

## ***CHAPTER - VII***

### **SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION**

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Increasing awareness of air pollution and the problems created thereby is now a known phenomenon. It is also established that its impact is most visible in the industrial region. It is equally clear that the activities of man are major causes for air pollution. These activities are, however, necessary for the immediate and future benefit of mankind.

Air pollution, though a global phenomenon, needs local solutions. The cost of preventive measures and implements are very high which developing nations cannot afford without outside assistance, financial and technical. Therefore, legal controls should take into account such realities.

It is here that the traditional principles of international law, which focus 'rights' rather than 'capabilities' in environmental pollution controls, are particularly, inadequate. Solutions to conflicts between the 'haves' and 'have-nots' are not provided by established principles of law concerning the use and control of resources.

Nevertheless, the sheer magnitude of the problem is staggering, especially when the nature and origin of the air pollution problems and their scientific, technological, biological, social and legal aspects are not properly understood in their true perspective.

The efforts by the states for the prevention and control of air pollution in their legislations would probably provide an improvised machinery to deal with and tackle the emergency situation.

National action will necessarily be the first line of defence against air pollution. National controls may be reinforced by a number of bilateral, regional and specific agreements, particularly in such areas enclosed by industries.

The present research venture titled, "Air Pollution Control in Industries in Tamil Nadu - A study on Legal Aspects" is undertaken to examine the causes and effects of air pollution and ascertain the measures taken by the study units. The investigation encompassed with an extensive survey to obtain primary data from a sample of 19 RED CATEGORY (Highly Polluting Units) industrial units, 190 employees of the sample units, 190 members of the public living near the sample units and 19 physicians of the sample units. The interview schedules administered to the sample units covered questions regarding its location, sources of emission, air pollution control measures provided, treatment of solid waste, compliance of provisions of Air Act. The schedules administered to the employees covered questions relating to the problems faced by the employees in a particular unit, the personal protective equipments provided and their usage, and the medical help provided to them by their organisations. The schedules administered to the general public covered questions regarding the hazards they faced from the polluting units, diseases contacted, resistance to the units and suggestions to get rid of the problem. The schedules administered to the physicians of the hospitals of the

study units covered questions relating to the types of problems faced by the employees, the nature of the problems and the treatment given to the employees.

The primary data gathered from the survey have been statistically analysed and presented in the form of frequency tables. Use has been made of statistical tools like percentage and chi-square test to find out the association between the type of sample unit and the pollution related characteristics and measures, between the designation of employees and the opinions of employees regarding pollution, between the type of unit and the opinions of members of public regarding pollution.

Polluting nature of sample units was analysed after constructing a pollution index exclusively for this study. Weighted scores were assigned to various pollution factors and on the basis of the scores secured by sample units, they were identified into three categories viz., less polluting, moderately polluting and highly polluting.

The study, it is hoped, will prove to be a worth while experiment as evident from the following summary of findings, given or stated briefly with a view to obtaining answers to the questions raised under the heading statement of the problems on the lines of which the objectives of the study were framed. To recapitulate, the research problem and the objectives of the study are as follows:

1. To underscore the significance of air pollution control in the changing industrial scenario.
2. To study the provisions of the Pollution Control Act in respect of air pollution control.
3. To examine the causes of air pollution in the study units.
4. To study the pollution control measures undertaken by different industries.
5. To ascertain the effect of air pollution on the workers and the community at large.
6. To study the role of TNPCB in control of air pollution in industries in the state of Tamil Nadu.
7. To suggest suitable measures that are required to be taken to minimise industrial pollution (air) and for conservation of natural resources through promoting suitable technologies.

The research findings recorded at various quarters in the preceding chapters of the present research report are consolidated in this final chapter. A capsule of the findings of the study is furnished in the following passages.

