CHAPTER – I

INTRODUCTION
GROUNDWATER POLLUTION: AN ANALYTICAL STUDY ON

LAW AND GOVERNANCE

CHAPTER – I

INTRODUCTION

Water is the fundamental for the life of all. It plays a very important role. Water cannot be created. It can be stored, diverted and used, but its overall availability cannot be enhanced. Easy access to water is a necessary condition not only for habitability in general but also for development. No life on this planet can exist without water. Fresh drinking water makes up only 6% of the total water on earth and 100% of the world’s population relies on it. This includes the icecaps and glaciers and if these sources are subtracted from the total, only 0.3% of the water on earth is usable for drinking and the majority of that is groundwater. UN report states that, water is the stuff of life and a basic human right.\(^1\) From a legal perspective, the UNDP rightly emphasizes the importance of the human right dimension of water. Thus water is an essential element for life – including human life on earth and as a result is a core concern in law.

Drinking water is directly essential, for instance, as an indispensible input in agriculture. Initially water has been polluted by man for his purposes like he has been washing himself, his clothes, his animals and his living place with water and sending all waste to water-ways, streams, rivers and tanks. Before industrial revolution man could not dirty the water so as to reach pollution level. But because of industrialization, population explosion, scientific and technological advances, water has become polluted enormously. According to scientists at the

National Environmental Engineering and Research Institute (NEERI), 70% of the available water in India is polluted\(^2\).

Groundwater is a globally important, valuable and renewable resource. The accessibility and the availability of groundwater in space and time is the biggest advantage of groundwater over surface water. It is the nature’s process of filtering out impurities that have ensured groundwater a source of fresh and pure drinking water in the past. However in the present day industrial society, dumping of industrial and municipal wastes, disposal of toxic chemicals, improper disposal of radioactive wastes and overdraw of water has resulted in the contamination of groundwater\(^3\). This study since is based on a particular localized problem which impacted in large scale river bed pollution and spoiling large agricultural lands in question. Also number of villages have lost quality drinking water available in their wells, ponds and lakes.

**Causes of water pollution:**

The major causes of water pollution are Natural Process and Anthropogenic. In the natural process, decomposed vegetables, animals and weathered products are brought into water resources thereby influencing the characteristics of water. In the anthropogenic cause industrial, agricultural, urban, domestic, radio-active, mining, pesticides and fertilizers etc. activities deteriorate the natural characteristics of water. Many river waters are polluted due to heavy influx of sewage, industrial effluents, domestic and agricultural wastes, consisting of simple nutrients to highly toxic and hazardous chemicals. Throwing of dead bodies, foul odours, silt deposits, poisonous pesticides are also contributing causes of water pollution. In India water of the major rivers, namely: Ganga, Yamuna, Godavari, Gomti, Kosi, Cauvery, Ravi, Sone,

\(^2\) India-2001 Encyclopedia, page C2-15
\(^3\) BB Vohra, *Managing India’s Water Resources*, (1990), pp 186-188.
Chenab, Jhelum, Narmada, Mahi, Tapti and Krishna are reportedly polluted in some form or the other. Water pollution is also one of the recognized sources of spreading of diseases.

The Groundwater Crisis:

India’s heavy dependence on groundwater has lead the country into water crisis because it is currently extracting its groundwater at an unsustainable rate. A groundwater depletion is perhaps most evident in the dry regions of the country. A joint study by the Central Groundwater Board (CGWB) and the States shows that approximately 14.7% of the groundwater units of the country are “over exploited” meaning the current groundwater extraction levels exceed recharge levels. Approximately 3.9% of the units are “critical” i.e., currently extracted at 90-100% of their capacity. These figures only account for current levels of use, and the number of overexploited regions is expected to continue rising each year. Furthermore, these national level depletion rates do not fully represent the plight of the arid regions. States that have a considerable number of overexploited units include Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra and Tamil Nadu. The alarming over exploitation of groundwater has dire social consequences. The effects of dropping water tables reach beyond the reach of access to water. Groundwater quality is quickly becoming an issue of equal concern.

