6.0 Introduction

Many of the important findings on industrialization, its impact on environment, Gandhi's understanding of industrialization and development and the various attempts on environmental protection as explained in the previous chapters are supported by the surveys of field data. Therefore a close interpretation of these field data is presented here, before the conclusion of this thesis.

In this chapter the researcher presents the empirical data which are collected through field study. Five large scale industries of Kerala are taken as samples. They are, Travancore Titanium Products, Ltd., Kochuveli (Thiruvananthapuram, former Trivandrum Dist.); Travancore Electrochemicals Industries, Ltd., Chingavanam (Kottayam Dist.); Hindustan News Print, Ltd., at Velloor (Kottayam Dist.); Hindustan Insecticides, Ltd., Udyogamandal (Ernakulam Dist.); and Gwalior Rayons Ltd., at Mavoor (Kozhikode Dist.), hereafter refered to as TTP, TECIL, HNL, HIL and GRASIM respectively. Their location is marked in the Figure 6.1.

As the attitude of the managements are similar, it is analysed together; so also that of the workers. But as far as the approaches, attitudes and problems of people residing near
Figure 6.1: Geographical Distribution of the Five Industries

1  TTP
2  TECIL
3  HNL
4  HIL
5  GRASIM
each factory vary, it has been done separately. After this, the Gandhian alternative to these is suggested which is followed by possibility of small scale industries as an alternative. The conclusion reached is that small scale industries are more environment friendly. It is also found that small scale industries are more employment generative and more economical when the environmental aspects are also taken into consideration. A brief account of the five industries taken as examples of this study are given below.

Travancore Titanium Products Ltd. (TTP)

TTP, a public sector unit, managed by the Government of Kerala was incorporated on 18th December 1946. The major product of TTP is titanium dioxide (TiO₂). The major raw material used is ilmenite. The knowhow was provided by the British Titan Products, UK and the production started in 1951. Initial output was 5 tons per day. The output of TiO₂ in 1992-93 was about 12,934 MT eventhough the installed capacity is 24,500 MT.

In addition to TiO₂, TTP is producing three other products namely potassium titanate, sodium titanate and phosphate free titanium dioxide. All the three are used as fluxes for special types of welding rods. Sulphuric acid, in which the raw materials are treated to get the product is produced in TTP using imported elemental sulphur by the contact process.

The major consumer of TiO₂ pigment is the paint industry. Leather, rubber, plastics, ceramic-ware, artificial fibres,
printing ink, soaps, talcum powder, paper, pharmaceutical preparations are the other industrial products which make use of titanium dioxide pigment. TTP provides direct employment to about 1378 persons of which 905 are workers. The average salary of a worker is about Rs. 3095 per month.

TTP causes both air and water (marine) pollution. The effluents from the factory are discharged into the Arabian Sea. They contain various chemicals such as sulphuric acid, ferrous sulphate, titanium dioxide, etc. Air pollution is caused mainly by sulphur dioxide.

The Travancore Electrochemicals Industries Ltd. (TBCIL)

The factory was incorporated in the year 1945. The principal raw material is limeshell. But now-a-days lime stone is used as the principal raw material due to the scarcity of limeshell. The commercial production was started in 1965 with the construction of the factory building with the import of plant and machinery from Germany.

The products include calcium carbide, acetylene black and desulphurisation compound (DSC). Totally there are about 700 employees working in this factory, of whom 521 are workers, 47 are supervisors, 15 are managerial and 38 are administrative and other categories include 79.

Among the products calcium carbide is used as a raw material for the production of PVCs, acetylene black for the
production of dry cells, and DSC for desulpharising in steel industries. As a chemical industry it causes much water and air pollution.

Hindustan Newsprint Limited (HNL)

HNL was commissioned in 1982 with an annual production capacity of 80,000 MT of newsprint. Commercial production was started in November 1982. In HNL pulp is produced by both chemi-mechanical and chemical process. The main raw material used are Bamboo, Reed Eucalyptus wood, etc. The mill consumes 45,000m³ water per day for the production process and the final discharge is about 37,500m³ per day.

The factory requires 400 MT eucalyptus wood, 250 MT reed/bamboo, 450 MT coal and other chemicals for the production of 250 MT of newsprint per day. The total number of employees are about 1654 of which 1269 are workers. The air, water and sound pollution are the main pollution problems from this mill.

Hindustan Insecticides Ltd. (HIL)

HIL Udyogamandal Unit was the first among the Central Public Sector undertakings to be set up in Kerala. This unit was established in 1958. The major products of HIL are DDT, BHC and Endosulphan. The by-products from the manufacture of DDT are sulphuric acid, hydrochloric acid (HCl) and Dichloro benzene which are recovered and marketed. Totally about 780 employees are working in HIL (as on 31.3.1993). Among them 542 are
workers, 116 are supervisors and 122 are administrative staff. The average salary of a worker is approximately Rs. 2250.

As far as HIL is concerned pollution begins with the raw materials themselves as they are chemicals and their hazardous nature increase while the raw materials are processed and the products are released. The air, water and land are polluted because of this factory.

**GRASIM Industries Ltd. (GRASIM)**

This industry, owned by the Birla group, started functioning in 1958. There are two units for the company viz., the Pulp Division and the Staple Fibre Division. The raw materials used for the production of rayon grade pulp are reeds and bamboo, eucalyptus and other soft and hard woods. The quantity of raw materials used per day is 600 to 650 tons. Paper was manufactured in the early days, but they stopped the production of paper in later years. The factory gives employment to about 3262 employees of whom 2662 are workers.

Earlier the Government agreed to supply 1 crore 60 lakh tons of bamboo annually at a rate of Rs. 1.50 per ton. In 1962 the annual supply was increased to 2 crore tons. Further in 1974 the Government agreed to supply 3 crore 60 lakh tons of softwood. The price of eucalyptus was fixed at Rs. 22.50 per ton and other softwood at Rs. 15/- per ton. A new agreement was signed when the factory was re-opened in 1988 after a prolonged strike of -207-
about three years. By this the Government agreed to supply raw materials at a price of Rs.250 per ton.\textsuperscript{1,2}

6.1 Attitudes of Management

While interviewing the Management the researcher got much information. All the five factories studied, run in profit. Regarding the technology, both indigenous and foreign technologies are adopted by these units.

As regards the co-operation of the management with the workers, the management of all the five units claimed that they are very cordial and they are giving prime importance to the workers' welfare. What the researcher observed during the study is that labour unrest used to cause outburst in these factories. Labour conflicts are very frequent in GRASIM. This is contrary to the management's claim that their relationship with the labourers is cordial. In fact, according to 50 percent of workers interviewed, the management's approach has not at all been cordial. So the conclusion reached is, that there is no uniformity of opinion regarding the relationship between management and workers.

Regarding the crisis of resource availability three managements said that they had the problem of shortages of resources and that they are therefore resorting to alternative means of resources. They were not getting enough quantity of raw materials.
Table 6.1: Availability of Raw Materials.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Industry</th>
<th>Sufficient</th>
<th>Not Sufficient</th>
<th>Alternatives used in case of shortages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TTP</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>TECIL</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.</td>
<td>HNL</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>HIL</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>GRASIM</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Table 6.1 shows that factories which use mainly natural resources as raw materials suffer from shortage while those which are using chemicals as raw materials do not suffer from such a shortage. It reveals how industrialization and the natural resource depletion are closely related. TECIL is using limestone in place of lime shell which was once available in abundance locally. HNL is meeting the shortage to a certain extent by importing pulp, paying high prices at Rs.23,000 per ton. According to GRASIM Management, they are using hard wood also to meet the shortage of soft wood.

One of the interesting things noticed while interviewing the management is that all the five units have similar views regarding environmental aspects. All said that they have implemented air/water purification systems. But it is clearly
felt that there exist some fear among the managements to discuss the problem in detail. They seem to believe that if they reveal the truth it will create problems. They are having strict instructions from the top management that these facts should not be revealed. As far as the cost for treatment plant is concerned TECIL management claimed that they have already spent 3.2 crores rupees. In GRASIM, the authorities said that the technology for the complete removal of chemicals was not available. Yet they spent 6 crore rupees for the installment of treatment system and daily they are spending Rs.30,000 to Rs.40,000 for pollution abatement. The HNL authorities claimed that they have already spent 32.2 crore rupees for the installation of pollution control equipments. HIL authorities said that in view of the limited technology available in the country for the pesticide effluent treatment, they have initiated action. They claimed that HIL has augmented facilities for environmental protection and pollution control. But they were reluctant to reveal the cost for its implementation. The management of TTP also took the same stand. They claimed that they have implemented pollution control measures but they were not interested to reveal the cost involved. Details are shown in Table 6.2. Though all the factories have installed some sort of treatment systems, it is often alleged by the locals that in order to save thousands, the managements are not operating the system properly.
Table 6.2: Cost Involved in the Installation of Pollution Control System

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Industry</th>
<th>Pollution Control System Present/Absent</th>
<th>Cost Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TTP</td>
<td>present</td>
<td>not revealed</td>
</tr>
<tr>
<td>2.</td>
<td>TECIL</td>
<td>present</td>
<td>3.2 crores</td>
</tr>
<tr>
<td>3.</td>
<td>HNL</td>
<td>present</td>
<td>32.2 crores</td>
</tr>
<tr>
<td>4.</td>
<td>HIL</td>
<td>present</td>
<td>not revealed</td>
</tr>
<tr>
<td>5.</td>
<td>GRASIM</td>
<td>present</td>
<td>6.0 crores</td>
</tr>
</tbody>
</table>

The managements said that there are State bodies like Kerala State Pollution Control Board (KSPCB) to monitor the pollution from the factories and each factory is having its own facilities to check the effluent samples within the factory. The results of the analysis of both (the Board and the factory) show that the final effluents contain chemicals and other materials within the tolerance limits. But in reality, many times, it is said that the Board Officers are compromising with the management of the units. The Pollution Control Board authorities orally agreed that if they took a very strict stand there arose a condition in which the factory will not have existence. So to some extent they are having a blind eye towards this problem.

