

Industrial Pollution of Bangladesh:  
A Case Study of Tannery Industries  
at Hazaribagh, Dhaka.

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## PREFACE

This study is undertaken as one of the research projects approved and financed by the Bangladesh Public Administration Training Centre (BPATC). It attempts to identify the impacts of industrial pollution of Bangladesh with particular reference to the Tannery Industries at Hazaribagh, Dhaka. BPATC has, in the mean-while undertaken a number of research projects in order to develop its training material and inputs on various important issues. But none of the studies have so far been completed on the present topic. As the magnitude of the problems of poverty and environmental deterioration increases in Bangladesh day by day, which has not only drawn the attention of policy planners, decision makers administrators and researchers of the country but also equally drawn the attention to the trainers of BPATC as a potential training inputs in its training programme.

Given this situation, the present study attempts to identify the industrial pollution and present the clear options and recommendations for the mitigation of environmental impacts for sustainable development that can be used as training materials at the BPATC.

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Syed Shamsul Alam  
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## Chapter-I

### Industrial Pollution of Bangladesh : A case Study of Tannery Industries at Hazaribagh, Dhaka.

#### Introduction:

The state of the country's environment cannot be isolated from the state of its economy. Sustainable development can only be achieved by managing economic systems in a way that maintains or improves the resource and environmental base. Given current levels of environmental degradation and economic confusion, this is no easy task. The planning and implementation of development initiatives will have to change significantly, the global economy will have to be fundamentally restructured, and international cooperation will have to take a quantum leap forward<sup>1</sup>. Unless the desire to ensure a sustainable future becomes a central theme of national governments, the continuing deterioration of the economy's natural support systems will eventually overwhelm efforts to improve the human condition.

2. In the past, development policies tended to be viewed as those that promoted growth in human activity, while environmental policies were seen as those that tried to restrict it. But in recent years, the idea of "environment as constraint" has given way to an acceptance of the "environment as partner". Development policy-makers increasingly recognize that failing to take the costs of environmental damage into account will prove to be inefficient and often ineffectual in raising incomes and well-being. While there is strong agreement at the conceptual level on

in Bangladesh to-day is indeed insignificant. This can be easily explained by the fact that industrial pollution has not assumed alarming dimensions due to the slow pace of industrial growth and the very limited sphere of industrial dynamics. Yet the state of the environment is rapidly deteriorating, specially in the urban and industrial areas.

6. For a developing country like Bangladesh, the conservation of the environment is of paramount importance, considering the fact that population and urbanization are recording concomitant rapid growth. People in large numbers are migrating from rural areas to the cities and urban locations, consequently increasing the pressure on land housing, education, sanitation and other infra-structural and social overhead. Manifold increase in urban population in Bangladesh has necessitated planned growth of cities with special regard to environmental consideration.

7. Dhaka city and its adjacent river Buriganga's water is being contaminated by different ways. The principal polluting agent of this city and the river water is industrial units which have been established on the river bank of the city. The Hazaribagh Tanneries of Dhaka happen to be a serious threat to the health of residents of the entire area and to the aquatic organisms in the river Buriganga. Environmental experts considered that if this state of condition is allowed continue, this region would gradually be unfit for residential use.

disasters and increased awareness at home and abroad has slowly convinced the government to be pro-active in protecting local and global environment and natural resources. This led to the formation of a separate Ministry for Environment and Forest in 1989 and declaration of 1990 as the Year of Environment and the decade of the nineties to be the Decade of Environments. To strengthen the environmental conservation commitments, recently launched Fourth Five Year Plan (1990-95) has articulated the Government's environmental objectives. In the recently held United Nations Conference on Environment and Development (UNCED), in Rio de Janeiro, Barazil. Bangladesh delegates, both from the government and NGO's presented a country report and their version of action plan. Since the Rio Summit, both the government and nongovernment sectors have initiated some noticeable activities in support of environmental protection and sustainable resource management.

10. In line with preservation of global genetic diversity and environmental protection, Bangladesh is a signatory of serveral important international agreements. Bangladesh has also signed the Montreal Protocol for the preservation of ozone layer. Choloro-Fluoro-Carbons (CFC) emission is limited largely due to the low level of industrial development and carbon monoxide levels in the largest city and has been found below the alert level established for many cities in the industrialized countries.

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the Jamuna Bridge Authority of Bangladesh.

13. No process exists within the government to identify a project's need for an environmental impact assessment at or before the initial feasibility study stage. No institution has been established to determine the scope of analysis that projects might require, carry out integrated analysis, or co-ordinate cross-sectoral reviews routinely among the agencies before new projects decisions are made. The rich but fragile natural resource base of Bangladesh, over time, has suffered from unsustainable and uncoordinated development activities, much of which has resulted in massive resource depletion and degradation.

14. Given this situation, Environmental protection and awareness issues must be integrated in the planning and decision making process of the public and the private sector. Therefore, development and promulgation of effective policy and regulations focusing on conservation resource renewal and pollution control and their strict adherence and enforcement is the key to the prospect of sustainable development in Bangladesh. This can be done properly when concerned authority will have comprehensive information with them on the existing industrial as well as other pollution scenario of the country.

#### 15. Methodology of the Study.

The prevention of environmental deterioration as well as human condition in a given region, caused by the unplanned

associated with environmental pollution have been requested to express their views about pollution. In addition, informal interviews have been taken from the workers, local people and residents of Hazaribagh area.

#### 18. Sampling and its size:

Department of Environment (DOE) currently estimates that 176 Tannery Industries of large, medium and small size are located at the Hazaribagh. Stratified random sampling has been used in the present study from the major three categories of industries mentioned above. Out of these categories, an attempt has made in such a way to ensure the equal size of the representative character of each category. This has helped to figure-out real situation of the study area and also ensure the category-wise extent of damage as well.

#### 19. Plan of Presentation:

The entire report has been divided into 5 chapters. Chapter-I deals with the background of the study, objectives, scope, methodology and limitation of the study. Chapter-II highlight the conceptual issues of environmental planning and management developed by the United Nations Environmental Programme (UNEP) and United Nations Centre for Human Settlements (Habitat) in 1987. Chapter-III deals with the existing environmental condition of Bangladesh with special reference to adverse effect of industrial plants. Chapter-IV an attempt has been made to examine adverse impact of Tannery Industries at

## Chapter-II

### Conceptual Framework of Environmental Planning and Management (EPM) for industrial pollution

#### Introduction

Over the past few decades, concepts relating to environmental planning and management have developed considerably. Initially, emphasis was on the understanding the main interaction between human settlements and the natural environment. Subsequently economic planning has been integrated with environmental issues which has been termed by World Development Report in 1992 as "without adequate environmental protection, economic development will be undermined, and without development only environmental protection would fail". As these concerns are now being pursued by the environmental scientists throughout world, theoretical information became much more relevant and widespread than array of environmental planning approaches available to solve the specific problems. In recent years the above idea has been maturing to an understanding that sustainable urban as well as rural development is dependent upon sustainable use of environmental resources on the one hand and upon minimization of vulnerability of human settlements to natural hazards on the other.