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5 Ibid.
6 Ibid.
Groundwater Contamination:

Groundwater is generally less susceptible to contamination and pollution when compared to surface water bodies. Water is not only a purifier but is also more prone and susceptible to pollution. It has an inborn mechanism to purify its own impurities but only to certain extent and in respect of certain pollutants. Generally groundwater is contaminated by some of the activities. They are categorized into four groups. They are Municipal sources, Industrial sources, Agricultural sources and the Individual sources. In Municipal sources, large amounts of biomedical and municipal wastes are routinely dumped in close proximity to water sources and can introduce harmful contaminants into the groundwater.

In Industrial sources, the release of large quantities of industrial effluent has led to severe groundwater pollution in various states. For example Vellore district is enormously affected by tanneries and other industries which contaminate groundwater and causing serious health issues to the people⁷. Studies of groundwater also indicated the high concentration of chromium in Palar River basin, which is much more than the permissible limit in drinking water. The tanneries are polluting the Palar River, causing ecological degradation and health hazards. (Maheswari.j. and K.Sankar, 2011). Another example is contamination in the western cities of Bichari and Pali is so severe that the groundwater is not only unfit for human consumption, also for irrigation⁸. In the third category, agricultural runoff carries with it hazardous chemicals found in fertilizers and pesticides that can eventually taint groundwater sources. In the fourth category,

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three-fourths of all urban wastewater goes untreated, leading to widespread death and disease from sewage-borne infection.

**Definitions**

The term “pollution” in the context of water is derived from the Latin word “pollutes”. “Pol” means before and “latus” means washed (i.e. before washing). The term “water pollution” is used to indicate an act of contamination or making foul the natural water bodies. The word pollution is a general term and includes contamination. Contamination makes water totally unfit for use\(^9\). The sum total of all the available water on the surface of the earth is called “Hydrosphere”.

The term ‘Environment’ includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property\(^{10}\).

‘Hazardous substance’ is defined as any substance or preparation which, by reason of its chemical or physico-chemical properties or handling, is liable to cause harm to human beings, other living creatures, plants, micro-organism, property or the environment\(^{11}\).

‘Pollution’ under the Water Act means 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 (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to

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\(^{10}\) Sec. 2(a) of the *Environment (Protection) Act, 1986*.

\(^{11}\) Sec.2 (e) of the *Environment (Protection) Act, 1986*. 
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.12  

“Trade effluent” includes “any liquid, gaseous or solid substance which is discharged from any premises used for carrying on any industry, operation or process, or treatment and disposal system, other than domestic sewage13”.  

The term “stream includes (i) river, (ii) water course (whether flowing or for the time being dry); (iii) inland water (whether natural or artificial); (iv) subterranean waters; and (v) sea or tidal waters to such extent or, as the case may be, to such point as the State Government may, by notification in the Official Gazette, specify in this behalf14.  

The Water (Prevention and the Control of Pollution) Act, 1974 does not expressly refers to groundwater. This can be examined in the light of the definition of ‘stream’ given in the Water Act. Streams include subterranean waters. The meaning of subterranean waters are nothing but ‘underground’ waters15. Thus, the control of pollution of subterranean streams includes control of pollution of groundwater. Dumping of polluting matter on the land, which may pollute groundwater, came to be regulated only after the introduction of 1978 amendment to the Water Act. Such a liberal interpretation may be viewed as conferring on the pollution control board, powers to take up appropriate measures against pollution of groundwater. Further the rules framed under EPA16 are silent on the question whether the board should consider the various

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12 Sec.2 (e) of the Water (Prevention and Control of Pollution) Act, 1974.
13 Sec.2 (k), ibid.
14 Sec.2 (j), ibid.
16 Hazardous Waste (Management and Handling) Rules, 1989. Rule 5 empowers the Board to issue authorization after the Board is satisfied that the operator of a facility or an occupier, as the case may be, possesses appropriate facilities, technical capabilities and equipment to handle hazardous waste safety'.
effects of hazardous waste on groundwater before it grants authorization for disposal in a particular locality. The boards are reluctant to act because they are overburdened with too many responsibilities and weakened by institutional pressures. A specific and definite legislation with a comprehensive mechanism of control and management is necessarily to be enacted for sustainable use of groundwater. Hence, it is desirable to look at the problem of groundwater from a wider perspective.