Regarding the awareness of the management about the public opinion that the effluent emission causes disturbances to the living things, all the managements have similar view that they are not creating pollution and the protest are unnecessary and are motivated.
The management does not agree that there is the problem of environmental pollution. Assuming that such a problem exists they admit that the workers would be the most affected. In so far as the workers do not complain, the management does not see the need for taking the problem of pollution very seriously. The workers do not protest for fear that they would loose their jobs.

As regards the awareness of Gandhian principles, four of the representatives of the five factories said that they were aware of the Gandhian ideas, but reluctant to give support to them. They argued that it was not possible to think about and practice Gandhian ideas of industrialization in an age of computers. The other one is ignorant about Gandhian ideas. When the Researcher pointed out the negative sides of industrialization (environmental degradation, natural resource depletion, urbanization, etc.) they held the view that science created all these inventions and science can give a solution to these problems. One among them pointed out that full utilization of natural resource is the need of mankind.

According to a recent article by Sri.K.A. Sreedharan, (Director of Factories and Boilers, Kerala), HNL, HIL and GRASIM were put under 'Major Accident Hazard Factories' as their storing capacity is well above the Threshold Quantity suggested by Hazardous Chemicals Rules 1989. The details are given in the Table 6.3.
Table 6.3: Details of Hazardous materials stored and its Threshold Quantity (T.Q.)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Industry</th>
<th>Hazardous materials</th>
<th>Max. storage in tons</th>
<th>T.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HIL</td>
<td>chlorine Oleum</td>
<td>15 24</td>
<td>10 15</td>
</tr>
<tr>
<td>2.</td>
<td>HNL</td>
<td>chlorine</td>
<td>130</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>GRASIM</td>
<td>chlorine sulphur dioxide</td>
<td>160 27</td>
<td>10 20</td>
</tr>
</tbody>
</table>
  a. pulp divn. carbon disulphide | 290       | 20                        |


This table shows that all the factories are storing hazardous materials well above the Threshold Quantity (T.Q.). This classification is made in order to have a close watch by the Government authorities on these industries. Accidental release of these material will cause havoc to the staff of the industry as well as the local public. According to the Task Force Report, TTP and TECIL are classified in this group of Major Accident Hazardous Industries.

6.2 Attitudes of Workers

The attitudes of workers were collected by interviewing them with the help of interview schedules. Two percent of workers from each industry were selected at random. The results are summarised below (Table 6.4 to 6.10) in percentage of workers.
Table 6.4 shows the length of service of workers in each factory. It varies from 1 to 30 years. What has been observed is that the length of service is directly proportional to susceptibility to pollution related health problems.

The distribution of workers in relation to their residence from the factory is shown in Table 6.5.

### Table 6.4 : Length of Service of Workers

<table>
<thead>
<tr>
<th>Name of the factory</th>
<th>TTP</th>
<th>TECIL</th>
<th>HNL</th>
<th>HIL</th>
<th>GRASIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>6-10</td>
<td>16</td>
<td>8</td>
<td>44</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>11-15</td>
<td>40</td>
<td>32</td>
<td>32</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>16-20</td>
<td>20</td>
<td>28</td>
<td>16</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>12</td>
<td>16</td>
<td></td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>26-30</td>
<td>8</td>
<td>8</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Table 6.5 : Distance from the work place to the workers residence

<table>
<thead>
<tr>
<th>Distance in Km.</th>
<th>TTP</th>
<th>TECIL</th>
<th>HNL</th>
<th>HIL</th>
<th>GRASIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 1</td>
<td>16</td>
<td>40</td>
<td>64</td>
<td>52</td>
<td>72</td>
</tr>
<tr>
<td>1-3</td>
<td>40</td>
<td>24</td>
<td>24</td>
<td>40</td>
<td>16</td>
</tr>
<tr>
<td>3-7</td>
<td>36</td>
<td>16</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Above 7</td>
<td>8</td>
<td>20</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
According to the Table, more than 50% of workers in each of the units are residing within a range of 0-3 Km. from the factory. This shows that these people are facing danger not only at the time of working but also when they are at home. Like the locals they are also susceptible to accidental release of poisonous gas, etc.

Regarding the role of Trade Unions, in defending arguing, providing and safeguarding the interests of employees, they expressed different opinions. Table 6.6 shows the different opinions of workers.

Table 6.6 : Attitude to Trade Unions and Their Activities

<table>
<thead>
<tr>
<th>Name of the factory</th>
<th>Satisfactory</th>
<th>satisfactory to a certain extent</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTP</td>
<td>45</td>
<td>37</td>
<td>18</td>
</tr>
<tr>
<td>TECIL</td>
<td>34</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>HNL</td>
<td>59</td>
<td>31</td>
<td>10</td>
</tr>
<tr>
<td>HIL</td>
<td>52</td>
<td>56</td>
<td>12</td>
</tr>
<tr>
<td>GRASIM</td>
<td>26</td>
<td>48</td>
<td>26</td>
</tr>
</tbody>
</table>

The observation made is that a good percentage of employees are not much satisfied with the working of the trade unions in protecting them from environmental health hazards. Some of them (especially in GRASIM and TECIL) are quite
unsatisfied with the working of the trade unions. They said that the trade union leaders were negotiating with the management not for the benefit of the employees but for the benefit of the political parties and for themselves.

Table 6.7 shows the opinion of the workers in each unit about the environmental problems the concerned factory is causing.

Table 6.7 : Attitude Towards Environmental Problems caused by the Concerned Industry

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>TTP</th>
<th>TECIL</th>
<th>Name of the factory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causing environmental</td>
<td>76</td>
<td>76</td>
<td>60</td>
</tr>
<tr>
<td>problems</td>
<td></td>
<td></td>
<td>92</td>
</tr>
<tr>
<td>Not causing any envirom-</td>
<td>24</td>
<td>16</td>
<td>nil</td>
</tr>
<tr>
<td>mental problems</td>
<td></td>
<td></td>
<td>nil</td>
</tr>
<tr>
<td>Indifferent</td>
<td>nil</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows that a major portion of the workers agree that the factories concerned are causing environmental problems. But when asked, why they stick on, the answer was different.

While it was lack of other employment which prompted the workers of TECIL, and GRASIM (Private sector) to stick on to the job, it was job security and better salary which prompt the
workers of TTP, HIL and HNL to stick on to their job. When it was asked whether they would prefer a job with better environmental condition but having less remuneration than the present one, only a few of them were willing to agree. The reason they pointed out was that even with the present salary they could not make both ends meet.

Regarding the activities of the local environmental protection pressure groups, a good percent of workers are aware of them. However, a certain percent does not favour their activities. Their percentage is high in GRASIM. They fear that the activities of the environmental protection groups will accelerate their problems, leading even to the closing down of the factory, throwing them to utter hunger. According to World Development Report 1995, by the World Bank, even if workers are aware of occupational risks, they may accept dangerous jobs because they have few or no alternative employment opportunities. 3A

Table 6.8 shows the attitudes of employees on the relation between job and health problem.
Table 6.8: Relationship Between Job and Health Problem

<table>
<thead>
<tr>
<th>Name of the factory</th>
<th>Related</th>
<th>Attitude of workers</th>
<th>Not related</th>
<th>Indifferent</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTP</td>
<td>40</td>
<td></td>
<td>43</td>
<td>12</td>
</tr>
<tr>
<td>TECIL</td>
<td>44</td>
<td></td>
<td>52</td>
<td>4</td>
</tr>
<tr>
<td>HNL</td>
<td>32</td>
<td></td>
<td>48</td>
<td>20</td>
</tr>
<tr>
<td>HIL</td>
<td>80</td>
<td></td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>GRASIM</td>
<td>48</td>
<td></td>
<td>36</td>
<td>16</td>
</tr>
</tbody>
</table>

What is observed from the table is that though, a major portion of the employees opined that their job had relation with their illness, in HIL 80 percent of the workers said that their job had direct relationship with their illness. This is because, in HIL poisonous chemicals are handled by the employees from the raw material part to the product end. The workers came to the conclusion that their disease is directly related to their job in two ways viz., Doctors opinion and opinion of co-workers.

According to Table 6.9 most of the employees have reach their conclusion by the doctor’s opinion.

Table 6.9: Attitude of Workers About Their Illness

<table>
<thead>
<tr>
<th>Name of the factory</th>
<th>Conclusion reached by</th>
<th>Doctors opinion</th>
<th>Co-workers opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTP</td>
<td>85</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>TECIL</td>
<td>90</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>HNL</td>
<td>75</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>HIL</td>
<td>84</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>GRASIM</td>
<td>92</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

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Table 6.10: Health Problems of Employees

<table>
<thead>
<tr>
<th>Disease</th>
<th>TTP</th>
<th>TECIL</th>
<th>HNL</th>
<th>HIL</th>
<th>GRASIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory problems such as Asthma, cough breathlessness</td>
<td>24</td>
<td>24</td>
<td>12</td>
<td>52</td>
<td>37</td>
</tr>
<tr>
<td>Disorder to Eye</td>
<td>12</td>
<td>4</td>
<td>55</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>14</td>
<td>8</td>
<td>6</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>Head ache</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>62</td>
<td>12</td>
</tr>
<tr>
<td>Gastro-intestinal (like loss of appetite indigestion etc.)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>44</td>
<td>--</td>
</tr>
<tr>
<td>Giddliness</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>52</td>
<td>--</td>
</tr>
<tr>
<td>Weakness</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>47</td>
<td>--</td>
</tr>
<tr>
<td>Pain to joints</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>36</td>
<td>--</td>
</tr>
</tbody>
</table>

Table 6.10 shows that though respiratory problems, disorder to eye and skin and headache are the common types of health problems in all the five units, the employees in HIL are susceptible to other kind of diseases, such as gastrointestinal problems, giddiness, etc.

