

**AN ECONOMIC ANALYSIS OF  
ENVIRONMENTAL LAW AND POLLUTION:  
A Study of Leather Tanning Industries in Tamil Nadu**

**Dissertation submitted to Jawaharlal Nehru University  
in partial fulfilment of the requirements  
for the award of the degree of  
MASTER OF PHILOSOPHY**

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**DECLARATION**

I declare that the dissertation entitled “AN ECONOMIC ANALYSIS OF ENVIRONMENTAL LAW AND POLLUTION: A Study of Leather Tanning Industries in Tamil Nadu”, submitted by me in partial fulfilment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** of this University is my own work and has not been previously submitted for any other degree of this or any other University.

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**CERTIFICATE**

We recommend that the dissertation be placed before the examiners for evaluation.

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*Dedicated to* \*\*\*\*\*

*My Baby*

*Husband*

*&*

*Family*

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## ABBREVIATIONS

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ACP	: Assimilative Capacity Principle
BOD	: Biological Oxygen Demand
CAC	: Command-and-Control
CETPs	: Common Effluent Treatment Plants
Cl	: Chloride
CLRI	: Central Leather Research Institute
CO <sub>2</sub>	: Carbon Dioxide
COD	: Chemical Oxygen Demand
Cr	: Chromium
DPSP	: Directive Principle of State Policy
EC	: European Commission
ETPs	: Effluent Treatment Plants
H <sub>2</sub> O	: Hydrogen Sulphide
ICJ	: International Court of Justice
ICL	: Customary International Laws
IRPTC	: International Register of Potentially Toxic Chemicals.
MCA	: Marginal Cost of Abatement
MDC	: Marginal Damage Cost
MPS	: Marginal Private Cost
MSC	: Marginal Social Cost
NEERI	: National Environmental Engineering Research Institute
NH <sub>3</sub>	: Ammonia



NO <sub>3</sub>	: Nitrate
OECD	: Organisation for Economic Cooperation and Development
P	: Pollution
PIL	: Public Interest Litigation
PILES	: Perundurai Leather Industries Eco Security Private Limited
PO <sub>4</sub>	: Phosphate
PPP	: Polluter Pays Principle
R.O.S	: Reverse Osmosis System
S	: Sulphides
SIGC	: SPICOT Industrial Growth Centre
SO <sub>4</sub>	: Sulphate
SPCB	: State Pollution Control Board
SPICOT	: State Industrial Promotion Corporation of Tamil Nadu Limited
SS	: Suspended Solids
T	: Tax
TDS	: Total Dissolved Solids
TKN	: Total Kjeldahl Nitrogen
TNPCB	: Tamil Nadu Pollution Control Board
TNURC	: Tamil Nadu Agricultural University Research Centre
UNEP	: United Nations Environment Programme
UNO	: United Nations Organisation
UOI	: Union of India

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*Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

*Vellore District Environment Monitoring Committee v The Honourable Chief Justice* Writ Petition Nos. 8335/2008 and 19017/2009, Madras High Court, 28 January 2010.

### International Cases:

*Leatch v Director-General National Parks & Wildlife Service and Shoalhaven City Council*, Land and Environment court of New South Wales, 1993 NSW Lexis 8229

*Nicholls v Director National Parks and Wildlife Service* 1994 (84) LGERA397

# **Chapter 1**

## **INTRODUCTION**

# INTRODUCTION

## 1.1 Background of the Study

In the present scenario, environmental pollution is the main and foremost problem throughout the world. Pollution appears in the environment due to the release of substances and energy from the waste products of industries and households. This eventually leads to changes in the natural environment which is usually harmful. On the basis of environmental degradation, pollution is commonly classified into four categories namely air pollution, water pollution, land pollution and noise pollution that cause damage in the existing natural balance of ecosystems.

Air pollution is mainly caused by the burning of fossil fuels and emission from automobiles which creates respiratory related diseases. Water pollution is occurring due to the discharge of untreated organic wastes and industrial effluents in the rivers, lakes and seas that destroy the marine life as well as human health and other forms of life. Land pollution takes place due to dumping of solid wastes in the soil by different sources such as residential, commercial and industrial premises. Noise pollution is another kind of pollution as technological utilisation in industries and emergences of most automobiles for the reason of modernisation.

In India, environmental pollution has increased mainly due to 'poverty, continuing forest devastation, the negative impact of economic development, and sheer greed'.<sup>1</sup> Further, the process of economic development is diminishing the quality of the environment in India. The destruction of environment is not due to the increasing rate of development rather it has occurred because of improper implementation of ecological principles. Thus, as the concept of development is not utilising these ecological principles properly has lead to increase in environmental pollution throughout the world as well as in India. This non-implementation of principles and focus on development without taking environment into consideration in India and world has not only affected the people health and quality of life adversely but also the flora and fauna and other living species.

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<sup>1</sup> Har Govind, 'Recent Development in Environmental Protection in India: Pollution Control', *Ambio*, 18 (8), 1989, p. 429.

Thus, India is concerned about the environmental pollution problems and taken various initiatives to resolve this emerging non-traditional security threat. In this regard, India has supported all the major initiatives issued by United Nations Organisation (UNO). Further, India was influenced by the UNO Conference on Environment and Human Development (1972) at Stockholm to control various kinds of pollutions, which influenced the Indian Government to incorporate Articles 48A,<sup>2</sup> 51A(g)<sup>3</sup> and 253<sup>4</sup> in the Constitution of India. On the basis of these Articles, Parliament has enacted the Air (Prevention and Control of Pollution) Act, 1981 and the Environmental Protection Act of 1986.

The Water (Prevention and Control of Pollution) Act of 1974 (amended in 1988) is the first law passed in India with the objective of controlling the discharge of domestic and industrial pollutions into rivers and lakes without adequate treatment. To achieve these objectives of the Act, Government of India has established the pollution control boards at the Central and State level and enforced standards to factories while discharging pollutants into water bodies. Another important amendment is Air Act of 1981 (amended in 1987) for the purpose of controlling and reducing air pollution. The functions of this act and the enforcement apparatus are similar to that of the Water Act.

Government of India has also implemented the Environment Protection Act (1986) to protect and improve the environment in the country, which consolidates the provisions of air and water acts. Thus, 'Environmental disasters prodded the Indian government into passing comprehensive legislation, including rules relating to storing, handling and use of hazardous waste'.<sup>5</sup>

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<sup>2</sup> It states that 'the state shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.

<sup>3</sup> This article imposes a responsibility on every citizen 'to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures'.

<sup>4</sup> It (read with entry 13 of the union list) provides power to the centre to make laws implementing India's international obligations and also any decision made at international conference.

<sup>5</sup> M. P. Prasad, 'Environmental Protection: The Role of Liability System in India', *Economic Political Weekly*, 39 (3), 17-23 January, 2004, p. 258.

On the basis of above mentioned acts, government is taking necessary steps to restrain pollution such as, the 'formulation of national environmental standards, prescribe procedures for managing hazardous substances, regulate industrial locations, establish safeguards for preventing accidents and collect and disseminate information regarding environmental pollutions',<sup>6</sup> which also stimulates the government to set up parallel regulatory agencies for the objective of protection of environment in the country. Along with these environmental acts to protect environment from degradation the citizens has a choice of three civil remedies to obtain redress:

'(a) a common law tort action against the polluter; (b) a writ petition to compel the agency to enforce the law and to recover clean up or remedial costs from the violator; or (c) in the event of damage from the hazardous industry accident, an application for compensation under the Public Liability Insurance Act (1991) or the National Environment Tribunal Act (1995)'.<sup>7</sup>

In India all these three civil remedies play a significant role in the containment of environmental pollution. Incidentally most of the cases in Tort Law fall under the categories of nuisance, negligence and strict liability along with these the Supreme Court has added a new principle of 'absolute liability'<sup>8</sup> after the incident of Bhopal tragedy due to the leak of hazardous substances from the industry. Before pursuing a brief discussion on Tort Law, it becomes necessary to understand the meaning of it. The common meaning of nuisance is anything that 'annoys, hurts or offends but, an interference to be an *actionable nuisance*, the conduct of the defendant must be unreasonable. Further, a nuisance must not be momentary, but must continue for some time: A single, short inconvenience is not actionable'.<sup>9</sup> Nuisance includes offensive smells, noise pollution, air pollution and water pollution.

There are two kinds of nuisances such as public and private nuisance. 'A public nuisance injures, annoys or interferes with the quality of life of a class of persons who come within its neighbourhood which is called an unreasonable interference with a general right of public'.<sup>10</sup> It comes under both a Tort and the

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<sup>6</sup> Ibid.

<sup>7</sup> Shyam Divan, and Rosencranz Armin, *Environmental Law and Policy in India: Cases, Materials and Statutes*, New Delhi, 2008, p. 87.

<sup>8</sup> Ibid., p. 88.

<sup>9</sup> Ibid., p. 91.

<sup>10</sup> Ibid.

Criminal Law. While, 'the private nuisance is a substantial and unreasonable interference with the use and enjoyment of land. The reasonableness of the defendant's conduct is the central question in nuisance cases'.<sup>11</sup>

A common law action for negligence may be brought to prevent environmental pollution. 'In an action for negligence, the plaintiff must show that the defendant was under a duty to take reasonable care to avoid the damage complained of; there was a breach of this duty and the breach of duty caused the damage'.<sup>12</sup> An act of negligence may also constitute a nuisance as well as amount to be paid for the breach of his action under the rule of strict liability. The person is strictly liable 'when he brings or accumulates on his land something likely to cause harm if it escapes, and damage arises as a natural consequence of its escape'.<sup>13</sup>

In India, the term absolute liability emerged with the expansion of chemical-based industries, increasing number of stores and use hazardous substances. Conventionally, the 'strict liability was considered adequate to regulate such hazardous enterprises but after the incident of Bhopal gas leak tragedy (1984), replaced the strict liability by the absolute liability, a standard stricter than strict liability'.<sup>14</sup>

Thus, the concept of absolute liability could be seen in the context of leather tanning industries too since they are chemical based industries, use hazardous substance in tanning process and one of the important sources of environmental pollution. According to Jerald, 'in India, leather tanning industries are the fourth largest commercial activity about 80 per cent of the total leather production export comes from Tamil Nadu, where there are 2200 tanneries, mostly small and medium-sized and many close to the coast'.<sup>15</sup> In all these leather tanning industries of Tamil Nadu two kinds of tanning process are used namely vegetable tanning and chrome tanning process. Prior to 1970's leather tanning industries of Tamil Nadu were using vegetable tanning process. However, towards the end of seventies onwards these

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid., p. 100.

<sup>13</sup> Ibid., p. 105.

<sup>14</sup> Ibid., pp. 105-106.

<sup>15</sup> Staffan Holmgren, *An Environmental Assessment of the Bay of Bengal Region*, Madras, 1994, p. 196.



industries started using the process of chrome tanning rather than vegetable tanning due to the international competition and development purpose.

The shift from vegetable tanning to chrome tanning process has resulted in environmental pollution by reason of discharging many untreated effluent chemical substances such as salt, sodium compounds, sulphuric acid into the Cauvery<sup>16</sup> and Palar<sup>17</sup>. The impact of these chemicals used in the industries is so high that it eventually led to environmental pollution and effects on the health of people residing near those industries. Under these circumstances the various civil society organisations filed a petition against these industries, which eventually made the Supreme Court of India and Madras High Court to intervene and resolve the emerging environmental pollution problems. Thus, as the pollution in the localities of leather tanning industries is increasing day by day it becomes necessary to understand the role played by these industries in polluting the area, chemicals used in industries, effects on health and environment, various court cases related to them and a brief economic analysis of these industries and related environmental law.

## 1.2 Review of Literature

According to U. Sankar, India has advantage in the production of leather products since it has strong raw material base, cheap labour and tradition of leather craftsmanship. In order to develop the leather tanning industries during 1950's and 1960's the Government of India facilitated these industries through various means such as providing technical and financial assistance. By 1970's the Government recognised the export potential of leather tanning industries. However, in the mid-1970's to stimulate the export of finished leather goods and products the Government of India banned the export of raw hides and skins.<sup>18</sup>

Towards the end of 1970's Jerald mentions that Indian industries started using the process of chrome tanning rather than vegetable tanning due to the international competition and development purpose which eventually resulted in environmental pollution in Tamil Nadu. Thus, it can be argued that leather tanning industries became

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<sup>16</sup> Erode and Thiruchirapalli districts.

<sup>17</sup> North Arcot district.

<sup>18</sup> U. Sankar, *Economic Analysis of Environmental Problems in Tanneries and Textile Bleaching and Dyeing Units and Suggestions for Policy Action*, New Delhi, 2001, p. 1.

one among the various industries which started using hazardous chemicals like textile industry and paper industry which polluted environment.<sup>19</sup> U. Sankar recalls that leather tanning are industries polluting the environment both in a direct and indirect manner. Specifically, leather tanning industries come under the category of 'Red',<sup>20</sup> which is considered as highly polluting industry.

Thus, leather tanning industries has endangered the health and environment in particular. In view of European Commission (EC), direct contact with chemicals can cause disability, illness and death. Further the Commission has reported that Leather dust has been listed as a potential carcinogen. The unskilled handling of chemicals for the process of treatment of hides and skins can generate the toxic hazards to the workers. Leak of chemical by accidents and negligence of packing, transporting, storage and handling can be harmful to the human beings as well as the environment.<sup>21</sup>

Similarly, Millie Nihila in the context of women workers in leather industries expresses that the women workers in the tanneries suffer from some of the gynaec problems such as abortions; premature deaths and still birth; high rate of neo-natal, infant and maternal mortality, prolapsed of the uterus; miscarriages as well as other health problems as anthrax, respiratory problem and so on.<sup>22</sup> The environmental pollution problem became so crucial that Murthy conveys that, from 1985 onwards people in North Arcot district of Tamil Nadu have conducted a series of dharna and demonstrations for control of pollution from the leather tanning industries. The motive of this dharna and demonstrations is that TNPCB could not give notice to the tanneries to stop pollution as well as government of Tamil Nadu has failed to control pollution through TNPCB.

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<sup>19</sup> Staffan Holmgren, *An Environmental Assessment of the Bay of Bengal Region*, Madras, 1994, p. 196.

<sup>20</sup> U. Sankar, 'Pollution control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 49.

<sup>21</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 32.

<sup>22</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2223.

Therefore, affected people from tannery pollution have filed writ petitions in the Supreme and High Courts of India for the purpose of controlling and prohibiting the environmental pollution. In this regard the Supreme Court of India in Vellore Welfare Forum case<sup>23</sup> signified the deteriorating conditions of environment and directed the Central Government to constitute an Authority under Section 3(3) of the Environment (Protection) Act, 1986 and to confer powers to the Authority under Section (5) of the Environment Act to deal with the pollution from tanneries and other polluting industries and for taking measures with respect to the matters referred to in Clauses (v) (vii) (viii) (ix) (x) and (xii) of sub-Section (2) of Section 3. The Authority should invoke the 'Precautionary Principle' and the 'Polluter Pays Principle' with the help of an expert team from NEERI and to assess the environmental degradation as well as to identify the suffered population in the affected areas by the pollution of tannery industries.

Thus, by viewing the verdict of Supreme Court of India on environmental law, it becomes significant to analyse these laws through using some of the concepts from economics as a discipline. The economic analysis of law is 'the application of economic theory and econometric methods to examine the formation, structure, processes and impact of law and legal institutions',<sup>24</sup> which treats the legal institutions within the subject of economic system.

Now in order to concentrate on the co-relationship between economics and environment and environmental law it is necessary to go through the role of development in the society. Development is the process of increasing the society's ability to meet human needs which happens through the commercial and economical activities. The industrial and commercial activities have developed a society and humans economically stable which can be thought of as a positive environmental externality. On the other hand, these activities cause the environmental destruction like pollution which is labelled as negative environmental externality. In the view of U. Sankar, externalities occurs when certain actions of producers are consumers have unintended external (indirect) affects on other producers or/and consumers it may be

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<sup>23</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>24</sup> Ejan Mackaay, 'History of Law and Economics', *Encyclopaedia of Law and Economics*, 200, 1999, p. 65, [Online: web] Accessed 28, February, 2010, URL: <http://www.scribd.com/doc/239168/0200-History-of-Law-and-Economics>.

positive or negative. Positive (technological spillover) externalities arise when an action by an individual or group confers benefits to others. Negative (pollution) externality arises when an action by an individual or group produces harmful effects on others.<sup>25</sup>

According to Krugman Pigou proposed that people who generate negative externality should have to pay a fee reflecting the cost they impose on others which is called on Pigouvian tax (effluent tax).<sup>26</sup> Michael Faure and Göran Skogh illustrated that the economics of polluter pay principle goes back to the work of Pigouvian tax in a sense the 'wrongdoer is responsible and should pay'.<sup>27</sup> Further, the Supreme Court of India pointed out in the Vellore Welfare Forum case<sup>28</sup> that the polluter pay principle alone is not sufficient to reduce environmental pollution, it also requires precautionary principle based on the international declarations such as Stockholm Declaration (1972) and Rio Declaration (1992).

From the above review of literature, it is observed that pollution is negative externality especially the effluent emanating from the leather tanning industries that is harmful not only to the people who are residing there but also to the flora and fauna and other living organisms. Based on this review of literature the proposed research is trying to internalise the negative (pollution) externality through the application of economics to the environment and the environmental law.

### 1.3 Rationale and Scope of the Study

The environmental pollution has become one of the major problems in the world. Countries are in the move to bring under control this problem internally and externally through passing laws and signing various treaties, agreements and following up significant declarations. As this proposed research is basically concentrating on leather tanning industries especially in Tamil Nadu, it would only

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<sup>25</sup> U. Sankar, *Environmental Externalities*, Chennai, 2006, pp. 1-2, [Online: web] Accessed 10 March 2011, URL: <http://envis.mse.ac.in/dissemination/sankar.pdf>.

<sup>26</sup> Paul Krugman, 'Building a Green Economy', *The New York Times*, 5 April, 2010, p. 3, [Online: web] Accessed 13 April, 2010, URL: <http://www.nytimes.com/2010/04/11/magazine/11Economy-t.html?emc=eta1>.

<sup>27</sup> Michael Faure and Göran Skogh, *The Economic Analysis of Environmental Policy and Law: An Introduction*, United Kingdom, 2003, p. 26.

<sup>28</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

concentrate or stick to the given paradigm. Since most of the leather tanning industries are basically polluting the river bodies the proposed research would enquire about the various chemicals used in the leather tanning process and subsequently analyse the side effects of those chemicals on human beings, flora and fauna and other living organism i.e., environment in totality. Further, as far as environmental pollution is concerned there are number of shared and contentious matters that have been noted by Supreme Court of India and Madras High Court. Thus, this research would look into various judgments of these benches in relation to the environmental pollution from the leather tanning industries in Tamil Nadu.

Environmental pollution has increased the apprehension of Central Government and State Government to prevent the pollution from leather tanning industries in Tamil Nadu. So, they have taken certain measures to withhold the pollution emitting from these industries in order to provide clean air and water to the local people. Thus, the ongoing research study would look into various measures and roles of the respective governments in the case of environmental pollution of leather tanning industries. At last but not least the research would focus into various laws related to environmental pollution and analyse these laws through with some of the relevant concepts relating to economics as a discipline.

#### **1.4 Plan of the Research**

##### **Chapter I: Introduction**

This chapter will deal with the relationship between economic development and environmental pollution. It will also examine the role of International Organisations and the Conferences associated with the emergence of environmental legislations in India. Further, it would analyse the importance of economic analysis of environmental law and pollution.

##### **Chapter II: Leather Tanning Process: Impact on Environment and Health**

This chapter would study the problems related to the pollution of leather tanning process and its impact on the environment and health.

### Chapter III: Legal Analysis of Environmental Pollution: Important Cases of Leather Tanning Industries in Tamil Nadu

This chapter will look into the role of the judiciary to control the pollution emanating from the leather tanning industries in Tamil Nadu. It would analyse the inferences of the judiciary about the government legislations and constitutional provisions related to environmental pollution control. Further, it would examine the interpretation of the judiciary about the principles and the customary international environmental law in relation to pollution.

### Chapter IV: Economic Analysis of Environmental Law and Pollution

This chapter will investigate the internalisation of negative (pollution) externalities through the use of Regulatory Standard approach, a Command-and-Control approach, Pigouvian Taxes and Subsidies method and the Coase theorem. It would deal with the role of law and economics in relation to environmental pollution and control. Further, it explores the economic analysis of the principles derived from the judicial inferences of environmental pollution from the leather tanning industries.

### Chapter V: Conclusion

This chapter would discuss the major findings of the study. It would look into in totality the changing dynamics of economic analysis of environmental law and pollution and provide certain suggestions or recommendations to avert environmental problems and pollution.

## **Chapter 2**

# **LEATHER TANNING PROCESS: IMPACT ON ENVIRONMENT AND HEALTH**

## **LEATHER TANNING PROCESS: IMPACT ON ENVIRONMENT AND HEALTH**

Environment has played a significant role in human life for ages. Man in the Ancient and the medieval period have considered the environment as a part and parcel of his life. He utilised the resources of environment limitedly and also safeguarded the resources for future generation. However, in the modern age with the emergence of the industrial revolution in the 18<sup>th</sup> century the socio-economic and political attitudes of people have changed. In this process of changes industrial revolution has bestowed positive aspects as well as negative aspects to the society. The most important positive aspect of the industrial revolution is scientific inventions by various scientists, which eventually helped in generating employment, higher standard of living etc. The negative aspect of this revolution is that it alienated the people from the ecology and is created the environmental pollution which eventually led to adverse affects on health and survival of people. Further, in the 21<sup>st</sup> century, globalisation, liberalisation and privatisation have instigated the environmental pollution in the race of money making or profit orientation. This kind of motive prevails in leather tanning industries as a result of that the environment of Tamil Nadu has been polluted. In this context, it becomes necessary to understand the environmental pollution as a whole and the process of leather tanning industries and its effects on the society.

### **2.1 Pollution**

*Random House Dictionary* describes pollution as a noun derived from the transitive verb *pollute*, which means: 'a) to make foul or unclean dirty: *to pollute the air with smoke* and b) to make impure or morally unclean: defile, desecrate – to soil, defile. (Synonym: 1. Soil, befoul. 2. Taint, containable, corrupt, debase)'.<sup>29</sup> Saigo and Cunningham (1992) describes, pollution 'as a process, to make foul, unclean, dirty; any physical, chemical, or biological change that adversely affects the health,

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<sup>29</sup> R. G. Chaturvedi and M. M. Chaturvedi, *Law on Protection of Environment and Prevention of Pollution*, Allahabad, 1998, p. 62.



survival, or activities of living organisms or that alters the environment in undesirable ways'.<sup>30</sup>

According to *American Heritage Dictionary of the English Language* (1992) pollution means 'the act or process of polluting or the state of being polluted, especially the contamination of soil, water or the atmosphere by the discharge of harmful substances'.<sup>31</sup> *Little Oxford English Dictionary* defines pollution means that the presence in the air, soil or water of a substance with unpleasant or harmful effects. Section 2(e) of the Water (Prevention and Control of Pollution) Act, 1974 describes

'pollution means such contamination 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'.<sup>32</sup>

*Halsbury's Laws of England* and International Law Association gives the following explanation about pollution in the Montreal Conference held in April 1982:

'any introduction by man, directly or indirectly, of substance or energy into the environment resulting in deleterious effects of such a nature as to endanger human health, harm living resources, eco-systems and material property and impair amenities or interference with other legitimate uses of environment'.<sup>33</sup>

Further, *Halsbury's Laws of England* describes that pollution is infringing the riparian rights or easements, percolating water, and artificial water course.

- Pollution is infringing the riparian rights or easements means

'the fouling of water in a natural stream flowing past the land of a riparian owner is an infringement of a right of property of that owner, whether he is or is not owner of any part of the river-bed, who is entitled to the flow of the water past his land in its natural state of purity, in such a case, the riparian owner may maintain an action without proof of damage. 'So, too, if a dominant owner has acquired an easement for the flow of water to his land in a pure state, the fouling of the water before it reaches his land constitutes an actionable interference with his right. This, however, is a matter distinct from riparian rights are derived from being a riparian owner and, as

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<sup>30</sup> S. V. S. Rana, *Environmental Pollution: Health and Toxicology*, New Delhi, 2007, p. 1.

<sup>31</sup> Ibid.