**Environment Pollution and Industrial Development:**

Air, Water or Noise pollution is a menace to the society. With the industrialization of the country problem of pollution comes in and if it is allowed to go unabated, there will be serious health hazard to the human community. It is true that we need industrialization for our development. No country can prosper without industrialization. At the same time it should be the endeavor of all to control pollution. We have to overcome hazard of pollution by taking proper measures to reduce it to the extent which may not cause health hazard.\(^{17}\)

In Vellore District leather industries are causing enormous pollution because fresh or raw hides cannot be used for manufacturing leather goods. They have to be treated and cured and this is done at the tanneries. The tanneries produce large amounts of solids, sulphides, chromium, alkalinity, lime, etc., all of which have to be disposed of in water bodies. There are a number of other industries like chemical industry, food related industries, textile industry, paper and pulp industry, rubber and plastic industries, metal industries, petroleum industry, mining industry that generate water pollutants. Some other industries like Optical glass industry produces red colour

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\(^{17}\) Mahavir Coke Industry and Another v. Pollution Control Board and others, AIR 1998 Gau.10.
waste containing detergents and suspended solids that do not settle down easily. Soap and detergent industry release pollutants such as tertiary ammonium compounds, alkalis, fats, and fatty acids, glycol, polyphosphates, sulphonated hydrocarbons. Soft-drink bottling plants produce highly alkaline wastes containing high amount of BOD from bottle washing.

Environmental pollution caused by hazardous industries presents potential challenge to life and the harmony between man and nature. There is always a conflict between industrial development and conservation of environment. The need to balance the values of development and environment, therefore, becomes imminent. Although the conservation of environment need not be construed as non-intervention, the industrial production process cannot be permitted to go unhindered to pollute the environment. In the words of Paton,

‘We cannot have an absolute right to an unspoiled environment, for modern industry must at least in some areas destroy rural beauty. The best that law can do is to curb the worst excesses of industrialization by town planning. Noise and pollution are two of the greatest offenders – the latter affects air, water, natural growth and health of humanity’\(^{18}\).

**Health Effects of Water Pollution:**

The effects of water pollution depend on the type of pollutants present in water. Pollutants bring about physical and chemical changes that make the water unfit for drinking and harmful to aquatic life and man. With rapid industrialization, the problem of pollution of natural water sources is also attaining alarming proportions. The most disturbing features of the modern wastes disposal system is that those who cause water pollution are seldom the people who suffer from it. Industries and cities discharge their untreated or only partially treated effluents into

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neighboring streams and, thus, expose the downstream’s riparian population to dangerously unhygienic conditions\textsuperscript{19}. Polluted water causes many water-borne diseases resulting in death.

The World Health Organization (WHO) estimates that as much as 80 percent of all diseases in the world are associated with water. It states: “One hospital bed out of four in the world is occupied by a patient who is ill because of polluted water”. It further states that about 25 million people die every year from the water-borne diseases in developing countries including India\textsuperscript{20}. According to an Expert Committee on Ganga Action Plan in India, the total volumetric domestic pollution is 75 per cent and industrial pollution 25 per cent; yet in toxic terms, the industrial pollution is much more\textsuperscript{21} because industries discharge chromium, mercury, arsenic and other hazardous chemical substances. Besides human health hazards, the polluted water also affects aquatic life.

The use and discharge of hazardous substances have contaminated air, water, and soil, rendering the environment more and more unfit for healthy living within and outside the industrial establishment. The industrial workers have been direct, constant and slow victims of hazardous substances used in industries. The effects of the main water pollutants that are causing effects in human health\textsuperscript{22} are,

\begin{itemize}
  \item Mercury compounds in waste water are converted into extremely toxic methyl mercury, which can cause numbness of limbs, lips and tongue, deafness, blurring of vision and mental derangement.
\end{itemize}

\textsuperscript{19} M.C. Mehta v. Union of India (Ganga Pollution Case), AIR 1988 SC 1115 at 1125.
• Nitrates in drinking water can cause disease in infants that sometimes results in death.