## **SUMMARY OF FINDINGS**

1. Industrial sector is held responsible for the country's economic growth and pollution is an undesirable by-product of industrial growth. While industrial growth is a must for nation because of its employment potential against rural development and uplifting of the standard of living, environmental control is our social responsibility. We have to guarantee an unpolluted environment to our society. The responsibility is depicted under the heading the "importance of air pollution control".
2. An overview of the legal provisions reveals that a compendium of controls including legal controls are necessary. The preventive regulations in terms of establishing standards, procedures and obligations have a major role. Legal controls also require strengthening of general obligation of states to prevent pollution and principles for determining the liability for pollution damages.
3. The survey reveals that a majority of the sample units (9) are located in Town Panchayat areas followed by panchayat areas in which 7 industries are located. A consoling feature is that only three polluting units are situated in the municipal limits. 13 sample units have owned land for their industry which is comparatively larger area when compared to the remaining 6 units which are located in leasehold lands allotted in industrial complex.

4. The study brings to light that 17 sample units (89.5%) have realised the importance of controlling pollution with (both technical and non-technical) staff appointed exclusively for the purpose of controlling pollution both by mechanical and non-mechanical means.
5. An important finding of the study has been that Air Pollution Control (APC) consultation was sought by the units, mainly, in the preparation of Environmental Impact Analysis (EIA) report and for the installation of APC equipments.
6. The study reveals that 15 sample units have emission from process, 19 units have emission from boilers and 18 units have emission from generator chimneys.
7. It is found from the study that all the study units have taken appropriate control measures to contain air pollution. It is quite evident from the fact that the APC measures such as cyclone separators, scrubbers, Bag filters, Dust extraction system, Fly ash arrestors and stacks were provided as per the TNPCB norm. The number of APC measures under operation were 198 in all the sample units and only 4 measures in 3 units were found under non-operation.
8. It is learned from the study that all the units, as they all belong to red category (highly polluting units), have obtained consent from the PCB under the provisions of Air Act 1981.

9. The study has brought to sharp focus that 10 sample units have complied with the conditions of the Air Act in respect of the provisions of the APC measures. The remaining 9 sample units have not complied with the conditions (as on the date of survey) and they are reluctant in complying with the conditions of the Air Act 1981 continuously.
10. It is evident from the study that the study units comply with the Air Pollution Standards stipulated by the Pollution Control Board.
11. The survey has brought to sharp focus the fact that there is a great concern among the public and workers regarding air pollution from industries. They started raising objections and lodging complaints against the units which are responsible for pollution.
12. A stark revelation of the study is that there has been five pronged action programme over the complaints against pollution. During the survey period it was learnt that the Pollution Control Board issued show cause notice to 2 sample units, 5 units were asked to provide the APC measures immediately and no action was initiated against 10 sample units in respect of complaints, due to the fact that the pollution levels were well within the standards.
13. The survey points out that 18 units have developed green belt within their premises. The noteworthy feature one can identify after seeing this green belt development is that the emission from sample units' has not affected the vegetation physically apart from heaping dust over the plants.

14. The survey discloses that people living within a radius of less than 2 kilometers from the sample units were facing problems because of pollutants such as dust, soot and bad odour etc.
15. The results of the test of hypotheses reveals that there is no association between the type of unit and the pollution control variables mentioned in the null hypotheses  $H_{0_1}$ , to  $H_{0_8}$  except  $H_{0_5}$ , and the variables are considered independent. The result of the test of hypothesis  $H_{0_5}$  reveals that there is association between the type of unit and the pollution control measures under operation. The variables are considered dependent.
16. The pollution index analysis reveals that 5 units with an index score of 7 and 8 are responsible for highly polluting the atmosphere, 9 units with an index score of 9 and 10 are classified as moderately polluting units and the remaining 5 units with an index score of 11 and 12 are considered as less polluting units.
17. From the survey, it has come to light that the emission of hazardous agents inside the working environment has direct effect on the health of the workers of the industries.
18. It is interesting to note that 43.1 percent of the sample employees have the experience of less than 10 years while only 13.7 percent possess experience of more than 20 years.

19. A striking disclosure of the study is that an overwhelming majority of 92.1 percent of the employees use the personal protective equipments all the time. About 7.9 percent of the employees are not using the protective equipments, which shows their ignorance of the importance of personal protective equipments.
20. Respondents to the extent of 15.3 percent felt that the personal protective equipments provided by the industries were adequate while 34.7 percent felt that the personal protective equipments provided by the industries were inadequate. They reported that they must be provided with nose mask, helmet and hand gloves.
21. It is evident from the study that three significant diseases which affected the sample employees of all the study units were irritation of eyes (32.6%), sore throat/stuffy nose (19.5%), and inflammation (10%).
22. The study brings to sharp focus that none of the employees of the study units was previously affected by any disease and their illness was due to the working environment of the present employment only. It is found that only 47 percent of the affected employees have reported to their employers about their health problems.
23. It is found that 51 health affected employees have received medical help from the hospital attached to the sample unit and 22 employees received monetary help from the employer. Yet another 47 sample employees have not received any help because their diseases were non-occupational and mild in nature.