<sup>32</sup> Water (Prevention and Control of Pollution) Act, 1974, [Online: web] Accessed 10 December, 2010, URL: [http://www.kerendis.nic.in/legislation/Water%20\\_Prevention%20and%20Control%20of%20Pollution\\_%20Act,%201974.pdf](http://www.kerendis.nic.in/legislation/Water%20_Prevention%20and%20Control%20of%20Pollution_%20Act,%201974.pdf).

<sup>33</sup> R. G. Chaturvedi and M. M. Chaturvedi, *Law on Protection of Environment and Prevention of Pollution*, Allahabad, 1998, p. 62.

against other such owners, the riparian owner cannot, by purporting to grant them, transfer them wholly or in part to an owner of non-riparian land'.<sup>34</sup>

- Percolating water

'Since a landowner has a right to take all that he can of underground water that is in no defined channel beneath his land, he has a right of action against any other landowner who pollutes the water so that the plaintiff landowner gets the water in a polluted state. Percolation of noxious refuse water from land into a mine may amount to a nuisance which will be restrained by injunction'.<sup>35</sup>

- Artificial water course

'where an artificial channel was made in such circumstances as to give the owners on its banks riparian rights, they have the same remedies to prevent pollution as have the owners on the banks of a natural stream, but it is doubtful whether the owner of land abutting on an artificial channel of a temporary nature can object to pollution. Where the enjoyment of water flowing in an artificial channel over the premise of a person from abandoned mines had continued for more than twenty years, working of the mines in a such manner as to foul the water could not be resumed without infringing a right of the recipient owner to the flow of pure water'.<sup>36</sup>

The Air (Prevention and Control of Pollution) Act, 1981 has defined air pollution under Section 2(b) as,

'the presence in the atmosphere of any air pollutant such as any solid, liquid or gaseous substances (including noise) presented in the atmosphere in this concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment'.<sup>37</sup>

Pollutants might be released accidentally or deliberately into the environment in a single slug (such as an oil spill), or continuously as an effluent, a leak, or by leaching of wastes. Environmental pollutants can be divided into three such as biological, physical and chemical pollutants. Biological pollutants are basically disease-causing organisms such as the cholera bacterium which emerges from polluted sewage waters that creates the maximum number of human illnesses and deaths. Significantly, this kind of pollution prevails more in the developing countries. Physical pollutants include energy forms such as heat, noise, radioactivity, smoke and dust particles which are damaging the ecosystem either directly or indirectly. Chemical pollutants are inherently harmful to the human beings as well as other living

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<sup>34</sup> Ibid., p. 63.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Air (Prevention and Control of Pollution) Act, 1981, Section 2(b), [Online: web] Accessed 10 December, 2010, URL: <http://hspcb.gov.in/Air%20Act%201981%20Relevant%20Provisions.pdf>.

organisms.<sup>38</sup> These pollutants are human-made organic chemicals like pesticides and industrial chemical effluents which is a gift of modern way of living, industrialisation, urbanisation and overpopulation. Chief Justice P.N. Bhagwati clearly pointed out that:

‘When science and technology are increasingly employed in producing goods and services calculated to improve the quality of life, there is certain element of hazard or risk inherent in the very use of science and technology and it is not possible to totally eliminate such hazard or risk altogether. We cannot possibly adopt a policy of not having any chemical or other hazardous industries merely because they pose hazard or risk to community. If such a policy were adopted, it would mean the end of all progress and development. Such industries, even if hazardous, have to be set up since they are essential for economic development and advancement of well-being of the people. We can only hope to reduce the element of hazard or risk to the community by taking all necessary steps for locating such industries in a manner which would pose least risk of danger to the community and maximising safety requirements in such industries’.<sup>39</sup>

Some of the hazardous chemical industries are textile industry, paper industry, and leather tanning industry and so on. These are the industries polluting the environment both in a direct and indirect manner. Specifically, leather tanning industries come under the category ‘Red’,<sup>40</sup> which is considered as highly polluting industry. Tanning is the process of converting animal hides/skins into leather which is the ‘stabilisation of the collagen structure of the hide/skins’,<sup>41</sup> by using various combination of natural or mechanical and synthetic chemical process. Basically, ‘tanning is essentially the reaction of collagen fibres in the hide with tannins, chromium, alum, or other chemical agents’.<sup>42</sup> The heart of the process is that ‘organic and inorganic materials become chemically bound to the protein structure of the hides and preserve it from deterioration’.<sup>43</sup> These processes of tanning are generally divided into four stages (to understand the functioning of these tanning processes in India look

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<sup>38</sup> S. V. S. Rana, *Environmental Pollution: Health and Toxicology*, New Delhi, 2007, pp. 2-3.

<sup>39</sup> *M. C. Mehta v. Union of India* AIR 1987 SC 965 and also see in R. G. Chaturvedi and M. M. Chaturvedi, *Law on Protection of Environment and Prevention of Pollution*, Allahabad, 1998, pp. 12-13.

<sup>40</sup> U. Sankar, ‘Pollution Control in Tanneries’, Kadekodi, K. Gopal ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 49.

<sup>41</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 18.

<sup>42</sup> U.S. EPA, United States of Environmental Protection Agency, ‘Compilation of Air Pollutant Emission Factors’, January, 1995, p. 9.15-1, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>43</sup> INECE, International Network for Environmental Compliance and Enforcement, ‘Tanneries’, 30 August, 2004, p. 5.1, [Online: web] Accessed 9 November, 2010, URL: <http://www.inece.org/mmcourse/chapt5.pdf>.

Figure No. 1.1) namely, pre-tanning process, beam house process, tan yard (tanning) process, post-tanning process and finishing process.

## 2.2 Process of Tanning

- Pre-tanning Process

The body coverings of large and small animals are classified as hides (skin) such as bovines, horses, sheep, goats and others. The hides of animal consist of three layers namely:

1. 'A thin outer layer (epidermis),
2. A thick and fibrous middle layer (derma), and
3. A sub-cutaneous layer of adipose tissue (flesh)'.<sup>44</sup>

The process of pre-tanning is removing the derma from epidermis, flesh, hair and bristles which is carried out by a combination of manual, mechanical, chemical and bacterial action. 'Initially hides/skin are flayed from the carcass and then preserved by curing it either with wet or dry salt'.<sup>45</sup> Curing often incorporates treatment with insecticides<sup>46</sup> to discourage beetle and other insect attack during storage and transport. Washout of these chemicals may cause effluent to the environment but in the recent development of wastewater treatment systems has reduced such effluent substances. However, the workers get 'burning sensation and fissures'<sup>47</sup> in their hands for the reason of spreading of salt over the hides/skin.

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<sup>44</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2222.

<sup>45</sup> Ibid.

<sup>46</sup> Insecticides may include: *Pyrethum*, *permethrin*, *p-dichloro-benzene*, *sodium silico-fluoride*, and *borax*. Earlier insecticides such as *DDT*, *benzene hexachloride* and *dieldrin* are banned for such use in many industrialised countries because of their combination of persistence and environmental toxicity. (Refer to current list of Chemicals Banned or Severely Restricted, as compiled by the UNEP International Register of Potentially Toxic Chemicals (IRPTC). *Arsenic* and *mercury* insecticides should not be used anywhere on account of their high human and environmental toxicity, and their extreme persistence.

<sup>47</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2227.

- Beam House Process

In this stage the hides/skin are prepared by cleaning (washing) and conditioning through various steps such as soaking, liming and unhairing, delime, bating, pickling and degreasing.

1. *Soaking*

'Soaking may be carried out in pit, paddle or drum (or a combination of these) to rehydrate the skin and reverse the cure process'.<sup>48</sup> Washing and soaking removes blood, manure (dung), dirt as well as the 'hides are fleshed to remove the excess tissue, to impart uniform thickness, and to remove muscles or fat adhering to the hide'.<sup>49</sup> The chemicals are used for the process of soaking and washing include sodium hydroxide (0.2-2.0 g/l), sulphide, sodium hypochlorite (up to 1 g/l) and/or wetting agents (0.5-2.0 g/l), emulsifiers, surfactants and enzyme preparations.

2. *Unhairing and Liming*

Unhairing is the procedure of steeping the animal skins into alkali and lime solution to break down the structure and the root of the hair. This process helps removal of hair from the animal skin. Further, the hairless skin is drenched into the alkali and sulphide for the complete removal of the hair and to modify the properties of the skin protein (collagen).<sup>50</sup> Traditional way of drenching the animal skins into lime and sodium sulphide solution not only for the process of loosen wool and hair but also which opens the fibre structure and 'plumps' the hide.<sup>51</sup>

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<sup>48</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 16.

<sup>49</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-1, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>50</sup> B. R. Mann and M. M. McMillan, *The Chemistry of the Leather Industry*, G. L. Bowron & Co. Ltd, 3 April, 2011, p. 1, [Online: web] Accessed 6 May, 2011, URL: <http://nzic.org.nz/ChemProcesses/animal/5C.pdf>.

<sup>51</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations* 1991, France, p. 16.

'The normal practice of liming is to use a series of pits or drums containing lime liquors (calcium hydroxide) and sharpening agents'.<sup>52</sup> After liming the hides are unhaired by scraping or by machine. The length of the process may vary from 18 hours (drum) to seven days (pit). This procedure releases major part of the Chemical Oxygen Demand (COD) load from a tannery. Fleshing is carried out immediately after the process of liming through this process the unwanted flesh and fats are removed from the hide. The chemicals such as 'calcium hydroxide – lime (2-10%) sodium sulphide (1-4%), sodium sulphhydrate, some caustic soda'<sup>53</sup> may also be used in the process of liming and unhairing. Recently there is more usage of 'enzymatic and dim ethylamine sulphate'<sup>54</sup> preparations but these are recommended as too toxic chemicals to the environment.

### 3. *Delime*

Deliming is the function of neutralising the alkali, lime and other chemicals from the pelt. These chemicals are removed by washing with more quantities of water which is necessary for the purpose of avoiding interference in the tanning stage. 'Acids (0.5-2.0%), (sulphuric, hydrochloric, lactic, formic, boric and mistures), acidic salts, ammonium chloride or sulphide, sodium bisulphate, hydrogen peroxide'<sup>55</sup> these effluent chemicals are discharged into the river or other water sources. However, the usage of 'Carbon Dioxide (CO<sub>2</sub>) instead of ammonium salts avoids the release of ammonia (NH<sub>3</sub>) in the effluents'.<sup>56</sup> 'The acidification of liquids still containing sulphide may generate toxic hydrogen sulphide (H<sub>2</sub>S) gas. With prior treatment using hydrogen peroxide or sodium bisulphate (which is cheaper) to oxidize the sulphide, this problem can be avoided'.<sup>57</sup>

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<sup>52</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-1, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>53</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 17.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

#### 4. *Bating*

Bating is an enzymatic process for the removal of the unwanted hide, short hair and dirt components after liming. It is performed to impart softness, stretch, and flexibility to the leather this treatment employs 0.5% bating material for 30 minutes up to 12 hours.<sup>58</sup> Bating materials includes 'wood flour or other carrier (50%), deliming agent (ammonium chloride, 30%), and pancreatic enzyme (1-5%)'.<sup>59</sup> 'Bating and deliming are usually performed together by placing the hides in an aqueous solution of ammonium salt and proteolytic enzymes at 27° to 32°C (80° to 90°F)'.<sup>60</sup>

#### 5. *Pickling*

Pickling is the final beam house operation which is the function of the hides/skin with 'bribe solution and sulphuric acids to adjust the acidity for preservation or tanning',<sup>61</sup> which is basically the adjustment of the pH of the pelts. The chemicals are used in the process of pickling includes '5-10% common salt (sodium chloride) or sodium sulphate; 0.6-1.5% acid (sulphuric, hydrochloric, acetic or formic, or mistures) and  $\beta$ -naphthol and mercury fungicides',<sup>62</sup> which is considered as too toxic to the environment.

#### 6. *Degreasing*

Basically, degreasing is the process of improving the quality of the final leather. 'Solvent degreasing will usually result in greasy residues remaining after solvent recovery. Surfactants may be used instead of solvents, especially if recovery is not used'.<sup>63</sup> However, both the surfactant and solvent end up in the wastewater and

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<sup>58</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 17, and also see U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-1, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>, and also see in Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2222.

<sup>59</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 17.

<sup>60</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-1, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>61</sup> *Ibid.*, p. 9.15-3.

<sup>62</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 17.

<sup>63</sup> *Ibid.*

must be further treated. Surfactants should be biodegradable. Some of the solvents are white spirit, kerosene, monochlorobenzene, and perchloroethylene for sheepskins after tanning. Sodium carbonate can be used for degreasing of pigskins.<sup>64</sup>

- Tan Yard (Tanning) Process

Once hides/skins are delimed, bated and pickled it is sent for tanning in which stage the appropriate method of tanning has to be decided, whether pelts will be tanned by vegetable tanning process or chrome tanning process. 'Conversion of raw hides and skins to semi-finished leather by vegetable tanning is called "Raw to East India" and conversion of raw hide and skin to semi-finished leather by chrome tanning is called "Raw to Wet Blue".<sup>65</sup> Later, this semi-finished leather have been converted into finished leather either by vegetable tanning or by chrome tanning or by combination of vegetable and chrome tanning.

1. *Vegetable Tanning*

Vegetable tanning is used for heavier leather such as belts and shoe soles which is done in pits by extracts of various barks and woods. Traditionally, hides/skins have been tanned by vegetable tanning process this method is evolved by local tanners through practical experiences. The most common indigenous method of tanning is bag tanning which is done with locally available barks and vegetable materials. The hides/skins are stitched in the form of bags which is tanned with combined liquor of vegetable materials. The development of this method is pit tanning method in which pelts are soaked into the pits containing extracts of avaram this process also called as east India tanning. These processes are done without any usage of machines with minimal capital.<sup>66</sup>

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<sup>64</sup> Ibid.

<sup>65</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 56.

<sup>66</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, pp. 2221-2222.



In vegetable tanning, 'the concentration of the tanning materials starts out low and is gradually increased as the tannage proceeds which is usually takes 3 weeks for the tanning material to penetrate to the centre of the hide'.<sup>67</sup> After the penetration of the concentration, the skins/hides are wrung and cropped or split but in heavy hides may be re-tanned and scrubbed. Sole leathers are commonly dipped in vats or drums containing sodium bicarbonate or sulphuric acid for bleaching and removal of surface tannins. A substance includes lingo-sulphate, corn sugar, oils and naturally 15-30% of commercial tanning extract are bark or wood of tree or aqueous extracts. The duration of the whole process is from one day (drum) to six weeks (pit). Then, the leather is dried out and may then undergo further finishing steps. Particularly, vegetable tanned leathers do not undergo for re-tanning, colouring, fat/liquoring or finishing.<sup>68</sup> However, the introduction of chrome tanning and synthetic materials for show the soles diminish the importance of vegetable tanning.

## 2. Chrome Tanning

Chrome tanning is purely a chemical process which is the most common type of tanning in the world. Basically, higher-weight cattle hides such as the skin of sheep, lambs, goats and pigs are tanned by the chrome tanning process. The technique of leather production with the use of chromium salt is called chrome tanning process. This type of leather tends to be softer and more pliable, is very stable in water, top handling quality, high hydro-thermal stability and excellent user properties and consumes less time to produce than the vegetable tanned leather.<sup>69</sup>

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<sup>67</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>68</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>, and also see *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, p. 18.

<sup>69</sup> J. Ludvik, *Chrome Balance in Leather Processing*, United Nations Industrial Development Organisation, 9 August, 2000, p. 1, [Online: web] Accessed 9 November, 2010, URL: [http://www.elaw.org/system/files/L\\_pollutants.pdf](http://www.elaw.org/system/files/L_pollutants.pdf), and also see U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

'Chrome tanning is accomplished by either "one-bath" or "two-bath" method'.<sup>70</sup> In the former process, the pelts is tanned with the most common reducing agents such as trivalent chromium sulphate, sodium dichromate, sulphuric acid and glucose then hides is crushed in a colloidal solution of basic sulphate of chromium till the completion of tanning. In the latter process, the hide/skin is drenched into a solution of hexavalent chromium salts. Following saturation is placed in this bath of sodium thiosulphite and acid which reduces the hexavalent chromium to its trivalent state.<sup>71</sup>

One-bath process of chrome tanning is commonly used in most of the countries specifically the United States is performing this process of tanning. Technically, in the one-bath process, 'the hides are in a pickled state at a pH of 3 or lower, the chrome tanning materials are introduced, and the pH is raised'.<sup>72</sup> Later, chrome tanned leather is piled down, wrung, and graded for the thickness and quality, split into flesh and grain layers, and shaved to the desired thickness. The grain leathers from the shaving machine are then separated for re-tanning, dyeing, fat/liquoring. The chrome tanning is done in drums for from four to 24 hours. After the tanning process the excess of water is removed from the hides/skins by wrinkling.<sup>73</sup> The following chemicals include in the process of chrome tanning such as,

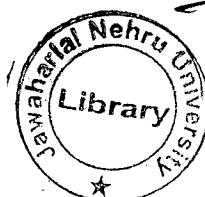
'8-12% of pelt weight of chrome tanning salt, and as little as 5-6% for low chrome processes (basic trivalent chromium sulphate hydrated complexes) (22-25% Cr<sub>2</sub>O<sub>3</sub>), 1.0% sodium bicarbonate (basifying agent to adjust pH), 0.1-0.5% masking agent – sodium formate, phthalate or salts of dicarboxylic acids, 0.1% fungicide if product is

<sup>70</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2221.

<sup>71</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2221, and also see U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>72</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>73</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2221, and also see U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.



to be stored/transported in wet blue condition. Some self-basifying chrome compounds are available'.<sup>74</sup>

Both vegetable and chrome tanning follow the same step as in the beam house process such as soaking, fleshing, liming/unhairing, deliming, bating, and pickling and the drying/finishing steps. However, chrome tanning is having additional processes includes re-tanning, dyeing (colouring) and fat liquoring these are called post-tanning processes.

- Post-tanning Process

*Re-tanning* is a next shorter tanning operation normally using same tanning agent other than chromium. Later, re-tanning solution is released from the drum and pigments (dye or colour) are added in the leather. The *dyeing* processes are of three types, i.e., 'acid, direct and basic or specialty dyestuff (1-6%)'.<sup>75</sup> The colouring solution is also discharged from the drum and pelts are taken out and wrung to remove excess moisture. Next a mixture of oils is added in the drum and the hides are rotated with the oil which is called *fat/liquoring* this helps to produce the desired softness.<sup>76</sup> 'Fat/liquoring is usually performed in a drum using an oil emulsion at temperatures of about 60° to 66°C (140° to 150°F) for 30 to 40 minutes'.<sup>77</sup> Fat/liquoring is usually lubricates the leather to impart strength and flexibility. 'Sulphonated fish, vegetable or animal oils; mineral and "synthetic" (3-10%)'<sup>78</sup> are used in the process of fat/liquoring.

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<sup>74</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 18.

<sup>75</sup> *Ibid.*, p. 19.

<sup>76</sup> INECE, International Network for Environmental Compliance and Enforcement, 'Tanneries', 30 August, 2004, p. 5.3, [Online: web] Accessed 9 November, 2010, URL: <http://www.inece.org/mmcourse/chapt5.pdf>.

<sup>77</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>78</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 19.

- Finishing Process

The next process of tanning is finishing such as drying and conditioning. Leather may be dried by any of five common methods.

'Air drying is the simplest method. The leather is hung or placed on racks and dried by the natural circulation of air around it. A toggling unit consists of a number of screens placed in a dryer that has controlled temperature and humidity. In a pasting unit, leathers are pasted on large sheets of plate glass, porcelain, or metal and sent through a tunnel dryer with several controlled temperature and humidity zones. In vacuum drying, the leather is spread out, grain down, on a smooth surface to which heat is applied. A vacuum hood is placed over the surface, and a vacuum is applied to aid in drying the leather. High-frequency drying involves the use of a high frequency electromagnetic field to dry the leather'.<sup>79</sup>

The two common approaches of conditioning the leather are staking and buffing which involves smoothing the grain surface of the leather. Staking is a form of massaging which makes the leather more pliable. 'Buffing is a light sanding operation applied to either the grain surface or the underside of a piece of leather. It is used to improve the nap of the underside or to smooth out surface imperfections on the grain surface'.<sup>80</sup> Buffing is the removal of the flesh side of the leather by mechanical abrasion to produce a suede effect, or to reduce the substances. In the vegetable tanning process rolling is done to compress the leather and make it firm and flat whereas in the chrome tanning process staking is done to make the flesh side suitable for further treatment.

The other finishing process includes, plating, applying film-forming materials which protect the quality but also enhance the colour of the leather. One or more finishing techniques are used for the purpose of gloss or waterproof qualities. Generally all leather receives at least one coat of a liquid finish material. Often three or more coats of finish are applied to leather in which each one followed by a drying cycle. Finally, the leathers is measured electronically and the area stamped on the underside. The leather is then packaged and stored for shipment.<sup>81</sup> The substances such as arylic or polyurethane polymer, nitrocellulose lacquer or urethane lacquer,

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<sup>79</sup> U.S. EPA, United States of Environmental Protection Agency, 'Compilation of Air Pollutant Emission Factors', January, 1995, p. 9.15-3, [Online: web] Accessed 9 November, 2010, URL: <http://www.epa.gov/ttnchie1/ap42/ch09/final/c9s15.pdf>.

<sup>80</sup> INECE, International Network for Environmental Compliance and Enforcement, 'Tanneries', 30 August, 2004, p. 5.3, [Online: web] Accessed 9 November, 2010, URL: <http://www.inece.org/mmcourse/chapt5.pdf>.

<sup>81</sup> Ibid.

chrome VI and benzidine dyes (toxic) are used in the process of finishing.<sup>82</sup> Currently tanning is generally full-chrome tanned leather or semi-chromed, or partially vegetable and partially chrome tanned. Chrome tanning process is discharging the three forms waste such as liquid waste, solid waste and sludge. Figure No. 1, clearly explains the tanning process in a systematic manner.

### **2.3 Process of Tanning: Impacts on Environment**

The tanning industries are creating a major environmental impact to the society through the discharge of effluent waters as well as very poor working conditions. The discharge of effluent water can affect the surface water, land, groundwater, air quality and also affect the human health. However, tannery industries are generating the major kinds of pollution such as water, air as well as noise pollution.

#### **Water Pollution**

Discharge of untreated tannery wastes into the surface waters can weaken the physical, chemical and biological qualities which create the noxious odours from the decomposition of organic matter. This tannery waste releases some of toxic chemicals into the water such as chromium, sulphides and ammonia and also nitrogen due to this the water may become saline and hard. The major water pollutants are as the Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), p<sup>H</sup>, Sulphides, Suspended Solids (SS), Total Dissolved Solids (TDS), Ammonia Nitrogen, Nitrate (NO<sub>3</sub>), Total Kjeldahl Nitrogen (TKN), Phosphate (PO<sub>4</sub>), Faecal coliforms, Chromium (Cr), Aluminium, Colours, Chloride (Cl), Phenolics, Acrylics, Oil and Grease and so on.<sup>83</sup>

#### ***a) Biological Oxygen Demand (BOD)***

Biological Oxygen Demand (BOD) is the quantity of oxygen necessary for the biological and chemical oxidation of water borne substances under ambient or test conditions. The waste water in the tannery, the BOD receives from organic material such as hide/skin and from Ammonia (NH<sub>3</sub>) in the delimiting process which not only

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<sup>82</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 19.

<sup>83</sup> *Ibid.*, pp. 21-30.

affects the dissolved oxygen resources of a water body but also reduces the oxygen content in the water and due to this flora and fauna cannot get proper oxygen from the water. The limits of BOD discharge, in the case of inland surface is 30 mg/l whereas in case of main coastal areas and irrigation land is 100 mg/l.<sup>84</sup>

b) *Chemical Oxygen Demand (COD)*

Chemical Oxygen Demand (COD) is a purely chemical oxidation test devised as an alternative method of estimating the total oxygen demand of waste water. The contribution of COD in the tannery waste water is attributed to a wide range of complex organic and inorganic process chemicals including dyes, detergents, biocides and syntams. The maximum limit of COD discharge is 250 mg/l in the water bodies.<sup>85</sup> However, this is 'more stable pollutants which gives a better indication of long-term effects than BOD'.<sup>86</sup>

c) *Total Dissolved Solids (TDS)*

The waste water from the tannery has a very high Total Dissolved Solids (TDS), the majority of which are sodium chloride and calcium Sulphate. Sodium chloride comes not only from the soaking and washing of raw hides/skins in water but also from the mixing of salt in the pickling operation which impacts the stream life in particular. The tolerance limit for TDS is 2100 mg/l.<sup>87</sup>

d)  $p^H$

The discharge level of  $p^H$  within the range of 5.5 to 9.0 can be harmful to only some of the species which is not a specific pollutants this is associated with the acidity or alkalinity of the waste water. In  $p^H$  of 7 is a neutral one.<sup>88</sup>

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<sup>84</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 60.

