



**MSc Programme in Urban Environmental Management**

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**TOWARDS IMPROVED INSTITUTIONAL FRAMEWORK FOR INDUSTRIAL  
WASTEWATER MANAGEMENT IN YOGYAKARTA, INDONESIA:  
CASE STUDIES OF TOFU HOME INDUSTRIES & SARI HUSADA, LTD.**

**by**

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**Dedicated to My Father & Mother with Love.....**

## ABSTRACT

As a developing country rich in natural resources, Indonesia is undergoing a transformation from an agricultural society to an industrial society. Such transformation has been characterised by rapid urbanisation and the conversion of productive agricultural land for settlements and industries. Development of industries is of prime importance as Indonesia is experiencing a prolonged economic crisis and the increasing demand for export of non oil commodities. Issues of Sustainable Development become crucial for the long term sustenance of water resources functioning as one of the industrial resource base. In conjunction to water resource management, the control of industrial effluent discharge plays a major role in sustaining the quantity & quality of Java's surfacewater & groundwater resources. The increasing competition over decreasing water supply, the rapid growth of small & medium industries lacking adequate pollution control, and the spreading of haphazard effluent disposal among new industries pose the need for a research on the adequacy & effectiveness of the institutional framework for wastewater management.

The research aims to analyse the adequacy of present institutional arrangements and the effectiveness of available instruments & tools for the management of industrial effluent discharge. The importance of such analysis is to generate feasible options for improving present pollution control instruments, tools & organizational measures. The concept of sustainable development, the ecological modernization theory and the positive sum gain principle function as the underlying base for approaching issues of effluent pollution control. Organizational & Policy Implementation Theories, and issues related to multiple resource users & multiple management entities provide the direction to enquire into necessary key attributes for improved institutional arrangements. Data collection methods employed include auditing, network analysis, interviews, discussions & consultations, and review of ongoing government programs.

Analysis of present institutional framework for industrial effluent management shows : (1) Inadequate preconditions for facilitating environmental care, (2) Lack of adequacy within present institutional arrangements for inducing coordination & cooperation, and (3) Lack of effectiveness of instruments and tools for pollution control among small & medium industries. Inadequate preconditions are attributed to the absence of a well functioning financial market; high interest and inflation rate; slow technological development; lack of environmental awareness among the general public; and the predominant use of prescriptive measures over market instruments and communications. Constraints to adequate institutional arrangements for promoting coordination & cooperation include inconsistent regulatory & economic instruments due to their sectoral nature; sectoral & vertical oriented approach to public administration; limited authority to the lead coordinating agency *BAPEDALDA* to enforce regulations and control program funding; and inadequate condition to promote public participation in monitoring & enforcement. The lack of effectiveness of presents tools & instruments for pollution control is attributed the absence of instrument differentiation adapted to the nature & size of different industries; cumbersome permits, taxes & retributions; lack of government effort to provide routine guidance and consultations on pollution prevention measures; and limited collaboration with other actors (Industrial Associations, universities & NGOs) for implementing programs and seeking donor agencies.

Feasible options for improving present institutional framework encompass : (1) Necessary preconditions for facilitating corporate environmental care, (2) Important institutional attributes for improving present institutional arrangements, and (3) Enhanced tools & instruments for increasing their effectiveness to control pollution. To facilitate corporate environmental care it is necessary to provide a framework in which industries can pursue their own goals; to emphasize the role of industries as a driving force while ensuring effective communication & implementing market oriented strategies; to facilitate information, assistance and guidance; and to adapt measures to local conditions. Proposed measures for improving the adequacy of present institutional arrangements include establishing authorised agencies for ensuring policy consistency; providing the lead impact management coordinating agency adequate authority to enforce regulation and to control funding; establishing a management objective & an integrated-comprehensive management plan at the provincial level; and providing the interagency coordination committee adequate jurisdictions for horizontal & vertical coordination. To enhance present tools & instruments, it is necessary to differentiate regulatory & economic instruments for the different industries; reduce & provide clear legal directives over function, target groups & objectives of environmental permits & retributions; and promote incentives & sanctions for the development of estates.