• The water polluted with sewage usually contains pathogens like virus, bacteria, parasitic protozoa and worms. The sewage-contaminated water, therefore, is a source of water borne diseases like jaundice, cholera, typhoid, amoebiasis, etc.

• Cadmium in sludge-derived fertilizer can be absorbed by crops; if inserted in sufficient amounts, the metal can cause an acute diarrhoeal disorder and liver and kidney damage.

• Excess fluoride in drinking water causes teeth deformity, hardening of bones, as also stiff and painful joints. (Skeletal fluorosis).

• Over-exploitation of groundwater may lead to reaching of arsenic from soil and rock sources and contaminate groundwater. Continuous exposure to arsenic causes ‘black foot, disease’. It also causes diarrhea, peripheral neuritis, hyperkeratosis, as also lung and skin cancer.

**Legal framework of water pollution:**

Existing water law is made up of a number of different instruments. This is the case at the international level where only certain aspects of water law have been developed and where no international water law treaty exists. This is also the case within India where it remains difficult to identify a coherent body of comprehensive law concerning water in general and groundwater in particular. This is related to the fact that distinct concerns have been addressed in different enactments. This is also due to the division of powers between the centre and the states and the
fact that water regulation is mostly in the hands of the states. The researcher highlights some of
the salient international instruments that are relevant in India and then to examine existing water
regulation in India and the different principles that govern different types of water.

**At International Level:**

International water law includes a number of instruments. They may not all apply directly in
India but contribute in various ways to the development of water law at the international as
well as national levels. For many years, international water law included mostly treaties
concerning navigation in international rivers, which constituted one of the early areas of
collaboration among states. This has been expanded to many non-navigational aspects over time
but the focus on international watercourses remains an important part of water law, as
exemplified in the Farakka treaty\(^\text{23}\).

International water law is both an old and highly developed area of law as well as an
area in need of significant development. International water law is well developed with regard to
cooperation among states concerning issues and activities that are clearly transboundary in scope
such as navigation on international watercourses. In recent decades, the importance of
collaboration on non-navigational aspects of international watercourses has rapidly grown and is
now recognized as a core objective of international water law.

International water law is yet to be effectively developed with regard to cooperation on
issues related to water found within national boundaries. While this still seems to be beyond
what most states can agree on at present, water is not different from biodiversity, which is also
nearly entirely found under national jurisdiction. Yet, it is now already fifteen years since UN

\(^{23}\) *Treaty on Sharing of the Ganges Waters at Farakka, New Delhi, 12 December 1996, 36 Int’l Leg. Mat. 519 (1997)*
member states recognized that biodiversity is a ‘common concern’ of humankind, which is under state sovereignty but requires a degree of cooperation in conserving and sustainably using it. Further, while international water law has at least started integrating an environmental perspective, the social and human rights dimension of water remain largely absent. The absence of a human right perspective in water law has been addressed from the perspective of human rights law through the adoption of General Comment 15 of the first Covenant.

**At National Level:**

India lacks an appropriate framework to regulate freshwater in all its dimensions. The existing water law in India is characterized by the coexistence of a number of different Principles, Rules and Acts adopted over many decades. These include common law principles and irrigation acts from the colonial period as well as more recent regulation of water quality and the judicial recognition of a human right to water.

Statutory water law also includes a number of pre- and post-independence enactments in various areas. These include laws on embankments, drinking water supply, irrigation, floods, water conservation, river water pollution, rehabilitation of evacuees and displaced persons, fisheries and ferries. 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. While the Constitution does not specifically recognize a fundamental right to water, court decisions deem such a right to be implied in Article 21 (right to life).

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The right to water can be read as being implied in the recognition of the right to a clean environment. In *Subhash Kumar v. State of Bihar*, the Supreme Court recognized that the right to life ‘includes the right of enjoyment of pollution free water and air for full enjoyment of life’\(^\text{27}\). In the Sardar Sarovar case, the Supreme Court went further and directly derived the right to water from Article 21. It stated that ‘[w]ater is the basic need for the survival of the human beings and is part of right of life and human rights as enshrined in Article 21 of the Constitution of India’\(^\text{28}\).