In Kerala, so far as no comprehensive study have been done to assess the health hazards caused by each industry to its concerned workers. So a comparative study, with results obtained from this study is not possible. The occupational diseases and health hazards caused by each industry to its workers is directly related to the internal working surroundings, prevailing in the
industry. For example, if a factory has very polluted atmosphere packed with dust and poisonous chemicals, it will directly affect the health conditions of the workers. A report prepared in 1987 by the Expert Committee/Task Force on safety in chemical and other hazards industries in Kerala is a valuable document in this regard. The Expert Committee/Task Force was appointed by the Government, in the wake of the Bhopal Tragedy. The major observations made by the committee on the five industries are given below.4

Its observation about HIL is that the present safety set up is not adequate. Effluent treatment system and air pollution control system are inadequate. As accidents of chlorine leakage have occurred earlier, the Committee cautioned the management about the necessity of periodical inspection. It also observed that empty drums of hazardous chemicals brought to the factory were dumped in open area.

The Committee made the following major observations about HNL. (i) The factory has no effective organizational set up for health and safety apart from appointing a safety officer. (ii) In the soda recovery area, there is predominant smell of hydrogen sulphide and other noxious gases. The particulate level is observed to be high. (iii) The noise and vibration level in the chipper section, soda recovery section and paper machines section were observed to be very high and none of the workers was seen using personal protective equipments. (iv) The effluent
treatment plant was very poorly maintained. (v) The air pollutant level, especially particulate and gaseous emissions from the recovery boiler slack are high. Finally the committee observed in general, the house keeping of the plant is far from satisfactory.

The following observations were made about TECIL (i) Personal protective equipments are not being provided in various places. (ii) The dust and particulate material level is extremely high inside the plant as well as in the vicinity. (iii) Solid waste disposal is inadequate. (iv) The exhaust provided for removal of smoke is found not effective. As a recommendation it was suggested that the management should take urgent and immediate action to bring down the level of pollution - onsite and offsite due to smoke, and dust nuisance.

(In this context it is worth pointing out that in a petition filed against the factory by a Public Action Forum, Honourable Justice Sankaran Nair made the Judgement in which, time was given to TECIL till 31-12-1990 to take regulatory measures to bring down pollution to tolerance limits indicated by KSPCB. But the factory went for appeal and pollution remains as a major problem).

As regards TTP, the Committee observed that there is severe problem of water pollution. There is dust nuisance in ilminite grinding section and pigment packing section. In digester area of TiO₂ plant, hazardous situation exists at the
peak of exothermic reaction. As the digester is very old design and crude type, there are no in-buit instruments provided to monitor reaction parameters and the fumes generated. At the peak of the reaction enormous quantity of gases are generated which even pushes the wooden top cover. At present, persons are sent away by giving an alarm. The Committee made strong dissatisfaction about the housekeeping inside the factory.

During the functioning of this task force the GRASIM was closed due to labour problems and the Committee could not visit the factory.

Table 6.11 shows the overall picture of the status of the safety measures in the five industries as observed by the Task Force/Expert Committee. Hazard identification study, risk assessment, safety audit or safety drills have not been done in these industries. Except TTP, other industries are not giving regular training to personnel.

Another source of information in this regard is the periodic air monitoring report in different industries in Kerala. This report is prepared by the Industrial Hygiene Laboratory (IHL), attached to the Office of the Joint Director of Factories and Boilers (Medical), Thiruvananthapuram. The results of the latest available reports of GRASIM, TTP and TECIL are given below.\(^5\) (Reports regarding the other two industries viz., HIL and HNL was not available.)
Table 6.11: Status of Existing Safety Measures in Industries Identified by Task Force/Expert Group

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the factory</th>
<th>Hazard identification study</th>
<th>Risk assessment</th>
<th>Safety audit</th>
<th>Regular inspection &amp; maintenance</th>
<th>Regular training drills</th>
<th>Permit system</th>
<th>Work system</th>
<th>Monitoring system</th>
<th>Alarm system</th>
<th>Appointment of safety officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TTP</td>
<td>N.D</td>
<td>N.D</td>
<td>N.D</td>
<td>D</td>
<td>D</td>
<td>N.D</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>2.</td>
<td>TECIL</td>
<td>N.D</td>
<td>N.D</td>
<td>N.D</td>
<td>D</td>
<td>N.D</td>
<td>N.D</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N.A</td>
</tr>
<tr>
<td>3.</td>
<td>HNL</td>
<td>N.D</td>
<td>N.D</td>
<td>N.D</td>
<td>D</td>
<td>N.D</td>
<td>N.D</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>4.</td>
<td>HIL</td>
<td>N.D</td>
<td>N.D</td>
<td>N.D</td>
<td>D</td>
<td>N.D</td>
<td>N.D</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N.A</td>
</tr>
<tr>
<td>5.</td>
<td>GRASIM</td>
<td>N.D</td>
<td>N.D</td>
<td>N.D</td>
<td>D</td>
<td>N.D</td>
<td>N.D</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Abbreviations

D : Done  
N.D : Not done  
Y : Yes  
N : No  
N.A : Not applicable

IHL has observed a high level of dust in the slaker area of GRASIM (pulp division) on 28.4.1994. The result is shown in Table 6.12.

**Table 6.12: GRASIM - Concentration of Lime Dust**

<table>
<thead>
<tr>
<th>Plant/section/location</th>
<th>Concentration of lime dust/mg/m³</th>
<th>TVL-TWA* mg/m³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaker feed end</td>
<td>33.33</td>
<td>10</td>
<td>Above the limit</td>
</tr>
<tr>
<td>Slaker discharge end</td>
<td>56.67</td>
<td>10</td>
<td>-do-</td>
</tr>
</tbody>
</table>

* TLV-TWA: Threshold limit value - Time Weighted Average in milligram per cubic meter.

Source: IHL-Air monitoring report, 28.4.1994,

The table shows that the concentration of lime dust is three to six times higher than the tolerance limit (TLV-TVA).

An assessment of lead content in work room air in the mechanical workshop of the TTP (study on 5th and 6th March 1991) shows that in most of the areas, in and around the lead burning section, the concentration of lead exceeds the prescribed threshold limit value. According to the report, over exposure to lead may lead to several diseases such as pallor, weakness, loss of weight, lassitude (feeling of weakness) malnutrition, etc. Besides this, it may affect gastro-intestinal, genitourinary, neuro-muscular and even central nervous system.

The report of air-monitoring study in the TECIL on 24.9.1993 shows that thermal stress exceeds the threshold limit values near the furnace 1 and furnace 2.
Noise pollution is common to all industries. However, its severity may vary in different industries and even within different locations of the same industry. In paper and pulp industries the intensity of noise pollution is very high in the chipper house. In HNL the noise level varies to 90 to 104 dBA in the wood chipper area and it is as high as 104-106 dBA in the bamboo chipper. The tolerance limit is 90 dBA.

Table 6.13 shows the locations inside GRASIM (pulp division) where the noise level exceeds the tolerance limit.

Table 6.13: GRASIM (pulp division) - noise level

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Location</th>
<th>Noise level (dBA)</th>
<th>TLV-TWA(dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Boliler House - Bottom floor left side of the JMW Boiler</td>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td>2.</td>
<td>Chipper house (No. 5) Bamboo (No. 11) Wood</td>
<td>99</td>
<td>90</td>
</tr>
<tr>
<td>3.</td>
<td>Raw water pump house filter</td>
<td>93</td>
<td>90</td>
</tr>
</tbody>
</table>


Noise level in the other 3 factories is not as severe as in HNL and GRASIM. It is interesting to note that when the workers were interviewed only few admitted that there was noise pollution in their factory and none complained that they have hearing impairment. This may be due to two major reasons.

(i) The end result of many hazards are quite obvious that the effect of noise is insidious and many workers may even be
unaware of their impediment. (ii) The workers are not willing to wear the protective devises provided by the company as it is often ill fitting and uncomfortable. In this case the workers used to face the consequence rather than wearing the protective devises.

But studies show that exposure to high noise level may lead to both psychological and physiosiological problems in addition to hearing loss. According to a study in a paper mill in India by a group of scientist from Industrial Toxicology Research Centre, Lucknow, significantly high prevalence of noise induced deafness was observed. The study pointed out that the results of this study is also applicable to other paper mills in the country as working conditions are not very different from one factory to another. The study adds that only short period of time is necessary for developing hearing loss.

According to another report based on a study in a factory located in Kerala and having a strength of 8216, about 26% of its workers had severe hearing impairment. The percentage of moderately affected was 62 and mildly affected 12. Studies on workers, working in high noise areas showed a higher incidence of diagnosed medical problems, absence due to illness and accidents at work than those in quieter areas. The other health problems caused by noise among workers are chest pain, palpitation and raised blood pressure.
These studies and observations show that the workers of these industries are facing health hazards either by polluted atmosphere packed with dust and poisonous chemicals or due to noise pollution or both. So the results obtained by the researcher as health hazards to workers, is to be viewed in the light of these studies and reports.

The Regional Labour Institute; Madras under the Ministry of Labour, Government of India had made a study\textsuperscript{12} regarding the industrial hygiene and health in the Endosulphan Plant of HIL. (This type of study has not been done in the case of other industries). According to the study about 38.06\% of the exposed workers have gastro-intestinal disorders. The percentage of workers having respiratory and cardio-vascular disorder were 76.12.