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## LIST OF ACRONYMS AND ABBREVIATIONS

AMDAL	Environmental Impact Assessment
ANDAL	Analysis of Environmental Impact (ANDAL is restricted to a detailed assessment report for new projects. AMDAL refers to the entire EIA process including the ANDAL)
BAPPEDA Tingkat I	Provincial Planning Board
BAPPEDA Tingkat II	Local (District) Planning Board
BAPEDAL	National Environmental Impact Management Agency
BAPEDALDA Tingkat I	Provincial Environmental Impact Management Agency
BAPEDALDA Tingkat II	Municipal Environmental Impact Management Agency
BAPPENAS	National Development Planning Board
BKPM	Provincial Investment Coordinating Board
BOD	Biological Oxygen Demand
Bupati	The District Head
Camat	The Sub-District Head
COD	Chemical Oxygen Demand
Depkes	Provincial Department of Public Health
Depperindag	Provincial Chamber of Commerce & Industry
DPA	Supreme Advisory Council (SAC)
DPR	People's Representative Council (PRC)
DPRD Tingkat I	Provincial People's Representative Council (PPRC)
DPRD Tingkat II	Municipal / District People's Representative Council
EIA	Environmental Impact Assessment
EMDI	Environmental Management Development in Indonesia
FOG	Fat, Oil & Grease
GOI	Government of Indonesia
HO	Hinder Ordinansi (Nuisance Permit)
KADIN	Provincial Entrepreneurial Association
KLH	State Ministry for Population & Environment
LIPPI	Indonesian Institute of Science
MPR	People's Consultative Assembly (PCA)

<b>NGO</b>	<b>Non Government Organisations</b>
<b>PEIA</b>	<b>Procedure for Environmental Impact Assessment</b>
<b>PEL</b>	<b>Preliminary Environmental Evaluation</b>
<b>PIL</b>	<b>Preliminary Environmental Information</b>
<b>PIP</b>	<b>Preliminary Project Information</b>
<b>PROKASIH</b>	<b>National &amp; Provincial Clean River Program</b>
<b>RKL</b>	<b>Environmental Management Plan</b>
<b>RPL</b>	<b>Environmental Monitoring Plan</b>
<b>SEL</b>	<b>Environmental Evaluation Study</b>
<b>SEMDAL</b>	<b>Evaluation of Environmental Impacts</b>
<b>SUPERKASIH</b>	<b>Agreement for Industrial Pollution Control &amp; Surface Water Management</b>
<b>TOR</b>	<b>Terms of Reference</b>
<b>WALHI</b>	<b>Wahana Lingkungan (An umbrella NGO dealing with environmental issues &amp; problems)</b>

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# CHAPTER I

## INTRODUCTION & RESEARCH FORMULATION

### 1.1 Background and Context

Indonesia's economic growth has been characterized by the growing diversification in agricultural and industrial commodities followed by increasing urbanization and conversion of productive agricultural land for other uses such as settlements and industries. Development of industries is of prime importance to the economy as Indonesia experiences the continuing economic recession and the more competitive world trade market, coupled with the growing and expanding demand by the developed countries for Indonesia's non-oil export commodities to be competitive. Economic factors leading to the country's changing economic policy such as the initiation of free market economy and the privatization of the previously public based sectors pose an ever increasing need for sustainable consumption of resources, especially water.

Issues of water resource management in quantity and quality will be increasingly important in Java as the island holds 60% of the population, 70% of irrigated agriculture and 75% of the total industrial activities in the country (World Bank, 1994). The rapid growth of commerce and industry must be supported with optimal allocation, rational distribution, and efficient use of water. An equally important aspect of water management which receives less attention is the adequate and efficient disposal of industrial wastewater discharge. Inadequate institutional arrangements and instruments for pollution control, absence of infrastructure facilities and limited industrial resource base all contribute to the lack of effectiveness in industrial pollution control. Effluents are discharged to land, surface water and public sewerage with little or no prior treatment. Major problems involves the management of nutrients as well as organic and toxic substances from liquid waste discharged to surface water. Discharge of effluent often reaches a point where it has an irreversible effect towards the immediate natural environment. The same environment simultaneously provides the basis and the limitations of economic growth, therefore it is of prime importance to internalize external environmental costs into the production and consumption process for achieving long term sustainability.