While the recognition of a fundamental right to water by the courts is unequivocal, its implementation through policies and acts is not as advanced.

The intervention of the central government in water regulation is limited by the constitutional scheme; the importance of national regulation in water has already been recognized in certain areas. Thus, with regard to water pollution, Parliament did adopt an act in 1974, the Water Act\(^\text{29}\). 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 various enactments, 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{30}

In recent times, the riparian right theory has increasingly been rejected as the appropriate basis for adjudicating water claims.\textsuperscript{31} Further, common law rights must today be read in the context of the recognition that water is a public trust.\textsuperscript{32} 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 neighbours’ 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{33} It is only over the past decade that some states have eventually adopted groundwater acts.

\textsuperscript{30} Hanuman Prasad v. Mendwa, AIR 1935 All 876.
\textsuperscript{31} Report of the Narmada Water Disputes Tribunal with its Decision in the Matter of Water Disputes regarding the Inter-State river Narmada and the river valley thereof between the states of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan, Chapters 8 and 9 (New Delhi: Government of India, vol.1, 1979).
\textsuperscript{32} M.C.Mehta v. Kamal Nath, 1997 1 SCC 388.
\textsuperscript{33} Model bill to regulate and control the development and management of groundwater, 2005, available at http://www.ielrc.org/content/e0506.pdf. Last accessed on 5th November 2014.
SIGNIFICANCE OF RESEARCH:

The importance of water for living being is not subject to compromise. Because without water life is not possible. The availability of quality water, both surface and ground is decreasing over the years in most of the river basins and industrial areas of India. Groundwater is generally less susceptible to contamination and pollution when compared to surface water bodies. The prediction of the future spread of pollution in groundwater system due to tannery effluents in Vellore district should be given proper and timely attention from all the angles because groundwater is the major source of water for domestic, agriculture and industrial use in that area. In Tamil Nadu, Vellore district is worst affected by tannery industries, particularly the groundwater is enormously polluted.

In a study it was observed that the people in the area are seriously affected and suffering from occupational diseases such as asthma, chromium ulcers and skin diseases. Incidence of respiratory diseases among workers exposed to occupational and environmental risks of tannery industry at Ranipet industrial area. (Mahimairaja et al., 2000). In some other studies, it was observed that in Vellore district, the groundwater is not suitable for domestic use. The villagers are forced to travel 4 to 5 km for water. Much of the groundwater is unsuitable for irrigation, and hundreds of wells in the region can no longer be used. (H.Manjunatha 2011, J.Nandabalan 2012, J.Maheswari and K.Sankar.2011). So, there is a need for a detailed study about the effectiveness of the existing laws and its implementation for mitigation of pollution and protection of groundwater. Hence the study assumes significance.

REVIEW OF LITERATURE:

Groundwater contamination due to industrial pollution has become a serious issue as it affects the environment, health of people and social wellbeing. A thorough analysis needs to be
carried out to arrive at a sustainable solution for mitigating the groundwater pollution. This includes analyzing the laws, prevention of groundwater pollution, groundwater quality assessment, health and social issues of the people depending on the contaminated water. Literature pertaining to the above has been reviewed. “The Journey of Water Resource Law and its Management: Doom or Dawn,” analyses the Constitutional provisions relating to water resources and inter-state water disputes along with the decisions passed by various courts.

Paras Diwan and Peeyushi Diwan have edited 30 articles in their first volume written by various eminent scholars relating to environment. The researcher is listing out some of the articles relating to water pollution hereunder.


“Groundwater Pollution in the Palar Riverbed near Vellore, Tamil Nadu, India,” by T.S.Dhiviyaa Pranavam, T.Venkatesa Rao, L.Punithavathi, S.Karunanidhi and A.Bhaskaran emphasized that the necessity of the riparian bed as a common property, resource to be used for better community health instead of short-term benefit.