2. Conceptual ideas developed so far on the environmental planning and management issues mainly emphasised on the approaches and procedures rather than particular model for solutions. They offered theoretical guidelines for institutionalizing

loop to indicate the cyclical process that characterises a full fudged environmental planning and management routine. Task 1 and 2 deal with preparatory activity needed for getting environmental planning and management (EPM) activity started. The principle elements of the EPM efforts are represented by the tasks 3,4 and 5. Task 6 refers to a monitoring and evaluation process aimed at improving and exploding EPM incrementally as experience is gained. Again a feedback loop is shown to symbolize this process.

#### Process of Environmental Planning Management(EPM)

The ultimate aim of EPM is to strengthen the overall management process of a given metropolitan city. It accompolishes this by .

- i) identifying study areas development opportunities and constraints inherent in environmental resources and hazards.
- ii) providing environmentally based inputs into metropolitan planning management policy making.
- iii) yielding critical information for determining the best measures for implementing policies and .
- iv) providing a basis for coordinating public and private interest involved in various aspects of pollution management.

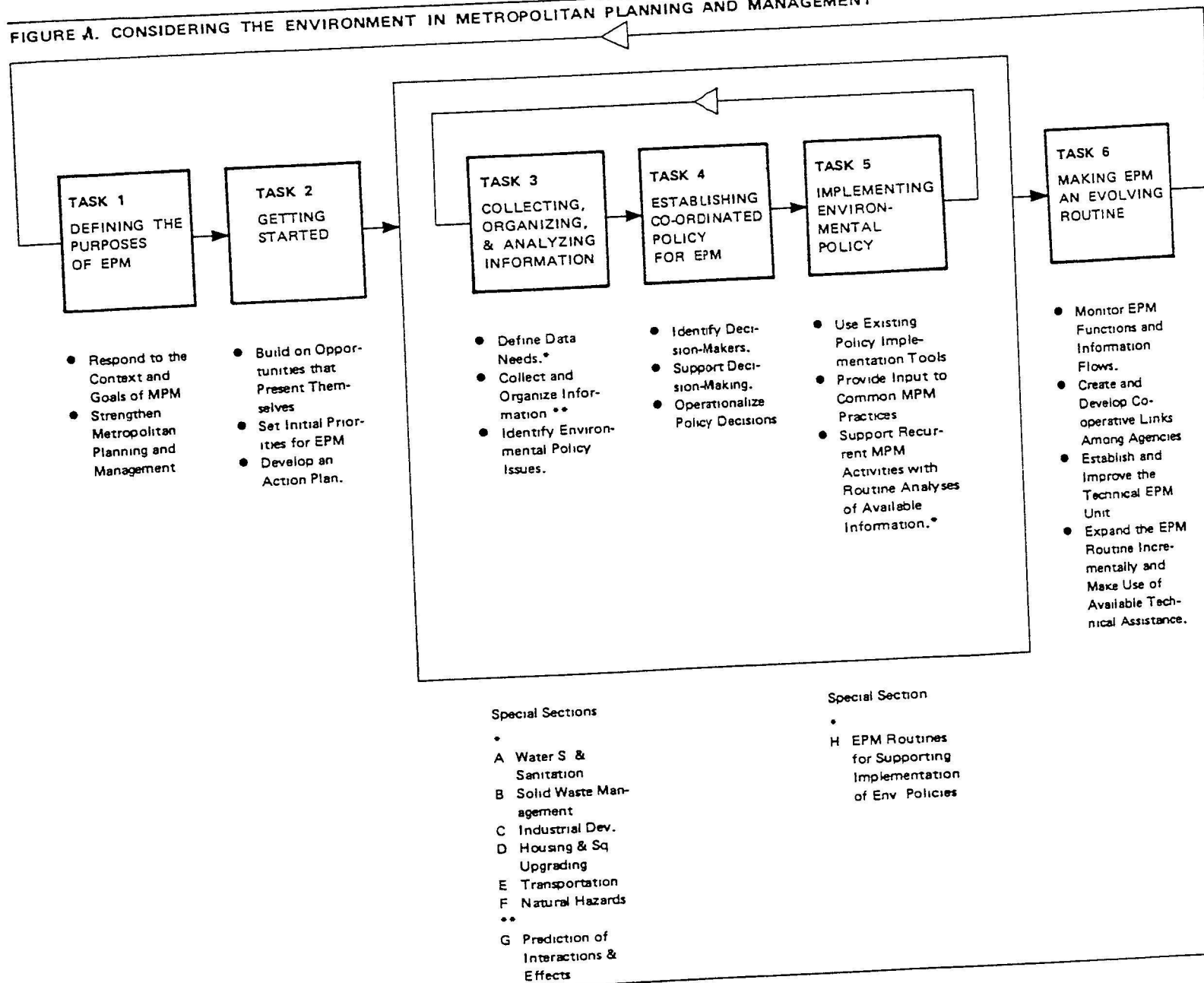
In order to achieve these goals of study area, several specific features must be disigned into it. These features are essential for undertaking a comprehensive study on



- b) Mechanisms for resolving divergent interest and mandates among metropolitan agencies and jurisdictions, so that environmental policies and implementation of related development programmes can be coordinated,
- c) A continuous process of policy analysis and refinement that anticipates the interactions between metropolitan development activities and environmental systems, analyses past policy, decisions, review and evaluates policy implementation measures, and prevents policy from being piecemeal and implicitly through project activity.

Having established the above concept and general orientation for environmental planning and management and having defined its specific purposes for any particular metropolitan area, it is necessary to formulate an appropriate conceptual framework for the present study. Figure-B is an attempt to formulate theoretical concept on the basis of this conceptual idea the present study has been carried out.

FIGURE A. CONSIDERING THE ENVIRONMENT IN METROPOLITAN PLANNING AND MANAGEMENT



## Chapter-III

### Environmental Condition of Bangladesh

#### Introduction:

1. Industrial pollution is one of the most serious environmental problem. It occurs when industrial waste, toxic chemicals and metals etc are contaminated by water, air and soil.
  2. As mentioned earlier that the state of the environment in Bangladesh is not worse as compared to the developed and industrialised countries of the World, and the magnitude of pollution in Bangladesh to-day is indeed insignificant. The industrial pollution has not assumed alarming dimensions due to the slow pace of industrial growth and the very limited sphere of industrial dynamics. But the condition of the environment is rapidly deteriorating specially in the urban areas as a result of unplanned growth of industrial units. Environmental experts estimate that the extent of pollution so far happened in Bangladesh; industry alone has contributed more than 50 percent of the damage. The continuous decline in the state of environment can also be attributed to the explosive growth of population, rapid urbanization and other socio-economic and geo-physical factors.
  3. Bangladesh now contains about 30,000 industrial units of which about 24,000 are small and cottage industries. Prior to independence most industrial activities were production of jute,
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mills, (BSS 1989). A map of Bangladesh shown here indicating the major industrial location.

This section attempts to identify the environmental conditions of Bangladesh with special reference to the adverse effects of industrial plant.