24. One of the most striking features of the study is that none of the employees of cement, distillery, refinery and dye had opted for medical treatment in other hospitals as adequate medical help was provided by the industries themselves. The employees in the remaining sample units who had taken treatment in other hospitals constituted 26%. The reason attributed by them was severity of the problems and extra care by the hospital.
25. The study reveals that 72.1 percent of the sample employees are of the opinion that the industry operates the APC measures sincerely and continuously and 40% of sample employees have attended the training programme (7 to 30 days) on pollution control organised by the sample units.
26. It was found out from the survey among employees that there is an unpleasant specific odour in the distillery and chemical factories, dust and gases reach the ventilation of the unit and there was a smoky atmosphere over the cement, thermal and fertilizer factories.
27. The results of the test of hypotheses show that there is association between the variables 'the designation of the employees' and 'the usage of protective equipment', 'the employees suffering from diseases', 'the prevalence of specific odour', and 'the training given to the employees'. The variables are considered dependent.

There is no association between the variables 'the experience of the employees and 'the employee suffering from disease', 'the designation of the employees' and 'the dust reaching ventilation of the sample unit', 'the designation of the employees' and the smoky atmosphere over the sample unit. The variables are considered independent.

28. The study among the members of the public shows that, irrespective of their age and occupation, they are well aware of the pollution problem in their area caused by the adjoining industries.
29. The study discloses that according to 152 respondents gases, dust and soot from the nearby industry reach the house and affect the habitation.
30. The survey reveals that 88.9 percent respondents from public reported that there was unpleasant specific odour in the area while 73.7 percent reported that they were affected by diseases like cough, headache, vertigo and nausea.
31. It is evident from the study that 50 percent respondents from public reported industrial gases and dust affecting the animals, vegetation and utensils; 66.3 percent expressed that dust and gases interfered with ventilation of the flats; 63.7 percent disclosed industrial dust resting on the washed clothes in the yard; 67.4 percent expressed that there was smoky atmosphere in their place.
32. The result of the test of hypotheses ( $H_{0_{17}}$  to  $H_{0_{23}}$ ) shows that there is association between 'the type of unit' and 'the gases, dust and soot reach

the house; 'the prevalence of specific odours', 'illness among public', 'gases and dust affect the animals, vegetation and utensils', 'dust and gases reach the ventilation of flats', 'dust resting over the washed clothes in the yard' and 'smoky atmosphere'. The variables are considered dependent.

33. The study among physicians brings to light that the refinery and petrochemical industries were prone to more number of diseases (6) followed by cement, fertilizer, and pesticide units (5). Sugar units were prone to 4 diseases while thermal units to 3 diseases. The units of distillery pesticide and pharmaceutical accounted for 2 diseases each.
34. A consoling feature of the survey among physicians is that in all the sample units the problems faced by the employees were mild in nature and there was no severe ailment.
35. Another striking feature of the study is that the employees of 16 units affected by diseases due to pollution, were treated in their own hospitals. The employees of remaining 3 units where there were no hospitals got treatment from Government Hospitals. In case of complicated nature of the diseases, the employees were sent to other well equipped city hospitals.

## SUGGESTIONS

In the light of sources and effects of air pollution and prevention and controlling provisions of Air Act 1981, the following suggestions have been stipulated for its effective control:

1. Arrest of industrial emissions can be achieved by using methods to reduce the concentrations of a pollutant by destroying or collecting the pollutant before it is emitted from the stack, e.g., burning destroys organic vapours, hydrogen sulphide, etc.
2. The control of pollution at source is preferable to Natural Dilution Method under which appropriate heights for the chimney are used in order to keep the ground level concentrations within the prescribed limits.
3. Without the backing of public opinion, laws are of little avail. Informed people can play a positive role in promoting environmental pollution awareness programmes and also help supplement official efforts to check the dangerous increase in the level of air pollution.
4. Every large firm which has air emissions would have to employ pollution control specialists to make sure that pollution control measures were being undertaken properly.
5. Loans for expansion be provided only after making sure that these industries follow the necessary pollution control measures.