<sup>85</sup> Ibid.

<sup>86</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 30.

<sup>87</sup> Ibid.

<sup>88</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 60, and also see *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 30.

*e) Sulphides (S)*

Sulphate (SO<sub>4</sub>) is a form of obnoxious and hazardous chemical to the atmosphere which is basically converted into Hydrogen Sulphide (H<sub>2</sub>S) gas at a level of p<sup>H</sup> less than 8.0. This gas is more toxic, odorous and can damage property by corrosion. It is lethal to operation and maintenance workers in sewers and effluent treatment plants. The limitation for release for sulphide in the case of inland surface and irrigation land is 2 mg/l whereas in marine coastal areas is 5 mg/l.<sup>89</sup>

*f) Suspended Solids (SS)*

It includes not only organic materials like sand, silt, clay and other toxic materials but also the inorganic components such as grease, oil, proteins and carbohydrates that can be settled rapidly by gravity and deposit at the bottom of streams, canals, pipes etc., which may be inert, slowly biodegradable, or rapidly decomposable substances. Later on, these solids increase the turbidity of the water, reduce light penetration and impair the photosynthetic activity of aquatic plants which damages the aquatic life by clogging of fish gills and respiratory passages, screening out light and develops noxious conditions through oxygen deletion. Inland surface water and marine coastal areas discharge limit of Suspended Solids is 100 mg/l and on the irrigation land it must be 200 mg/l.<sup>90</sup>

*g) Chromium (Cr)*

The discharge of trivalent chromium concentrations can cause problems like incineration and destruction of oxidation processes which can produce hexavalent chromium which is more toxic than the trivalent chromium. The tolerance limits for total Chromium (Cr) are 0.1 mg/l for inland surface water and 1.0 for marine coastal areas and land for irrigation.<sup>91</sup>

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<sup>89</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, pp. 60-61, and also see *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 30.

<sup>90</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 61.

<sup>91</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 62, and also see *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 30.

#### *h) Oil and Grease*

Oil and grease released from the process of degreasing and the post-tanning stage of fat/liquoring which is biodegradable due to the reason that most of the oil and grease is from animal or vegetable based materials and these not only cause a non-relishable taste and odour problems but also stick to the gills of fish, causing suffocation, and may taint the flesh of fish. Oil deposits in the bottom sediments of water can inhabit bottom flora and fauna. The tolerance limit for oil and grease in the discharge of effluents is 10 mg/ l in inland surface water and on land for irrigation and 20 mg/l for marine coastal areas.<sup>92</sup>

#### Air Pollution

A tannery effluent is not only which pollutes water sources and land but also which pollutes the air quality enormously. The biological decomposition of organic materials and sulphide emissions from waste waters is generating odours from tanneries. Some of the potential sources of odour and air pollution are sulphide emissions from unhairing, ammonia emissions from unhairing and delime liquors and fleshings. The major pollutants from leather tanning industries are as, Methyl Ethyl Ketone, Methy Isobuty Ketone, Toluene, Xyol, Diacetone Alcohol, Glycol Ether EB, Glycol Ether PMA, Acetone, Hydrogen Sulphate (H<sub>2</sub>S) and Ammonia (NH<sub>3</sub>).

#### Noise Pollution

The other kind of pollution is noise pollution which basically affects the health of the workers by making an enormous noise from the machines which can cause permanent hearing damage to workers. Government is set the basic standard of noise is 90 decibles (dba). The following machine operations would be exposed to an excessive amount of noise (that is above 90 dba).

'Fleshing, sammying, setting out and shaving machines, each of which has a knife cylinder rotating at high speed and power-operator transport rollers partially that rotate, bringing the skin into contact with knife. During staking, when skin is put through ????, noise increases. Noise depends on belts used, materials handled, location of the machine mounted, too many drums in the same room etc. In the finishing process automatic sprayers create noise'.<sup>93</sup>

<sup>92</sup> U. Sankar, 'Pollution Control in Tanneries', Kadekodi, K. Gopal, ed., *Environmental Economics in Practice*, New Delhi, 2004, p. 61.

<sup>93</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2223.



## 2.4 Tannery Pollutants: Effects on Human Health

Direct contact of chemicals can cause disability, illness and death. Leather dust has been listed by the European Commission (EC) as a potential carcinogen. The unskilled handling of chemicals for the process of treatment of hides and skins can generate the toxic hazards to the workers. Leak of chemical by accidents and negligence of packing, transporting, storage and handling can be harmful to the human beings as well as the environment.<sup>94</sup> The following Table No. 1, (Chemicals used in Leather Tanning Process and its Health Effects) explains the health hazards from the tanning industries.<sup>95</sup> The women workers in the tanneries suffer from some of the gynaec problems such as abortions; premature deaths and still birth; high rate of neo-natal, infant and maternal mortality, prolapsed of the uterus; miscarriages as well as other health problems as anthrax, respiratory problem and so on.

Overall, the leather tanning industries and its process has affected the health and environment severely in Tamil Nadu. As a result, this eventually led to agitations against the leather tanning industries in 1985. Recognising the grievances of people the civil societies of Tamil Nadu filed a Public Interest Litigation (PIL) against the leather tanning industries. Thus, the Supreme Court of India and the Madras High Court took initiatives to solve the problems of people residing near the leather tanning industries.

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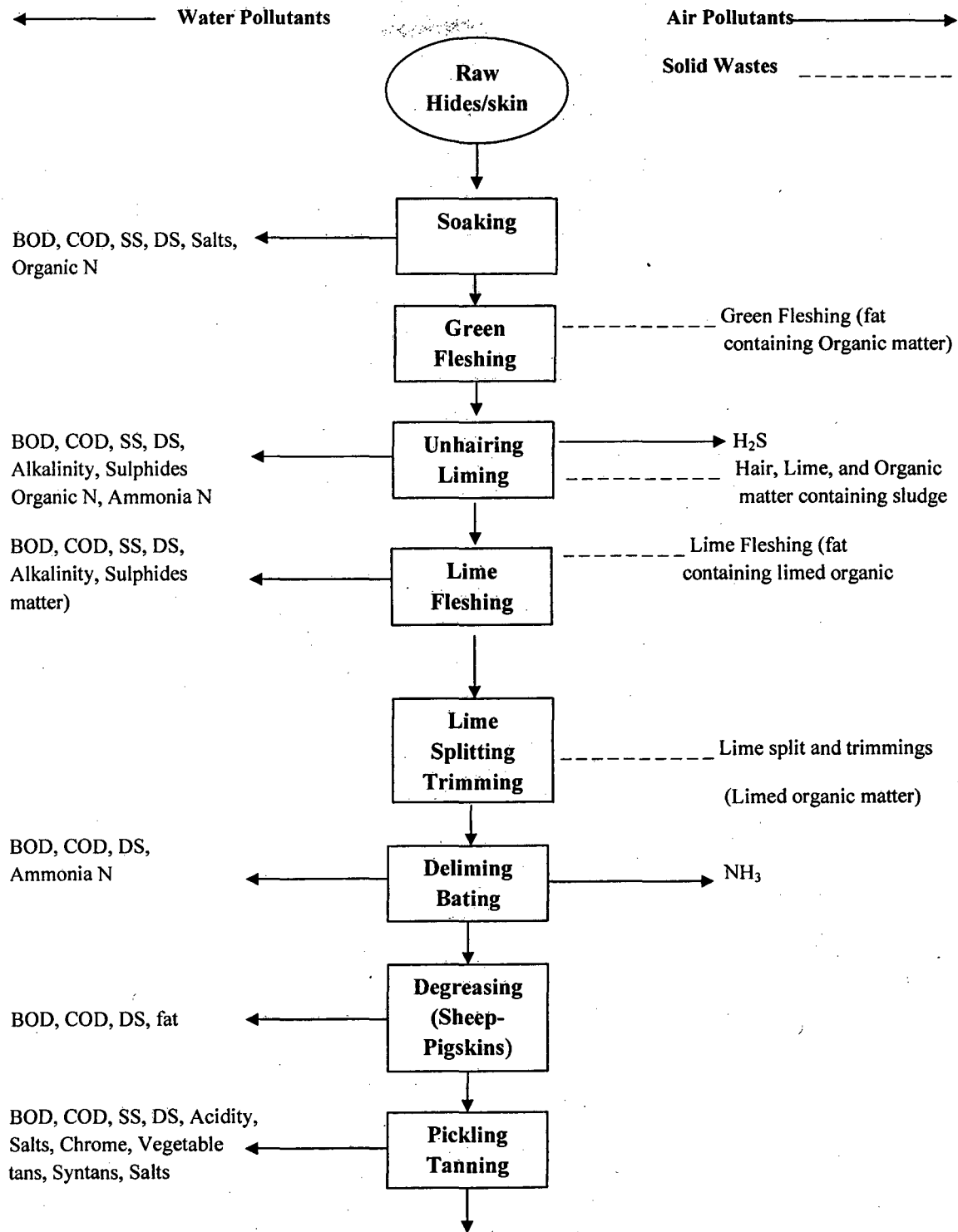
<sup>94</sup> *Tanneries and the Environment: A Technical Guide to Reducing the Environmental Impact of Tannery Operations*, France, 1991, p. 32.

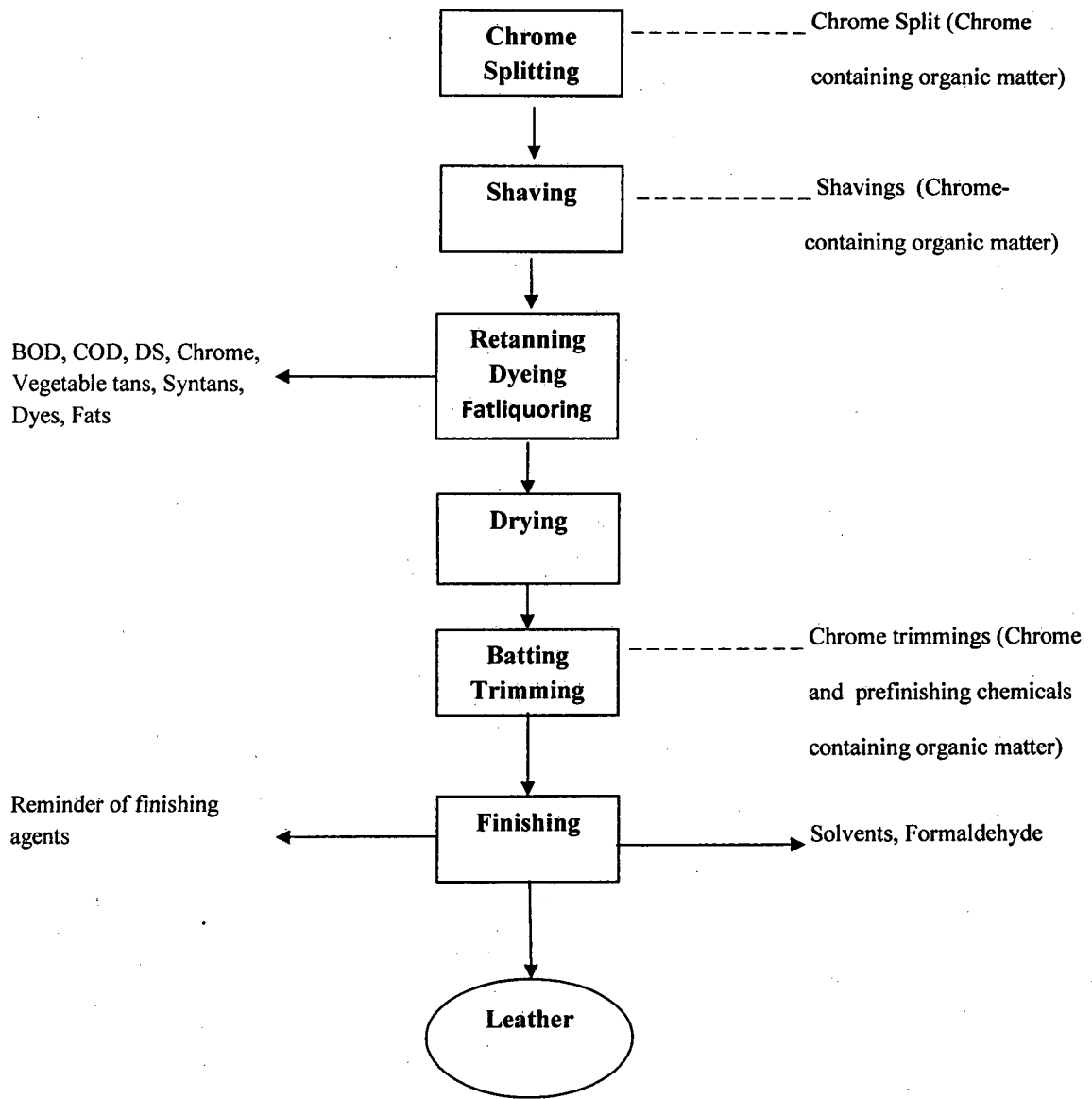
<sup>95</sup> Millie Nihila, 'Development Process and Status of Women: Tanning Industry in Tamil Nadu', *Economic and Political Weekly*, 28 (41), 9 October, 1993, p. 2227.

**Table No. 1.1 Chemicals used in Leather Tanning Process and its Health Effects**

Chemical Used	Process	Health Effects
Hydrogen sulphide	Pre-tanning and finish	Fatal (high concentration); low concentration causes irritation to eyes, respiratory tracts, lung disease and nerve damage. The effect starts with drowsiness and could end with death.
Carbon monoxide	Pre-tanning	Headache, nausea, dizziness, slow pulse, redness of skin, weakness, dimness of vision, coma and death, long-term effect on heart, vision and memory.
Lime	Pre-tanning and liming	Generate heat, burns eyes and skins on contact, lime blast may also occur.
Phenol (phenol is used in India but it has been banned in a few European countries)	Pre-tanning	Highly poisonous, is readily absorbed through skin. Burns skin on contact, and is followed by anesthetic effect and possible discoloration, dermatitis, attacks the eyes and mucous membrane of the nose and throat. Inhalation affects the lungs gastrointestinal system. Liver and kidney damage may also be so extensive as to cause death.
Sodium sulphide	Unhairing	Effects are similar to that of sodium hydroxide. When this comes in contact with acids it forms hydrogen sulphide which is a toxic gas.
Sodium hydroxide	Pre-tanning and Post-tanning	Dermatitis, ulceration and burns from contact with concentrated solution. Inhalation leads to irritation in respiratory tract and damage to lung tissues. Ingestion leads to fatal poisoning and also affects eye tissues.
Sulphur dioxide	Pre-tanning and Post-tanning	Irritation of mucous membranes, lungs; bronchitis, shortness of breath.
Sulphuric acid	Pre-tanning and Post-tanning	Burns eyes and skins on contact. Ingestion leads to internal poisoning, irritation of mucous membrane and lungs; shortness of breath and decay of teeth and nails.
Ammonia	Pre-tanning	Conjunctivitis, swelling of eye lids, burning of throat, coughing, pulmonary irritation of skin, especially if it is moist, dyspnea and respiratory failure.
Acetic acid	Delime and bate	Burns the eyes, harmful to eyes when splashed, cough, causes chest pain, edema, irritation of nose and throat.
Chromium (chromium acid, chromium)	Chrome tannage	Irritation of mucous membrane and formation of the compounds, ulcer in the nose and mouth, urine concentration, dermatitis, and allergy.
Isocyanates	Finish (catalyst)	Attacks like asthma; tightness in chest, difficulty in breathing, reduces lung capacity over a period of time.
Organic solvents (acetone, acrolein, benzene, butanol, ethanol, and ethyl acetate, methanol, methyl, ketone, trichloroethylene, toluene and xylene)	All Processes	Skin contact with solvents cause removal of natural lubricants in the skin butanol, ethanol, and ethyl acetate, methanol and results in redness, cracking dermatitis. Inhalation of solvent vapour may cause ethyl impairments such as lack of coordination or drowsiness which have no discernible permanent effect on health, but which may increase the risk of accidents. In other cases over exposures may result in damage to the central nervous system, blood, lungs, liver, kidney and/or gastrointestinal tract.
Oxalic acid	Finish	It is strong poison if ingested and also can cause severe burns to eyes, skin and nasal passages on contact.
Dyes	Post-tanning	Dermatitis, bronchial asthma, bladder cancer, bladder tumour, hemopathy.
Formaldehyde	Finish	Irritant, inhalation of this substance at a concentrated level caused irritation to lungs eyes nose and throat, develop brownish discoloration of the finger tips, painful nail buds and fibrous areas. It can also cause cancer.

**Figure No. 1.1: Tanning Process**





## **Chapter 3**

# **LEGAL ANALYSIS OF ENVIRONMENTAL POLLUTION: IMPORTANT CASES OF LEATHER TANNING INDUSTRIES IN TAMIL NADU**

# **LEGAL ANALYSIS OF ENVIRONMENTAL POLLUTION: IMPORTANT CASES OF LEATHER TANNING INDUSTRIES IN TAMIL NADU**

The current state of the environmental system tells society that all human activities impact 'nature' and the living world especially through the process of economic development which is diminishing the quality of environment. The recent concept of development is not utilising ecological principles properly, which leads to increase in environmental pollutions in the society which in turn adversely affects not only people's health and quality of life but also the flora and fauna and other living organisms. Pollution appears in the environment due to the release of substances and energy from waste products of both industries and the households, which result in changes, usually harmful, within the natural environment. Various observations prove that the pollution is classified into three categories such as air, water, land and noise pollution that cause degradation in the existing natural balance of ecosystems.

Air pollution is mainly caused by the burning of fossil fuels and emissions from automobiles which leads to respiratory disorders. Water pollution occurs due to discharge of untreated organic wastes and industrial effluents into the rivers, lakes and seas which destroy the marine life as well as human health and other forms of life. Land pollution takes place due to dumping of solid wastes in the soil by different sources such as residential, commercial and industrial premises. Noise pollution is another kind of pollution caused by technological utilisation in industries and emergences of most automobiles for the result of modernisation.

All these types of pollution are found in the surrounding areas of leather tanning industries. In India, leather tanning industries are one of the most important aspects of creating the environmental pollution. The state wise data reveals that Tamil Nadu possesses the highest number of leather tanning industries in India. According to Jerald as 'it is the fourth largest commercial activity about 80 per cent of the total leather

production export comes from Tamil Nadu, where there are 2200 tanneries, mostly small and medium scale industries and many close to the coast'.<sup>96</sup> In all these leather tanning industries of Tamil Nadu two kinds of tanning process are used namely vegetable tanning and chrome tanning process. Prior to 1970's, leather tanning industries of Tamil Nadu were using vegetable tanning process. However, towards the end of seventies onwards these industries started using the process of chrome tanning rather than vegetable tanning due to the international competition and development purpose.

The largest disadvantage of this chrome tanning process is that it discharges very large quantities of untreated effluent chemical substances such as salt, sodium compounds, sulphuric acid into the Cauvery<sup>97</sup> and Palar<sup>98</sup> rivers in Tamil Nadu which lead to the water pollution in the environment. Therefore, from 1985 onwards people in North Arcot district of Tamil Nadu have conducted a series of dharna's and demonstrations to control pollution from the leather tanning industries. The reason behind these dharna's and demonstrations is that government of Tamil Nadu failed to control pollution through Tamil Nadu Pollution Control Board (TNPCB). Therefore, affected people and civil societies (NGO's) have filed writ petitions and demanded the provision of justice to the common people from the Supreme Court of India and the Madras High Court for the purpose of controlling and prohibiting the environmental pollution from the leather tanning industries. As a result, the Supreme Court of India and the Madras High Court considered the grievances of the people and gave the certain verdicts which are as following:

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<sup>96</sup> Staffan Holmgren, *An Environmental Assessment of the Bay of Bengal Region*, Madras, 1994, p. 196.

<sup>97</sup> Erode and Thiruchirapalli districts

<sup>98</sup> North Arcot district

### **3.1 Verdicts of Supreme Court and Madras High Court: Tanneries Environmental Pollution**

#### **3.1.1 M/S M. P. N. NACHIAMMAI ACHI, RUBY TANNERY AND OTHERS v G RANGASAMY 1995 CRI.L.J. 2988**

The TNPCB has taken the first step in controlling the environmental pollution by the leather tanning industries in Tamil Nadu. The Board has filed the petition on M. P. N. Nachiammai, Ruby tannery and others under Section 482 Cr. P. C and under the offence of Section 26 of the Water (Prevention and Control of Pollution) Act, 1974 for the discharge of sewage effluent from their tanneries which is causing pollution and thus, they are liable to be punished under Section 44 of the Act. Therefore, these industries filed a revision petition in the district Magistrate Court against the allegation of the TNPCB in 1989. The Judicial Magistrate has dismissed the petition of TNPCB by stating that the plaintiff (TNPCB) had not tested the sample of the sewage effluent for whether this will cause the pollution and the complainant has not specified the place of the discharge of the sewage effluent like either in a stream or well or sewerage or on land therefore, which cannot be taken as the violation of the provision of the Act. Thus, it could be seen that initially the courts were not very interested in intervening in the matters pertaining to tannery pollution. The big difference started with the following case.

#### **3.1.2 VELLORE CITIZENS WELFARE FORUM v UNION OF INDIA AND OTHERS AIR 1996 SC 2715**

The Vellore Citizens Welfare Forum filed a writ petition in the Supreme Court of India against the Union of India (UOI), State of Tamil Nadu and TNPCB regarding the control of pollution from tanneries in Tamil Nadu. This writ petition as Public Interest Litigation (PIL) under Article 32 of the Constitution of India asks for orders for the protection of thousands of innocent lives suffering from series of air and water pollution being caused by tanning industries who were discharging untreated effluent into the



agricultural fields, roadsides, waterways and open lands which ends up finally being mixed with the river Palar in the State of Tamil Nadu. This is the major water source for the residents of that area. The main concerns in the appeal were as follows:

- To provide clean drinking water and medical facilities to the affected people in the villages as well as take immediate measures to avert pollution in the affected areas.
- To close down tanneries having no effluent treatment plant and violating pollution control measures and environmental laws.
- To pay adequate compensation to victims of pollution and constitute an expert team to examine the condition of those affected areas by tannery pollution.

Moreover, the petitioner has pointed out the survey of Tamil Nadu Agricultural University Research Centre, Vellore (TNAURC). According to the survey, nearly 35,000 hectares of agricultural land in the tanneries belt have become partially or totally unfit for cultivation. The tanneries have discharged more than 170 types of chemicals such as sodium chloride, lime, sodium sulphate, chromium (Cr), sulphate (SO<sub>4</sub>), fat/liquor ammonia (NH<sub>3</sub>) and sulphuric acid and almost 35 litres of water are used in the process of one kilogram of finished leather in the chrome tanning process. This toxic effluent is damaging the physico-chemical properties of the soil and contaminating the quality of groundwater.

On the basis of this, the Court directed the National Environmental Engineering Research Institute, Nagpur (NEERI) to examine the feasibility of setting up of Common Effluent Treatment Plants (CETPs) for the cluster of tanneries situated at different places in Tamil Nadu. The NEERI submitted the report based on their examination in these places. According to the report, at present 30 CETPs have been identified for tannery clusters in the five districts of Tamil Nadu consisting of North Arcot Ambedkar, Erode Periyar, Dindigul Anna, Trichi and Chengal MGR out of which only seven CETPs were under operation, while 10 were under construction and 13 were proposed. The seven CETPs are as follows:

1. M/s. TALCO Ranipet Tannery Effluent Treatment Co. Ltd. Ranipet, Dist. North Arcot Ambedkar.
2. M/s. TALCO Ambur Tannery Effluent Treatment Co. Ltd., Thuthipet Sector, Ambur Dt. North Arcot Ambedkar.
3. M/s. TALCO Vaniyambadi Tanners Enviro Control Systems Ltd., Vaniyambattu, Vaniyambadi, Dt. North Arcot.
4. M/s. Pallavaram Tanners Industrial Effluent Treatment Co., Chrompet Area, Dt. Chengai MGR.
5. M/s. Ranipet SIDCO Finished Leather Effluent Treatment Co. Pvt. Ltd., Ranipet, Dt. North Arcot Ambedkar.
6. M/s. TALCO Vaniyambadi Tanners Enviro Control Systems Ltd., Udayandiram, Vaniyambadi, Dt. North Arcot Ambedkar.
7. M/s. TALCO Pernambut Tannery Effluent Treatment Cp. Ltd., Bakkalapalli, Pernambut, Dt. North Arcot Ambedkar.