5. A survey was conducted by the Department of Environment (DOE) in 1988 to identify the numbers of major polluting units in Bangladesh. This survey declared 878 polluting industries and strongly recommended to install treatment plants or adopt measures for pollution control over a period of next three years. The following numbers and types of units were identified :-

Table-1.1

| Sl. No. | Name of Unit               | Number |
|---------|----------------------------|--------|
| 1.      | Textiles                   | 298    |
| 2.      | Tanneries                  | 176    |
| 3.      | Pharmaceutical & Chemicals | 166    |
| 4.      | Jute industries            | 92     |
| 5.      | Iron and Steel mills       | 57     |
| 6.      | Rubber & Plastic Goods     | 34     |
| 7.      | Pesticides & Insectocides  | 23     |
| 8.      | Suger Mills                | 16     |
| 9.      | Distilleries               | 3      |
| 10.     | Cement Factories           | 3      |
| 11.     | Fertilizers Plants         | 5      |
| 12.     | Paper & Pulp Industries    | 5      |
|         |                            | 878    |

6. Department of Environment (DOE) recently estimates that total number of industries generating waste water from production operations has risen to over 1200 cubic gallons. However DOE has not had capability to account for the actual quantities of specific contaminants produced by these industries, except in case of few large units of critical concern.

7. It may be mentioned that, with few exceptions almost all industries are not equipped with pollution control systems. Only one tannery known to treat its waste water effluent in the effective manner. Of the five urea plants operation, two are equipped with ammonia stripping units. None of the pulp and paper mills have mean for waste water treatment facilities, though one, the karnaphuly mill neutralizes its effluents and also recovers pulp from an in-plant stream prior to discharge. All the industries discharging industrial waste water over 300 in total, within the Dhaka municipality lack any means for providing treatment.

8. Regarding air emissions, with exception of pollution reductions available through adjustment of air-to -feed ratios and boiler and furnace, and those required for product recovery, there are no installed controls. Many of the industries contributing large amount of air emissions are simply too preventive to be equipped with air emissions control devices without significant process modification including large number of brick kilns and some of the steel reprocessing and re-rolling units.

Chittagong. Any individual inhaling the emitted fumes is prone to suffer from respiratory and lung infections. A large number of cases have been reported already by medical authorities in that region. The liquid discharge in to the Karnaphuli river has been found to contain specific pollutants as well. The investigation by the parent corporation of the fertilizer complexes attributed the following causes of air pollution from the TSP plant:

- a) Frequent power failure,
- b) Corrosion and
- c) The Sulphuric acid plant releasing unabsorbed acidic gases during start up operations.

The TSP management took steps in this direction and they opined that a long exhaust stack pipe of 150 ft. height was adequate to make the effluent gases become infinitesimally dilute

iii) Underground water pollution by insecticide industry at Tejgaon, Dhaka.

The underground water (deep tube well) at Tejgaon industrial area was contaminated as a result of secret dumping of condemned insecticide by the Insecticide industry. After investigation of EPC the authority has been asked to remove the pollutant and not to discharge the untreated pollutants in future. Consequently upon the insecticide contamination, portable water of Dhaka WASA was rendered unfit for drinking purpose in certain locations at Tejgaon. Constant pumping out of the polluted underground water from the dug well of the insecticide factory has been done. Dhaka WASA has been advised to watch the activities of the factory with

SO<sub>2</sub> and SO<sub>3</sub> gases, which are then precipitated with the rain water as very dilute sulphuric acid. One of the minor chemical industries in Joydebpore is under threat of closure if sufficient pollution control measures are not taken.

vi) Pollution from Caustic Soda and Mercury:

In Bangladesh, caustic soda and chlorine are produced by the electrolysis of brine, using mercury cell. Any loss of mercury from the washing operation or otherwise finds it's way first to the Karnaphuli river. In addition to that there has been report of mercury leakage from DDT and other chemical factories. Mercury is one of the most toxic DDT which causes serious irreversible neurological damage .

vii) Pollution from the Karnaphuli Paper Mill (KPM) and Rayon Complex:

The Karnaphuli Paper Mill and Rayon Complex happens to discharge their effluent directly into the river Karnaphuli. The discharged effluent that amount to more than 10-12 million gallons of untreated waste, is dumped almost daily into the above river. This results in mortality of fish in the river which was stretched of five miles downstream and one mile upstream from the mill.

A detailed investigation was carried out in order to study the type of effluent and to find out easy and economic methods to treat and dispose of the effluent. In the study it was found out that the KPM and Rayon Complex discharge had the following characteristic features.

whose wastes are directly dumped into the Buriganga. In the downstream region, the industries are dispersed mainly along the Dhaka-Narayangonj road which runs by the side of the Buriganga river. There are about twenty four (24) large & medium industries situated on the river Buriganga.

All these waste chemicals from tanneries are either disposed along with the liquid effluent or they find their way into the river after washing operations. The wastes from tanneries were found to be extremely harmful to the aquatic organisms since they contain high concentration of chromium compounds. It was found that the wastes from tanneries include both organic and inorganic chemicals which were degradable and could also undergo chemical changes. These compounds decompose and consume dissolved oxygen causing oxygen sags. After an oxygen sag is created the decomposition process goes in anaerobically and consequently gives rise to a decreased quantum of available dissolved oxygen and also pungent odour in air emit. Quite consistently therefore, fishes were rarely found to inhabit this stretch of the Buriganga.

A total of 176 tannery units are operating in the Hazaribagh region. They were, in most cases found to discharge their effluent into the adjacent Buriganga river<sup>10</sup>. The water pollution control project (WPCP), surveyed in fairly deep details the characteristic features of these tanneries considering their environmental ramification and the results have been incorporated in the WPCP Year book.



discharged every day. In the above sections an attempt has been made to highlight the overall condition of industrial pollution of Bangladesh. If we compare the extent and magnitude of pollution amongst this sector above, the tannery industry would probably be ranked highest polluter and as a major threat to urban residents.

### Tannery Industries in Bangladesh: Historical Development

12. Before analysing the data of the present study, a brief historical development of the tannery industries in Bangladesh is discussed in the following paragraphs.

13. Pre-independence period As in other parts of Indian sub-continent, leather has been tanned by indigenous method in Bangladesh for thousands of years. Subsequently this indigeneous method with little modification emerged as vegetable tanned method which is still in use for the manufacture of sole and industrial leather.

Following the invention of chrome tanning in the Western Europe and the North America about one hundred years ago this industry was revolutionized all over the world. In Bangladesh, first two leather plants were established at Hozaribagh, Dhaka in 1946. However, manufacturing of leather was mainly dominated by vegetable tanned method for use in the local market as well as for export to Pakistan, Turkey and Iran where it was in high demand for the manufacturing of Kabuli chappals.

Table-1.2

## Growth of Registered Tannery Industries

| Year    | No. of Plants | Annual Growth |         |
|---------|---------------|---------------|---------|
|         |               | No.           | Percent |
| 1980-81 | 135           | -             | -       |
| 1981-82 | 140           | 5             | 3.7     |
| 1982-83 | 146           | 6             | 4.3     |
| 1983-84 | 150           | 4             | 2.7     |
| 1984-85 | 151           | 1             | 0.7     |
| 1985-86 | 160           | 11            | 7.3     |
| 1986-87 | 175           | 15            | 9.4     |
| 1987-88 | 210           | 25            | 14.9    |

Considering overall the importance of the in our national economy industry, the present study is an attempt to address the environmental impact of waste material discharge by the tannery of industries at Hazaribagh looking the issue from the residents point of view the and requested them to express and reveal adverse effect they encountered as result of the presence of tannery industries at their locality.