Eventhough the working surroundings of these five industries are below average the case of GRASIM is somewhat worse. Adequate safety measures are not often provided for workers. The tragic death of three workers by breathing poisonous gas while repairing the effluent line is a worst example for this. The mishap was occured on 23.6.1995. The management’s version is that the death is not due to poisonous gas but the three had mearly fallen into the tank and drowned. But according to the study by Joint Director of Factories and Boilers (Medical) the death was due to hydrogen sulphide gas.\textsuperscript{13}
The awareness of workers about the Gandhian idea of industrialization was also checked. Eventhough a good percentage of workers in these five units are quite aware of it, only a small percentage is willing to accept the Gandhian way of industrialization. Others argued that in the present situation Gandhian ideas of industrialization are somewhat impracticable and India should follow in the footsteps of industrialized nations.

The overall picture obtained is that they support large scale industries, because according to them they provide better salary. Workers are often reluctant to provide information regarding environmental problems within the factory. There exist a fear among the workers that if they provide the information it will affect them. This was predominant in workers in TECIL and GRASIM.

6.3 Environmental Problems to the Local People

Since the environmental problems caused by these five industries to the local population vary, they have to be discussed in various sub-heads. Eventhough all these five industries are pollutive to air, water, land, etc. their intensity varies and the corresponding response from the locals also varies. (A general analysis of the environmental problems caused by each industry to its locals was studied by interviewing them, but without a separate interview schedule.)
The environmental hazard raised by TTP spread over three areas viz., Kochuveli, Vettukat and Kannanthura. Among these three areas, it seems, Vettukat is severely affected, as the drainage carrying effluents discharged from the factory is passing through this area. The drainage ends somewhat on the shore. So the effluent pollutes the sea shore first and then the sea.

The effluents contain different hazardous chemicals. The effluent discharged from the factory per day contain sulphuric acid (2.34%), titanium dioxide (0.021%) and ferrous (3%). Due to the wastage of these chemicals the loss to the factory per year is very high. In addition to these chemicals, such as manganese, vanadium, chromium, sirconium, titanim sulphate, etc. are also present. The effect of these chemicals on human beings and other living things has not yet been studied.

These chemicals cause thermo-chemical pollution to the sea spreading about 36 Sq Km. from the sea shore of TTP. This has caused high Bio-chemical Oxygen Demand (BOD) and the disappearance of about sixty eight types of fishes. The loss due to this for the fishing people for the last twenty years is calculated to be about Rs.1.06 crores. The major problems the factory has caused is the huge unemployment among the fisherfolk of Vettukat, Kannanthura and Kochuveli. Significant reduction or shortage has been noted among the fisherfolk for the last thirteen years.
Today the shortage has risen to 24 percent.\textsuperscript{16} It is utter poverty and the resultant anger which prompted the local fishermen to unite and start an agitation against the factory. The agitation in 1973 became so violent that it took two lives. Another major hazard that the effluents are causing is the loss to the fishing equipments such as nets etc. The chemicals present in the marine water, due to the mixing up of effluents from TTP, cause much damage to the fishing nets. The nylon nets come into contact with the poisonous discharge from the factory and they get worn-out much earlier than their normal period of usage.

Health problems caused by TTP are many. The fumes released through the chimney of TTP is rich in SO\textsubscript{2}. Its concentration is very high when compared to International Standard. According to International Standard SO\textsubscript{2} content should not exceed 0.3 ppm. It is calculated that the atmospheric SO\textsubscript{2} content in one kilometer radius of TTP is 0.7 ppm.\textsuperscript{17} This high concentration of SO\textsubscript{2} in the atmosphere causes irritation to eye, cough, breathlessness and asthma among the locals. According to the 'Powrasamithi', the organization of the locals of Kochuveli, it is the people of Kochuveli who are suffering a lot from air pollution, as the wind direction is from the west to the east.

The high acidic nature of the effluent causes skin diseases among the locals of Vettukat. Children are more susceptible to diseases. The locals attribute the early
abortion, prevalent in that region to TTP. Another hazard caused by TTP to the local people is the shortage of safe drinking water. Water from the local wells is not used for drinking purposes as it is polluted. According to the National Institute of Oceanography report, pH of the well water varied between 2.2 and 3.4, indicating clearly acidic nature.\textsuperscript{18} It is estimated that the pollution from TTP reduces the yield of coconut by 5\%.

TTP makes use of the conventional sulphate technology to produce TiO\textsubscript{2}. But the modern plants are being built on chloride route because of its simplicity and environment friendly nature.\textsuperscript{19,20} Another reason why TTP is more pollutive is that TTP is using an acid plant which is twenty years old even though its lifespan is only ten years.

**TECIL**

TECIL, creates environmental hazards to the people living around the factory. The effluents from the plant are discharged through different exits of the factory to the Mulakanchira canal, causing pollution.

Raw materials are processed under high temperature ranging to 2400\textdegree C, and in the process, 438kgs of carbon monoxide and 688kgs of carbon dioxide are generated, per ton of calcium carbide produced.\textsuperscript{21} Lime slurry, one of the by-product of acetylene black is often alleged to be discharged into the Mulakanchira canal. The canal water is used for both irrigation and as a water way by the local community. This has become
impossible now because of the siltation caused due to dumping of solid waste.

The KSPCB has allowed the company to discharge 40m³/day into the canal during emergencies. But once it came to the notice of the Board that they were using unauthorized or clandestine outlet, without intimating the Board. Immediate instructions were issued to close it and they were asked to show cause. Meanwhile people complained about the grave pollution caused by the factory. The locals in Chingavanam are of the view that the factory often used to open the outlet and the Board was knowingly or unknowingly supporting this.

The grave environmental problems caused by TECIL is summarised in Table 6.14. The table was taken from the historic Judgement made by Honourable Justice C. Sankaran Nair.

Table 6.14 : TECIL : Level of Pollution

<table>
<thead>
<tr>
<th>Date of examination</th>
<th>Pollutants</th>
<th>Tolerance limit</th>
<th>Existing/observed level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3.90</td>
<td>pH in well water</td>
<td>5.5</td>
<td>6.9</td>
</tr>
<tr>
<td>1.7.90</td>
<td>particulate matter</td>
<td>250Mg/Nm³</td>
<td>575Mg/Nm³</td>
</tr>
<tr>
<td>3.3.90</td>
<td>Noise inside</td>
<td>75 d.ba.</td>
<td>106 d.ba.</td>
</tr>
<tr>
<td>3.3.90</td>
<td>Suspended solids</td>
<td>100</td>
<td>1820</td>
</tr>
<tr>
<td>3.3.90</td>
<td>Total dissolved solids</td>
<td>2100</td>
<td>3250</td>
</tr>
<tr>
<td></td>
<td>Cyanide</td>
<td>(not stated)</td>
<td>702 (Excess)</td>
</tr>
</tbody>
</table>

The table clearly shows that TECIL and its surroundings are packed with pollutants. The level of pollutants are many times higher than the tolerance limit. The Board admitted before the Court that there were functional inadequacies and statutory violations from the part of the factory and the infrastructural facility of the factory was insufficient to combat pollution.

While conducting a survey it has been noticed that in almost every home in that area there were one or two cases of critical asthma, chronic cough and other respiratory ailments. The reason for this trouble is attributed to the air and water pollution caused by the poisonous gases emitted from the factory.

The local people interviewed are of the view that the problem of both water and air pollution is there. Water pollution is more severe on the western side of the factory while air pollution is severe in the eastern part. This is because the waste disposal is through a pipeline which ends in the Muvattupuzha river. The fumes coming out of the chimney go to the opposite direction (east) and it goes miles ahead and the people residing in distant places used to come with protest.

During the interview the local people showed the researcher the damages caused to the vegetation. The plants do not give proper yield as their growth is inhibited. The dust (SPM) can be observed as a thick layer on the leaves. Before
the coming of the factory the villagers got much yield from the paddy fields. Now the people are reluctant to cultivate paddy because that will end only in loss. Large areas of paddy fields, which the factory has purchased from the locals, are being used for the disposal of solid waste. (bottom ash and sludge). The factory is using coal as a major source of energy. The waste produced from this process is fly ash and bottom ash. While fly ash increases the SPM of the air the disposal of bottom ash remains a problem. At present a certain quantity of fly ash is collected and used for making bricks. During rainy season the ash content percolates into the wells making the water unsuitable for consumption.

The people residing in this locality complained that many are suffering from asthma and other respiratory diseases. The effluents from the factory make the water of Muvattupuzha more pollutive. The water appears deep brown in colour. There are many who are earning their bread by taking sand from the waterbed. While interviewing them they said that they feel itching while taking the sand from water bed. They said that such a problem was not there before the establishment of the factory. Earlier they were satisfied with their working environment but now they find it unhealthy. But it is due to the lack of other employment opportunity that they are doing the same. They shared the view that the sand contains residues of pulp. This will lower the quality of the sand collected. The pulp content in the sand makes black spots in the walls when it is used for plastering.
A paper presented in the Sixth Kerala Science Congress revealed that in the Muvattupuzha river, the down stream of outfall was coloured brown to dark brown and mostly alkaline. High BOD value was also observed. In brief the study showed that the polluted condition of the river alarm the continuation of such contamination by pulp and paper effluents which is rendering the receiving waters unworthy of normal use.

In a study conducted by Environmental Studies Department of Cochin University, the data show that the Chemical Oxygen Demand (COD) and Colour exceed the prescribed limit. The presence of lignin makes high values of COD in the newsprint effluents. The noise pollution also irritates the locals eventhough the management claims that it is restricted to the factory premises.