Serial numbers 5, 6 & 7 CETPs have seen improvement in their performance but are still not operating as per the standard specified by the Ministry of Environment and Forests and TNPCB for inland surface water discharge. Therefore, based on the recommendation of NEERI, it was said that the TNPCB should monitor the direction of above mention three units and suggested to submit the final report to the Supreme Court within the period of two months. The report of NEERI mentioned that, the physico-chemical characteristics of ground and well water and river Palar shows that well waters around the tanneries are unfit for drinking as well as water quality of river Palar specifically, where the effluent is discharged is highly polluted. Thus, the Court directed those tanneries that had not connected with the above declared seven CETPs shall be liable to be closed with immediate effect in the districts of North Arcot Ambedkar, Erode Periyar, Dindigul Anna, Trichi and Chengai M.G.R.

Further, the Court has described that, the leather industry in India has become a major foreign exchange earner and especially the State of Tamil Nadu is the leading exporter of finished leather.<sup>99</sup> Though, the leather industry is vital for the country for generating foreign exchange and reduction of unemployment in the society but, it has no right to destroy the ecology, degrade the environment and create the health hazards in the society. These ills cannot be permitted to expand or even to continue unless it tackles by itself the problem of pollution created by the said industry. The traditional concept that development and ecology are opposed to each other is no longer acceptable. “Sustainable Development” is the answer. “Sustainable Development” has been accepted as a viable concept to eradicate poverty and improve the quality of human life while living within the carrying capacity of the supporting eco-systems. “Sustainable Development” means ‘development that meets needs of the present without compromising the ability of the future generations to meet their own needs’. Therefore, the Court has specified that “The Precautionary Principle” and “The Polluter Pays Principle (PPP)” are essential features of “Sustainable Development”.

#### *The Supreme Court Order and Direction*

The Court has directed the Central Government to constitute an Authority under Section 3(3) of the Environment (Protection) Act, 1986 and to confer powers to the Authority under Section (5)<sup>100</sup> of the Environment Act. In order to deal with the pollution emitting from these tanneries and other polluting industries and for taking measures with respect to the matters referred to in Clauses (v) (vii) (viii) (ix) (x) and (xii) of sub-Section (2) of Section (3)<sup>101</sup>. The Authority should invoke the “Precautionary Principle” and the

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<sup>99</sup> Accounting for approximately 80% of the country’s export

<sup>100</sup> Section (5) of this Act dealt that Power to give directions. – Notwithstanding anything contained in any other law but subject to the provisions of this Act, the Central Government may, in the exercise of its powers and performance of its functions under this Act, issue directions in writing to any person, officer or any authority and such person, officer or authority shall be bound to comply with such directions. Explanation – For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct – (a) The closure, prohibition or regulation or any industry, operation or process; or (b) Stoppage or regulation of the supply of electricity or water or any other service.

<sup>101</sup> Section 3(2) (v) restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards; (vii) laying down procedures and safeguards for the handling of hazardous substances; (viii) examination of

“PPP” with the help of an expert team from NEERI to assess the environmental degradation as well as to identify the suffered population in the affected areas by the pollution of tannery industries.

The Authority should assess the compensation for the affected individuals/families. They should determine the compensation to be recovered from the polluters as the cost of reversing the damaged environment. The Authority is in power to direct the closure order to the industries owned/managed by a polluter in case, he evades or refuses to pay the compensation awarded against him. Further, this compensation shall be in addition to the recovery from him as arrears of land revenue. The Court even ordered that a pollution fine of Rs. 10,000/- each would be imposed on all the tanneries in the districts of North Arcot Ambedkar, Erode Periyar, Dindigul Anna, Chengai M.G.R and Trichi. This fine should be paid before 31 October, 1996 in the office of the Collector/District Magistrate concerned. The fine should be deposited as the “Environment Protection Fund” which is utilised for the compensation and the restoration of the damaged environment. If the tanneries fail to deposit by 31 October, 1996 should be liable under the Contempt of Courts Act. The authority shall review the cases of all the industries which are already operating in the prohibited area. Further, it would be open to the authority to direct the relocation of any of such industries.

The Court suspended the closure order of the tanneries which already set up Effluent Treatment Plants (ETPs) or connected with the CETPS on before 30 November, 1996. The Court also ordered all the tanneries and other industries in the State of Tamil Nadu to obey and maintain the quality of the water through the standards fixed by the Board regarding Total Dissolved Solids (TDS) and approved by the NEERI. The Chief Justice of the Madras High Court has requested to constitute a special bench “Green

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such manufacturing processes, materials and substances as are likely to cause environmental pollution; (ix) carrying out and sponsoring investigations and research relating to problems of environmental pollution; (x) inspection of any remises, plant, equipment, machinery, manufacturing or other processes, materials or substances and giving, by order, of such directions to such authorities, officers or persons as it may consider necessary to take steps for the prevention, control and abatement of environmental pollution; (xiii) preparation of manuals, codes or guides relating to the prevention, control and abatement of environmental pollution.

Bench” to further, monitor this kind of the pollution cases under Article 226 of the Constitution of India.

The Ministry of Environment and Forests, Government of India has constituted the Loss of Ecology (Prevention and Payments of Compensation) Authority in the year 1996 and appointed Mr. Justice P. Bhaskaran, as its chairman. After the detailed study of this the Authority award was delivered on 12 March, 2002. According to the Authority, the 546 tanneries in the district of Vellore had to pay the compensation amount of Rs. 26.82 crores to 29,193 families as pollution damages. While, Vellore Welfare Forum case has been a landmark judgment in relation to environmental pollution. After the judgement the issue of tannery pollution problem came into limelight and now it is continuously surfacing in the courts as is demonstrated by the contents of the following judgment.

### 3.1.3 THE PERUNDURAI CITIZENS WELFARE SOCIETY v THE TAMIL NADU POLLUTION CONTROL BOARD<sup>102</sup>

The Perundurai Citizens Welfare Society filed two writ petitions in the Madras High Court under Article 226 of the Constitution of India against TNPCB, the Perundurai Leather Industries Eco Security Private Limited (PILES), the State Industrial Promotion Corporation of Tamil Nadu Limited (SPICOT) Industrial Growth Centre, the Loss of Ecology (Prevention & Payment of Compensation) Authority, UOI and CPCB. The petitioner stated that, there are about 800 tanneries situated in the State of Tamil Nadu, out of which about 550 are in Vellore district, 100 in Dindigul district, 150 located in Pammal and Pallavaram and 50 in Erode and some other in Trichy district. The effluent from these industries contains TDS level not less than 10000 to 15000 mg/1 litre. Though, the petitioner has alleged that the Board has to maintain the standard for discharging of TDS prescribed by the NEERI as 2100 mg/1 litre not permitting any polluting industry (tanning) either old or new in the prohibited areas of in and around Perundurai.

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<sup>102</sup> *The Perundurai Citizens Welfare Society v The Tamil Nadu Pollution Control Board* Writ Petition Nos. 15244/2004 and 1682/2003, Madras High Court, 20 December, 2004.

The Court has dismissed these petitions with the argument that, the Green Bench and TNPCB has already directed PILES and SIPCOT to maintain the physio-chemical and biological treatment system and ensure zero discharge through the construction of the CETPs with the utilisation of 2800 acres of land in Perundurai. They also directed the tanneries in Erode to shift to Perundurai due to the control of pollution in the river Cauvery and Kalingarayan Canal which is the main source of drinking water and irrigation in Erode District. The Physio-chemical and biological treatment system should ensure the TDS of 2100 mg/litre specified by the Board and the treated effluents also completely reused by the installation of Reverse Osmosis System (R.O. system)<sup>103</sup> should ensure zero discharge by the CETPs. It clarified this issue by the report of the Technical and Advisory Consultant, Central Leather Research Institute (CLRI) in May, 2002.

According to the report, construction of CETPs with the collaboration of PILES and SIPCOT has followed the concept of physio-chemical and biological treatment system and R.O. system and which ensures the zero discharge. The implementation of these systems has not created any environmental pollution in and around Perundurai. The CETPs constructing areas of 2800 acres of land is not within one kilometre from the embankments of rivers, streams, dams and so on. Therefore, the CETPs constructing areas do not come under the prohibited areas. The Court has agreed to the construction of CETPs with the collaboration of PILES and SIPCOT and also accepted the relocation of tanneries from Erode to Perundurai. The Court directed the Ministry of Industries through the Council for Leather Exports to monitor the functions of these CETPs. Finally, the Court advised the petitioner for the misuse of PIL with the fine of Rs. 1500/- for each petitions. In spite of this kind of judgment the issue has remained perennial in the courts as is evident from the contents of the following two judgments.

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<sup>103</sup>R.O. system could be suitable evaporation system for the rejects as tertiary treatment by the implementation of this system could achieve the standards of 2100 mg/lit and the treated water reused completely in the tanning process which leaving a small quantity of rejects which could be evaporated through suitable evaporation systems which ensures the zero discharge of effluent in that area.

3.1.4 PEOPLE HEALTH AND DEVELOPMENT COUNCIL v STATE OF TAMIL  
NADU 2005 (2) MLJ 44 (2)

The People Health and Development Council and M. Thangavelu have filed these writ petitions in Madras High Court against Forest and Environment Department, Housing and Urban Development Department, TNPCB, Collector of Erode District and District Environment – Welfare Engineer. The main motive of these petitions is to bring to the government notice that it needs to close down the 34 tanneries situated in Erode as well as to take necessary action against those industries for their past pollution in that area. Basically these tanneries are situated in the agricultural and residential areas which are located within the 1 K.M of the Kalingarayan Canal. This Canal is connected with the River Bhavani, which is a main water source in the Erode district. These tanneries are functioning without the proper authorisation of the Board and discharging 170 types of chemical effluent through chrome tanning process. These effluents are contaminating the drinking water either directly or through a roadside drain. This contaminated water is becoming unfit for the drinking as well as the irrigation, which is causing the great financial hardship to the local farmers due to less crop yielding condition.

The Court found out through the report of the TNPCB that, all the tanneries in and around the Kalingarayan Channel and the Bhavani River had already installed ETPs but they were not following the primary treatment of physio-chemical treatment system and secondary treatment of biological treatment system. Further, they did not implement a suitable membrane technology as R. O. system and were not following the standard of TDS as 2100 mg/lit. The Court in response to this granted the time to implement R. O. system in the tannery units located in and around Erode district before 31.08.2005. If, the tanneries are not willing to adhere to this direction and adopt the R. O. system they are advised to shift their concern to SIGC Perundurai within that period. Finally, the Court has concluded this case with the observation of *M.C. Mehta v Union of India* though, 'we are conscious of the fact that these tanneries bring more employment and revenue, but life, health and ecology have greater importance to the people'.

### 3.1.5 N.V. RAMANAN v STATE OF TAMIL NADU<sup>104</sup>

In Madras High Court, N. V. Ramanan filed writ petition under Article 226 of the Constitution of India against the State of Tamil Nadu and the Loss of Ecology (Prevention and Payments of Compensation) Authority to grant the interest to the compensation awarded dated 8.12.2008 from the date of disbursement of such compensation. The petitioner owned 2.56.0 hectare of land and the award of compensation covered the period from 12 August, 1991 to 31 December, 1998 and the rate of compensation was determined as per the direction from the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>105</sup> case in the Supreme Court. The TDS in water content determined the compensation i.e. from 1000+ to 2100 TDS the compensation would be the amount of Rs. 1000/- per hectare/year, from 2100+ to 3500 is Rs. 2000/-, from 3500+ to 4900 is Rs. 6500/- and from 4900 & above is Rs. 14,000/- per hectare/year.

The Court examined this case based on the recommendation of the Tamil Nadu Agricultural University and the Agricultural Research Station, Virijipuram. They recommended that, the Authority had not paid the compensation with the interest rate till date. The Court directed that as the petitioner well water used for irrigation was above 4900 mg/lit TDS and the authority is bound to pay Rs. 14,000/- per hectare/year as compensation. Therefore, the Authority should pay the compensation to the petitioner as a sum of Rs. 2, 65,216 as on 31.12.1998 (Rs. 14000 x 2.56 x 7.4 years = Rs. 2, 65,216/- from 12 August, 1991 to 31 December, 1998 together with interest at the rate of 8% per annum within a period of 8 weeks from today from the 'Environment Protection Fund'.

Further, the Court did not appreciate the reason of the Authority that they are unable to recover compensation amount by the polluting industries which are closed and whereabouts are not traceable. Though, the Court directed the Authority to take action under the Revenue Recovery Act to recover the amount of compensation payable by the polluting industry and should recover this compensation as arrears of land revenue. If the

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<sup>104</sup> *N.V. Ramanan v State of Tamil Nadu* Writ Petition No. 23352/2009, Madras High Court, 11 January, 2010.

<sup>105</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715



industry failed to deposit the amount by 31 October, 1996 it shall be closed forthwith and shall also be liable under the Contempt of Courts Act, 1971 as per the judgment of the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>106</sup> case. The Court concluded this case with the quotation of Mahatma Gandhi 'Agriculture is the backbone of Indian Economy' and due to the development of Information Technology and industries, the agriculturists are losing their income.

Thus, it could be seen that the above mentioned judgments of the Supreme Court and the Madras High Court have dealt with some of the important aspects and principles in relation to the environmental pollution. In the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>107</sup> case, the Supreme Court has interpreted the constitutional provisions related to the environmental pollution control, powers and functions of Governments (Central and State) and Boards (Central Pollution Control Board and State Pollution Control Board) and the role of Customary International Law (CIL) and International Conventions for the protection of environment and control of pollution. Further, the Supreme Court has gone through various important principles and the aspects in relation to the law and the environmental pollution such as Sustainable Development, Precautionary Principle, PPP and Absolute Liability.

The Supreme Court also ordered the Central government to establish an authority to rectify the damages in the surrounding areas and to provide compensation to the affected people. It even insisted the Madras High Court to set up 'Green Bench' in order to solve the upcoming pollution problems in future. Thus, the Madras High Court took these inventiveness of Supreme Court as the precedent and provided all the future judgements related to pollution control such as installation of R. O. system and physio-chemical and biological treatment system for the purpose of maintaining the TDS limit. Further, the Madras High Court followed the foot prints of the Supreme Court and dealt with the aspects of compensation for the affected people from the tanneries pollution. Thus, under this context it is indispensable to go through various interpretations of

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<sup>106</sup> Ibid.

<sup>107</sup> Ibid.

Supreme Court and Madras High Court in a sequence manner in order to understand the role of these Courts to prevent environmental pollution from leather tanning industries.

### **3.2 Judicial Interpretation: Leather Tanning Pollution Cases in Tamil Nadu**

The Constitutional provisions and legislative enactments is one of the basic criteria to analyse the pollution problems in India especially in Tamil Nadu. It requires a detailed study of these provisions and enactments and the manner the Supreme Court and Madras High Court has evaluated the role of them to control the environmental pollution.

Thus, the Supreme Court of India in *Vellore Citizens Welfare Forum v Union of India and Others*<sup>108</sup> has interpreted some of the constitutional provisions through which it has dealt with the process of prevention and control of pollution such as Articles 21, 47, 14 and 19(1)(g). The Constitution of India guarantees the protection of life and personal liberty through the Article 21. The Court has loudly pronounced that, the right to have a good environment is a part of the right to life, which is guaranteed under Article 21 of the Constitution of India. It even mentioned that, the right to a decent environment and right to life is naturally linked which cannot be separated due to environmental degradation this kills human life as well as affects the ecosystem in the earth.<sup>109</sup>

The Supreme Court describes that, 'Article 14<sup>110</sup> of the Constitution enshrines the right to equality before the law and protects a person against arbitrary or unreasonable State actions, which prohibits arbitrariness since every arbitrary action violates the principle of equality'.<sup>111</sup> The Court believes that discharge of hazardous effluents from the industry is one major kind of arbitrary action of such a way which degrades the environment. Thus, this arbitrary action violates the fundamental right to equality of treatment.

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<sup>108</sup> Ibid.

<sup>109</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 60.

<sup>110</sup> Equality before law – The State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India.

<sup>111</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 65.

Under the Indian Constitution, Article 19(1)(g) provides that every citizen shall have the right to practice any profession, or carry on any occupation, trade or business but which is subject to reasonable restrictions and this may be imposed in the interest of the general public as provided under the Article 19(1)(6)<sup>112</sup> of the Constitution. This Article 19(1)(6) clearly explains that no one (person) has the right to carry on business in the manner by which the business activity becomes a health hazard to the entire society. While, the Supreme Court interpreting Article 19 of the Constitution of India stated that no polluting industry can be permitted to run under the garb of development if it results in public nuisance and imbalance of the ecosystem. Restrictions can be imposed on the developmental activities in the interest of the public which is mandatory for the purpose of sustainable development.<sup>113</sup>

According to Supreme Court of India, the Article 47 in the Directive Principles of State Policy is a non-justifiable provision of the Constitution of India, even though this Article deals with environment and expresses that 'State shall have the duty to raise the level of nutrition and the standard of living and to improve public health and also endeavour to bring about prohibition of the consumption except from medicinal purposes of intoxicating drinks and of drugs which are injurious to health'.<sup>114</sup> Thus, the Supreme Court considers that it is the duty to State to improve the standard of living of people and protect them from various toxic chemicals emanating from leather tanning industries.

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<sup>112</sup> Article 19(1)(6) of the Constitution states that 'Nothing in sub-clause (g) of the said clause shall affect the operation of any existing law in so far as it imposes, or prevent the state from making any law imposing, in the interest of general public, reasonable restriction on the exercise of the right conferred by the said sub-clause, and in particular, substituted by section (3) of the Constitution (First Amendment) Act, 1951 for certain words [nothing in the said sub-clause shall affect the operation of any existing law in so far as it relates to, or prevent the State from making any law relating to – (i) the profession or technical qualifications necessary for practicing any profession or carrying on any occupation, trade or business or (ii) the carrying on by the State, or by a corporation owned or controlled by the State, of any trade, business, industry or service, whether to the exclusion complete or partial, of citizens or otherwise]

<sup>113</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, pp. 66-67.

<sup>114</sup> P. M. Bakshi, *The Constitution of India*, Delhi, 2005, p. 90.

In 1976, the parliament amended the Forty-Second Amendment Act which included specific provisions for environmental protection and improvement.<sup>115</sup> This amendment has introduced Article 48A<sup>116</sup> in the Directive Principles of States Policy (DPSP) and Article 51A(g)<sup>117</sup> in the Fundamental Duties. The Supreme Court of India with regard to environment stated that Directive Principles guide the State for their actions in public interest which 'possess the legal status of being complimentary to fundamental rights and impose an obligation on the government, including courts to protect the environment'.<sup>118</sup> Further, it elaborated that a fundamental duty imposes the duty on every citizen to protect and promote the natural environment. The preservation of environment and the ecological balance is not only the task of the government but also the duty of every citizen in the country.

It can be suggested that this amendment has been implemented on the basis of Article 253<sup>119</sup> of the Constitution of India, as a response to the Stockholm Declaration (United Nation Conference on the Human Environment, June 5 to 16, 1972). This Declaration clarifies that every man has a fundamental right to freedom, equality and adequate conditions of life (quality of the environment) that permits the dignity of life and well-being. Further, the Declaration specifies that every individual in the society has an important responsibility and a duty to protect and improve the environment for the present and the future generations.<sup>120</sup> However, all these articles do not guarantee the provisions of protection and promotion of environment in a direct manner but they play a significant role in the improvement of the environment.

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<sup>115</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 56.

<sup>116</sup> Article 48(A) of the Constitution states that the Protection and improvement of environment and safeguarding of forests and wild life – The State shall endeavour to protect and improve the environment and be safeguard the forests and wild life of the country.

<sup>117</sup> Article 51A(g) Fundamental Duties of the Constitution states: It shall be the duty of every citizen of India – (g) to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures.

<sup>118</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 69.

<sup>119</sup> Article 253 states that Legislation for giving effect to international agreement. – Notwithstanding anything in the foregoing provisions of this Chapter, Parliament has power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body.

<sup>120</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 56.

In the matters of environmental legislative enactment in India the Supreme Court of India declared that the Parliament has taken the first attempt to deal with the environmental problems through the enactment of the Water (Prevention and Control of Pollution) Act, 1974 based on the provision of Article 252(1)<sup>121</sup> of the Constitution of India to prevent and control of water pollution. The Supreme Court also noted that for water maintenance or restoration, water board was established. Further, it stated that Section (2) of Water Act has provided the clear definition of the 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 of any liquid, gaseous or solid substance into water (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 organism’.<sup>122</sup>

The Court also elaborated on the various sections of Water Act such as: Section (3) and (4) of the Act. These sections confer powers on the Central and State Governments to take all such measures as they deem necessary for the purpose of protecting and improving the quality of the environment and preventing and controlling and abating environmental pollution, Section (24) speaks about the prohibition on use of stream or well for disposal of polluting matters, etc., and Section (25) pertains to restrictions on new outlets and new discharges and sub-section of Section (25) enables the State Board to grant its consent referred to in sub-Section (1) as:

‘Section 25(4) - The State Board may -- (a) grant its consent referred to in sub-section (1), subject to such conditions as it may impose, being-- (i) in cases referred to in clauses (a) and (b) of sub-section (1) of section (25), conditions as to the point of discharge of sewage or as to the use of that outlet or any other outlet for discharge of sewage; (ii) in the case of a new discharge, conditions as to the nature and composition, temperature,

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<sup>121</sup> Article 252 states that Power of Parliament to legislate for two or more states by consent and adoption of such legislation by any other state. – (1) if it appears to the Legislatures of two or more States to be desirable that any of the matters with respect to which Parliament has no power to make laws for the States except as provided in Articles 249 and 250 should be regulated in such States by Parliament by law, and if resolutions to that effect are passed by all the Houses of the Legislatures of those States, it shall be lawful for Parliament to pass an Act for regulating that matter accordingly, and any Act so passed shall apply to such States and to any other State by which it is adopted afterwards by resolution passed in that behalf of the House or, where there are two Houses, by each of the Houses of the Legislature of the State.

<sup>122</sup> Section 2(e) in Water (Prevention and Control of Pollution) Act, 1974, [Online: web] Accessed 10 December, 2010, URL: [http://www.kerenvis.nic.in/legislation/Water%20\\_Prevention%20and%20Control%20of%20Pollution\\_%20Act,%201974.pdf](http://www.kerenvis.nic.in/legislation/Water%20_Prevention%20and%20Control%20of%20Pollution_%20Act,%201974.pdf).

volume or rate of discharge of the effluent from the land or premises from which the discharge or new discharge is to be made; and (iii) that the consent will be valid only for such period as may be specified in the order, and any such conditions imposed shall be binding on any person establishing or taking any steps to establish any industry, operation or process, or treatment and disposal system or extension or addition thereto, or using the new or altered outlet, or discharging the effluent from the land or premises aforesaid; or (b) refuse such consent for reasons to be recorded in writing'.<sup>123</sup>

Section (44) prescribes a penalty for contravention of Section (25) or Section (26) which states that any person who contravened the provisions of Section (25) or (26) shall be punishable with imprisonment for a term which shall not be less than one year and six months but which may extend to six years and with fine.

With regard to Air (Prevention and Control of Pollution) Act, 1981 and Environment Protection Act of 1986, the Supreme Court of India in *Vellore Citizens Welfare Forum v Union of India and Others*<sup>124</sup> expressed that the Stockholm Declaration has influenced the Parliament to enact the Air (Prevention and Control of Pollution) Act, 1981 and Environment Protection Act of 1986. The functions of the Air Act and the enforcement apparatus are similar to that of the Water Act. The Environment Act has consolidated the provisions of Air and Water Act. In its verdict the Court mentioned that the amendment of the Environmental Protection Act is one of the major measures for protecting environmental degradation specifically Section 3, 4, 5, 7 and 8 of the Environment Act are more relevant for control and protection of environmental degradation. Section 3, 4 and 5 ensure the powers and functions of the Central Government to take measures to protect and improve the environment and the Section (7) and (8) deals that:

'Section (7) describes that "Persons carrying on industry, operation, etc., not to allow emission or discharge of environmental pollutants in excess of the standards. – No person carrying on any industry, operation or process shall discharge or emit or permit to be discharged or emitted any environmental pollutant in excess of such standards as may be prescribed". Section (8) says that "Persons handling hazardous substances to comply with procedural safeguards. – No person shall handle or cause to be handled any hazardous substance except in accordance with such procedure and after complying with such safeguards as may be prescribed'.<sup>125</sup>

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<sup>123</sup> Ibid., Section 25(4).