#### Rationale for selection of the area

17. As may be seen from the table below that more than three quarters of ten total number registered tannery industries are located at Hazaribagh. Dhaka City's map shown in Fig-B indicates the study area.

Existing Policies and legislatives of Environmental Protection and Management in Bangladesh.

Concern over the environmental protection and its management in Bangladesh was felt by the Government during the early period of 1970s after the Stockholm Conference on the Human Environment in 1972. Since then the importance of proper environment protection has been recognised and began to take a wider dimension. In 1977, the Government promulgated the "Environmental Pollution Control Ordinance" which continues to be the only effective legislation in respect of environmental protection till now.

This Ordinance provided for constitution sixteen member "Environment Pollution Control Board" and an "Environment Pollution Control Cell." The Board was to be the body to lay down policies for control, prevention and abatement of environmental pollution and to suggest measures for implementation of such policies.

With the recommendations of the Board, Government established a "Department of Environment and Pollution Control" (DEPC) in 1985. Subsequently the DEPC has been renamed and reconstituted as "Department of Environment" (DOE) and was placed under the newly formed "Ministry of Environment and Forest" in August 1989. The Government of Bangladesh and its administration declared 1990 as the "Year of Environment" and the 1990s as the "Decade of Environment." The establishment of an International Institute of Environmental Studies and Disaster Management

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Table-1.4

## Environmental Policies and their implementation strategies

| Sl.No. | Name of sectors                               | Number of Policies | Implementation Strategies |
|--------|-----------------------------------------------|--------------------|---------------------------|
| 1.     | Agriculture                                   | 5                  | 7                         |
| 2.     | Industries                                    | 5                  | 11                        |
| 3.     | Health & Family Planning                      | 5                  | 5                         |
| 4.     | Energy                                        | 6                  | 9                         |
| 5.     | Water Development, Flood Control & Irrigation | 7                  | 10                        |
| 6.     | Land Development                              | 4                  | 7                         |
| 7.     | Forest, Wild Animal & Biodiversity            | 6                  | 12                        |
| 8.     | Fisheries and Livestock                       | 4                  | 7                         |
| 9.     | Food                                          | 3                  | 5                         |
| 10.    | Coastal belt and Oceanic Environment          | 4                  | 8                         |
| 11.    | Communication and Transport                   | 3                  | 9                         |
| 12.    | Housing and Urbanization                      | 4                  | 7                         |
| 13.    | Population                                    | 4                  | 5                         |
| 14.    | Education and Mass Media                      | 5                  | 3                         |
| 15.    | Science and Technology Development            | 4                  | 4                         |
| Total  |                                               | 69                 | 119                       |

In addition government of Bangladesh passed several ordinances, policies and strategies, from time to time we have also inherited a number of environment-related legislations of other sectors from British period and also formulated a number of

There is a definite need to update and modification of these laws. Even in some cases fresh legislation are required for instance, the EPC ordinance of 1977 deals only with air and water pollution. It does not comprehensively cover the matter like landuse planning, disposal of potential pollutants and other socio-economic activities affecting water qualities. The law also does not specifically require clearance from department of environment before installation industrial units. It does not provide a framework of administrative mechanism and the means to restrict the discharge of effluents or the impacts of the residue of agrochemicals in the environments. The penalty for offences of this law has often been found inadequate and the procedures for enforcing the provisions of this laws are also not very clear and specific.

The other sectoral legislations also have their limitations and weakness. The Pesticide Rules of 1985 for instance do not incorporate the "Polluter Pay Principle" for damages arising out of the agro-chemicals.

With the view to eliminating the shortcoming of the existing environmental pollution related ordinances, acts and policies, there is a need to review and update laws as well as regulations for the protection of environment particularly pollution from industrilization.

Studies undertaken so far on the industries particularly on Tannery including the present one would presumably provide

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## Chapter-IV

### Analysis of the data and findings of the study

The present study is directed towards identifying the adverse effect of Tannery Industries of Hazaribagh ,Dhaka as a case study. Following sections of this chapter analysis the data collected from both secondary and primary sources on the study area. About 7.2 million sq. inches of leather is produced annually. This amount of leather is processed from some 10 million cows, buffaloes, goats and sheep. Approximately 85 percent numbering about 8.5 million pieces of hides and skins weighing about 25,000 tons are produced annually from some 176 tanneries at Hazaribagh alone in a area measuring about 25 hectares within Dhaka city.

As every stage of the production process of the tannery industries are directly and indirectly responsible for polluting the environment in a number of ways. It is therefore reasonable to highlight all the stages of preparation process in order to understand detail mechanism of pollution in the whole production system. The analysis of the collected data is presented in the following sections covering .-

- A) Raw materials preparation,
- B) Discharge of pollutants and
- C) Impact of tanneries pollutants in the environment.

#### A) Preparation of Raw Materials

The main raw materials used in the tannery industries are

a) Blue Stage

This stage undergo a number operations in which the leather will be ready for the first phase of the finishing stage i.e. up to crust leather. These are.-

i) Soaking:

Soaking is usually done in pits, paddle or wooden drums. Pits are mostly used for dried hides while paddles drums are used for wet salted hides. Soaking not only removes dung, blood and soil from the hides, but also improves the penetration capability of chemicals into hides and skins. Wetting agents are also added in this stage to open the structure of the hides and accelerate water penetration.

ii) Cutting into sides

After soaking hides and skins are generally cut into two parts called sides. They are processed either as a whole or trimmed uneven portion to make desire size.

iii) Liming

This operation is aimed at removing the hair from the hides and loosening fat flesh etc. Soaking and liming can be done simultaneously by simply changing chemicals or water rather than using two different vessels.

iv) Fleshing

This is the process of removing the connected tissue which

## ii) Splitting

Thick hides and skins will be split by a splitting machine. The top layer is called the grain part and the bottom layer, the flesh part. Both parts are split according to the need of products to be made by it.

## iii) Shaving

Thickness of splits is adjusted in a machine fitted with shaving blades which reduce the substance of the leather according to the desired thickness.

## iv) Retanning, Fat Liquoring and Dyeing

This is also a combined process in which the semi-finished leather has a final tanning and further treatment. Before the final shade is given to the leather, additional properties such as perspiration resistance are added by retanning with vegetable or synthetic tanning material. As chrome tanned leathers are acidic they are neutralized before dyeing. Fats are also used for softening the leather, a process known as fat-liquoring. It is possible to combine neutralization, retanning, fat-liquoring and dyeing in one process. Wooden or plastic drums are mostly used to carry out this operation.

## v) Setting out

As in sammying this process involves the removal of moisture content. Creases are also removed at this stage.



flexible and this operation is known as staking. Two techniques are normally used for this process which is usually followed by a final drying or "airing off" operation.

#### ix) Sorting

At the end of crust-stage, the leather will be sorted on the basis of grain quality.

#### C) Ready to Finish

This is the final stage of the finishing operation which also undergo following stages :-

##### i) Buffing Dusting

Where the grain of leather appears defective its surface is sand-papered to remove such defects. This operation is done by a buffing machine which is followed by dusting to clear the dust from the surface.

##### ii) Seasoning

At this stage the leather surface is given a pigment solution called "binders". The binder is applied by a machine or by a hand process. This treatment parts a coating on the leather which is followed by drying.