HIL

A study of the environmental degradation caused by HIL on the locals is somewhat impossible as the area, Udyogamandal is packed with different types of chemical industries. The major chemical industries which are situated adjacent to HIL are FACT, Indian Aluminium Company, Travancore Cochin Chemicals (TCC), Indian Rare Earth (IRE), etc. Actually about 25% of the State's industries are located along the banks of the river Periyar and these are mostly crowded within a stretch of five kilometers in the Eloor Edayar region (Udyogamandal). These factories inject different kinds of poisonous chemicals into the atmosphere. As
the outlet of almost all these factories are opening to the Periyar river, the water in the river becomes highly contaminated.

Since the same chemical can be discharged from more than one factory, causing damage to human beings, we cannot say which factory is responsible for the disease. Likewise the same disease can be caused by different pollutants emitted by different factories. Here also the exact culprit cannot be traced out. For example sulphur dioxide is a common pollutant from many chemical industries. So the health hazards caused by sulphur dioxide cannot be attributed to a single factory. The example of a disease which can be caused by different chemicals, is asthma.

The major gaseous effluents from HIL are hydrochloric acid from the DDT plant, chlorine gas from DDT and BHC plants and acid mist from hydrolysis plant. Hydrochloric acid (HCl) which is a by-product of DDT is sold to near by TCC. Often as the tank of TCC is filled with HCl, it will not accept HCl and therefore the storage tanks in HIL get filled and much acid is drained into the sewer. Since neutralizing doesnot often occur free acid flows into the fields. Moreover the effluent water of HIL contains benzene, BHC, DDT, etc. Much of the environmental problem in HIL is due to the old and inefficient plant and lack of maintenance.

The health condition of the locals of HIL is affected not only by the product of the factory such as DDT, BHC and
Endosulphan but also due to the raw materials used like Hexachlorocylopentadiene (HCCP) and the by-products like hydrochloric acid. DDT causes serious problems to the locals such as skin diseases, headache, vomiting, lower abdominal pain, etc. DDT is also found to be neuro-toxic. BHC has strong irritant properties. It causes irritation to the eyes and to mucous membranes of the nose. Benzene, a raw material used for BHC preparation, is a highly reactive substance which reacts with cellular constituents. Fatigue, loss of appetite, etc. are caused by benzene. Benzene is also highly carcinogenic. According to a study of ILO the mutagenic effects of benzene is very high.24 HCCP, a raw material used for the production of Endosulphan is highly poisonous. Changes are reported in the brain, heart, liver, abdominal glands and kidneys of all species of animals tested. Thionyl chloride is a highly corrosive liquid. It affects skin, mucous membrane and eyes. HCl generated as by-product oozes into the paddy fields and becomes unusable for cultivation.

Exposure to pesticides may even lead to sterility in human beings. World Development Report 1995 reports a recent case occurred in Texas in 1994 were a law suit was filed on behalf of 16,000 farm labourers who claimed that exposure to a pesticide, proven to cause reproductive problems, had made them sterile. 24A
The environmental problems arising from GRASIM spreads over two villages viz., Mavoor in Kozhikode district and Vazhakkad in Malappuram district. They face both the problems of air and water pollution. The smoke from this factory blows southward and south-eastward. Thus the toxic fumes affect the people of Vazhakkad, their crops and livestocks. The toxic gases responsible for air pollution in the area are hydrogen sulphide, carbon disulphide, carbon monoxide and chlorine.

Years back people of the villages of Mavoor and Vazhakkad used the river water for drinking, bathing, irrigation, fishing, shell picking and for many other purposes. But as the factory expanded, pollution of the river becomes acute and severe. The river water sometime turns into black soupy liquid, foul-smelling and hot at times. Killing of fishes has became common.

In June 1982, one of the pipes broke and caused havoc. People in the region insisted that they would not allow the repair of the pipe line unless the factory undertook to treat the effluents to the prescribed effluent standards, before discharging through the new pipe line. The factory filed a petition in the High Court seeking police protection. The Judgement made by Honourable Justice K.K. Narendran, in 1982, decreed that the factory should at first install the treatment facility and then seek police protection.25
According to a study, the concentration of heavy metals like mercury and lead were very high at the downstream of the river, whereas it was zero at the upstream, revealing clearly the role played by the factory in polluting the river water. As per the study, the downstream water showed a mercury concentration varied from 0.007 Mg/l to 2.871 Mg/l and lead from 0.951 Mg/l to 2.613 Mg/l.\(^{26}\) (The prescribed limit of mercury in effluent water is 0.01 Mg/l and 0.1 Mg/l for lead).

When the data on mercuric contents on river water samples were first published the factory flatly denied its possibility. Eventually they put forward the view that the contamination might have arisen from the caustic soda they had bought and used. But the most interesting hypothesis put forward was that mercury contamination occurred due to the use of mercury by the tribals and local people for extraction of gold at the upper reaches of the river. Naturally the question arose why mercury was not detected at Kollimadu (upstream). As observed by Honourable Justice K.K. Narendran in his historic Judgement against the factory,

"It is to be remembered that one of the pollutants in the effluent is nothing other than mercury. Then what is the magnitude of the threat to life caused by the effluent discharge from the petitioner's factories I need not say."\(^{27}\)

According to a paper presented in the 1994 Kerala Science Congress, the waste water discharged from GRASIM contains mercury in high quantity.\(^{28}\) The most toxic air pollutant at Mavoor is
sulphur dioxide. Carbon disulphide liquefies quickly, settles on the vegetation outside the factory and destroys them. This will cause reduction in yield in coconut, cashew, aracanut, jackfruit and pepper. It has been well known that certain medical camps and preliminary health check-ups had earlier been conducted at Vazhakkad. Such surveys showed that lung diseases, anemia and skin diseases were wide spread in this area.

The children residing in the 'Yatheemkhana' (Muslim Orphanage), in Vazhakkad is severely affected by air pollution, as it is situated in a hill top, bringing the chimney of the factory and the orphanage in somewhat on the same level. So the children are forced to breath the polluted air in which concentration of sulphur dioxide is very high. This has resulted in increased rate of respiratory diseases among the children.

In 1991 one of the pipes of the effluent outlet burst at Kayalam and a few people in the adjacent areas were hospitalized because of the acute effect of inhaling noxious fumes that arose from the broken pipe line. A study conducted by Dr. T.K. Gopinath of Calicut Medical College clearly demonstrated that 23% of males and 20% of females inhabiting in the Vazhakkad - Mavoor areas have Cardiac-Pulmonary disease as a result of exposure to polluted air. 29

The locals complained that often the Management does not operate the effluent treatment plant so as to save thousands of rupees. When the effluent treatment plant is not working, the
effluent will come to the surface of the water and they will become dry when they come into contact with air. Wind will carry this dry effluent from the water surface to the atmosphere. It will cause itching when skin is exposed to it. The dry effluents are often consumed with food materials which are kept open and they will reach the lungs through breathing. This will cause different kinds of health problems, varying from headache to asthma.

The environmental problems created by GRASIM to the locals can be summarised in the following words as observed by Honourable Justice K.K. Narendran.

"The banks of Chaliyar, once a health resort, have virtually become a hell on earth. At least, for one decade the people there are suffering. The petitioner company has liberally contributed to this. If the State Government and the Kerala State Board for Prevention and Control of Water Pollution had taken timely and effective steps this could have been prevented long ago."

The study shows that all the five industries taken as examples are found to be pollutive. The only difference is about the rate of pollution. In this context it must be remembered that these industries are spending lakhs of rupees for pollution control. But still they remain a threat to human population. Besides creating serious problems to the environment and living things, large scale industries upset the socio-economic order of that locality. A detailed picture of the socio-economic effects caused by these industries is given in the scheme 6.1. A close
Scheme 6.1: Socio-Economic Effects of Polluting Industries

<table>
<thead>
<tr>
<th>Agricultural Economy</th>
<th>Industrial Economy</th>
<th>Rural Economy</th>
<th>Traditional Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>The toxic chemicals present in the air and water affect the plant growth. This results in a reduction in the yield. The plants will absorb toxic chemicals from the soil. They will reach the body of human beings when they consume the fish. Polluted water cannot be used for irrigation if used reduction in agricultural output will be the result.</td>
<td>An industry which is pollutive can affect the industrial economy itself. This is what happened in Harour, i.e., the monopoly of a single industry. No other industry can be set up downstream of the factory as the water is polluted. So it cannot be used for running machinery.</td>
<td>Rural economy was adversely affected. For example, fisherman are left jobless as the pollutive effluents from the industry cause reduction in fish yield. Those who are engaged in shell picking and sand taking from the water beds are left unemployed. Damage to fishing equipments such as fishing nets etc.</td>
<td>Traditional industries such as mat weaving and box-making were affected due to shortage in raw materials, as they have been consumed by pulp and paper industries. The tribals cannot purchase reeds and bamboos, by paying high price. When Birla and HNL are getting reeds and bamboos at subsidised rates the tribals have to pay the market price.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shortage in drinking water</th>
<th>Upsets family budget</th>
<th>Shortage in man power</th>
<th>Material loss</th>
<th>Decreased land value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well water gets contaminated due to the effluents. So drinking water shortage. Wastage of human labour and time to collect water from the places where it is available. The workers and the poor local people are severely affected by pollution. They have to do work everyday for earning their livelihood. Susceptibility to diseases often prevent local people to spend additional money for health aspects. Workers may get medical reimbursement, but what about the locals? Steel and brass vessels and other home equipments react with the polluted water and lose their colour or even cause destruction to them. People are not interested in living near polluting industries and major accident hazards industries. So land value reduction.</td>
<td>Steal and brass vessels and other home equipments react with the polluted water and lose their colour or even cause destruction to them. People are not interested in living near polluting industries and major accident hazards industries. So land value reduction.</td>
<td>People are not interested in living near polluting industries and major accident hazards industries. So land value reduction.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
examination of these facts generates a series of questions such as:

- Is it necessary to produce more with more environmental degradation and more natural resource depletion?
- Is it necessary to produce more by making more susceptible to diseases?
- Is it necessary to produce more by investing huge amounts even in pollution control mechanisms and still producing pollution?
- Is it necessary for a country like India to produce more with less number of labourers where unemployment is in its maximum?
- Is it necessary to produce more with a large capital?
- Is it necessary to produce more at the expense of rural poor engaged in traditional industries and fishing?