<sup>124</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>125</sup> Section (7) and (8) in Environment (Protection) Act, 1986, [Online: web] Accessed 10 December, 2010, URL: [http://himachal.nic.in/environment/notifications/The\\_Environment\\_\(Protection\)\\_act\\_1986.pdf](http://himachal.nic.in/environment/notifications/The_Environment_(Protection)_act_1986.pdf).

Further, Court even conveyed that the Parliament has enacted the Environment (Protection) Rules, 1986 in that rules 3(1), 3(2), and 5(1) are dealing with the environmental pollution control issues:

‘Section (3) deals – “Standards for emission or discharge of environmental pollutants. – (1) For the purposes of protecting and improving the quality of the environment and preventing and abating environmental pollution, the standards for emission or discharge of environmental pollutants from the industries, operations or processes shall be as specified in the schedule I to IV”. Section 3(2) “Notwithstanding anything contained in sub-rule (1), the Central Board or a State Board may specify more stringent standards from those provided in the schedule in respect of any specific industry, operation or process depending upon the quality of the recipient system and after recording reasons, therefore, in writing”. Section 5(1) “Prohibition and restriction on the location of industries and the carrying on processes and operations in different areas’.<sup>126</sup>

On the basis of above mentioned constitutional provisions and legislations, government is taking necessary steps such as, the ‘formulation of national environmental standards, prescribing procedures for managing hazardous substances, regulate industrial locations, establish safeguards for preventing accidents and collect and disseminate information regarding environmental pollutions’,<sup>127</sup> which also stimulates the government to set up parallel regulatory agencies for the objective of protection of environment in the country. The violations of these environmental legislations and the constitutional provisions are treated as offences and are visited with penal consequences.

Thus, there is a close relationship between the environmental legislations and Constitutional provisions. This is visible in the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>128</sup> case, where Supreme Court interpreted that the right to live includes the right to a clean and humane environment. It can be argued that Constitutional provisions and legislative enactments can play significant role to control pollution in India and especially in leather tanning industries of Tamil Nadu, only when they are implemented in a proper and transparent and accountable manner. In case, these provisions and legalisation are not implemented properly with accountability then they

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<sup>126</sup> Section 3(1), 3(2) and 5(1) in Environment (Protection) Rules, 1986, [Online: web] Accessed 10 December, 2010, URL: <http://envfor.nic.in/legis/env/env4.html>.

<sup>127</sup> P. M. Prasad, ‘Environmental Protection: The Role of Liability System in India’, *Economic Political Weekly*, 39 (3), 17-23 January, 2004, p. 258.

<sup>128</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

would be just a paper work and wastage of time. Thus, in this regard it is important that someone should implement these provisions and laws made by legislatures in the ground reality to control pollution emanating from leather tanning industries. So, there comes the need and role of governments i.e. Central Government, State Governments and various Boards associated with the reduction of pollution in India and in their respective states.

In this regard, the Supreme Court in the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>129</sup> elucidated that according to Section (63)<sup>130</sup> of Water Act (1974)

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<sup>129</sup> Ibid.

<sup>130</sup> Section (63) of the Water (Prevention and Control of pollution) Act, 1974 states that, **POWER OF CENTRAL GOVERNMENT TO MAKE RULES.**

(1) The Central Government may, simultaneously with the constitution of the Central Board, make rules in respect of the matters specified in sub-section (2); Provided that when the Central Board has been constituted, no such rule shall be made, varied, amended or repealed without consulting the Board.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely: -

(a) the terms and conditions of service of the members (other than the chairman and member-secretary) of the Central Board under sub-section (8) of section (5); (b) the intervals and the time and place at which meetings of the Central Board or of any committee thereof constituted under this Act, shall be held and the procedure to be followed at such meetings, including the quorum necessary for the transaction of business under section (8), and under sub-section (2) of section (9); (c) the fees and allowances to be paid to such members of a committee of the Central Board as are not members of the Board under sub-section (3) of section (9); (d) the manner in which and the purposes for which persons may be associated with the Central Board under sub-section (1) of section (10) and the fees and allowances payable to such persons; (e) the terms and conditions of service of the chairman and the member secretary of the Central Board under sub-section (9) of section (5) and under sub-section (1) of section (12); (f) conditions subject to which a person may be appointed as a consulting engineer to the Central Board under sub-section (4) of section (12); (g) the powers and duties to be exercised and performed by the chairman and member secretary of the Central Board; \* \* \* (j) the form of the report of the Central Board analyst under sub-section (1) of section (22); (k) the form of the report of the Government analyst under sub-section (1) of section (22); (l) the form in which the time within which the budget of the Central Board may be prepared and forwarded to the Central Government under section (38); (ll) the form in which the annual report of the Central Board may be prepared under Section (39); (m) the form in which the accounts of the Central Board may be maintained under section (40); (mm) the manner in which notice of intention to make a compliant shall be given to the Central Board or officer authorized by it under Section (49); (n) any other matter relating to the Central Board, including the powers and functions of that Board in relation to Union Territories; (o) any other matter which has to be, or may be prescribed.

(3) Every rule made by the Central Government under this Act shall be laid, as soon as may be after it is made, before each House of Parliament while it is in session for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, (before the expiry of the session immediately following the session or the successive session aforesaid), both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be ; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.



the Central Government has the powers to constitute a CPCB and according to Section (64)<sup>131</sup> the State Government has the powers to establish a State Pollution Control Board (SPCB) to reduce leather tanning pollution in Tamil Nadu. However, Court revealed that the environmental pollution from leather tanning industries is due to the irresponsibility of CPCB and SPCB. Thus, it is the responsibility of Central Government and State Government to monitor the functions of respective Board's and demand that they follow their duties properly in order to reduce pollution emanating from leather tanning industries. Further, the Court has recommended the CPCB follow the functions mentioned in the Section (16)<sup>132</sup> and Section (18)<sup>133</sup> of Water Act (1974) to lessen the

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<sup>131</sup> Section (64) of the Water Act, 1974 says that, **POWER OF STATE GOVERNMENT TO MAKE RULES.**

(1) The State Government may, simultaneously with the constitution or the State Board, make rules to carry out the purposes of this Act in respect of matters not falling within the purview of section 63; Provided that when the State Board has been constituted, no such rule shall be made, varied amended or repealed without consulting that Board.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely: -

- (a) the terms and conditions of service of the members (other than the chairman and the member-secretary) of the State Board under sub-section (8) of section (5); (b) the time and place of meetings of the State Board or of any committee of that Board constituted under this Act and the procedure to be followed at such meeting, including in quorum necessary for the transaction of business under section (8) and under sub-section (2) of Section (9); (c) the fees and allowances to be paid to such members of a committee of the State Board as are not members of the Board under sub-section (3) of section (9); (d) the manner in which and the purposes for which persons may be associated with the State Board under sub-section (1) of section (10) and the fees and allowances payable to such persons; (e) the terms and conditions of service of the Chairman and member secretary of the State Board under sub-section (9) of section (5) and under sub-section (1) of section (12); (f) the conditions subject to which a person may be appointed as a consulting engineer to the State Board under sub-section (4) of section (12); (g) the powers and duties to be exercised and discharged by the chairman and member secretary of the State Board; (h) the form of the notice referred to in section (21); (i) the form of the report of the State Board analyst under sub-section (3) of section (22); (j) the form of the report of the Government analyst under sub-section (3) of section (22); (k) the form of application for the consent of the State Board under sub-section (2) of section (25) and the particular it may contain; (l) the manner in which inquiry under sub-section (3) of section (25) may be made in respect of an application for obtaining consent of the State Board and the matters to be taken in to account in granting or refusing such consent; (m) the form and manner in which appeals may be filed, the fees payable in respect of such appeals and the procedure to be allowed by the appellate authority in disposing of the appeals under sub-section (3) of section (28); (n) the form in which and the time within which the budget of the State Board may be prepared and forwarded to the State Government under section (38); (nn) the form in which the annual report of the State Board may be prepared under section (39); (o) the form in which the accounts of the State Board may be maintained under sub-section (1) of section (40); (oo) the manner in which notice of intention to make a complaint shall be given to the State Board or officer authorised by it under section (49); (p) any other matter which has to be, or may be, prescribed.

<sup>132</sup> Section (16) of the Water Act, 1974 deals with **FUNCTIONS OF CENTRAL BOARD.**

pollution radiating from leather tanning industries such as advice, coordination and provision of technical assistance to SPCB, monitoring the activities of SPCB and

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(1) Subject to the provisions of this Act, the main function of the Central Board shall be to promote cleanliness of streams and wells in different areas of the States.

(2) In particular and without prejudice to the generality of the foregoing function, the Central Board may perform all or any of the following functions, namely:--

(a) advise the Central Government on any matter concerning the prevention and control of water pollution; (b) co-ordinate the activities of the State Boards and resolve disputes among them; (c) provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution; (d) plan and organise the training of persons engaged or to be engaged in programmes for the prevention, control or abatement of water pollution on such terms and conditions as the Central Board may specify; (e) organise through mass media a comprehensive programme regarding the prevention and control of water pollution; (ee) perform such of the functions of any State Board as may be specified in an order made under sub-section (2) of section (18); (f) 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; (g) lay down, modify or annul, in consultation with the State Government concerned, the standards for a stream or well: Provided that different standards may be laid down for the same stream or well or for different streams or wells, having regard to the quality of water, flow characteristics of the stream or well and the nature of the use of the water in such stream or well or streams or wells; (h) plan and cause to be executed a nation-wide programme for the prevention, control or abatement of water pollution; (i) perform such other functions as may be prescribed.

(3) The Board may establish or recognise a laboratory or laboratories to enable the Board to perform its functions under this section efficiently, including the analysis of samples of water from any stream or well or of samples of any sewage or trade effluents.

<sup>133</sup> Section (18) of the Water Act, 1974 describes about, **POWERS TO GIVE DIRECTIONS.**

(1) In the performance of its functions under this Act -- (a) the Central Board shall be bound by such directions in writing as the Central Board may give to it; and (b) every State Board shall be bound by such directions in writing as the Central Board or the State Government may give to it: Provided that where a direction given by the State Government is inconsistent with the direction given by the Central Board, the matter shall be referred to the Central Government for its decision.

(2) Where the Central Government is of the opinion that the State Board has defaulted in complying with any directions given by the Central Board under sub-section (1) and as a result of such default a grave emergency has arisen and it is necessary or expedient so to do in the public interest, it may, by order, direct the Central Board to perform any of the functions of the State Board in relation to such area for such period and for such purposes, as may be specified in the order.

(3) Where the Central Board performs any of the functions of the State Board in pursuance of a direction under sub-section (2), the expenses, if any, incurred by the Central Board with respect to performance of such functions may, if the State Board is empowered to recover such expenses, be recovered by the Central Board with interest (at such reasonable rate as the Central Government may, by order, fix) from the date when a demand for such expenses is made until it is paid from the person or persons concerned as arrears of land revenue or of public demand.

(4) For the removal of doubts, it is hereby declared that any directions to perform the functions of any State Board given under sub-section (2) in respect of any area would not preclude the State Board from performing such functions in any other area in the State or any of its other functions in that area.

organising training to persons engaged in abatement of water pollution etc. Similarly, the Court urged the TNPCB to follow the functions cited in the Section (17)<sup>134</sup> of Water Act (1974) to minimise the pollution emitting from leather tanning industries. In this regard the Court has ordered the TNPCB to maintain the TDS level prescribed by the NEERI as 2100 mg/1 litre. To this end, polluting industries should be given notices to construct ETPs for individual industries, construct the CETPs for cluster of tanning industries, and in cases where industries have not constructed ETPs or joined with CETPs they should be

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<sup>134</sup> Section (17) of the Water Act (1974) says that, **FUNCTIONS OF STATE BOARD.**

(1) Subject to the provisions of this Act, the functions of a State Board shall be --

(a) to plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the State and to secure the execution thereof; (b) to advise the State Government on any matter concerning the prevention, control or abatement of water pollution; (c) to collect and disseminate information relating to water pollution and the prevention, control or abatement thereof; (d) to encourage, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution; (e) to collaborate with the Central Board in organising the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of water pollution and to organise mass education programmes relating thereto; (f) to inspect sewage or trade effluents, works and plants for the treatment of sewage and trade effluents and to review plans, specifications or other data relating to plants set up for the treatment of water, works for the purification thereof and the system for the disposal of sewage or trade effluents or in connection with the grant of any consent as required by this Act; (g) lay down, modify or annul effluent standards for the sewage and trade effluents and for the quality of receiving waters (not being water in an inter-State stream) resulting from the discharge of effluents and to classify waters of the State; (h) to evolve economical and reliable methods of treatment of sewage and trade effluents, having regard to the peculiar conditions of soils, climate and water resources of different regions and more especially the prevailing flow characteristics of water in streams and wells which render it impossible to attain even the minimum degree of dilution; (i) to evolve methods of utilisation of sewage and suitable trade effluents in agriculture; (j) to evolve efficient methods of disposal of sewage and trade effluents on land, as are necessary on account of the predominant conditions of scant stream flows that do not provide for major part of the year the minimum degree of dilution; (k) to lay down standards of treatment of sewage and trade effluents to be discharged into any particular stream taking into account the minimum fair weather dilution available in that stream and the tolerance limits of pollution permissible in the water of the stream, after the discharge of such effluents; (l) to make, vary or revoke any order -- (i) for the prevention, control or abatement of discharge of waste into streams or wells; (ii) requiring any person concerned to construct new systems for the disposal of sewage and trade effluents or to modify, alter or extend any such existing system or to adopt such remedial measures as are necessary to prevent control or abate water pollution; (m) to lay down effluent standards to be complied with by persons while causing discharge of sewage or sullage or both and to lay down, modify or annul effluent standards for the sewage and trade effluents; (n) to advice the State Government with respect to the location of any industry the carrying on of which is likely to pollute a stream or well; (o) to perform such other functions as may be prescribed or as may, from time to time be entrusted to it by the Central Board or the State Government.

(2) The Board may establish or recognise a laboratory or laboratories to enable the Board to perform its functions under this section efficiently, including the analysis of samples of water from any stream or well or of samples of any sewage or trade effluents.

given notice to close down their industries and those industries which are functioning in prohibited areas should be given notices to relocate themselves.

Apart from Water Act (1974), the Supreme Court has also discussed about Environmental Protection Act (1986) in the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>135</sup> where it explained the powers given to the Central Government in this regard. Particularly, Section (3)<sup>136</sup> of Chapter II of Environmental Protection Act,

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<sup>135</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>136</sup> Section (3) of the Environment (protection) Act, 1986 deals that **Power of Central Government to take measures to protect and improve environment.** –

(1) Subject to the provisions of this Act, the Central Government shall have the power to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution.

(2) In particular, and without prejudice to the generality of the provisions of sub-section (1), such measures may include measures with respect to all or any of the following matters, namely: –

(i) co-ordination of actions by the State Governments, officers and other authorities – (a) under this Act, or the rules made thereunder; or (b) under any other law for the time being in force which is relatable to the objects of this Act; (ii) planning and execution of a nation-wide programme for the prevention, control and abatement of environmental pollution; (iii) laying down standards for the quality of environment in its various aspects; (iv) laying down standards for emission or discharge of environmental pollutants from various sources whatsoever; Provided that different standards for emission or discharge may be laid down under this clause from different sources having regard to the quality or composition of the emission or discharge of environmental pollutants from such sources; (v) restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards; (vi) laying down procedures and safeguards for the prevention of accidents which may cause environmental pollution and remedial measures for such accidents; (vii) laying down procedures and safeguards for the handling of hazardous substances; (viii) examination of such manufacturing processes, materials and substances as are likely to cause environmental pollution; (ix) carrying out and sponsoring investigations and research relating to problems of environmental pollution; (x) inspection of any premises, plant, equipment, machinery, manufacturing or other processes, materials or substances and giving, by order, of such directions to such authorities, officers or persons as it may consider necessary to take steps for the prevention, control and abatement of environmental pollution; (xi) establishment or recognition of environmental laboratories and institutes to carry out the functions entrusted to such environmental laboratories and institutes under this Act; (xii) collection and dissemination of information in respect of matters relating to environmental pollution; (xiii) preparation of manuals, codes or guides relating to the prevention, control and abatement of environmental pollution; (xiv) such other matters as the Central Government deems necessary or expedient for the purpose of securing the effective implementation of the provisions of this Act.

(3) The Central Government may, if it considers it necessary or expedient so to do for the purposes of this Act, by order, published in the Official Gazette, constitute an authority or authorities by such name or names as may be specified in the order for the purpose of exercising and performing such of the powers and functions (including the power to issue directions under Section (5) of the Central Government under this Act and for taking measures with respect to such of the matters referred to in sub-section (2) as may be mentioned in the order and subject to the supervision and control of the Central Government and the provisions of such order, such authority or authorities may exercise the powers or perform the functions or

(1986) describes the powers of Central Government to control pollution from the leather tanning industries. Under Section 3(3) of the Environment Act (1986), the Central Government has to constitute an authority with adequate powers to control pollution and protect the environment. However, in view of the Supreme Court of India it was felt that it was a pity that till now no authority (ies) has been constituted by the Central Government to control environmental pollution. The Court believes that if the conditions in the five districts of Tamil Nadu, where tanneries are operating, are permitted to continue in the same manner, then in the near future all rivers/canals shall be polluted, underground waters will be contaminated, agricultural lands would turn into barren and the residents of the area would be exposed to serious diseases. Therefore, the Court directed the Central Government to realise its responsibility and statutory duty immediately to protect the degrading environment and take instant action under the provisions of Environment Act. In this context, the Supreme Court ordered the Central Government to constitute an Authority and provide powers and functions under Section (4)<sup>137</sup> and (5)<sup>138</sup> of Chapter II of the Environment Act (1986) with the help of Green Bench of Madras High Court.

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take the measures so mentioned in the order as if such authority or authorities had been empowered by this Act to exercise those powers or perform those functions or take such measures.

<sup>137</sup> Section (4) of the Environment Act (1986) says that **Appointment of officers and their powers and functions.** –

(1) Without prejudice to the provisions of sub-section (3) of Section (3), the Central Government may appoint officers with such designations as it thinks fit for the purposes of this Act and may entrust to them such of the powers and functions under this Act as it may deem fit.

(2) The officers appointed under sub-section (1) shall be subject to the general control and direction of the Central Government or, if so directed by that Government, also of the authority or authorities, if any, constituted under sub-section (3) of Section (3) or of any other authority or officer.

<sup>138</sup> Section (5) of the Environment (Protection) Act, 1986 describes **Power to give directions.** –

Notwithstanding anything contained in any other law but subject to the provisions of this Act, the Central Government may, in the exercise of its powers and performance of its functions under this Act, issue directions in writing to any person, officer or any authority and such person, officer or authority shall be bound to comply with such directions.

**Explanation** – For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct – (a) The closure, prohibition or regulation or any industry, operation or process; or (b) Stoppage or regulation of the supply of electricity or water or any other service.

The Authority should assess the compensation for the affected individuals/families and to determine the compensation to be recovered from the polluters as the cost of reversing the damaged environment. The Supreme Court stated that Authority should direct the closure order to the industries owned/managed by a polluter in case he evades or refuses to pay the compensation awarded against him and this shall be in addition to the recovery from him as arrears of land revenue. The authority shall review the cases of all the industries which are already operating in the prohibited area and it would be open to the authority to direct the relocation of any of such industries. Based on the recommendation of the Supreme Court, the Ministry of Environment & Forests, Government of India constituted the Loss of Ecology (Prevention and Payments of Compensation) Authority in the year 1996 and appointed Justice P. Bhaskaran, as its Chairman. Respecting the orders of Supreme Court, the Authority conducted a detailed study and delivered its award on 12 March, 2002. Accordingly, "the authority made 547 tanneries in the District of Vellore to pay a compensation amounting to Rs.26.82 crores to 29,193 families as pollution damages and three crores to restore the environment".<sup>139</sup>

However, the functions of the authorities were questioned such as compensation, collection and relocation in the further cases. As a result, in *Vellore District Environment vs. The Honourable The Chief Justice ... on 28 January, 2010, W.P. No. 8335/2008 and 19017/2009*,<sup>140</sup> the powers and functions of the authority was clearly determined by Madras High Court. According to the Madras High Court, the major powers and functions of Loss of Ecology (Prevention and Payments of Compensation) Authority are as following:

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<sup>139</sup> Geetanjoy Sahu, 'Implementation of Environmental Judgments in Context: A Comparative Analysis of Dahanu Thermal Power Plant Pollution Case in Maharashtra and Vellore Leather Industrial Pollution Case in Tamil Nadu', *Law Environment and Development Journal (LEAD)*, 6 (3), 2010, p. 345, [Online: web] Accessed 11 March, 2011, URL: <http://www.lead-journal.org/content/10335.pdf>.

<sup>140</sup> *Vellore District Environment Monitoring Committee v The Honourable Chief Justice* Writ Petition Nos. 8335/2008 and 19017/2009, Madras High Court, 28 January, 2010.

'(i) exercise of powers under Section (5) of the Environment Act, 1986 for issuing directions and for taking measures with respect to matters referred in Clauses (v) (vi) (vii) (viii) (ix) (x) and (xii) of Sub-section 2 of the Section (3) of the Act;

(ii) to assess the loss to the ecology and environment in the affected areas and also identify the individuals/families who have suffered due to pollution and assess the compensation to be paid to them and to determine compensation to be recovered from the polluters for reversing the damaged environment which is collected from the polluter as arrears of land revenue and to frame schemes for reversing the damaged ecology and environment by pollution with the consultation of State of Tamil Nadu expert bodies like NEERI, CPCB etc which shall be executed by the State Government of Tamil Nadu under the supervision of the Central Government and the expenditure shall be met from the "Environment Protection Fund" and other sources from the State and Central Government;

(iii) to lay down the procedure for actions to be taken under (i) to (ii) and above;

(iv) to compute the compensation under two heads as reversing the ecology and payment to individuals;

(v) to direct the closure of any industry or class of industries owned or managed by a polluter in case of evasion or refusal to pay the compensation awarded against the polluter;

(vi) to review the cases of all the industries which are already operating in the prohibited area and to close permanently or direct the relocation of any of such industries which ever not having adequate treatment facilities and comply with the orders issued by the Madras High Court and the Supreme Court from time to time'.<sup>141</sup>

Further, the Madras High court has given the direction to the Authority on 10.04.2008 as

'(i) The Loss of Ecology Authority shall make enquires as to whether the polluters have complied with condition after 1999 as per the award and fix the compensation payable within four months and also assess the damage caused to the ecology since 1999.

(ii) The Authority shall frame a scheme for reversal of the damage to ecology within eight weeks and issue the same to the District Collector, who is directed to implement the scheme.

(iii) the District Collector shall recover the compensation as assessed by the earlier order from the polluters and pay the same to the affected parties and shall file a status report into this Court. The District Collector shall also strictly comply with the scheme framed by the Authority'.<sup>142</sup>

The Supreme Court and High Court of Madras realised that the pollution in India and Tamil Nadu has become so crucial issue that constitutional provisions and legislative enactments are playing significant role but not to a larger extent to control the environmental pollution problem. Thus, it can be argued that as pollution is a problem

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<sup>141</sup> Ibid.

<sup>142</sup> Ibid

throughout the world it requires something concrete mechanism which can analyse the environmental pollution problems at universal level and provide solutions even at local levels. In this regard Supreme Court and Madras High Court started following various ICL and Conventions in relation to environmental pollution to safeguard the environment and provide solutions to the problems emanating from leather tanning industries.

Customary International laws are those aspects of international law that has been derived from customs along with some general principles of law and treaties. Thus, every state (Country) has an obligation to follow the Customary Law which is the greatest strength of this law. The Article 38 of the International Court of Justice (ICJ) lists the sources of ICL in detail.

'The ICJ whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:

- a) International conventions, whether general or particular, establishing rules expressly recognized by the contesting states;
- b) International custom, as evidence of a general principle accepted as law;
- c) The general principles of law recognized by civilized nations;
- d) Subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as a subsidiary means for the determination of rules of law'.<sup>143</sup>

This Article also reflects the most important divisions of ICL that includes hard and soft law. Hard international law generally refers to the agreements of principles that are directly enforceable by a national or international body. The soft international law refers to the agreements or principles that are meant to influence individual nations to respect certain norms or incorporate them into the national law. According to Palmer, Soft law consists of statements like resolutions, recommendations, declaration, and final decisions of conferences which are legally obligatory on every nation. Soft law can act like a mediator between the mere policy statements and binding principles. Thus, environmental commitments are cross-referencing from one body or instrument to another until a common international understanding develops. Although, these agreements sometimes oblige countries to implement legislations, more often they cannot be pressurised to enforce those soft laws in their territory.<sup>144</sup>

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<sup>143</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 60.