##### iii) Embossing or Plating and Spraying

In this sub-process a press is given to look the

In the dry season the discharges meander through the flood plains contaminating ground water, destroying rice fields and creating both an eye-sore and obnoxious odours. In the wet season, the waste water discharges into riverine water body contaminates the surrounding water and discoloured.

The nature and broad characteristics of the tannery industries effluents/discharges can be assessed from the range of values of the samples, analysed by Department of Environment during January to June 1991. Following table shows the quality of water on the basis of important parameter.

Table-2.1

Water quality informations for the Tannery Industries

| Parameter                           | Ranges of values | Permissible limit for discharge. |
|-------------------------------------|------------------|----------------------------------|
| BOD(Biochemical Oxygen Demand) mg/l | 120-3300         | 30                               |
| COD(Chemical Oxygen Demand),mg/l    | 187-13200        | 250                              |
| Chromium,mg/l                       | 5- 40            | 1                                |
| E C (Umho.cm)<br>3                  | 268-4320         | 175                              |
| *Flow m /day -4000 (estimated)      |                  |                                  |

Sources : DOE, 1992

It may be mentioned that the analysis of the above table was done from the sample taken from main drains in Hazribagh area.

Further, a feasibility study on "Proper collection and safe disposal of the waste waters from Hazaribagh , was undertaken by

Table-2.2

## Waste Water Characteristics and Variation of Tannery Industries

| Parameter                             | Range of variation |
|---------------------------------------|--------------------|
| H                                     |                    |
| P                                     | 4 to 10            |
| Total Alkalinity as Caco <sub>3</sub> | 185 to 6,475 mg/l  |
| Electrical Conductivity               | 1,670-93 U-Mohs/cm |
| Chloride                              | 175-18,000 mg/l    |
| Chromium                              | 3-3,800 mg/l       |
| COD                                   | 120-9,600 mg/l     |
| Amonia Nitrogen mg/l                  | 12-1970 mg/l       |

It can be seen from the above table that the tanneries in Hazaribagh have been discharging highly toxic effluent to receiving bodies. Variation in waste water characteristics occurs primarily because of the batch process operation in the tanneries. Report also confirmed that adverse impact of untreated waste water and other solid waste from tanneries into Buriganga river can not continue indefinitely.

### C. MPACT OF TANNERIES IN THE ENVIRONMENT

It is very difficult to make an evaluation of the overall impact in the environment caused by the combined discharge in a single study. Because it is very important to remember that no pollutants act by itself. It acts and manifest itself as a part of a complex of several other agents. The final effect of a pollutant in the environment is the result of many factors acting

- a) Socio-economic and demographic profile
- b) Awareness about environmental pollution and
- c) Impact of environmental pollution
- a) Socio-Economic and Demographic Profile

Respondent's socio-economic background and demographic features are not only very important variable for gathering and collecting unbiased information of a given study, but also provides an opportunity to share ideas and opinion to the researcher with that of respondents in a wider scale and broader perspective. Moreover, this information is useful in further analysis of the data which is presented in two following chapters.

### Age

Age is one of the very important and key aspect of any opinion survey. In the present study an attempt has been made to find out age distribution of respondents of the sample covered. The entire sample study area has been classified into three age categories. The first category includes respondents from 25 to 35 years, the second , category ranges from the age of 36 to 55 and the third category includes persons from the age of 56 and above. The distribution of the respondents age category is given in the table 2.3

Table 2.4

## Educational Level of the respondents

| Level     | Frequency | Percentage |
|-----------|-----------|------------|
| Primary   | 23        | 15.23      |
| Secondary | 82        | 54.31      |
| Tertiary  | 46        | 30.46      |
| Total     | 151       | 100%       |

The distribution of the respondents according to their educational level indicates that all respondents in the present study are literate. Table 1.4 shows that majority of respondents come in the category of secondary level i.e. 54.31 percent followed by tertiary level 30.46 percent and primary level 15.23 percent. It is clear from the table 1.2 that secondary level of respondents are numerically dominate in the present study. It was also found that the respondents who had higher the educational background had good idea about environment and its pollution.

#### Occupational Structure

In the present study, occupational structure has also been taken into consideration. The study of occupational structure is very important factor from ecological point of view.

Table 2.6

Ownership pattern and range of living

| Range of living<br>period | Trequency | Percentage | Living status |                  |                |                  |
|---------------------------|-----------|------------|---------------|------------------|----------------|------------------|
|                           |           |            | Own<br>house  | Perent.<br>house | Hired<br>house | Perent.<br>house |
| 3 to 5 years              | 82        | 54.30      | 5             | 3.31             | 79             | 52.32            |
| 6 to 9 "                  | 67        | 44.34      | 8             | 5.29             | 31             | 20.53            |
| 10 to above               | 2         | 1.36       | 3             | 1.98             | 25             | 16.55            |
| Total                     | 151       | 100%       | 16            | 10.54            | 135            | 89.40            |

Pattern and range of living period of the study area, from the above table it shows that majority of the respondents (54.30 percent) range of living periods are 3 to 5 years, while 44.34 percent of respondents range of living period are between 6 to 9 years and only 1.36 percent respondents are living range 10 years and above.

On the otherhand, overwhelming majority i.e. 89.40 percent of respondents are living in hire-house and only 10.58 percent of respondents are owner of the house. It is clear from the table that inspite of being owner of the house, majority of the house-owners do not prefer to live at the Hazaribagh because of aesthetic and hygenic reasons. House owners of this area are living different areas rather than study area. They are not only push to live apart from their houses but also pull to live away from their houses.

### Type of pollution

Residential areas with in the tannery industries are being contaminated in various ways as a result of the effluents discharged by the tanneries. Residents were also asked to express their opinion about the pollution occurred in the locality. Based on their response and opinion, contamination was divides into three broad categories such as a) water b) air and c) soil. The distribution of respondents opinion according to there categories is presented in the table 2.8

Types of contamination and distribution

Table 2.8

| Type of opllution | Frequency | percent |
|-------------------|-----------|---------|
| Water             | 151       | 100%    |
| Air               | 151       | 100%    |
| Soil              | 97        | 46.25%  |

Table 2.8 above gives a clear picture of the respondents idea about the types of pollution being occurred. Overwhelming majority e.g. 100 pervcent of respondents considered that water is polluted by the effluent discharged from the tanneries. On the other hand almost equal number of respondents passed their opinion that air was also polluted and obnoxious odour was responsible for the contaminated effluent discharged by the tanneries. While more than forty percent i.e. 44.19 percent of respondents were also mentioned that soil was

correlation between education and awareness about environmental pollution. All these respondents who were unaware about environmental pollution were from the illiterate and low education background. On the other hand, about 13 percent of the respondents who were fully aware about environmental pollution belonged to the high educated group. This clearly demonstrates that education is not only a very important factor which broaden the mental capabilities and horizon of a person, but also provides an opportunity to equip him with the contemporary situation of the environment he lives.

In order to probe this issue further the role of educational score were assigned to the families of the respondents in accordance with the educational level of the family members. The preceding table 2.9 also demonstrates that two third of persons who were fully aware about environmental pollution belonged to high score category. While about 3.31 percent were unaware about environmental pollution. This finding further indicates that education play a significant role in the awareness of individuals attitude about environment. The respondents from better educated families were better informed about environment. The chi-square value also shows a very close relationship between this two variables.