It is here the Gandhian principles of industrialization sounds much, and it is here the vision of Gandhi becomes relevant. As said earlier Gandhi was not a blind opponent of large scale industrialization. But at the same time he argued that large scale production should be minimised and such industries should be established only where khadi and village industries cannot be an alternative.

Today we have small scale industries to compete and even replace large scale industries, where khadi and village industries are not an alternative. So the number of large scale industries which cannot be replaced by village industries or even small scale industries can be kept to a minimum.
6.4 The Gandhian Alternatives

The relevance of Gandhian ideas as an alternative to these industries is discussed here.

The global use of pesticides is increasing day by day as we saw in Chapter 3. It is interesting to note that the first recorded incidence of pesticide poisoning in India was in Kerala in 1958.\textsuperscript{31} More than 100 people died after consuming imported food grains inadvertently mixed with ethyl parathion. Today the overapplication of pesticides in Kuttanad, the 'rice bowl of Kerala', has raised serious environmental problems. Out of 1500 tons of pesticides used in Kerala, about 1200 tons is used in Kuttanad region,\textsuperscript{32} an ecologically fragile area of only 874 km\textsuperscript{2}. A recent study\textsuperscript{33} (1993) by S.R. Nair and P.N. Unni of Centre for Water Resource Development Management (CWRDM) shows that in Vembanad lake, around the Kuttanad area the active ingredient of lindane in the water samples was 0 to 400Mg/l and in the sediment 0 to 20000Mg/l. In the down stream areas DDT concentration was 12000-22000Mg/l. According to them the pesticides discharged into the lake water are found to be a threat to aquatic species as well as human beings. The bio-accumulation of pesticides in the food chain result in serious health hazards.

According to Gandhi "...trading in soil fertility for the sake of quick returns would prove to be a disastrous short-sighted policy." He adds, "It would result in virtual depletion
of soil". Even though Gandhi's remark was on fertilizer it may also be suited to pesticides as they are also used to get quick returns. At the same time it would result in virtual depletion of soil. It is scientifically proved that pesticides are harmful. According to International Labour Organization (ILO) upto five million people are poised each year by pesticides and out of them 40,000 fatally. The third world which uses twenty percent of these chemicals, suffers 99 percent of the deaths. Some of the several reasons why pesticides are not safe are given below:

(i) A pesticide may kill more than the pest (ii) A pesticide may remain for a long time in the environment (iii) A pesticide may travel far through air, soil and water (iv) A pesticide may turn into another poison (v) A pesticide may become more poisonous in the presence of other chemicals/pesticides (vi) Pesticide damage may show up long after the pesticide had left the body.

It is in this context that a re-thinking is necessary, whether large scale pesticide production is necessary and whether its large scale application is advisable. It is true that on the outbreak of contagious diseases like plague or cholera, DDT or BHC is necessary. Quite recently we experienced its importance when plague spread at Surat in Gujarat. But ardent advocates of pesticides must bear in mind that it is again the dirty environment which caused the outbreak of this ugly disease.
Today in India as many as 137 pesticides have been approved for use. One has to think whether this much variety of pesticides is necessary for India. The strong recommendation put forward here is, we have to reduce the production and application of pesticides slowly and at the same time switch over to some other methods as described below so as to reduce the production and application of pesticides.

(i) Plant resistance: Some varieties of crops are more resistant to attack by certain insects. Multiply these varieties.

(ii) Biological Control: This can be done by using natural enemies to control pests. Predators, parasites and microbes have been introduced into problem areas for pest control.

(iii) Micro-organisms: The major advantage of micro-organisms over pesticides is that they are often very specific in their effect.

(iv) Extracts from Plants: Extracts from certain plants possess pesticide qualities. For example Neem tree has been in use long ago in India for this purpose. Today the American multimillionaires have found their industrial possibility and have established huge plants in Karnataka, to produce insecticides from Neem tree.

(v) Hand picking: This is possible only where the cultivation is in small quantity. In agriculture too, Gandhi favoured small scale production. According to him each village has to produce
its own food and this method is applicable in this context. He was a strong believer of 'Gram Swaraj', where villages are to be self-sufficient in almost all cases and when it was not possible, the necessity is met through the peaceful co-existence between villages.

Organic matter in the soil helps plants to grow strong and well. It is the best pesticide money can buy. As said earlier strong plants have resistance to pests. Gandhi was an ardent supporter of organic manure, which enriches soil, improves village hygiene through the effective disposal of wastes. This will not only save our foreign exchange but also enhance crop yields.

Today a good portion of Kerala's forest resources are being used by GRASIM. As per the latest agreement between the management and the Government, Government is obliged to supply two lakh metric tons of raw materials, including 1,60,000 tons of Eucalyptus and 40,000 tons of bamboo and reed to the factory. The water consumption of the factory is about 68 million litres per day. The daily consumption of drinking water in Calicut city, which is also drawn from the Chaliyar river is only 45 million litres per day.

According to late Dr. N.V. Krishna Varrier,\textsuperscript{35} Government had spent lakhs, which is very higher than the amount spent for the construction of railway line between Ernakulam and Shornur, to construct a road from Calicut to Mavoor. He further adds that
in order to give raw materials to the Birlas, the Government had also taken up the responsibility of planting eucalyptus. He blamed the Government for working as an agent of Birla to run the industry.

But what the factory has given back to the people of Kerala was utter pollution. According to the Estimate Committee Report (1977-79)\textsuperscript{36} of Kerala Legislative Assembly, which was constituted by the Government when public agitation against the factory was in its climax, was of the opinion that the management has not taken any earnest effort to solve the problem not even considered their moral obligation to the people who have been suffering a lot for the last fifteen years due to pollution. The committee is quite unsatisfied with the adament and arrogant attitude of the management, in not implementing the instructions issued by the Board.

It was to save the 3500 employees and their employment that the Government had turned a blind eye to the problem of pollution caused by GRASIM. Again it was for the same reason that the Government was forced to supply reeds and eucalyptus just for Rs.250/- (13 employees committed suicide during the 1985-89 strike). At that time the rate for a ton of eucalyptus was Rs.1170/- in Assam and Rs.1099/- in Maharashtra.\textsuperscript{37}

Since its establishment in 1958, GRASIM witnessed several labour agitations, closing and reopening of the factory due to labour unrest were quite common up to 1989 when the factory was
finally reopened after a closure of nearly three years. This shows that the workers were not satisfied with the remuneration given by the management. Bonus was not paid for several years. The factory management is of the opinion that it is still working just due to the pressure and request from Government, even though it is incurring huge loss. In this regard it is worth to look into the Judgement made by Honourable Justice K.K. Narendran. According to the Judgement "The Rayon is an industry where the margin of profit is not only comfortable but considerable." It so what is observed from the overall picture is that the management is looting the forest resources of Kerala by making its employees a tool in its fight against the Government to get natural resources at a cheap rate.

To sum up, it can be said that GRASIM industries are good only for the management and the management alone. In the words of Dr. N.V. Krishna Varrior, GRASIM is not an industry but 'Plague', 'Cancer' in the face of Kerala. It exploits the State's forest resources, water, etc. and injects pollutants to air water and land. In Justice K.K Narendran's words, "Life, especially human life, should not be so cheap in this country."

Here comes the relevance of Khadi, preached by Gandhi, and that too in a country like India, situated in the tropics, where khadi is better to the body than cloths made of synthetic fibres;
where the forest resources are limited. Gandhi says,

"Mill cloth is very different from Khadi; it leads to exploitation. The circumstances of bringing a large number of people together leads also to loose living. But Khadi is founded on affection and can be produced in pure surroundings in the home. It helps millions of our people to get a living and so Khadi cannot grow in competition with the mills, but only through the love of the people. If the people have faith in it, Khadi will certainly grow."

Gandhi always cautioned Indians about the danger of following the West. But our attitude was that what the West is doing must be the best for us also. What the West wear is best for us and what the West eat is best for us also! Imitating the West we ignored khadi and began to use cloths made up of synthetic fibres, manufactured at the expense of our natural resources and polluting our environment.

HNL is also a giant which consumes natural resources in large quantities and injects pollution to the local surroundings. Today the country is spending about Rs.300 crores of foreign exchange per annum on newsprint import. This shows that production of newsprint within the country does not meet our requirement. Even though the production is less than the requirement the major problem that our large scale mills are facing is inadequate availability of forest based raw materials. Deforestation for the production of paper is at the expense of the poor who depend on forest for fuel, wood, fodder, building materials and herbs. Table 6.15 shows the capacity of our forest to supply raw materials and the widening gap between the demand and deficit.
Table 6.15: Raw Materials for Paper Production - Demand & Deficit
(all figures in million tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Raw material from</th>
<th>Demand</th>
<th>Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forest</td>
<td>Bagasse</td>
<td>Straw</td>
</tr>
<tr>
<td>1990</td>
<td>1.2</td>
<td>0.18</td>
<td>0.20</td>
</tr>
<tr>
<td>1995</td>
<td>1.2</td>
<td>0.36</td>
<td>0.22</td>
</tr>
<tr>
<td>2000</td>
<td>1.2</td>
<td>0.60</td>
<td>0.25</td>
</tr>
<tr>
<td>2005</td>
<td>1.2</td>
<td>0.72</td>
<td>0.25</td>
</tr>
<tr>
<td>2010</td>
<td>1.2</td>
<td>0.84</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Source: Indian Institute of Forest Management, Bhopal cited in Anumita Roychoudhury, "Industries Eye Forest Land for Plantations", ‘Down to Earth’ April 1993, p. 16

The table clearly shows the helplessness of our forest to satisfy the growing demand. It can supply only 1.2 millions eventhough the demand for paper is increasing year after year.