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36 S.N.Jain,”The Water Pollution Act: The Basic Legal Issues,” ibid at 149-64.
37 K. Krishnan Nair, “Law for Prevention of Water Pollution,” ibid at 165-76
38 P.S.Sanghal, “Water Pollution Control Laws: A Critical Analysis”, ibid at 177-200
39 G.S.Bajwa, “Problem of Marine Pollution and its Management,” ibid at 201-18
Some of the studies carried out in the field of groundwater pollution and its management in various areas by eminent scholars are listed hereunder:


In Assessment of groundwater quality in Tirupur region. (Arumugam K.2013) and Assessment of Groundwater Quality and its Sustainability for Drinking and Irrigation purposes of Prakasam District, Andhra Pradesh, India.(Maruthi Devi 2013), the scholars have focused mainly the groundwater quality assessment in a particular region of a state.


**Results of the Review:**

The review of literature indicates that scholars have widely concentrated on issues relating to water pollution and the environment. Some of the studies have highlighted groundwater contamination by various sources. Some others have focused on prevention of groundwater pollution. Most of the research works were based on adaptation of technical methods such as
GIS, Remote Sensing and the Contaminant Transport Modeling for determining contamination and have also suggested for remediation. Only a few studies like, Environmental Jurisprudence and the Role of Judiciary – a Critical Study (Parikh Madhuri, 2014) and Legal Aspects of Water Pollution, Indian Perspective: a Critical Appraisal (Ramana, BJV, 2013) are based on legal aspects, widely focused on the development of environmental jurisprudence and the water pollution in general. None of the studies have analyzed the legal aspects with special reference to groundwater pollution. However, the judiciary has contributed to answer certain legal issues relating to the contamination of subsoil water which poses health hazard, environmental degradation and threat to the ecology. None of the studies have carried to address these legal issues on academic lines. Therefore, in this research work, a systematic attempt is made to explore and analyze the effectiveness of the laws relating to groundwater protection and its implementation in mitigating pollution and the protection of groundwater in a comprehensive manner.

**OBJECTIVES OF RESEARCH:**

The aim of this study rests on the visible destruction of nature, environment, and groundwater coloring due to hazardous chemicals by the industries like tanneries. The havoc known to the world was dismal but the danger caused has been colossal. Thus the researcher makes an attempt to examine, how the laws failed? How the enforcement machinery became the silent spectator for this situation. The objectives of the research are listed hereunder:

- To analyze the constitutional aspects of right to water, responsibility for providing water, and the environment protection.
• To analyze the groundwater protection laws of Tamil Nadu and to find out the legal support for protecting the rights of the general public who are largely affected by groundwater pollution.

• To make a thorough analysis of central laws relating to groundwater protection and control of pollution.

• To trace and analyze the international instruments relating to groundwater protection and control of pollution. To analyze the role of judiciary in protecting the rights of people who are affected because of pollution by various industries including tanneries.

• To examine various water policies and the governing machineries related to groundwater pollution and its possible contribution to prevention and the protection of groundwater from industrial pollution for securing the rights of general public.

• To obliterate the lacunae in the existing laws and its implementation by recommending the appropriate measures to be made for the possible prevention and the control of pollution.

**HYPOTHESES:**

The researcher has framed the following hypotheses for the purpose of realizing the aims and objectives

i) Tannery industries cause groundwater pollution.

ii) Lack of effective governance leads to the poor mitigation of groundwater pollution.
To test these hypotheses, the following questions have been framed:

- What is the Constitutional scheme relating to right to water and the Environment Protection?
- What are the laws relating to groundwater pollution in the state of Tamil Nadu? How far they help to effectively control pollution?
- How far the national laws influence groundwater governance in the State of Tamil Nadu?
- What is the role of environmental laws to prevent and control groundwater pollution?
- What is the international concern for water protection? How far international law is relevant for effective protection of groundwater under domestic laws?
- What is the role of governing machineries in preventing and controlling groundwater pollution? Whether they are working properly?
- What is the role of judiciary in combating and preventing groundwater pollution?