#### c) Impact of Environmental Pollution

Untreated industrial waste and effluent often creates localized very severe environmental problems which not only



The Table 2.10 shows that 39.07 percent of the respondents were of the view that untreated waste and effluent of tannery industries were responsible for highly pollution of the surrounding environment. While about half of the respondents i.e. 47.89 percent considered that the area was polluted by the industries and only 13.43 percent were of the opinion that the area was moderately polluted by the industries. It is important to note that no one is found amongst the respondents who considered that the area was not polluted by the industries.

#### Disease due to Environmental Pollution

It is well known fact that environmental pollution has an adverse effect on health and hygiene of the inhabitants of the area. In order to find out how far the respondents were aware of this fact, they were asked to mention the disease which are commonly found to suffer among the residents and likely to spread due to this environmental pollution. The responses are shown in Table 2.11

Table 2.11

#### Spread of diseases due to environmental pollution

| Name of diseases    | No of Frequency | Percent |
|---------------------|-----------------|---------|
| Respiratory Disease | 46              | 30.48   |
| Bronchitis          | 35              | 23.17   |
| Headache            | 16              | 10.59   |
| Dyscentry           | 19              | 12.58   |
| Alergy              | 15              | 9.93    |
| Skin Diseases       | 20              | 13.24   |
| Total               | 151             | 100%    |

iii) Coloured compound and iv) inorganic salts when discharged into Buriganga river and other canals as a liquid waste not only reduce the level of dissolved oxygen but also seriously affect the aquatic life.

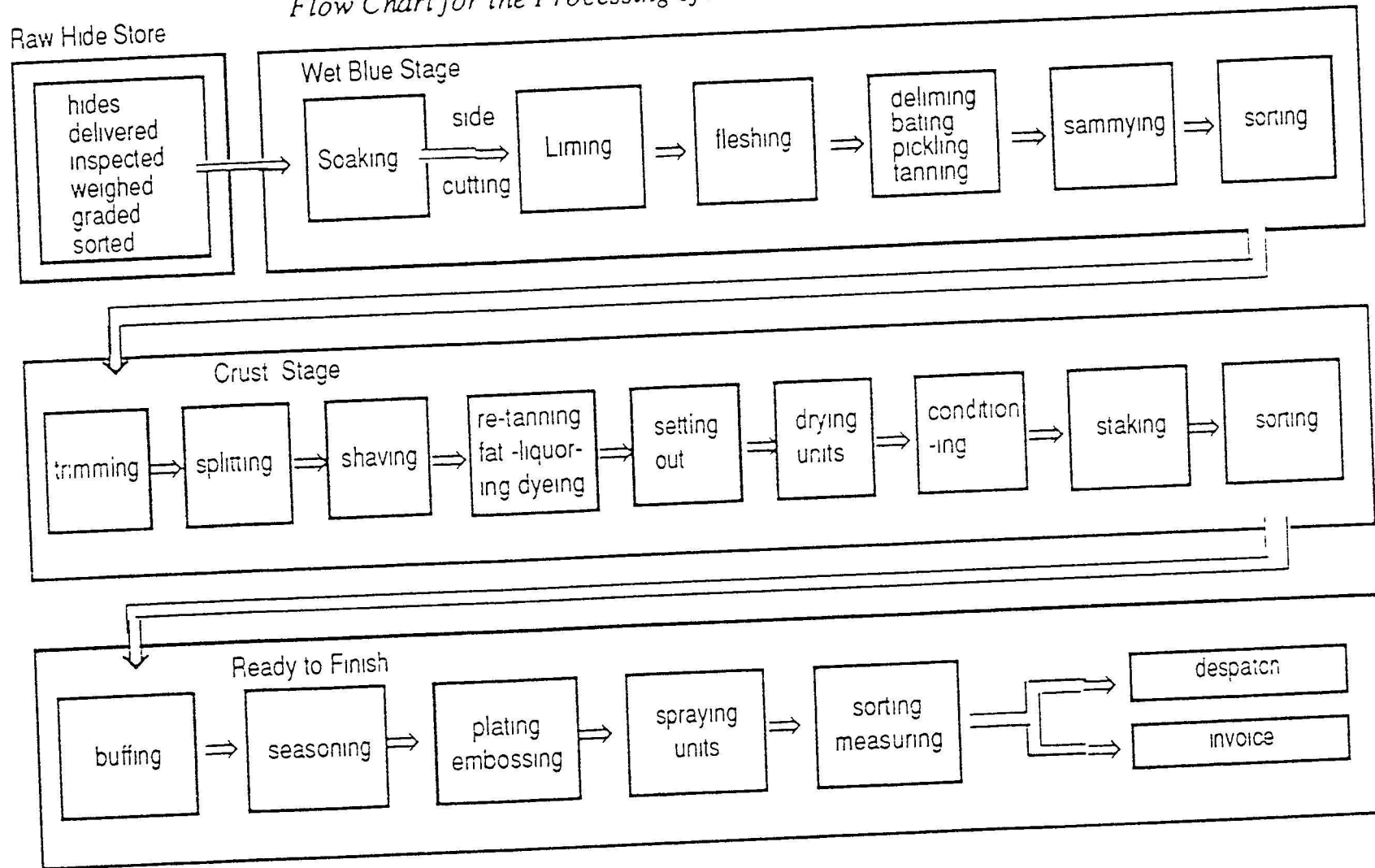
Pollution can also lead to the degradation of amenities in terms of aesthetic and recreational values.

Beside the above impacts, the study further attempts, to explore the condition of surrounding ecosystem, which has been collected by asking questions to the environmental professionals. Following are the opinions they have made about the degradation of natural support system.

- 1) Slowly bio-degradable material in the tanneries effluent are usually coloured and therefore reduce the light penetration and biological activity in the water.
- 2) Toxic material with liquid coloured compound also seriously affect the drinking water.
- 3) Living organisms absorbing the slowly bio-degradable compound cause biological effects.
- 4) Toxic liquor most acutely hamper the living environment of fisheries.
- 5) Salt containing nitrogen and phosphorus act as a fertilizers in the nearby receiving water body and cause excessive growth of the living plants.
- 6) The larger particles of chrome liquor, residual organic material, cooking and bleaching chemicals and in-organic

Figure C

*Flow Chart for the Processing of Raw Hides to Finished Leather*



## CHAPTER V

### SUMMARY AND CONCLUSION

The main objectives of the present study has been i) to find out the major causes of industrial pollution in Bangladesh, and ii) to identify the impacts of this pollution with special reference to Tannery Industries of Hazaribagh, Dhaka as a case study and iii) present the clear options for mitigation of the impacts for sustainable environmental development.

The main finding listed below based on the secondary and primary data of the present study. Moreover in drawing policy implications and conclusion author viewed the issues of pollution in the context of wider industry specific perspective.

#### Main Findings

- 1) Almost all the Industries in Bangladesh are discharged massive untreated solid and liquid materials of both organic and inorganic wastes into water and to the neighbouring areas of the respective plants, thereby contaminates the water and its ecosystem. This situation can be conceived from the following examples of the present study. There are 176 tannery industries at Hazaribagh, Dhaka, each tannery on a average discharges 2.5 gallons of liquid waste daily. Each day all these tanneries discharge about 2.5 thousand cubic liters of liquid wastes. These liquid find their ways through drain and canals into Buriganga river and other

d) Overwhelming majority of the respondents were living in hired-house and very insignificant respondents were owner. Inspite of being owner of the house, majority of them do not prefer to live at the study area, because of aesthetic and hygenic reason. They are not only push to live apart from own their houses but also pull to live away from their houses.