It is true that the paper consumption of India is very less than that of the US (For details see Chapter 3, Table 3.8) We could have further reduced the consumption of paper if we had followed the ideals of Gandhi. Gandhi used paper very carefully. For example he prepared replies to letters using the blank space on the other side of the envelope addressed to him. This shows how much Gandhi was aware of the importance of paper. If we had followed this type of wise use of paper, avoiding luxuries, we would have been able to save our forest to a large extent and could have reduced pollution to a certain extent.
In India, while the large scale industries are using forest-products as their raw materials, small scale industries are using non-wood materials such as bagasse, fibrous crop residues, jute cuttings, cotton waste, cotton rags and waste paper. This shows that small scale paper-making can not only save our valuable forest resources to a large extent but also place an important role in cleaning the environment. Again Gandhian principle of small and cottage industries gains momentum.

Other natural resources used by large scale paper plants are coal and water. Paper and pulp factories are the major consumers of water and at the same time they discharge a major part of it as waste water containing numerous pollutants. Coal is the major energy source for many large scale paper industries. When the disposal of bottom ash is a serious problem, the fly ash causes different kinds of respiratory diseases.

As far as TECIL is concerned, the products of this industry are used as raw materials in steel industries, energy production and production of PVCs. It is interesting to note Gandhi’s ideas on energy and power. Hardly less importance was given to self sufficiency with respect to power than self sufficiency in food. As Aldous Huxley has pointed out, the discovery of new sources of unlimited power, involving a terrific capital outlay or the use of raw materials to which only a few can have access would only accentuate the already existing
international rivalries and domination of the week by the strong.42

As these are raw materials for some other materials these are transported to some other places and are being given to multi-millionaires. This itself Gandhi had criticized. He was a man who stood for the localised production and consumption pattern. He was of the view that man should produce what he is in need with the locally available resources and that only for his need. Here the interesting thing is that the factory was started with seeing the abundance of limeshell available in these areas. But now due to the scarcity of limeshell, they are using limestone brought from distant places.

One of the products of TECIL is used as a raw material in the production of dry cells, which are used for power generation. But what is needed is that the natural order of preference in this sector would be to utilize in the first place the energy of wind, water, tides and sunshine (for details see Chapter 3, Table 3.2). Imported fuel or electric power would be used as a last resort. When the pollution aspect is considered the other side diminishes. Science and Technology have hither-to been used by large, to subserve the interest of entrenched power-big industry, big finance, the sophisticated townfolk. It was Gandhi’s aim to bring down science and technology from the mountain tops to the plains, where the commonfolk dwell so as to give the masses- small producer, the breaker of soil and
handicraftsman plying his craft in his cottage for their full benefit.

Whether we have to opt this type of polluting industry, which helps the rich to enjoy more luxuries is the question? In his Judgement Honourable Justice Sankaran Nair observed, "I have noticed the wide sweep of the rights guaranteed by Art. 21 which comprehends the right to healthy environment, and the duty in the State to protect these rights". The factory argued that it had already spent three crores to check pollution and closing of the factory means loss of economic wealth and loss of employment to many. But according to Honourable Justice "That would be no justification for allowing a harmful activity to continue invading the fundamental rights..." But till now the factory is functioning by neglecting this. So even Judiciary fails in front of industrialists.

TTP, is also a chemical industry in which mainly TiO₂ is produced is transporting to other units where paints and cosmetics are produced. The consumption of paints and cosmetics does not go in tune with the Gandhian ideology of simple living. Gandhi’s idea of simple living meant: those who have not enough to eat should have plenty of fresh, wholesome balanced diet, those who are naked should have artistic durable clothes, those who are living in ill-lighted ill-ventilated slums or have no shelters should have sunny, airy, cozy dwellings amid agreeable surroundings to live in. Then the system of economy recommended
by Gandhi is the most efficient, the most inexpensive and the
surest way of insuring a decent standard of living to the people
at large in the immediate present.

But by raised standard of living, what is viewed today is
'modern living', which creates environmental pollution and
environmental degradation. As an industry, which produces the
raw materials for paints and cosmetics, it is considered a
necessity of 'modern living'.

Chemical industries are more pollutive than any other type
of industries. So its production, especially large scale
production should be avoided. But wherever it is considered a
must, having no alternative, its production in small units unit
is recommended. In this context it should be remembered that
small scale industry in India constitutes an important segment of
chemical industry and accounts for over 35% production of
chemicals and allied products.45

6.5 Small Village and Cottage Industries - A Real Alternative?

The feasibility of small, village and cottage industries
as suggested by Gandhi as a real alternative to large scale
production in terms of environment, employment and economy is
discussed here.

Environment

The general belief is that small scale industries are more
environment-friendly. The assumption is based on the fact that
the quantity of consumption of raw material is directly proportional to the quantity of pollution produced. In a large scale unit the consumption of raw materials and water is high, thus providing products and pollution in large quantity. In a small scale unit the consumption of raw material is limited, so also product and pollution. In large scale industries it is necessary to store large quantities of chemicals for the production. This is one of the major hazard that the large scale industries are causing to the local population. But in the case of small units this much quantity of chemicals need not be stored and thus the chance of accidental release is negligible. According to E.F. Schumacher,

"The technology of mass production is inherently violent, ecologically damaging, self-defeating in terms of non-renewable resources, and stultifying for the human person. The technology of production by the masses, making use of the best of modern knowledge and experience, is conducive to decentralisation, compatible with the laws of ecology, gentle in its use of scarce resources and designed to serve the human person instead of making him the servant of machines." 

But there is a belief that small units are equally pollutive. The reason for this phenomenon, which is greater in tanneries and paper making units, can be explained as follows:

(i) Small scale industrialists are quite unaware of the hazardous nature of chemicals they use, and their environmental effects (ii) Government's liberalized policy on SSI and KVI also has aggrevated the problem. Also liberalized policies are adopted in the case of routine pollution monitoring (iii) Often
it will not be profitable for the small scale industrialists to implement their own pollution control devices (iv) Grouping of similar SSIs in the same area having no pollution control devices will cause high level of pollution.

However all these hazards can be overcome by adopting the following methods,

(i) SSI become more pollutive when they concentrate in a particular area. In this case pollution can be checked by the establishment of a single pollution control device. The expense for pollution control mechanism can be equally shared by the industrialists. As it is a collective set up, additional expense each industrialist has to invest is only minimum.

The World Bank points out different examples from India where this co-operative experiment is working successfully. In Hyderabad a group of 40 small companies set up a common waste water treatment plant that they operate jointly on a non-profit basis. In Gujarat 400 small factories did the same. The report adds,

"Such arrangements are cheaper than individual treatment facilities at each plant, and it is easier to operate, maintain and monitor one large facility than numerous scattered small ones." 48

(ii) The Government can provide extension and advisory service so as to check pollution and increase profits.
Today, in India the pollution control cell of National Productivity Council, under The Ministry of Labour does this service. This system is effectively practiced to reduce emissions and water use in electroplating, food processing, bleaching and dying, many cement plants, pulp and paper, drugs and tanneries.

(iii) Another method is that Government can provide technical know-how, etc. to establish pollution control devices.

(iv) Application of appropriate technology would also be able to reduce pollution to a great extent.

To quote E.F Schumacher,

"Small scale operations, no matter how numerous, are always less likely to be harmful to the natural environment than large-scale ones, simply because their individual force is small in relation to the recuperative forces of nature."

Employment and Economy

One of the major reason why Gandhi advocated small and village industries is its capacity to solve unemployment. This Gandhian principle gains much momentum in a country like India and especially Kerala, where the army of the unemployed is increasing day by day. Large scale industry requires large capital investment. A major portion of the capital invested is for the machinery. That is why large scale industry requires
less work force, where almost all the works are done by machines. According to Stuart Chase "one man and a machine replaces ten hand workers.... One man stays and nine men go. Society has gained a cheaper process, and nine men have lost their jobs". In the small scale industry on the other hand, the major work is done by humans and the machinery is just helping him. However, in large scale industry man is replaced by machine. This was what Gandhi never wanted. According to him "Every machine that helps every individual has a place." But he adds "Labour has its unique place in a cultured human family", that is, large scale industry will not only reduce the employment opportunities but also reduces the human values. Table 6.16 shows that the percapita investment of employees is very high in large scale industries. It is true that large scale industries will provide casual employment to a certain extent. But at the same time it

<table>
<thead>
<tr>
<th>Industry</th>
<th>Capital investment (in lakhs)</th>
<th>No. of employee</th>
<th>Investment per employee (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTP</td>
<td>6,700</td>
<td>1378</td>
<td>4.9</td>
</tr>
<tr>
<td>TECIL</td>
<td>1,441</td>
<td>700</td>
<td>2.1</td>
</tr>
<tr>
<td>HNL</td>
<td>22,000</td>
<td>1654</td>
<td>13.3</td>
</tr>
<tr>
<td>HIL</td>
<td>2,800</td>
<td>781</td>
<td>3.6</td>
</tr>
<tr>
<td>GRASIM</td>
<td>8,263</td>
<td>3262</td>
<td>2.5</td>
</tr>
</tbody>
</table>
should be remembered that large number of locals are loosing their employment due to the pollution problem of the factory. For example the fisherfolk around TTP has lost their job due to large scale pollution. The traditional employees engaged in shell picking, sand taking and fishing in and around GRASIM have lost their employment. The large scale consumption of reed and bamboo in pulp and paper (GRASIM and HNL) factory is affecting the traditional employees engaged in mat weaving box making, etc. In addition to this it causes health hazards to human beings living near to the factory (For details see Chapter 3).