<sup>144</sup> *Ibid.*, pp. 60-62.



On the other hand, Conventions are the most important form of International Environmental Law. The 'Convention' includes treaties, statutes, protocols and any other form of express written agreement concluded between States. The most significant environmental soft law instruments are the 1972 Stockholm Declaration on the Human Environment and the 1992 Rio Declaration on Environment and Development. These declarations for the purpose of maintaining the Sustainable Development deal with the Precautionary Principle and the PPP. Thus, sustainable development is one of the most important mechanisms, which has derived from the ICL in order to bring a balance between the ecology and environment.

The Supreme Court of India has quite often cited the ICL and Conventions in various judgements to provide justice to the people. Similarly, in the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>145</sup> case the Supreme Court has mentioned that there is no hesitation in upholding Sustainable Development, Precautionary Principle and the PPP since, these are accepted as the part of the ICL. This kind of the borrowing of jurisprudence from the conventions and other nations has alleviated the problems in the domestic conditions.

Sustainable development is the development of the quality of human life while at the same time living in harmony with nature and maintaining the carrying capacity of the life supporting ecosystem. The environmentalists have explained it as an ample heritage for future generations. The legal scholars have interpreted it as a balanced synthesis of environmental and developmental imperatives and the economists have described it as economic growth which can be sustained for generations.<sup>146</sup>

According to the Brundtland Report (1987), Sustainable Development is the 'development that meets the needs of the present generation without compromising on the ability of the future generations to meet their own needs' which is also called the integration of economics and ecology in all levels of decision making. The *Caring for the Earth: A Strategy for Sustainable Living* (1991) document has clarified sustainability as

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<sup>145</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>146</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 20.

'a characteristic or state that can be maintained indefinitely' while 'development' is 'the increasing capacity to meet human needs and to improve the quality of human life'. Therefore, Sustainable Development means the improvement of the quality of human life within the supportive ecosystems.

Further, the concept of Sustainable Development rejects the old notion that development and environment are antithesis to each other whereas, in reality they are syntheses and complimentary to each other.<sup>147</sup> Similar views are expressed by the Supreme Court in *Vellore Citizens Welfare Forum v Union of India and Others*<sup>148</sup> case that the traditional concept of development and ecology as opposed to each other is no longer acceptable. The Supreme Court believes that "Sustainable Development" is the answer and it is a viable concept to eradicate poverty and improve the quality of human life while living within the carrying capacity of the supporting eco-systems. Basically, it focuses on integration of development and environmental imperatives. It modifies the previously unqualified development concept.<sup>149</sup> Further, the Court has illuminated this principle in the Stockholm Declaration (1972) 'to defend and improve the environment for present and future generations which has become an imperative goal for mankind'. Therefore, every human being has a fundamental right to freedom, equality and adequate conditions of life (quality of the environment) that permits the dignity of life and well-being, which is the important responsibility and the duty of every individual in the society to protect and improve the environment for the present and the future generations.<sup>150</sup>

The Court has even declared some of the salient principles of "Sustainable Development" such as the report of Inter-Generational Equity, Use and Conservation of Natural Resources, Environmental Protection, Precautionary Principle, PPP, Obligation to Assist and Cooperate, Eradication of Poverty and Financial Assistance to the developing countries. Among all these principles the Precautionary Principle and the PPP

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<sup>147</sup> Ibid., p. 21.

<sup>148</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>149</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 20.

<sup>150</sup> Ibid., p. 56.

are two essential features of Sustainable Development. As these two are important principles of Sustainable Development it becomes essential to understand the relevance of them in the context of environmental protection and pollution control in the Indian context.

Precautionary Principle plays a vital role to determine whether the developmental process is sustainable or not. It emphasises on the fact that sustainable development demands the society to stop developmental activities if it causes serious and irreversible environmental jurisprudence. Though, the Precautionary Principle is the shift from the Assimilative Capacity Principle (ACP) this underlies earlier legal measures to protect the environment. According to the Stockholm Declaration (1972), the ACP is:

‘science could provide the policy makers with the necessary information and means to avoid encroaching upon the policy makers with the necessary information and means to avoid encroaching upon the capacity of the environment to assimilate impacts and it presumes that relevant technical expertise would be available when environmental harm is predicted and there would be sufficient time to act in order to avoid such harm’.

It is based on the belief that scientific theories are certain and adequate to provide the remedies for ecological restoration. Further, this principle propagates that whenever pollution occurs it has to build the foundation of scientific certainties and adequacies. However, it has a setback in the environmental context due to uncertainties and inadequacies of information about environmental quality. The uncertainty occurs due to the inadequate data, ignorance and indeterminacy. This becomes a problem when scientific knowledge is institutionalised as policy making or used as a basis for decision making by agencies and the courts. Agencies and Courts have to make choices based on existing scientific knowledge which cannot be tested. Whereas, a scientist may refine, modify or discard variables or models when more information is available.<sup>151</sup>

Both inadequacy and uncertainty in ACP has lead to the emergence of the Precautionary principle. The Precautionary principle is an extension of the Preventative Principle. The Precautionary Principle has its origin in the *Vorsorgeprinzip* Principle of German administrative law which means “prior worry or care”. It is evolved from the political agenda and through the enclosure in numerous international policy documents

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<sup>151</sup> Ibid., p. 28.

and conventions.<sup>152</sup> The Principle 15 of the Rio Declaration (1992) on Environment and Development gives a perfect explanation for the Precautionary Principle which says:

‘In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.’

In the context of India the Supreme Court in the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>153</sup> case has explained the ‘Precautionary Principle’ dealing with Municipal Law. The Supreme Court said:

- ‘The state government and the statutory authorities must anticipate, prevent and attack the cause of environmental degradation.
- Where there are threats of serious and irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The “onus of proof” is on the actor or the developer to show that his action is environmentally benign’.

This principle has led to the special principle of burden of proof especially in the environmental related cases. In this case, the Court observed that the new concept which places as the burden of proof on the developer or the industrialist, who is proposing to alter the status quo, has now become a part of environmental law in India. The Precautionary Principle is implemented whenever there is an identifiable risk of seriousness or irreversible environmental harms including the extinction of species and widespread of toxic pollution in the environment. It may be appropriate to place the burden of proof on the person or entity whoever is involving themselves in such kinds of activities that is potentially harmful to the environment.<sup>154</sup> Therefore, in this case the Court specifies that Precautionary Principle as the essential feature of Sustainable Development.

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<sup>152</sup> David Wilkinson, *Environment and Law*, London, 2002, p. 111.

<sup>153</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>154</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 49.

This principle applies when there are good grounds for judging the action taken promptly at comparatively low costs which may or may not avoid more costly damage later or irreversible effects may or may not follow if action is delayed. This is gradually giving momentum and recognition to the legal principle of environmental law. The majority of the cases agreed that precautionary measures are justifiable not only to solve environmental problems but also for the protection of human health.<sup>155</sup>

Nevertheless, Judge Stein J has not accepted the concept of the Precautionary Principle in the case of *Leatch v Director-General National Parks and Wildlife Services and Shoalhaven City Council* (1993), he says that the Precautionary Principle has derived on the basis of common sense of the decision-makers which is not the direction based on the scientific information. Therefore, the application of this principle leads to the evidential difficulties. In another case *Nicholls v Director National Parks and Wildlife Service* (1994) TALBOT, J observed that 'the precautionary principle may be framed appropriately for the purpose of a political aspiration, its implementation as a legal standard could have the potential to create interminable forensic argument. Taken literally in practice it might prove impossible'. According to Jans, the decision about the implementation of the precautionary principle may have to be based on 'tentative and indicative scientific data'. To wait for certainty would be contrary to the principle itself.<sup>156</sup>

Another important feature of sustainable development is PPP which is derived from theories of justice and economics, but mainly from the theory of economics. It requires polluters to cover at least the costs of regulation of their activity and probably also the restoration costs for ensuing environmental damage.<sup>157</sup> The credit for popularising the PPP for the first time goes to the OECD. The PPP means that the producer should be responsible for the costs of preventing the pollution which they caused in the past. This cost of prevention includes environmental costs and the direct costs to people or property. This principle is basically based on the idea that prevention is

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<sup>155</sup> David Wilkinson, *Environment and Law*, London, 2002, pp. 114-119.

<sup>156</sup> *Ibid.*, pp. 112-116.

<sup>157</sup> *Ibid.*, p. 133.

better than cure.<sup>158</sup> The Report of Brundland (1987) has insisted that the internalisation of the environmental cost of economic activities which effectuates the spirit of the PPP. It encourages the developers to invest for the preventive, restorative or compensatory measures. The Principle 16 of the Rio Declaration (1992) proclaims that national authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments and the polluter should bear the cost of pollution with the view of public interest and without distorting international trade and investment.

This principle is imposed through common law actions such as nuisance or negligence. Under the common law, a person can sue for nuisance when an act endangers his life, health, property and obstructs his enjoyment of the rights common to all people. The nuisance can be classified as public and the private nuisance. 'A public nuisance injures, annoys or interferes with the quality of life of a class of persons who come within its neighbourhood which is called an unreasonable interference with a general right of public'.<sup>159</sup> It comes under both a Tort and the Criminal law. According to Lord Denning, public nuisance is:

'A nuisance which is so widespread in its range or so indiscriminate in its effect that it would not be reasonable to expect one to take proceeding on his responsibility to put a stop to it, but that should be taken as the responsibility of the community at large'.<sup>160</sup>

It is an act or illegal omission causing any common injury or danger or annoyance to the public who so ever occupy property in the neighbourhood. 'The private nuisance is a substantial and unreasonable interference with the use and enjoyment upon common rights of the general public'.<sup>161</sup> For instance, it can be said as private nuisance is interference in the use of others land while public nuisance is the interference in the common right property of the general public. The central question in the nuisance cases is the reasonableness of the defendant's conduct. Both the categories have substantial nexus

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<sup>158</sup> Gurdip Singh, *Environmental Law in India*, Delhi, 2005, p. 31.

<sup>159</sup> Shyam Divan and Armin Rosencranz, *Environmental Law and Policy in India: Cases, Materials and Statutes*, New Delhi, 2008, p. 91.

<sup>160</sup> P. Leelakrishnan, *Environmental Law in India*, New Delhi, 1999, p. 2.

<sup>161</sup> Shyam Divan and Armin Rosencranz, *Environmental Law and Policy in India: Cases, Materials and Statutes*, New Delhi, 2008, p. 91.

with environmental management and major connection with environmental laws. The roots of environmental law can be found in the common law concept of nuisance. For instance, the definition of pollution under the Water Act shows that contamination of water as called as pollution therefore, which may or is likely to create a nuisance.<sup>162</sup>

In the *Vellore Citizens Welfare Forum v Union of India and Others*<sup>163</sup> judgment, the Court has dealt the Common Law of nuisance based on the references from the Blackstone's commentaries on the Laws of England which says:

'if a person keeps his hogs, or other noisome animals, 'or allows filth to accumulate on his premises, so near the house of another, that the stench incommodes him and makes the air unwholesome, this is an injurious nuisance, as it tends to deprive him of the use and benefit of this house. A like injury is, if one's neighbor sets up and exercise any offensive trade; as a tanner's a tallow-chandler's or the like; for though these are lawful and necessary trades, yet they should be exercised in remote places; for the rule is, sicutere "tuo, ut alienum non laedas;" this therefore is an actionable nuisance. 'And on a similar principle a constant ringing of bells in one's immediate neighbourhood may be a nuisance... With regard to other corporeal hereditaments; it is a nuisance to stop or divert water that used to run to another's meadow or mill; to corrupt or poison a water-course, by erecting a dye-house or a lime-pit, for the use of trade, in the upper part of the stream; ' to pollute a pond. From which another is entitled to water his cattle; to obstruct a drain; or in short to do any act in common property, that in its consequences must necessarily tend to the prejudice of one's neighbor. So closely does the law of England enforce that excellent rule of gospel-morality, of "doing to others, as we would they should do up to ourselves'.<sup>164</sup>

A common law action for negligence may bring prevention in the environmental pollution problems. In an action for negligence, 'the plaintiff must show that the defendant was under a duty to take reasonable care to avoid the damage complained of; there was a breach of this duty and the breach of duty caused the damage'.<sup>165</sup> This act of negligence may constitute a nuisance as well as amount to be paid for breach of his action under the rule of strict liability. The person is strictly liable 'when he brings or

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<sup>162</sup> P. Leelakrishnan, *Environmental Law in India*, New Delhi, 1999, p. 33.

<sup>163</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>164</sup> This is quoted from Blackstone's commentaries on the Laws of England (Commentaries on the Laws of England of Sir William Blackstone) Vol. III, Chapter XIII, "Of Nuisance" fourth edition published in 1876 and also see *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>165</sup> Shyam Divan and Armin Rosencranz, *Environmental Law and Policy in India: Cases, Materials and Statutes*, New Delhi, 2008, p. 100.

accumulates on his land something likely to cause harm if it escapes, and damage arises as a natural consequence of its escape'.<sup>166</sup>

The Supreme Court has added the new concept of Absolute Liability with this common law action for nuisance, negligence and the strict liability after the incident of Bhopal tragedy caused due to the leak of hazardous substances from the industry. Before this tragedy, the strict liability was considered as adequate measure to regulate hazardous enterprises. However, this was not sufficient for controlling environmental pollution from the industries. As a result, absolute liability has emerged for the purpose of introducing the strictest standards for controlling pollution from the most hazardous industries. In the case of leather tanning pollution, the Court has dealt the role of the PPP and the Absolute Liability through the judgment of *Indian Council for Enviro-Legal Action v Union of India*, 1996 (3) SCC 212

'We are of the opinion that any principle evolved in this behalf should be simple, practical and suited to the conditions obtaining in this country". The Court ruled that "Once the activity carried on is hazardous or inherently dangerous, the person carrying irrespective of the fact whether he took reasonable care while carrying on such activity. The rule is premised upon the very nature of the activity carried on". Therefore, the polluting industries are "absolutely liable to compensate for the harm caused by them to villagers in the affected area, for the soil and for the underground water and hence, they are bound to take all necessary measures to remove sludge and other pollutants lying in the affected areas". Consequently, the Court interpreted the "Polluter Pay Principle" as the absolute liability for harm to the environment extends not only to compensate the victims of pollution but also the cost of restoring the environmental degradation which is part of the process of "Sustainable Development".<sup>167</sup>

It can be argued that the polluter is responsible for compensating and repairing the damage caused by his omission in the context of absolute liability. This is the essence of the PPP. The hazardous industries are the high-water mark in the process of development of PPP.

Nevertheless, the doctrine is limited in the sense that it can be applied only at the remedial stage i.e., after pollution has taken place. Meanwhile, the application of this principle has sometimes resulted in confusion. As a result, there have been disputes over on its exact scope which include over limits on payments for damage caused. Hence, it

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<sup>166</sup> Ibid., p. 105.

<sup>167</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715



can be said that the PPP is not immune from criticism. The implementation of the PPP may impose an oppressive burden to the existing industry which suppresses the future investment. Some authors argue that there is no single polluter in the society and the whole society is responsible to pay the costs of such activities. But, every individual in the society cannot afford to pay the liability due to their economic conditions.<sup>168</sup> For instance, according to U. Sankar most of the leather tanning industries of Tamil Nadu is small scale industries. The PPP demands these industries to pay pollution fee which has resulted, as an oppressive burden on them and in their future investment in the small scale leather tanning industries.<sup>169</sup>

This argument is also dealt in the case of *Vellore District Environment v The Honourable Chief Justice* ... on 28 January, 2010,<sup>170</sup> it has been said that the leather tanning industries are unable to pay the quantum fixed by the authority due to their financial strain and some of the polluting tanneries are small scale industries therefore, they resort to instalment measures to pay the pollution fine. The Court also agreed with the claim of these industries and asked them to pay the compensation in instalments. However, in reality with the acceptance of such initiatives has resulted in the failure of the implementation of the PPP. The fine is collected from the polluter for the reason of the restoration the environment in the immediate manner but this kind of instalment payment will lead to the delay in the restoration of damages in the environment. The PPP can be reinterpreted as 'he who pays may pollute' which is seen as an unethical approach to environmental protection. According to Gaines, the application of the PPP control costs vary according to the environmental standards adopted in each State and the each industry however, the full economic equity requires uniformity of environmental standards. As we have seen above, there are many practical difficulties involved in arranging for the internalisation of pollution costs.<sup>171</sup>

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<sup>168</sup> David Wilkinson, *Environment and Law*, London, 2002, pp. 131-132.

<sup>169</sup> U. Sankar, *Economic Analysis of Environmental Problems in Tanneries in Textile Bleaching and Dyeing Units and Suggestions for Policy Action*, New Delhi, 2001, pp. 1-161.

<sup>170</sup> *Vellore District Environment Monitoring Committee v The Honourable Chief Justice* Writ Petition Nos. 8335/2008 and 19017/2009, Madras High Court, 28 January, 2010.

<sup>171</sup> David Wilkinson, *Environment and Law*, London, 2002, pp. 131-132.

Thus, the Precautionary Principle and the PPP have accepted the part of the legal system in the case of *Vellore Citizens Welfare Forum v Union of India and Others*<sup>172</sup> where the Court directed to assess the damage of the ecology and environment and impose these principles on the polluters who are responsible to pay compensation. These principles are the source of liability and compensation for pollution. It exposes two fold liabilities to the polluters; one is to pay compensation to the victims of their pollution and secondly restoration of ecology. Thus, the Precautionary Principle and the PPP have acquired the status of CIL along with the principle of Sustainable Development.

Thus, by analysing the sustainable development, Precautionary Principle, PPP it is been argued by some scholars that to an extent they are suitable to the Indian context even though, they have been taken from CIL and Conventions. This view is rejected by few scholars who believe that the Supreme Court has taken these principles from the Conventions and ICL without the practical experiences. They consider that those principles are derived from the developed nations which will not be suitable to the developing countries like India. This is clearly explained by the Daniel Berkowitz, Katharina Pistor and Jean-François Richard, as countries that have transplanted laws without adaptation and applied them to a population not already familiar with these laws tend to have relatively ineffective legal institutions. In the viewpoint of economic the legal transplantation involves increasing the extent to which lawmakers in a given jurisdiction rely upon analysis conducted in a foreign jurisdiction as opposed to analysis conducted locally. In short, transplanted law to local conditions has a major effect on economic development.<sup>173</sup> Another important disadvantage of ICL in relation to environmental protection is uncertain not clear trans-boundary harm.

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<sup>172</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>173</sup> Kevin E. Davis, 'Law-Making in Small Jurisdictions', *The University of Toronto Law Journal*, 56 (3), Summer, 2006, p. 171, and also see in Nuno Garoupa and Anthony Ogus, 'A Strategic Interpretation of Legal Transplants', *The Journal of Legal Studies*, 35 (2), June, 2006, p. 340.

Thus, overall analysing this chapter it could be seen that pollution has become a major problem in India especially in Tamil Nadu due to the leather tanning industries. The Supreme Court of India and Madras High Court is concerned about the pollution problems emanating from leather tanning industries of Tamil Nadu. To reduce the environmental pollution the Supreme Court of India has endorsed all kind of means namely constitutional provisions and legislative enactments, defined the powers and functions of Central Government and State Government and various Boards, adopted CIL and Conventions. The Supreme Court through CIL and Conventions has focussed on sustainable development and two major features of sustainable development namely Precautionary Principle and PPP. As, the Supreme Court of India has used these two principles to limit the environmental pollution emanating from leather tannery industries, it becomes essential to analyse the judgements of Supreme Court and Madras High Court by using certain economic instruments and the implementation of economic theories.

## **Chapter 4**

# **ECONOMIC ANALYSIS OF ENVIRONMENTAL LAW AND POLLUTION**

## ECONOMIC ANALYSIS OF ENVIRONMENTAL LAW AND POLLUTION

We now attempt to make some analytical comments on the environmental law that has emerged from tannery pollution in Tamil Nadu using some concepts from the discipline of economics. There is by now a wide spectrum of analysis which has emerged from the economic analysis of law. We begin by briefly reviewing this scholarship in its wider context before narrowing down to environmental concerns. The Law and Economics or the economic analysis of law is 'the application of economic theory (primarily microeconomics and the basic concepts of welfare economics) and econometric methods to examine the formation, structure, processes and impact of law and legal institutions'.<sup>174</sup> In short, an approach treats the legal institutions within the subject of economic system. In particular, 'Economics has mathematical precise theories (price theory and game theory) and empirical sound methods (statistics and econometrics) of analysing the effects of prices on behaviour'.<sup>175</sup> Hence, the economic analysis provides a 'scientific theory to predict the effects of legal sanctions on behaviour',<sup>176</sup> such as sanctions respond to prices.

In the concept of a scientific theory of behaviour, economics provides a useful normative process for evaluating law. 'Law are not just arcane technical arguments but also the instruments for achieving important social goals'<sup>177</sup> for which, legal institutions are using the economic analysis of scientific theory of behaviour for evaluating law in a perfect manner. Further, the law and economics tries to provide the consensus to the people because 'different people have different desires, goals and values, but everyone would agree that they would rather have their desires met than

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<sup>174</sup> Nicholas Mercurio and Steven G. Medema, *The Economics and the Law: from Posner to Post-Modernism*, New Jersey, 1997, p. 3, and also see in Ejan Mackaay, 'History of Law and Economics', *Encyclopaedia of Law and Economics*, 200, 1999, p. 65, [Online: web] Accessed 28 February, 2010, URL: <http://www.scribd.com/doc/239168/0200-History-of-Law-and-Economics>.

<sup>175</sup> Robert Cooter and Thomas Ulen, *Law and Economics*, Massachusetts, 2000, p. 3.

<sup>176</sup> Ibid.

<sup>177</sup> Ibid.

not met, and they would prefer that this happen more often instead of less often'.<sup>178</sup> Due to this law and economics emphasises the 'arguments of and the justification for the theory of moral philosophy known as utilitarianism. In Brief, utilitarianism holds that morality requires the doing of whatever would maximise the sum total of pleasure while minimising the sum total of pain',<sup>179</sup> the law and economics tries to keep the advantages of utilitarianism to avoid controversial value judgments while losing its disadvantage of being unworkable for social decision-making. This transformation occurs by taking utilitarianism's discussion of "fulfilling desires", and putting it into the context of economic action'.<sup>180</sup>

Turing now to the application of economics to the environment and environmental law one of the first steps needed is to understand the role development has in human society. Development is the process of increasing the society's ability to meet human needs – that is, improving the quality of human existence to ensure people enjoy a long, healthy and fulfilling life. This aspect of development is achieved through the economic and commercial activities in the society. The proper use of natural resources in economic and commercial activities leads to economic development and growth in the society whereas, excess use of natural resources and disposal of toxic substances into the air, water, and land leads to the environmental degradation and pollution in the society which damages the health of both the humans and other living existence. On the one hand, the industrial and commercial activities have developed a society and humans economically stable which can be thought of as a positive environmental externality. On the other hand, these activities cause the environmental destruction like pollution which is labelled as negative environmental externality.

#### **4.1 Environmental Externalities**

Externalities refer to unintentional effects of industrial activities which lead to positive and negative effects on people in society either in a direct or indirect manner. This occurs when the actions of producers or consumers have unintended external

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<sup>178</sup> Brian Bix, *Jurisprudence: Theory and Context*, Durham, 2006, p. 191.

<sup>179</sup> Ibid.

<sup>180</sup> Ibid., p. 192.

effects over other producers or/and consumers. In economic terms this is thought of as one party imposing costs or benefits on other parties, which are not recognised in market transactions. A positive externality arises when the certain actions of an individual or group of individuals bestows benefits on others. Technological innovations are the best instance of a positive externality. Positive externalities benefit not only the firm but also to the society.

A negative externality occurs when the activities of one or group of individuals have harmful effects on other individual(s) and the society as a whole. This kind of harmful effects can disturb the general public either directly or through the environmental damages such as pollution. Pollution may harm not only human beings but also the flora and fauna through the destruction of the quality of the air, water which is also creating noise pollution.

The leather tanning industries are using chrome tanning process and certain toxic chemicals in the production procedure namely chromium, sulphides and ammonia and also nitrogen. In this series of production process the leather tanning industries are discharging the untreated pollutants into the rivers for instance; Ammonia Nitrogen, Phosphate ( $PO_4$ ), Aluminium, Colours, Suspended Solids (SS) and Faecal coliforms so on. This eventually is diminishing the welfare of individuals near to the water sources.