4. Based on the extent of awareness about environmental pollution the responents have been classified into three categories e.g.(i) Unaware (ii) partially aware and (iii) Fully aware. A majority of the respondents are placed in the fully aware category.

5. The knowledge of awareness is correlated with other variables like education, occupation and income are significant correlated with awareness regarding environmental pollution. Respondents belonging to higher education and income are better aware about the environmental pollution.

6. With regard to the awareness about specific pollutants, important finding are as follows.

- a) A large majority of the respondents considered that keeping raw hides in the godown without any treatment for two to three months for tanning purpose is not only unhygenic but also responsible for spreading obnoxious odour.
- b) Most of the respondents viewed that keeping lossening fat, separated flesh, blood and soil from hides in the open space

- e) Bio-degradable material also affect quality of drinking water and living organism may cause biological effect.

The above findings of environmental impacts can broadly be divided into two types based on the extent and gravity of the effects over a period of time such as i) short term reversible effect and ii) long term irrevesible effect.

The short term effect: Causing rapidly reversible disturbance in the aquatic ecosystems. These effects might not been considered most adverse ecological effect compared with the long term effects. This group of effects are as follows:-

- Increased the respiratory disease in families,
- Sustances with high acute toxicity,
- Decreased lung functions among the children,
- Light absorbing substances,
- pH changing substances,
- Oxygen consuming substances,
- Substances stimulating aquatic growth.
- Excess in acute respiratory disease compared to unexposed group.

The long term effects: Which cause irrevesible disturbance in the ecosystem. Among the substances which may cause long term effects, following are mentionable:

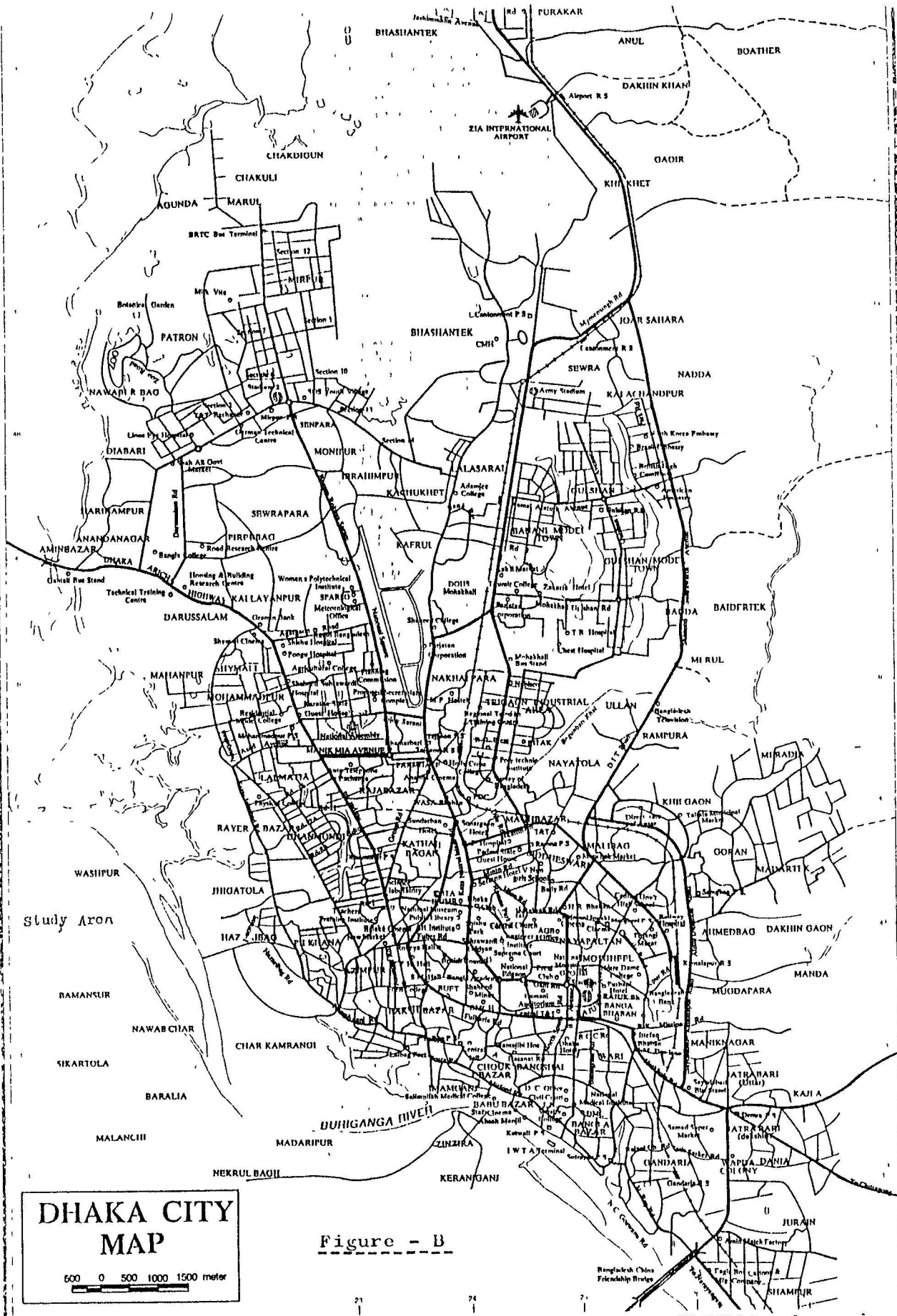
- Aggravation of symptoms of respiratory related illness in children and elderly,
- Presistant substances which have geno-toxic properties and thereby present risks to consumers of drinking water contaminated by these substances.

- a) Promoting indigenous pollution-abatement technology and creating design capabilities.
- b) Recognition of the industries maintaining the best environment protection by honouring them with national and departmental awards.
- c) Make provision to declare Best Industries of the year to those industries maintaining effective industrial pollution control programme.
- d) There should be stringent penalty system for non-compliance in conformity with the "Polluter Pay Principle."
- e) Existing industrial units which have not carried out modifications or corrective measures for pollution control suggested by DOE, and they should severely dealt with and their licences be cancelled after the expiry of time-limit.

### Conclusion

Bangladesh being an agrarian country, the pace of her industrial development has recently been accelerated. There are about 30,000 industrial units amongst which 6,500 large and medium size operating in the country. These industries are discharging huge amount of solid and liquid waste and adversely polluting the surrounding environment and ecosystem.

