing rules still derive from the early common rule of riparian rights. Thus, the basic rule was that riparian owners had a right to use the water of a stream flowing past their land equally with other riparian owners, to have the water come to them undiminished in flow, quantity or quality.\textsuperscript{xi} In recent times, the riparian right theory has increasingly been rejected as the appropriate basis for adjudicating water claims.\textsuperscript{xii} Further, common law rights must today be read in the context of the recognition that water is a public trust.\textsuperscript{xiii} If the latter principle is effectively applied in the future, it would have important impacts on the type of rights and privileges that can be claimed over surface water. Common law standards concerning groundwater have subsisted longer. The basic principle was that access to and use of groundwater is a right of the landowner. In other words, it is one of the rights that landowners enjoy over their possessions. The inappropriateness of this legal principle has been rapidly challenged during the second half of the 20th century with new technological options permitting individual owners to appropriate not only water under their land but also the groundwater found under neighbors’ lands. Further, the rapid lowering of water table in most regions of the country has called in question legal principles giving unrestricted rights to landowners over groundwater. Similarly, the growth of concerns over the availability of drinking water in more regions has led to the introduction of social concerns in groundwater regulation. As a result of the rapid expansion of groundwater use, the central government has tried since the 1970s to persuade states to adopt groundwater legislation.\textsuperscript{xiv}

Rule have been framed under EPA for control, collection, treatment, storage and disposal of hazardous wastes. These rules have conferred on pollution control boards the power to grant authorization for the activities connected with disposal of hazardous wastes. The Rules are silent on the question whether board should consider various effect of hazardous wastes on ground water before it grant authorization for
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disposal in a particular locality. However, the board is not barred from incorporating objective standards of maintaining ground water safety when the authorization is issued.\textsuperscript{v}

5. Solution
Water pollution is a serious problem in India as almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants.

In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcity as it limits its availability for both human use and for the ecosystem.

Extensive studies have been undertaken to find economically feasible alternatives for water and wastewater treatment. A number of methods such as coagulation, membrane process, adsorption, dialysis, foam flotation, osmosis, photo catalytic degradation and biological methods have been used for the removal of toxic pollutants from water and wastewater\textsuperscript{vi}. However, their applications have been restricted by many factors, such as processing efficiency, energy requirement, engineering expertise, economic benefit and infrastructure, all of which precludes their use in much of the world.

The waste water should be treated at the source itself, but even if it is let out into the river after treatment, it will not have any effect on the pollutant already present in the river. To exterminate the pollutants in river, it is necessary to treat the river water as well and here AFI (Artificial Floating Islands) can help us. One can simultaneously start treating the water at various places with the help of Artificial Floating Islands, so that the ecology of the Mula Mutha River can be restored. Climate of India is suitable for use of AFI, the temperature and atmosphere can accelerate the process of conversion of complex matter in simpler form. According to various studies, with proper selection of Plants and site, AFI can reduce BOD and COD by 80 and 60 percent respectively. The root system converts the complex molecules in simpler nutrient form; this simple form of nutrient is consumed by other aquatic organisms, thereby it improves water quality in an eco-friendly way. AFI can prove to be a great support system to save our rivers and life depending on them.\textsuperscript{vii}

\textsuperscript{1} Philippe Cullet(2007), “water law in india overview of existing framework and proposed reforms” Available at http://www.ielrc.org/content/w0701.pdf
\textsuperscript{3} Id
\textsuperscript{4} R.C.Das & D.K.Behra (2008), Environmental Science –Principles and Practices ;Prentice Hall of India Pvt.Ltd. New Delhi p.20
\textsuperscript{5} Stuart Bell & Donald McGillivray(2004),"Environmental Law “,Oxford University Press pp.552-553
\textsuperscript{6} Philippe Cullet(2007), “water law in india overview of existing framework and proposed reforms” Available at http://www.ielrc.org/content/w0701.pdf


Ibid

Hanuman Prasad v. Mendwa, AIR 1935 All 876

M.C. Mehta v Kamal Nath, 1997 1 SCC 388.


Floating islands as an alternative to constructed wetlands for treatment of excess nutrients from agricultural and municipal wastes – results of laboratory-scale tests by Frank M. Stewart, Tim Mulholland, Alfred B. Cunningham, Bruce G. Kania and Mark T. Osterlund