Further, these leather tanning industries are polluting the quality of air by discharging various kinds of pollutants in the environment such as Methyl Ethyl Ketone, Methyl Isobutyl Ketone, Toluene, Xyol, Diacetone Alcohol, Glycol Ether EB, Glycol Ether PMA, Acetone, Hydrogen Sulphate ( $H_2S$ ) and Ammonia ( $NH_3$ ). In the case of noise pollution the leather tanning industries is polluting the working environment while it is performing fleshing, sammying, setting out and shaving machines. Further, in the finishing process automatic spraying is creating unbearable noises.

Viewing the above mentioned environmental pollution due to leather tanning industries it can be said that water and air pollution is occurred due to various types of chemicals used in the production and discharging these chemicals in the form of pollutants in the environment. This eventually is generating a variety of classes of health hazards to the people residing near to these industries for example Hydrogen

Sulphide and Sodium Sulphide chemicals used in the leather tanning process is leading to lung diseases, nerve diseases and respiratory problems. Similarly, Phenol causes liver and kidney damages, utilising of Ammonia leads to respiratory problems, Isocyanates becomes the source of asthma, tightness in chest and reduces the lung capacity over a period of time.

This kind of pollution problem has come into limelight over recent times due to excessive use of natural resources, irresponsibility of the industries and failure of government to control pollution on account of 'non benevolent behaviour of government'.<sup>181</sup> Developing countries like India is suffering from this kind of negative environmental externality. Specifically as our study focuses on the leather tanning industries of Tamil Nadu that have been discharging effluents into the river, agricultural fields, road sides water ways and open land which has created the negative externality in North Arcot district of Tamil Nadu. On the one side, the leather tanning industries have provided employment opportunities to the local people that have led to economic development – the positive externality. On the other side, this has created environmental pollution as negative externality through the discharge of effluents into the water sources which has developed a severe health hazard to the local people.

The generation of positive externality pilots a social benefit that is greater than private benefit whereas the negative externality advances a social cost that is more than the private cost. The divergence between private benefits (costs) and social benefits (costs) results in inefficiency in resource allocation. The existence of a negative externality is challenging the efficiency of the market due to the creation of divergence between social and private costs as a result of that the market imparts inaccurate signals'.<sup>182</sup> In the tanneries water pollution case the industries leather production is imposing the social costs on all those who are residents of that place. As a consequence, the industries typically find it profitable to pollute water resources beyond the socially optimal level. 'The negative externality occurs when the marginal

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<sup>181</sup> M. N. Murthy, A. J. James and Smita Misra, *Economics of Industrial Pollution Abatement: Theory and Empirical Evidence from the Indian Experience*, Delhi, January, 1998, p. 142.

<sup>182</sup> U. Sankar, *Environmental Externalities*, Chennai, 2006, p. 1-2, [Online: web] Accessed 10 March, 2011, URL: <http://envis.mse.ac.in/dissemination/sankar.pdf>.



social cost will be higher than the marginal private cost (price) and hence the private optimal level of output will be higher than the social optimal output'.<sup>183</sup>

The Government intervention is needed to internalise these negative externalities in production and consumption decisions of individuals so that socially optimal level of outputs and private optimal levels of outputs will be the same. But, in the leather tanning pollution case, the Government has failed to implement the polices and the law in an effective manner as a result of that the local residents and the Vellore Citizens Welfare Forum (NGO) ended up filing a case in the Supreme Court for the purpose of controlling the water pollution from the leather tanning industries in that area. This case could be analysed by utilising the benefits and costs analysis:

#### 4.2 Benefits and Costs Analysis

The following Figure No. 4.1 can be used to illustrate the negative environmental externalities of the leather tanning industries. The horizontal axis depicts the amount of pollution discharged by the leather tanning industries. The vertical axis describes the Marginal Cost of the industries. 'A' movement from right to left indicates that less pollution being discharged. Curve 'A' represents the Marginal Cost to the leather tanning industries of reducing pollution. As the industries reduce its emissions from E to 0, it becomes increasingly costly for the industries to make additional discharge reductions. Curve 'B' is the Marginal Social Cost (which is called non benefit) of pollution damage which is not to the industries but to the residents in that area. This curve is sometimes referred to as the marginal 'willingness to pay',<sup>184</sup> to avoid pollution, or marginal value of clean water. Thus, the curve also represents the marginal benefits to those individuals of pollution reduction.

The Marginal Social Cost increases as the industries increases its discharge from 0 to E. Classical economic theory has argued that, the socially optimal amount of pollution discharge is E\*, the point at which the damage caused by an additional unit of pollution is just equal to the Marginal Cost  $t^*$  of avoiding it. Operating in an unregulated market, however, the industries would instead choose to discharge

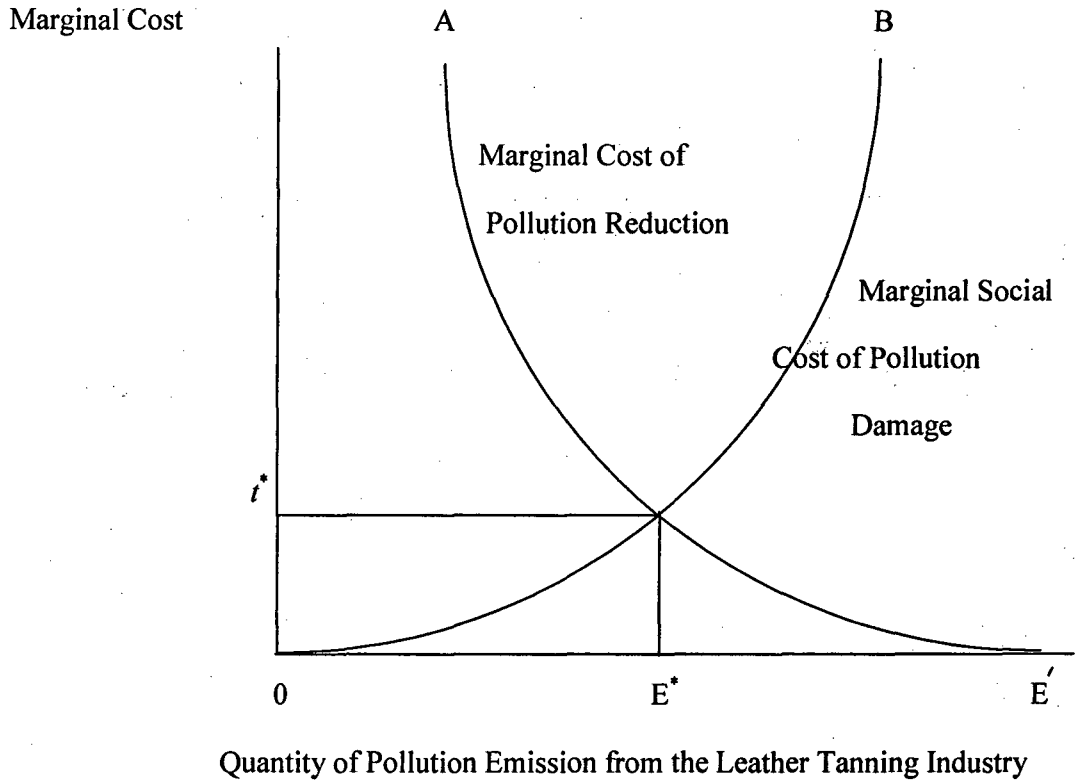
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<sup>183</sup> Ibid., p. 2.

<sup>184</sup> Nicholas A. Ashford and Charles C. Caldart, *Environmental Law, Policy, and Economics: Reclaiming the Environmental Agenda*, Cambridge, 2008, p. 132.

pollution at point E', in excess of the socially optimal amount. The reason is that, since the Marginal Cost of Pollution Damage to the industries is zero, the industries will not find it profitable to incur any costs to reduce its discharge of pollutants.

**Figure No. 4.1: BENEFITS AND COSTS ANALYSIS**



*Note: The Socially optimal level of pollution derived from the marginal costs and benefits of pollution control.*

*Sources: Ashford, A. Nicholas and Caldart, C. Charles, Environmental Law, Policy, and Economics: Reclaiming the Environmental Agenda, Cambridge: The MIT Press, 2008, p. 133.*

The above mentioned diagram could be analysed even in the orders of the Supreme Court of India in the Vellore Welfare Forum case. In general the Utilitarian theory describes that people or individuals tend to gain pleasure and minimise the pain. Similarly, the two sections in the Vellore Forum case are trying to do this. One section that is the people residing over that place are trying to minimise the pollution and maximise the social benefits. This can be achieved if the individual pollution reaches  $E'$  to 0 level i.e. Marginal Private Cost (MPC) is called Marginal Cost of Pollution Reduction that should be greater than the Marginal Social Cost (MSP) which is

beneficial to society. Whereas, the other section i.e. industries are trying maximisation of private benefits and minimisation of Marginal Cost of Pollution Reduction. This can be attained if the industrial effluent discharge reaches the level of 0 to  $E$  i.e. MSP should be greater than MPC which is beneficial to industry.

Thus, in this process, the Supreme Court of India realised that it cannot try to appease one section and avoid the other. As a result, the Supreme Court of India has tried to bring a balance between the two sections by giving direction to the government to issue notice to the large scale industries in order to construct the Effluent Treatment Plants (ETPs). Further, it has ordered to the government to establish Common Effluent Treatment Plants (CETPs) for the cluster of industries (small and medium scale industries). As, these industries are small and medium in nature they are not able to construct ETPs, therefore, the Court directed the government to provide subsidies for construction of CETPs. In addition to that, the Court also instructed the industries to implement the physio-chemical and biological treatment system and installation of R. O. System for the attainment of zero discharge from the industries.

On the other hand, the Court initiated the authority to collect the polluter fee from the industries and award that polluter fine in the form of compensation to the affected individual/families and reversing the damaged environment. Thus, this balancing approach of the Supreme Court of India could be seen in the diagram, where the socially optimal amount of pollution discharge is  $E^*$ , the point at which the damage caused by an additional unit of pollution is just equal to the marginal cost  $t^*$  of avoiding it. Through this way the Court has internalised the negative (pollution) externalities in production and consumption decisions of individuals so that socially optimal levels of outputs and private optimal levels of outputs will be the same.

In this case, as we have seen in the previous chapter, that the Court has dealt with the environment and development by balancing certain issues. The judiciary has tried to internalise the negative externalities and maintain parity between socially optimal levels of outputs and privately optimal levels of outputs. The Court has stated that, the leather tanning industries is a major foreign exchange earner especially for

the state of Tamil Nadu which is the leading exporter of finished leather.<sup>185</sup> The leather tanning industries are vitally important to the country for generating foreign exchange and employment opportunities to the people in the society but it has no right to destroy the ecology, degrade the environment and create the health hazards in the society which cannot be permitted to expand or even to continue unless it tackles by itself the problem of pollution created by the said industries.<sup>186</sup> Objections have been raised that a development scheme was approved by the government without taking into consideration the environmental hazards, or without providing the compensation to the people, and thus often development has resulted in economic failure of the weaker sections of society and degradation of the environment.<sup>187</sup>

The judiciary has been playing a proactive role in the enforcement of environmental regulations especially in the case of tanning industries pollution – it directed the tanners to install treatment plants (ETPs or CETPs) or closure or relocation, and bear the remedial cost as well as provide compensation to the victims of pollution. In this regard, it recommended PPP, Precautionary Principle and new approaches for considering market choices ‘to give industries and consumers clear signals about the cost of using environment and natural resources’.<sup>188</sup> Through this direction the Court has been internalising the negative (pollution) externality by making use of Command-and-Control (CAC) as an application of the PPP, encouraging the Precautionary Principle and attempting to compensate victims. We now proceed to make some analytical comments on the issue that have been emphasised by the Indian courts, namely the PPP and the Precautionary Principle.

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<sup>185</sup> Accounting that approximately 80% of the country’s export

<sup>186</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

<sup>187</sup> S. P. Sathe, *Judicial Activism in India*, New Delhi, 2002, p. 225.

<sup>188</sup> U. Sankar, *Environmental Externalities*, Chennai, 2006, p. 11, [Online: web] Accessed 10 March, 2011, URL: <http://envis.mse.ac.in/dissemination/sankar.pdf>.

### 4.3 Polluter Pays Principle: Standard Based System of Environmental Regulations and Command-and-Control Approach

As we have pointed out above, the study of law and economics deals with both analytic and normative dimensions. The former aims at demonstrating that large areas of law could be explained not so much with matters of justice but with the efficient allocation of resources. The normative work in the field is concerned with giving legislators and judges a framework for legislating and adjudicating cases so as to promote the efficiency.<sup>189</sup> The central aim of the law is understood as protecting and managing the society and its natural environment in an efficient manner. Here efficiency would mean the introduction of economic incentives into the environmental policy as one prominent organising principle for protecting the environment. According to Prasad, the law and economic literature has focused on the role of legal institutions and common law rules in achieving efficiency and distributive goals, particularly in the area of environmental policy. There is an *ex post* approach where parties pay damages after the harm has occurred as well as *ex ante* approach, where parties pay a fine after violating regulatory standards, sometimes even before harm has occurred.<sup>190</sup>

The *ex ante* (rules) is set by the legislative authority whereas the *ex post* (standards) formulated by the judiciary or executives. This bifurcation may be used to question whether developing countries should adopt a standard-based system of environmental regulation that relies heavily on the judiciary or lower levels of the executive for the specification of norms, or a rule-based system that concentrates more power in the legislature or at higher levels of the executive.<sup>191</sup> The standards are set by the state that plays a major role in the enforcement of laws.

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<sup>189</sup> Jeffrie G. Murphy and Jules L. Coleman, *Philosophy of Law: An Introduction to Jurisprudence*, USA, 1990, p. 181.

<sup>190</sup> P. M. Prasad, 'Environmental Protection: The Role of Liability System in India', *Economic Political Weekly*, 39 (3), 17-23 January, 2004, p. 257.

<sup>191</sup> Michael Faure, Morag Goodwin and Franziska Weber, 'Bucking Kuznets Curve: Designing Effective Environmental Regulation in Developing Countries', *Virginia Journal of International Law*, 51(1), 2010, p. 110.

However, it is seen that there are chances of overlapping between the liability and regulatory approaches to environmental protection such as 'compliance with regulatory standards does not automatically relieve the party from the liability as well as non-compliance with regulatory standards does not necessarily make it liable'.<sup>192</sup> Therefore, collaborative use of these two systems is necessary to correct the externalities for that purpose the court should use a tort liability as a temporary substitute for regulation which resolves the conflict between *ex ante* and *ex post* approaches. Thus, the optimal-mix of alternative legal system is one where regulatory authorities set the minimum standards which are not insufficient to internalise the risk of harm created by the leather tanning industries. In this regard, the Supreme Court has taken into consideration of these standards and awarded damage compensation to the affected individuals and the families in that area. Consequently, the Court ordered the TNPCB to maintain the standard for discharging of TDS prescribed by the NEERI as 2100 mg/l litre. Thus, the Court has followed the economic instruments to provide an opportunity to the polluters to make use of their private information on finding least cost means of complying with the standards. Under the standard pollution charge system, the charge of each pollutant is equal to the marginal abatement cost of the prescribed standard provides an incentive to internalise the negative externality.<sup>193</sup>

This standard pollution charges system is also called the CAC method of pollution control. In this process standards are set to protect and improve the quality of environment. It is a piece of legislation which recommends for mandatory performance. Thus, it imposes the regulatory standard which includes standards for maximum permissible emissions, standards for the technology that can be used in a production process or other types of controls. These regulatory standards are specifying the use of inputs and outputs activities. Under a CAC approach the regulator can enforce the environmental standards based on the optimal level of

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<sup>192</sup> P. M. Prasad, 'Environmental Protection: The Role of Liability System in India', *Economic Political Weekly*, 39 (3), 17-23 January, 2004, p. 257.

<sup>193</sup> U. Sankar, 'Laws and Institutions Relating to Environmental Protection in India', presented at the conference on *The Role of Law and Legal Institution in Asian Economic Development*, Erasmus University, Rotterdam, Netherlands, 1-4 November, 1998, p. 36, [Online: web] Accessed 19 June, 2011, URL: [http://www.mse.ac.in/pub/op\\_sankar.pdf](http://www.mse.ac.in/pub/op_sankar.pdf).

pollution (where the Marginal Social Cost (MSC) is equal to the Marginal Social Benefit (MSB) to pollution).<sup>194</sup> Thus, CAC regulations basically deal with prevention of environmental related problems 'by specifying how a company will manage pollution-generating process'.<sup>195</sup> Further this mechanism depends on 'regulations followed up by an ongoing inspection program'.<sup>196</sup>

The environmental quality standards are generally three types to be exact they are ambient, emission and technology. Ambient standards refers to certain pollutants in a particular environment to "never-exceed"<sup>197</sup> given minimum levels since dropping beyond this given minimum levels would lead to a harmful situation. As these ambient standards cannot be imposed on polluters directly, the help of legal measures are taken in order to regulate their emission producing activities.

Second type of environmental quality standard is emission standards which also follows the principle of "never-exceed". This standard is directly applied 'to the quantities of emissions from pollution sources per unit of time'.<sup>198</sup> It sets a limitation to the level of performance which needs to be followed by the polluters. This standard only sets maximum limits of emission and leaves the discretion in the hands of polluters how to achieve it. However, it is evident that setting of mere standards of emission need not mean of achieving ambient standards. Moreover, if there is no control on number of polluting firms and mere emission standards are fixed then it is

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<sup>194</sup> R. Quentin Grafton, Wiktor Adamowicz, Diane Dupont, Harry Nelson, Robert J. Hill and Steven Renzetti, *The Economics of the Environment and Natural Resources*, USA, 2004, p. 65.

<sup>195</sup> Ralph Stuart, 'Command and Control Regulation', *Encyclopaedia of Earth*, 16 September, 2006, [Online: web] Accessed 22 July, 2011, URL: [http://www.eoearth.org/article/Command\\_and\\_control\\_regulation](http://www.eoearth.org/article/Command_and_control_regulation).

<sup>196</sup> Ibid.

<sup>197</sup> PIDS, Philippine Institute for Development Studies, A Law of Nature: The Command-and-Control Approach, *Economic Issue of the Day*, 3 (1), April, 2002, p. 1, [Online: web] Accessed 22 July, 2011, URL: [http://www.sswm.info/sites/default/files/reference\\_attachments/PIDS%202002%20Standards%20in%200Command%20and%20Control.pdf](http://www.sswm.info/sites/default/files/reference_attachments/PIDS%202002%20Standards%20in%200Command%20and%20Control.pdf).

<sup>198</sup> Ibid., p. 2.

obvious that aggregate environment quality in terms of ambient standards is not directly checked.<sup>199</sup>

Third environmental quality standard is technology standard. These standards mention that in order to protect the environment the polluter should adopt certain technologies or practices such as design, engineering, input and output standards. The technology standards impose on polluters certain decisions and technologies which are to be used. Therefore, it can be said that technology standards is a kind of “technology forcing”<sup>200</sup> on the polluters to adopt technological whether they like it or they do not like to meet the environmental standards.

It is evident that the above mentioned three types of CAC are implemented in general throughout the world in order to control the pollution. However, in India ambient and technological standards are followed to regulate the environmental pollution. In this regard in Vellore Welfare Forum case<sup>201</sup> the Supreme Court directed the NEERI to find out the exact environmental damages and pollution occurred due to leather tanning industries. Consequently, NEERI prepared a report and recommended that prescribed standards of TNPCB and Central government standards is not sufficient to control pollution emitting from the leather tanning industries and if it continued in the same manner pollution will only be intensified in future. Thus, NEERI recommended that maintain the standard of 2100 mg/ 1 litre of TDS discharge for controlling pollution from leather tanning industries. It strongly suggested to Supreme Court that following the standard of 2100 mg/1 litre of TDS discharge only can help in internalising the pollution externality. Thus, Court viewed the recommendations of NEERI from the perspective of Sustainable Development concept and ordered the TNPCB and authority to maintain standards of 2100 mg/1 litre with the assistance of NEERI.

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<sup>199</sup> Ibid.

<sup>200</sup> Ibid.

<sup>201</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715



In the context of India, the Supreme Court has implemented the ambient and technological standards to protect the environment from the pollution problems. The Supreme Court in Vellore Welfare Forum case<sup>202</sup> has ordered the leather tanning industries to “never-exceed”<sup>203</sup> (ambient standard) the standard of 2100 mg/litre of TDS discharge. It even implemented the technological standards by recommending the leather tanning industries to construct ETPs, CETPs and implement the physio-chemical and biological treatment system and installation of R. O. System in order to protect the environment.

The main advantage of this approach is that it is providing the clear outcome and simple to monitor compliance which leads the emission reduction. When the polluter has violated this approach he has to pay a fine for his infringement. For this reason the polluters would prefer to undertake pollution abatement rather than the pay the charges which increases the functions of level of abatement for pollution control.

However, this approach has many conceptual, information and econometric problems in getting reliable estimates of the marginal abatement costs. The major problem of this approach is that information uncertainty. It is not only costly for regulators to gather necessary information but also creating inaccurate or dishonest reporting. Further, this mechanism is uniformly applied in every polluting industry which is not decreasing pollution levels or emission in a cost-effective manner. Since the Marginal Costs of limiting pollution will vary among the sources therefore, it is not guaranteed the equality level of limiting pollution in the sources. Under this situation, polluters are charged for only for the pollution abatement rather than the marginal cost of pollution that they continue to emit which leads economically

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<sup>202</sup> Ibid.

<sup>203</sup> PIDS, Philippine Institute for Development Studies, A Law of Nature: The Command-and-Control Approach, *Economic Issue of the Day*, 3 (1), April, 2002, p. 1, [Online: web] Accessed 22 July, 2011, URL:  
[http://www.sswm.info/sites/default/files/reference\\_attachments/PIDS%202002%20Standards%20in%20Command%20and%20Control.pdf](http://www.sswm.info/sites/default/files/reference_attachments/PIDS%202002%20Standards%20in%20Command%20and%20Control.pdf).

inefficient condition.<sup>204</sup> Therefore, many economists believe that the introduction of the Pigouvian taxes on pollution is an efficient way of dealing the negative externality than government-imposed regulatory standards (application of CAC approaches). Taxes leave the decision of how to deal with pollution to individual sources by assessing a fee or “tax” on the amount of pollution that is generated.

#### 4.3.1 Pigouvian Tax

Arthur Pigou has proposed that ‘people who generate negative externalities should have to pay a fee reflecting the costs they impose on others which is called as “Pigouvian Tax”. The simple version of a “Pigouvian Tax” is an “effluent fee” it means anyone who dumps pollutants into a river, or emits them into the air, must pay a sum proportional to the amount dumped’.<sup>205</sup>

The following Figure No. 4.2 explains the “Pigouvian Tax” approach for pollution control from the industries. Through his contribution government can achieve a socially-optimal level of pollution. It determines a tax on output by equating the Marginal Social Cost of Pollution to the Marginal Benefits achieved from the production that causes the pollution this can be translated into a tax on effluents produced during production, by equating the Marginal Costs of Effluent Control (Abatement Cost) to the Marginal Cost of Damages (caused by the effluent being discharged into the environment). The intersecting point of the Marginal Damage Cost (MDC) and the Marginal Cost of Abatement (MCA) determines both the optimal level of Pollution (P) and the optimal level of Taxes (T). To note, per unit of the T should be equal to the Marginal Social Cost (MSC) and Marginal Private Cost (MPC) corresponding to social optimum output. In the social optimal output condition the price is equal to the MSC. Therefore, the imposition of Tax will raise the output price

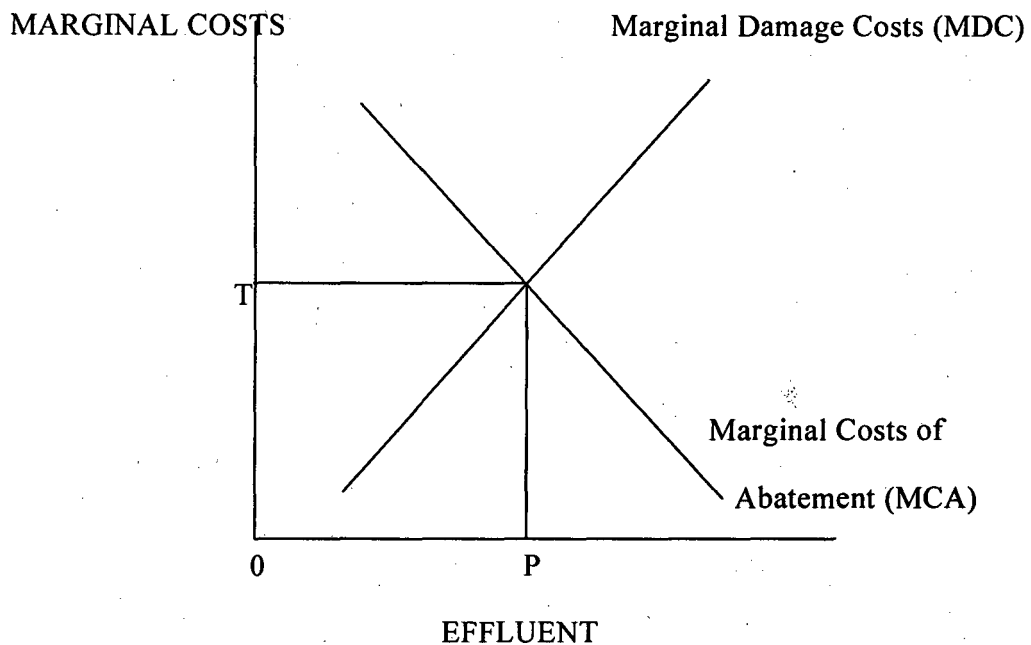
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<sup>204</sup> Environmental Literacy Council (Scientists, Educators, Economists), ‘Environmental Economics’, *The Essentials*, 1, 2007, pp. 42-43, [Online: web] Accessed 19 June, 2011, URL: <http://www.enviroliteracy.org/pdf/EnviroEcon-vol1.pdf>.