6. In big industrial centres, where a number of industries exist, the environmental preservation activities can be made as a group task. Emissions whether from a particular industry or from a group of industries, all in fact, pollute the atmosphere. With this approach, the available resources and know-how can be utilised to the optimum extent by bringing down the pollutants on a quantitative basis than on individual basis.
7. Policies and programmes may be evolved for promoting and supporting different forms of non-polluting alternative sources of energy.
8. Industrial areas should be properly planned to minimise the effect of pollution.
9. Environment audit is necessary in the industrial units to prevent accidents caused by hazardous chemicals.
10. Government should provide economic incentives to industrial units to enforce pollution control in accordance with the provisions of the Air Act 1981.
11. There may be effective supervision and improvement of engineering control of hazards.
12. There may be improved analytical techniques of monitoring in the polluting industries.

13. Meteorological stations and pollution monitoring stations have to be established both by industries and agencies concerned with Air Pollution Control.
14. Modern technology of aerial photographic techniques and remote sensing techniques for monitoring air are to be established.
15. There may be research and development effort on pollution control system.
16. Cleanable HEPA filters prove to be more efficient than the fabric filters widely used. Therefore, the industries may switch on to these type of filters.
17. Results in Europe and the U.S. indicate that condensing heat exchangers can reduce emission and decrease the cost of electricity, removes many air toxics. So these industries in India also may go in for such technologies.
18. Low emission and waste free incineration systems may be used which eliminate all the pollutants at the final stage.
19. Opacity monitors are widely used in India. Instead, mass measuring continuous emission monitors may be used since these systems prove to be much more accurate.

20. The industries should implement new technologies such as use of fibre glass, teflon in bag filters, de-NO<sub>x</sub> and desulphurisation systems and new generation electrostatic precipitators.
21. The workers may be educated about the risks involved in the job and the importance of personal protection.
22. There may be periodical medical check up to ascertain the health problems of the workers at the earliest.
23. Protective equipments like nose mask may be provided to the employees to protect them from inhalation of chemicals.
24. Since the health of every individual is of paramount importance, it is the bounden duty of the Government to ensure that the right to live in a healthy atmosphere is undisturbed. In this ever increasing world of pollution, it is high time that the Government took concrete steps to insist upon industries to frame environmental policies and to be bounded by it.
25. Pollution Control Boards should be geared up to meet the challenges that may arise in this endeavour.
26. Clause 173 of the Companies Bill, 1997, envisages that the Directors' Report shall contain details of "the measures taken for the protection of environment in such manner as may be prescribed". This is a welcome

provision and the nature of reporting should not be a generalised one but tuned to the nature of each polluting industry.

27. One can take a horse to the water but cannot force it to drink. The focus should first be on the industries which do not bother about pollution control measures, ignore notices and wriggle out of social obligations in this regard. All pollution oriented industries should be asked to identify and/or designate an officer in their establishments who would be akin to an officer in default in this area.
28. Eventually, a general awareness of the dangers of pollution should be created amongst the public. A vigilant citizenry can ensure that the policy makers, administrators and the industry fulfil their obligations towards society in respect of this very vital aspect of human survival against pollution of nature and environment. Professionals can also play a leading role in this regard.

## **CONCLUSION**

Pollution problem in the country has reached tremendous dimensions and if necessary steps are not taken to meet this challenge and contain this crisis, there will be further environmental deterioration which will have a cancerous effect on human life and other species. There is a need to have a national thinking without bias and partial considerations. If this is not done and policies and programmes are not framed, executed, assessed and

monitored without dedication and devotion, the catastrophes will be common and the life of the masses miserable.

Since industrial activities cannot be prohibited for reasons of great benefits to mankind, necessity dictates only regulation and control for an equitable solution of air pollution problems. The maxim that prevention is better than cure is more apt to explain the situation in matters of air pollution than any other. It is well known that legal controls do not offer any sure and complete cure. They are effective so long as they are honoured, and at best are a deterrent.