All these show that large scale industries in no way solve the problem of unemployment. At the same time employment can be generated if this amount is spent in small and village industries.

Another comparison is made between the capital invested, employment and per capita investment of employee in Government majority companies, Government owned companies, Government of India companies, registered small scale units and traditional industries in Kerala. Table 6.17 clearly shows the investment per employ in traditional and small scale industries is only a few thousands while it is lakhs in the case of large scale industries.
Table 6.17: Investment against each Employee: Comparison of Industries

(as on 31.3.1993)

<table>
<thead>
<tr>
<th>Company</th>
<th>Capital investment (in lakhs)</th>
<th>No. of employee</th>
<th>Investment per employee (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govt. Majority Companies</td>
<td>20,712.89</td>
<td>8,865</td>
<td>2.34</td>
</tr>
<tr>
<td>Govt. Owned Companies</td>
<td>51,329.42</td>
<td>8,941</td>
<td>5.74</td>
</tr>
<tr>
<td>Govt. of India Companies</td>
<td>1,12,600.81</td>
<td>22,757</td>
<td>4.95</td>
</tr>
<tr>
<td>(in Kerala)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small scale Units</td>
<td>1,00,888.51</td>
<td>5,68,598</td>
<td>0.18</td>
</tr>
<tr>
<td>Traditional Industries</td>
<td>6,201.00</td>
<td>51,495</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Sources: Compiled from Economic Review 1994

As per the Steering Committee on Industry and Mining, the employment given by large and medium industries was 1 lakh whereas, small scale industries provided 3.67 lakhs and traditional industries provided employment to about 10 lakh persons.53

Revealing Gandhi’s contemporary relevance S.H. Patil observes, "Large scale industries cannot sustain large scale population and cannot provide full employment to all."54 According to a paper presented in the Sixth Kerala Science Congress, large investments, in fact, cause more harm than good to
Kerala in terms of environmental risks, unscrupulous exploitation of natural resources, consumption of energy, low employment potential, blocking of large geographical area, etc.\textsuperscript{55}

Eventhough the five industries taken under study are profit making, the case is not encouraging as far as Kerala as a whole is concerned. According to the Stearing Committee, the State Public Sector enterprises have been characterized by low levels of capacity utilization, (TTP is an exception. It is running profitably eventhough only about 50\% of its capacity is utilized.), low productivity and consequent low levels of profitability. The average-turn over - investment-ratio of the State Public Sector is only 0.65:1.\textsuperscript{56}

Large scale industries are generally believed to be profitable as far as the industrialists are concerned. But when we discuss the economic profitability of large scale industries in a wider sense such as national, or global, the picture we receive is a reverse one. Large scale production means large scale consumption and that too at the expense of natural resources. Large scale production leads to wastage of products, again wastage of natural resources. We know that natural resources are limited and the wealth of a nation to some extent is determined by natural resources. So while we are producing in high quantity, we are depleting our natural resources and thus
weakening our economy. Small scale production is always need based. Wastage can be avoided. As the production is in small quantity the natural resources depletion as well as environmental degradation is less. Thus the economy of a nation as far as natural resources are concerned can be saved. What the industrialized nations are doing is that they indulge in mass production, discarding the needs and thus depleting the natural resources in an alarming way. This will cause damage not only to their economy but also to the world either as global warming or such other ways.

Large scale production is very profitable as far as private sectors are concerned since they have no accountability to the people. Thus if an industrialist gets 10 lakh rupees from his large scale industry, he need not divide the profit, since he has no accountability to any one. But this is not the case with a Government owned factory. When the Government owned factory makes 10 lakhs as profit, the nations natural resources are depleting. The Government is also accountable to the health hazards caused by the pollution from the industry to the local public and the socio-economic implications, again due to pollution and natural resources depletion. So the net profit has to be calculated only after calculating the loss due to health hazards and socio-economic implications.
The concept of 'social cost' which environmental economists want to incorporate in the conventional estimate of 'production cost' was the prime concern to Gandhi and that is why he was against large scale industry-oriented development and centralized production. In addition to the growth of slums, turbid conditions of life and work, natural resource depletion and pollution, the products obtained from mass production lead to degradation of human health. The quality of a hand made product is much better than that of their machine made counterpart. Hand-pounded rice may be costlier than mill-polished rice, but when the ill effects of polished rice on the nations health are computed, it would not be found dearer. According to Gandhi mill cloth is cheaper as it saves the buyer a few Annas but at the same time it cheapens the lives of men, women and children.56

As pointed out by E.F Schumacher

"In industry, we can interest ourselves in the evolution of small-scale technology, relatively non-violent technology, 'technology with a human face', so that people have a chance to enjoy themselves while they are working instead of working solely for their pay packet and hoping, usually forlornly, for enjoyment solely during their leisure time."57

Performance of Small Scale Industries: Kerala

The performance of small scale industries in Kerala can be better understood, if a comparison of it with that in all India is made. The comparison is made in the Table 6.18.
Table 6.18: Performance of Small Scale Industries - India Vs. Kerala

(Base: 1988-89)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Statement</th>
<th>Unit</th>
<th>Kerala</th>
<th>All India</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sick and closed</td>
<td>%</td>
<td>13.43</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Average investment per unit</td>
<td>Rs.lakh</td>
<td>1.19</td>
<td>0.71</td>
</tr>
<tr>
<td>3.</td>
<td>Average investment per worker</td>
<td>Rs.</td>
<td>17,980</td>
<td>9,984</td>
</tr>
<tr>
<td>4.</td>
<td>Production per unit</td>
<td>Rs. lakh</td>
<td>3.11</td>
<td>4.52</td>
</tr>
<tr>
<td>5.</td>
<td>Production per worker</td>
<td>Rs.</td>
<td>46,997</td>
<td>63,646</td>
</tr>
<tr>
<td>6.</td>
<td>Annual product per rupees of investment</td>
<td>Rs.</td>
<td>2.61</td>
<td>6.37</td>
</tr>
<tr>
<td>7.</td>
<td>Employment per unit</td>
<td>No. of person</td>
<td>6.62</td>
<td>7.10</td>
</tr>
</tbody>
</table>


The table shows how far the Kerala SSIs has to go a long way in order to have a performance same as that of all India average.

6.5 Conclusion

The relative merits of small and large scale industries are examined based on the criteria of environment, employment and economy. The environment aspect of five factories has been studied in detail and the conclusion arrived at is that the environmental problem of an industry may vary according to several characteristics such as the quantity of raw materials...
used, chemicals used, the quantity of natural resources used and the quantity of hazardous material stored.

It is found that all the three problems are acute as far as large scale industries are concerned, eventhough the quantity of pollution they inject varies according to each industry. At the same time it is theoritically proved that these problems are comparitively negligible in the case of small scale industries and the conclusion reached is that small industries are less pollutive than large scale industries.

Employment and economy of large and small scale industries are compared by using Government reports such as Economic Review, Stearing Committee Report on Industry and Mining, etc. Here also it is proved that small industries are more employment generative, and more economic in general. The high range of employment absorption in small firms compared to large firms is also proved. The Stearing Committee Report observes, "... the immediate task of providing employment to atleast a fraction of the unemployed mass requires overall development of small scale and village industries efficiently in a healthy atmosphere."58 According to International Economic Organizations and the International Legal Organizations, the only way to respond effectively to the unemployment problem is the promotion of small scale enterprises and the self employment.59

According to TECIL management, it has spent Rs.3 crores for pollution control against its capital investment of 14
crores. Other industries are also spending (or claimed to be spending) huge amount for pollution control. Eventhen the pollution caused by these industries is very high. But small industries need not find much money for pollution control, or in case where it is necessary, due to the establishment of common pollution control systems, the amount that has to be spent can be kept to a minimum. In the case of a Government-owned factory, the socio-economic effects and health hazards to local people have to be met by Government, eventhough the money is not spent directly from the factory’s account. A small industry can be easily managed compared to a large firm. Unnecessary expenditure can be avoided or atleast limited in small firms.

The relative importance of small industries as suggested by Gandhi over large scale industries, on environment, employment and economy appears to hold good in the light of our above study.

References

5. Government of Kerala Office of the Joint Director of Factories and Boilers (Medical) Industrial Hygiene Laboratory, Air Monitoring Report on GRASIM, TTP and TECIL (unpublished).

7. n.5


10. n.9.


12. Government of India, Ministry of Labour, Regional Labour Institute, Study of Industrial Hygiene and Health in the Endosulphan plant of M/s Hindustan Insecticides Ltd., Udyogamandal, Kerala, 1984 (mimeographed).

13. n.5.


15. n.14

16. n.14

17. n.14


24A. n.3A, p.76.

25. M/s Gwalior Rayons Silk Manufacturing (WwG) Co.Ltd. V. The District Collector, Kozhikode, Judgement on 30th March 1982 (OP No. 734/82)


27. n.25.


29. n.2, p.74.

30. n.25.


32. P.V. Raju (KSSP), Misuse of Pesticides in Kerala (Unpublished).


36. n.2, p.84.

37. n.2, p.86.

38. n.25.

39. n.35, p.211.

42. Pyarelal, Towards New Horizons, 1959, p.43.

43. n.21, p.693.

44. n.21, p.694.


49. n.46, p.29.


51. Harijan 28.7.1946.

52. n.51.


56. n.53, p.25.

57. n.46, pp.16-17.

58. n.53, p.