<sup>205</sup> Paul Krugman, ‘Building a Green Economy’, *The New York Times*, 5 April, 2010, p. 3, [Online: web] Accessed 13 April, 2010, URL: <http://www.nytimes.com/2010/04/11/magazine/11Economy-t.html?emc=eta1>.

and reduce the demand and so which helps to internalise the environmental pollution externality.<sup>206</sup>

**Figure No. 4.2: PIGOUVIAN APPROACH TO POLLUTION CONTROL**



Sources: Murthy, N. M., James, J. A., and Misra, Smita, *Economics of Industrial Pollution Abatement: Theory and Empirical Evidence from the Indian Experience*, Delhi: Unpublished draft from Institute of Economic Growth, January, 1998, p. 80.

From the above discussion it is evident that CAC approach and “Pigouvian Tax” is the component of PPP. The PPP is basically implemented through CAC and market-based approach. CAC includes performance and technological standard system, whereas market-based instrument includes a pollution tax which is also referred as Pigouvian term of “effluent fee”. The PPP has emerged from the international environmental law and the conventions. This international law and conventions has given the guideline for the environmental policy formulation and environmental liability to both developed as well as developing countries. It describes that the person who damages the environment should bear the cost for his damaging activities of the past.

<sup>206</sup> U. Sankar, *Environmental Externalities*, Chennai, 2006, pp. 4-5, [Online: web] Accessed 10 March, 2011, URL: <http://envis.mse.ac.in/dissemination/sankar.pdf>.

The PPP is an attempt to make polluters or damager should be liable to pay the social cost thereby bringing pollution to the optimum level. According to Organisation for Economic Cooperation and Development (OECD), the PPP in an economic point of view 'prices of goods (depending on the quality and/or quantity of environmental resources) reflect, more closely, their scarcity and that economic agents concerned react accordingly'.<sup>207</sup> According to the Article 174(2), European Commission (EC) Treaty states that community policy on the environment should be based on the principle 'that the polluter should pay',<sup>208</sup> which is appealing the wrongdoer should be liable to pay for their action. In the context of economics the PPP talks about the "Pigouvian Tax" for internalising the negative externalities. This concept of imposing the taxes over on the industries for their negative externality action should lead to the economic efficiency in the society.

The Supreme Court has followed the aspects of the CAC and "Pigouvian Tax" approach through the implementation of PPP in the Vellore Welfare Forum case<sup>209</sup> and demanded the government and authority to implement the following aspects for controlling pollution from the leather tanning industries such as:

- to implement the CAC method wherein the government fixing the standards of discharging the TDS level prescribed by the NEERI, the effluent water treated through the CETPs and with use of certain scientific techniques for controlling pollution such as installation of R.O. System.
- to implement the Pigouvian taxation system through the application of PPP for controlling pollution from the leather tanning industries.

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<sup>207</sup> Shruti Rajagopalan, *The Polluter does not Pay Model for Environmental Protection in India*, European Masters in Law and Economics Master Thesis, London, August, 10, 2008, p. 6. [http://www.emle.org/\\_data/Shruti\\_Rajagopalan\\_\\_The\\_Polluter\\_Does\\_Not\\_Pay\\_Model\\_for\\_Environmental\\_Protection\\_in\\_India.pdf](http://www.emle.org/_data/Shruti_Rajagopalan__The_Polluter_Does_Not_Pay_Model_for_Environmental_Protection_in_India.pdf).

<sup>208</sup> Michael Faure and Göran Skogh, *The Economic Analysis of Environmental Policy and Law: An Introduction*, United Kingdom, 2003, p. 26.

<sup>209</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

This clearly indicates that leather tanning industries should bear the costs of abatement and restoration of the environment and they should be liable to pay the compensation to the affected people by way of giving polluter fine. The PPP as interpreted by the Court refers that the industries are absolutely liable to pay compensation to the victims of pollution and also the cost of restoring the environmental degradation. It could be argued that, PPP is a vibrant principle to reduce the environmental pollution. Since, the polluters are liable to pay fine for polluting the environment. However, it is not free from drawbacks in the implementation of liability regime.

In this case the victims are receiving very small amount of compensation from the industrial damages but the environmental litigation is usually very high. Thus, there is 'the problem of rational disinterest' as the expected compensation may not be enough to induce to any individual victim'.<sup>210</sup> As per the Court order the pollution fine amount is Rs. 10,000 from each polluting industries. Further, the Court directed the authority to utilise this polluter fine for the purpose of compensation and reversal of damaged environment. Thus, the meagre amount is not sufficient for compensation as well as for reversal of damaged environment. Moreover, the affected people are suffering from many health problems which are more costly, for instance cancer, respiratory problems, lungs problems. In the case of women health issues problems are more severe in the form of abortions; premature deaths and still birth; high rate of neo-natal, infant and maternal mortality, prolapsed of the uterus; miscarriages. These problems are not only affecting the physical organs of the people but also generating high mental pressure among the men and women and children residing near the leather tanning industries. Thus, the compensation given to the affected people is not sufficient to look after their day today lives and their ill health problems.

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<sup>210</sup> Michael Faure and Göran Skogh, *The Economic Analysis of Environmental Policy and Law: An Introduction*, United Kingdom, 2003, p. 29.

Another problem of liability regimes is that the victims have to prove the fault. In environmental pollution case it should be very difficult and not possible to prove the causation. Therefore, the economic calculation of environmental damage should be impossible to determine the exact harm which leads economic inefficiency. In this tannery case, the environmental harm or damage is very large and difficult to define which an industry specifically is creates the insolvency problem.<sup>211</sup>

The PPP has integrated a moral judgment by placing responsibility for cessation of pollution directly over on the polluter and which is a very cheap method for controlling pollution. The incorporation of the PPP through the judgment reveals the symbolic value of a clean environment. Few scholars do not agree with this argument for instance, the economists favouring a Coase theorem approach have rejected the application of law in this context because it leads to an economically inefficient condition. Indeed, 'environmental debate between law and economics reflects this tension, since the law is primarily concerned with fairness and ethical principles while economics is concerned with economic efficiency'.<sup>212</sup>

Thus, according to Coase (1960), in the context of internalising the negative externality, the negotiation between the polluter and the victims is very important because it leads to the condition of well defined property rights and the zero transaction cost. Therefore, not only the government and the judicial intervention should not give the solution for internalising the negative externality. He characterised the concept of negotiation between the industry and the residence in the process of 'reciprocal nature of the harm'.<sup>213</sup> The absence of the transaction costs makes there is no sense for the government to impose a solution. Further, in the environmental damages case the property rights are difficult to define properly in the context of environmental pollution from the industries due to transaction cost should be high in the process of negotiation between the polluters and victims as well as the

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<sup>211</sup> Ibid., pp. 28-31.

<sup>212</sup> Nicholas A. Ashford and Charles C. Caldart, *Environmental Law, Policy, and Economics: Reclaiming the Environmental Agenda*, Cambridge, 2008, p. 175.

<sup>213</sup> Ronald H. Coase, 'The Problem of Social Cost', *Journal of Law and Economics*, 3 October, 1960, pp. 1-2.

environmental damages has causing the uncertainty due to this the Precautionary Principle has arose for addressing the problem of environmental pollution.

#### 4.4 Economic of Precautionary Principle

The term precautionary principle had its origin from the German word '*Vorsorgeprinzip*' which conveys the common sense based advice – *to err on the side of caution*. This principle eventually played a significant role in the German environment policy and within less than two and half decades it was implemented in various environmental treaties throughout the world for invoking decision making.<sup>214</sup>

In the view of K. S. Kavi Kumar, the basic rationale for using Precautionary Principle is that when the impacts of certain hazardous activities are not clear then in general it is considered to let the action continue as long as uncertainty is not resolved completely. However, Precautionary Principle rejects such notions and believes in anticipating those activities and trying to avert any kind of environmental harm. Thus, it supports 'monitoring, preventing and mitigating uncertain potential threats'.<sup>215</sup>

The two most accepted definitions of Precautionary Principle are: The Principle 15 of the Rio Declaration (1992) states that

In order to protect the environment, the precautionary approach shall be widely used by States according to their capabilities. Where there are threats of serious and irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'.<sup>216</sup>

The second definition of Precautionary Principle is based on the Wing spread Statement, which says that:

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives,

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<sup>214</sup> K. S. Kavi Kumar, *Precautionary Principle*, Dissemination Paper – 8, Madras School of Economics, Centre of Excellence in Environmental Economics, Sponsored by Ministry of Environment and Forests, Government of India, 2008, p. 4, [Online: web] Accessed 22 July, 2011, URL: <http://coe.mse.ac.in/dp/Precaution-Kavi.pdf>.

<sup>215</sup> Ibid.

<sup>216</sup> Nicholas A. Ashford and Charles C. Caldart, *Environmental Law, Policy, and Economics: Reclaiming the Environmental Agenda*, Cambridge, 2008, p. 176.

including no action. In this context the proponent of an activity, rather than the public, should bear the burden of proof<sup>217</sup>

These definitions of Precautionary Principle have been indicated in various international agreements and treaties from time to time such as:

a) Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 – “Parties to this protocol .. determined to protect the ozone layer by taking precautionary measures to control equitable total global emissions of substances that deplete it...”

b) Framework Convention on Climate Change, 1992 – “The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects”.

c) Convention on Biological Diversity, 1992 – does not directly use the term “Precaution” but interprets the ‘serious and irreversible’ harm referred in the Rio Declaration in the context of biodiversity. It states ‘where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat’.

d) The Masstricht Treaty of European Union, 1992 – “Community policy on the environment must aim at a high level of protection and be based on the precautionary principle, as well as on the principle that preventive action should be taken, that environmental damage should be rectified at source and that polluter should pay”.

e) Cartagena Protocol on Bio-Safety, 2000 – “In accordance with the precautionary approach the objective of the Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking into account risks to human health and specifically focusing on trans-boundary movements”.

f) Cartagena Protocol on Bio-Safety, 2000 – “In accordance with the precautionary approach the objective of the Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking into account risks to human health and specifically focusing on trans-boundary movements”.

g) Stockholm Convention on Persistent Organic Pollutants (POPs), 2001 – The objective states, “Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and environment from persistent organic pollutant”. This treaty operationalises precaution with explicit reference to it in the preamble, provisions for adding POPs, and determination of best available technologies’.<sup>218</sup>

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<sup>217</sup> K. S. Kavi Kumar, *Precautionary Principle*, Dissemination Paper – 8, Madras School of Economics, Centre of Excellence in Environmental Economics, Sponsored by Ministry of Environment and Forests, Government of India, 2008, p. 4, [Online: web] Accessed 22 July, 2011, URL: <http://coe.mse.ac.in/dp/Precaution-Kavi.pdf>.

<sup>218</sup> Ibid., pp. 8-9.



Apart from these declarations and treaties Precautionary Principle has been dealt in various other agreements and treaties namely Ozone Layer Protocol (1985), United Nations Environment Program (1989), Energy Treaty (1994), and World Trade Organisation (WTO) SPS Agreement (1995).

While viewing the Precautionary Principle in the context of India it is seen that this principle has not been explicitly mentioned in any environment related law. Nevertheless, the Supreme Court of India has tried to summon this principle in some judgements. For instance, in the Vellore tannery case, the Court has dealt with the precautionary principle as the major features for the controlling pollution and which is an essential aspect of maintaining the sustainable development in the society. Thus, according to the Supreme Court of India, the “Precautionary Principle” under the Municipal Law is:

- ‘The State Government and the statutory authorities must anticipate, prevent and attack the causes of environmental degradation.
- Where there are threats of serious and irreversible damage, lack of scientific certainty should not be used as a reason of postponing measures to prevent environmental degradation.
- The “Onus of proof is on the actor or the developer/industrialist to show that his action is environmentally benign”.<sup>219</sup>

Thus, the efficient judicial activism with regard Precautionary Principle has guided the National Environmental Policy to adopt this principle as a guiding principle to control environmental pollution.

The strength of this principle is based on the extent of the legislative operation of the precautionary principle in relation to the environmental protection and pollution control, the willingness of the executives for the implementation of the principle in a very effective manner and the judicial interpretation and the directions related to the implementation of the precautionary principle. If any one of the organs of the government has not followed this principle which leads to the failure of implementation of this principle.

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<sup>219</sup> *Vellore Citizens Welfare Forum v Union of India and Others* AIR 1996 SC 2715

The Precautionary Principle is not clearly defined and more controversial than the PPP. It emerged for the purpose of addressing the scientific uncertainties and often associated with the best way of environmental risk assessments. In the environmental pollution case, the time scales and the consequences of the environmental damages are not clear and difficult to define in clear scientific terms. The environmental damages have not impact the present generation but also to the future generation which is called sustainable development. The development aspect has to maintain the sustainability for the present and the future generation. Moreover, environmental impacts of current activities carried out by the industries may not be seen for many generations, and may have implications well beyond the current political terms and agendas. In a broad sense, there are two basic policy approaches that can be taken in the face of such uncertainties.

- 'The first cautions that regulatory action may not pursued until the uncertainties are sufficiently resolved, lest the regulated industry be made to incur needless costs.
- The second cautions that harm to the environment and public health can be far-reaching, and calls for regulatory action when the available (yet imperfect) data are sufficiently suggestive of harm this approach forms the basis for the precautionary principle'.<sup>220</sup>

Though, the precautionary principle has been criticised as being both too vague and too arbitrary to form a basis for rational decision making. This principle is not based on the cost-benefit analysis and the assessment of risk also irrational as well as not on the basis of scientific and economic point of view. According to Ashord, the Precautionary Principle are rational within an analytical framework as rigorous as uncertainties permit, and one that mirrors democratic values embodies in regulatory, compensatory, and common law. Further, he argued that risk assessment place in a regulatory system based on a precautionary approach, cost-benefit analysis as a decision-making criterion will often be at odds with the precautionary principle'.<sup>221</sup>

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<sup>220</sup> Nicholas A. Ashford and Charles C. Caldart, *Environmental Law, Policy, and Economics: Reclaiming the Environmental Agenda*, Cambridge, 2008, pp. 175-176.

<sup>221</sup> *Ibid.*, p. 178.

Richard Stewart (2002) argues uncertainty does not justify regulatory precaution. While 'preventive regulation of uncertain risks is often appropriate and should incorporate precautionary elements where warranted by risk aversion or information acquisition, strong versions of the [principle] do not provide a conceptually sound or socially desirable prescription for regulation'.<sup>222</sup> The precaution is authorised when the victims are themselves risk averse, but not the government acts as trustee for the victims in the absence of expressed risk aversion.

Though, there are a lot of criticisms of Precautionary Principle in general, all these criticisms are overshadowed by the positive role it is playing in the context of environmental pollution. In the Indian context, it can be argued that it is an efficient instrument in controlling the environmental pollution and it requires proper recognition in the environmental related laws. Further, recognition is not only the solution for solving environmental related problems rather it should be implemented effectively in present and future.

Thus, overall analysing this chapter we can conclude that economics by using its mechanisms has tried to understand the environmental law and reduce the pollution emanating from the leather tanning industries. The economic analysis of Supreme Court verdict in Vellore Welfare Forum case reveals that social optimum level of output and private optimum level of output should be the same so that it is possible to be better off without making others worse off. The Court achieved this balancing level by ordering the government and the authority to provide compensation to the affected people and reversing the damaged environment. Through the application of this the Supreme Court has attained social optimum level of pollution control. Whereas, on the other hand the Court specified the importance of construction of ETPs and CETPs, implementation of the physio-chemical and biological treatment system and installation of R. O. System for the attainment of zero discharge from the leather tanning industries. Through this the Court internalised the negative externality problems which has led to the private optimum level. Therefore, the Court has taken these major steps in order to bring a balance between the society and the industries.

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<sup>222</sup> Ibid., p. 180.

The usage of economic instruments such as CAC, market-based system of pollution tax and standard based regulatory system over on the legal interpretation has lead to the level of controlling and internalising the negative (pollution) externality problems. The Supreme Court has utilised these economic instruments not directly in the form of CAC, market-based system of pollution tax and standard based regulatory system rather it has opted indirect way i.e. PPP and Precautionary Principle. These two principles in order to control pollution are intertwined and cannot work alone to their fullest extent of efficiency without the other. Thus, it can be said that these two principles are two sides of the same coin. Based on the arguments of this chapter it has proven that the main goal of economic analysis of the environmental law is to internalise pollution externality and achieve economic efficiency.

## **CONCLUSION**

## CONCLUSION

Our environment refers to the surrounding places where we all live. When these places get polluted automatically our environment gets polluted. Pollution of environment is nothing but making the environment foul. In other words, it could be said that environmental pollution is discharging of unwanted things into air, water and land which may cause threats to ecological balance and degrading our quality of life. In general our environment is polluted in three ways namely air, water and noise. Air pollution occurs when fresh air is contaminated by various harmful substances. Water pollution occurs when toxic substances enter in to various sources of water namely lakes, streams, oceans, wells, and other water bodies. Whereas, noise pollution occurs due to unwanted sounds or noises in our surroundings.

Thus, in the 21<sup>st</sup> century environmental pollution has become one of the biggest threats to mankind on the planet today. This shows that environmental problems are becoming worse day by day not only throughout the world but also in India which needs to be rectified. In this regard various actions have been taken in India to internalise the pollution by means of judicial activism, constitutional provisions, legislature enactments, and non-governmental organisations (NGOs).

In all the above mentioned means to restrict environmental pollution one thing is common i.e. law as the source of internalising environmental pollution. Laws are made by legislatures, enacted by executive and interpreted by judiciary to control pollution. In order to get a clear picture whether these laws are made properly, executed efficiently and interpreted with accountability a measurement rod is required which can effectively analyse these things and derive conclusion to avoid future pollution problems. This is possible by economics as a discipline by utilising certain concepts. Thus, law and economics are two intertwined measurement rods which can help in internalising the pollution.

This research work basically focuses on the pollution emitting from leather tanning industries and how this pollution could be internalised without affecting the society by means of law and economics (economic analysis of law).

The leather tanning industries is basically one the largest polluting industries in India and especially in the state of Tamil Nadu. These industries being polluter in nature has been specified under the 'Red', category which is considered as highly polluting industries. In the production process, leather tanning industries utilise large amount of water and variety of chemicals that is harmful to the society and environment. The chemicals used in industries while producing the semi-finished and finished process has lead to high concentration of pollutants and generating solid wastes which is enormously polluting the water sources and atmosphere. Consequently, this has drawn to different kinds of health effects such as respiratory problems, kidney and lung failure, asthma, cancer and women facing gynaec problems so on.

The high concentration of pollutants discharging from leather tanning industries and its side effects on health and environment initiated civil societies to raise voice against those industries behalf of affected people. The civil societies made judiciary and governments to arbitrate and demanded the provisions of justice to safeguard the right to life of the people. As a result, judiciary took the cause seriously and granted justice in balancing manner by directing Central and State Government and Boards (CPCB and TNPCB) to establish a new authority (Loss of Ecology) to examine the damages occurred in the affected areas and to provide compensation to the affected people and reversing the damaged environment. On the other hand the Court instructed them to issue notice to the large scale industries to construct ETPs and directed the State government to construct CETPs for cluster of industries (small and medium scale industries) with the subsidy of Central government, implementation of physico-chemical and biological treatment system and installation of Reverse Osmosis system (R.O. system).

The Court comprehended that in order to achieve the above mentioned goals it is essential to follow two significant principles from Customary International Law (CIL) and Conventions namely Polluter Pays Principle (PPP) and Precautionary Principle. Through the verdict of Vellore judgement the Court strongly recommended that these two principles are the most important features of sustainable development.

Thus, through this verdict 'Judicial Activism' could be seen in an efficient and effective manner in various sections of the judgement. For instance, in the constitution of India, Articles related to environment are dealt in indirect way. However, the Supreme Court derived these constitutional provisions related to environment and interpreted them in a useful and well-organised manner in accordance to the Indian context. Secondly, some of the important legislations related to environment were interpreted and made the officials to realise their duties and powers to control pollution. Finally, prior to this verdict many judgements were given related to environmental issues which basically took into consideration the domestic laws of India. However, for the first time the Supreme Court of India realised that domestic laws alone are not sufficient and international laws should be considered to internalise the environmental pollution. As a result, the Court borrowed Polluter Pays Principle (PPP) and Precautionary Principle from Customary International Law (CIL) and Conventions and internalised the pollution externality emanating from leather tanning industries.

The Court to ensure and achieve these objectives of the verdict demanded the executive to implement said directions. In order to put into practice these objectives in required manner efficiency, accountability and transparency is very much needed. This is possible through the application of economic instruments over on the judicial interpretation since, it provides a clear scientific certainty and adequacy of information. Therefore, application of economic instruments on the environmental pollution problems gives a certainty and clear information about the damage in the environment through which the motive of the judiciary to attain the level of internalising the pollution externality is viable.



Nevertheless, the court has applied economic instruments such as Command-and-Control (CAC), market-based system of pollution tax and standard based regulatory system to internalise the negative (pollution) externality problems. The Supreme Court has utilised these economic instruments not directly in the form of CAC, market based system of pollution tax and standard based regulatory system rather it has opted indirect way i.e. PPP and Precautionary Principle.

In order to internalise the negative (pollution) externality problems the research suggests the following recommendations:

**Suggestions:**

- *Collaborations:* India should collaborate with other countries and import technological equipments for internalize pollution. It should call the expertise from developed countries to examine the situation and train the people to protect the environment. Further, the private companies should also collaborate with the other private companies and public sectors and invest money in those equipments.
- *Symbols of Environment Pollution:* In order to control AIDS government has created a significant symbol. Similarly, government should also propagate a symbol of environmental pollution and create awareness about that symbol especially in the leather tanning industries area. These symbols should be specified on the polluting industries by the government. So, that people become aware of the polluting industries
- *Seminars and Conference:* Seminars and conferences should be conducted by the government along with industries and NGOs. These seminars and conference should be conducted every month and yearly once they should conduct a national conference on leather tanning issues. This will help people to come together and exchange their problems and views about environment.
- *Committee in Parliament and Legislative Assembly:* As Parliament and Legislative Assembly have various types committees such as Public Accounts

Committee, Committee on Estimate and Public Undertakings Committee. Similarly, members of parliament and legislature assembly should constitute a committee on environmental issues.

- *Mass Media:* The role of mass media is significant to internalise the environmental pollution especially in the case of leather tanning industries. Sometimes only it publishes articles magazines and newspaper. In order to generate consciousness among the people it should try to project more the issues related to this industry.
- *Corruption and Black Money:* Corruption and black money is also somewhere helpful in aggravating environmental pollution. In case corruption and black money is regulated then those money can be used in importing technologies from abroad for pollution control and improve the health condition of the affected people.
- *Hospitals to be created by Polluters:* The polluters should construct hospitals for the affected people from their own money since the health of these people is deteriorated in working their industries.

On the whole, this research concludes that laws enacted by the legislature and interpreted by the judiciary are playing a significant role in internalising the environmental pollution but in order to analyse whether they are properly implemented or not in ground reality could only be achieved through the use of economic instruments.

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