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বাংলাদেশ লোক প্রশাসন প্রশিক্ষণ কেন্দ্র  
সাভার, ঢাকা

(Questionnaire of the Study)

শিল্পের মাধ্যমে বাংলাদেশের পরিবেশ দূষণ . হাজারীবাগ (ঢাকা) চাঁমড়া  
শিল্পের উপর একটি ঘটনা সমীক্ষা

প্রশ্নমালা

(এই জরিপে সংগৃহীত তথ্যাবলী কেন্দ্রের একটি গবেষণা কর্মে ব্যবহৃত হবে ।  
অন্যে উত্তরদাতার নাম প্রকাশ করা হবে না এবং প্রদত্ত তথ্যাবলী কেবলমাত্র এই  
গবেষণাকর্মের মধ্যে সীমিত থাকবে ।)

প্রথম অংশ :

- ১। উদ্ভাতার নাম (প্রচিহ্নক)
- ২। ক) বয়স..... খ) বিবাহিত গ) অবিবাহিত  
ঘ) পুরুষ/মহিলা ।
- ৩। শিক্ষাগত যোগ্যতা .....
- ৪। পেশা.....
- ৫। পরিবারের মোট সদস্য সংখ্যা .....
- ৬। তাঁদের বয়সের বিবরণ .

| ১-১০ | ১১-২০ | ২১-৩০ | ৩১-৪০ | ৪১-৫০ | ৫১-৬০ | ৬১-৭০ | ৭০ উদ্দেশ্য |
|------|-------|-------|-------|-------|-------|-------|-------------|
|------|-------|-------|-------|-------|-------|-------|-------------|

৭। আপনি এই মহল্লায় সহায়ী/ভাড়াটে হিসাবে বসবাস করছেন ।  
সহায়ী..... ভাড়াটে .....

৮। কত বৎসর হলো বসবাস করছেন ? ৩ ৫ বৎসর ৬-৯ বৎসর এবং ১০ বৎসরের  
উদ্দেশ্য ।

দ্বিতীয় অংশ :

৯। আপনি যে চাঁমড়া শিল্প এলাকায় বসবাস করছেন, আপনি কি জানেন এই  
ধরনের শিল্প যে এলাকায় থাকে, সে এলাকায় প্রাকৃতিক পরিবেশ নানানভাবে  
দূষিত হয়ে থাকে ? হ্যাঁ/না । উত্তর হ্যাঁ হলে আপনার চাবপাশের  
প্রকৃতিগতভাবে পরিবেশ দূষণ কব প্রকার বর্ণে আপনি জানেন ?

ক) মাটি দূষণ খ) পানি দূষণ গ) বায়ু দূষণ এবং ঘ) শব্দ দূষণ

মাটি দূষণ :

১০। চাঁমড়া শিল্পের জন্যে আপনার এলাকায় মাটি যদি দূষিত হয় তাহলে এর  
কারণগুলো উল্লেখ করুন .

- ৯। দূৰ্গন্ধ
- ১০। বিযাক্ত তরল বজ্য পদার্থ
- ১১। ইত্যাদি।

#### তৃতীয় অংশ :

১। পূর্বে প্রসঙ্গলোকের আলোকে দেখা যাচ্ছে যে সকল কাৰণে একটি প্রাকৃতিক পৰিবেশ দূষিত হয়ে থাকে তাব সবগুলোই আপনাব এলাকায় বিদ্যমান রয়েছে। এতাবস্থায় এখানকার পৰিবেশ সমস্ত বাখাব জন্য ব্যক্তিগত বা যৌথভাবে কোমবলপ প্রচেষ্টা জড়ীতে/বর্তমানে চালিয়েছেন/চালাচ্ছেন কি হ্যাঁ/না। উত্তর হ্যাঁ হলে কি ধবণের প্রচেষ্টা চালিয়েছেন/চালাচ্ছেন জনগ্রহণপূর্বক উল্লেখ করুন :

- ১)
- ২)
- ৩)

২। ধরুন আপনাব প্রচেষ্টা ব্যর্থ হলো তাহলে কি আপনি সারা জীবন এই অবস্থায় এখানেই বসবাস করতে চান না অন্যত্র সবে বসবাস করতে চান ? হ্যাঁ/না। উত্তর হ্যাঁ হলে কোন এলাকায় যেতে চান, সেই এলাকাব নাম উল্লেখ করুন প্লিজ।

৩। যদি এখানে থাকতে চান তাহলে পৰিবেশ দূষণমুক্ত কবতে আপনাব সুপাবিশ সমূহ উল্লেখ করুন।

১) চামড়া শিল্প এলাকা সমূহ এখান থেকে মহবের বাইরে স্থাপনের ব্যবস্থা করা।

২) প্রতিটি চামড়া শিল্প জরুরী ভিত্তিতে রাকখানার বজ্য পৰিবেশন ব্যবস্থা গড়ে তোলা

৩) পৰিবেশ ব্যবস্থা গড়ে তুলতে ব্যর্থ হলে চামড়া শিল্প মালিকের কারখানা বন্ধ কবে দেয়াব ব্যবস্থা নেয়া।

৪) পৰিবেশ দূষণের কারণ হতে পারে এমন যে কোন শিল্প আবাদিক তথা পৌব এলাকায় বর্তমানে সরিয়ে ফেলা এবং ভবিষ্যতে না হতে পারে তাব উপর নিষেধাজ্ঞা জারী করা।

৫) চামড়া শিল্প আবাদিক এলাকায় থাকলে পৰিবেশ দূষণের ফলে উল্লত এলাকাবাসীব যে সকল নারীক ও মানসিক ব্যাধী ও অসুবিধা হতে পারে সে সম্পর্কে সচেতনতা গড়ে তোলা।

৬) পৰিবেশ সংরক্ষণ বিষয়ে প্রচারের পত্রার পুস্তিকা ইত্যাদি বেডিও/টেলিভিশনে প্রচারে ব্যবস্থা করা।

৭) সঠিক রক্ষাবোল ও নিয়মিত ফিটনেস সার্টিফিকেটের মাধ্যমে চামড়া শিল্প কারখানাগুলো থেকে নিগত বজ্য পদার্থ সমূহ বোদ্ধ করা।

৮) পৌব এলাকাবীন সকল প্রকাব বজ্যের মিবাপদ অপসারণ নিশ্চিত করা।

৯) এই মহল্লাব সকল স্তরের জনসাদারণেব জন্য বিশুদ্ধ ও মিবাপদ খাবার পানি সরবরাহ নিশ্চিত করা।

গ) উত্তর হ্যাঁ হলে প্রতিক্রিয়া/অসুবিধা তথ্যাদি অনুগ্রহপূর্বক বলুন .

| পরিবারের সদস্য | কি ধরনের অসুবিধা |        | বোনের নাম ও সময় |
|----------------|------------------|--------|------------------|
|                | পারিবারিক        | মানসিক |                  |
| সদস্য-১        |                  |        |                  |
| সদস্য-২        |                  |        |                  |
| সদস্য-৩        |                  |        |                  |
| সদস্য-৪        |                  |        |                  |
| সদস্য-৫        |                  |        |                  |
| সদস্য-৬        |                  |        |                  |
| সদস্য-৭        |                  |        |                  |

ঘ) পূর্বোক্ত বর্ণনানুসারে পরিবারের যে সকল সদস্যের এই রোগের জন্য চিকিৎসকের পরামর্শ গ্রহণ করেছেন কি না : হ্যাঁ/না

ঙ) উত্তর হ্যাঁ হলে এদের বর্তমান অবস্থা সম্পর্কে সংক্ষেপে বলুন :

৫। চাঁমড়া শিল্পের ক্ষতিকর এবং ভাল দিকের উপর আপনার মন্তব্য সংক্ষেপে উল্লেখ করুন পিঙ্গা :