**RESEARCH METHODOLOGY:**

The research is a doctrinal work. As part of the doctrinal research the researcher has collected data from various sources i.e., primary and secondary. Accordingly the researcher has adopted Historical and Analytical method. Historical method is employed to trace out the origin, development and evolution of groundwater laws. Analytical method is used to analyze the groundwater laws in the present scenario. The decisions of the courts are analyzed to evaluate the contribution of judiciary. However, the researcher has limited her study only to the groundwater pollution caused by tannery industries situated in and around Vellore of Tamil Nadu.
SOURCES:

The researcher has used both primary and secondary sources for the purposes of the study. Provisions relating to environment protection in the Indian Constitution, right to water and the powers of governing authorities relating to water are discussed. State of Tamil Nadu legislations relating to groundwater\textsuperscript{40}, water supply\textsuperscript{41} and other related laws are referred. Similar legislations of other states and the national\textsuperscript{42} and state\textsuperscript{43} water policies are cited.

Legislations relating to environment\textsuperscript{44}, environment rules made by the central government under various legislations\textsuperscript{45}, National policies relating to environment and industries are referred. The reports and working of governing machineries like CPCB, TNPCB and the CGWA etc., are consulted.

The sources at the international level includes (UN) General Assembly resolution on rights to water\textsuperscript{46}, Human Rights Convention, UN convention on biological diversity, Agreement establishing World Trade Organization, World Bank guidelines, Multilateral environmental agreements\textsuperscript{47}, United Nations Convention on Environment and Development (UNCED); United Nations Convention on Biological Diversity,1992; World Summit on Sustainable Development (WSSD) 2002 are referred. The secondary sources are mainly the books and articles written by

\textsuperscript{40} The Tamil Nadu Groundwater (Development and Management) Act, 2003, the Tamil Nadu Groundwater (Development and Management) Repeal Act, 2013 and the Chennai Metropolitan Area Groundwater (Regulation) Act, 1987.


\textsuperscript{42} National Water Policies, 1987, 2002 and 2012.

\textsuperscript{43} (Tamil Nadu) State Water Policy, 1994.

\textsuperscript{44} Water (Prevention and Control of Pollution) Act, 1974, Cess Acts relating to water pollution, Environment (Protection) Act,1986, etc.,

\textsuperscript{45} For example, rules made under Environment (Protection) Act, 1986; Environment (Protection) Rules, 1986.

\textsuperscript{46} UN General Assembly Resolution A/RES/64/292 dated 28 July, 2010.

eminent authors and experts. Modern sources like electronic sources including internet and the data available in official websites, newspapers and periodicals are utilized for the present research for the purpose of deducing the findings and for reaching appropriate conclusion.

**SCHEME OF STUDY AND CHAPTERISATION:**

**Chapter I** provides a general Introduction. This chapter also covers the research problem, objectives of research, hypothesis, research methodology and sources.

**Chapter II** deals with Basic elements of Groundwater Laws. This chapter explains historical background of water laws and also provides basic provisions under general laws relating to water protection.

**Chapter III** analyses International Concern for Water Protection. It discusses about International Conventions and Laws relating to the protection of groundwater and its relevance under domestic laws.

**Chapter IV** analyses National Concern for Water Protection. It analyses the Laws relating to the protection of groundwater and the relative provisions under Environment Protection Laws. It also emphasizes the role of working of the governing machineries for effective control and protection of groundwater.
Chapter V deals with Vellore Tanneries and Groundwater Issues. This chapter explains about the background of tanning industries\(^{48}\), the purpose of installing these types of industries in one place, pollution of Palar River\(^ {49}\), groundwater contamination\(^ {50}\) and health issues\(^ {51}\) based on the secondary data available on the relevant topics.

Chapter VI analyses the Role of Judiciary. It examines the contribution of judiciary in protecting the constitutional right of the general public against the polluting industries. This chapter analyses the Vellore Tannery Case and other similar type of cases decided by High Courts and the Supreme Court. It also analyses the impact of Judgments in the affected areas.

Chapter VII forms the Conclusion of the research. It provides some suitable suggestions based on the findings.

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\(^{48}\) www.roionline.org/books/Industrial%20ecology_Chapter07_Leather.pdf. last accessed on 3\(^{rd}\) September 2014.