The new politics of pollution hold that the change in global environmental policy involves transformation from conventional policy style in the form of direct legislation and control to other schemes such as the use of economic instruments and public participation. The role of government has also been transformed from that of a regulator to a facilitator for corporate environmental management. Within the context of industrial wastewater management, the study focuses on the institutional arrangements for promoting coordination and integration (the macro context of environmental management), the mix of available and possible forms of instruments and tools for industrial pollution control (legal, economic & social instruments, end of pipe, WEP, EMS), and the relation between the government, industries and the general public (the micro context of environmental management).

The practice of wastewater management by Sari Husada Ltd (a large scale milk formula industry) & tofu home industries in Yogyakarta are compared and contrasted to analyse the effectiveness of present pollution control tools and instruments when applied to the two different cases. The discussion will also focus on the extent and causes of previous compliant and non compliant behavior of the industries above. Such discussion is used to formulate feasible combination of tools and instruments for effective industrial pollution control. Institutional frameworks, instruments, tools and organizational arrangements are discussed on the local and regional level for problem analysis purposes. In the case of absence of institutionalization at the local & regional level, an analysis of institutionalization at the national level is performed.

Tofu home industries and Sari Husada Ltd are taken as case studies due to their contribution in generating revenues for the province, in providing jobs for the labor force, and in changing the natural environment across time and space. The case studies involving Sari Husada Ltd and small tofu home industries function as a model for problem-solution analysis of industrial wastewater management in other Indonesian cities.

## **1.2 Problem Definition**

Within the context of industrial wastewater management, Yogyakarta's past experience shows heavy reliance on direct legislation and control. Failures arise as reliance on conventional policy style requires extensive resources, lengthy litigation and



complex institutional framework. Transformation to other schemes such as the use of economic instruments, voluntary instruments and public disclosure gradually emerge alongside conventional methods. However, efficiency and effectiveness of the transformed policy style and institutional framework are still disputable as existing and new industries continuously dispose untreated or minimally treated wastewater effluent to surface water and soil. Such is especially the case with small home industries whereby adequate infrastructure facilities and industrial resource base are very limiting.

The lack of industrial effluent control & management by industries results in the following consequences eminent in the city of Yogyakarta :

- ◆ Direct discharge of untreated or minimally treated waste water effluent by large industries to the city's rivers (Code, Winongo & Gadjah Wong) and streams causing irrigation water and river water used by downstream & upstream Code community to be polluted with organic & inorganic materials as well as heavy metals;
- ◆ Discharge of toxic industrial wastewater into public sewers leads to sewer deterioration in the form of corrosion, malfunctioning of sewage pumping stations and overloading of public waste water treatment in the Regency of Bantul;
- ◆ Illegal disposal of biodegradable & non biodegradable waste water into the storm drainage system leads to drainage stoppage and system deterioration;
- ◆ Waves of haphazard disposal of untreated waste water are spreading to new medium and small scale industries whose potential for generating toxic waste is even greater;
- ◆ Increasing competition among industries and households over decreasing supply of uncontaminated water results in increasing lack of water conservation.

### **1.3 Objectives of the Research**

To provide a sound problem-solution analysis and seek a 'win-win' solution with the least opportunity cost, the need for reliable & multifaceted research is inevitable. To arrive at such solutions, the general research objectives are formulated as follows :

- ◆ To reduce pollution and decrease environmental deterioration by promoting sustainable development through the stand still principle;
- ◆ To increase public welfare by safeguarding their health against industrial pollution;
- ◆ To ensure a sustainable industrial development.

The general research objectives above lead to the more specific goals of the study, i.e. :

- ◆ To analyze the adequacy and effectiveness of the present institutional framework for industrial effluent management at the provincial and municipal level;
- ◆ To examine the possibility of providing industries with mechanisms that will promote recycling and source reduction of wastewater effluent.

#### **1.4 Research Questions**

The questions which function as a guide to identify problems, analyze current institutional capacity, generate solutions and propose recommendations for achievement of the proposed objectives are as follow :

- (1) How have other means of pollution control (economic instruments, public pressure, technical assistance) been adopted in conjunction with the production- consumption process ?
- (2) How adequate & effective is the present institutional framework for industrial wastewater management ?
- (3) What management tools & instruments are available to strengthen the institutional framework ? (Tools : conventional pollution control, waste prevention, cleaner production & clean technology. Instruments : permits & standards, economic incentives and sanctions, covenants, etc)
- (4) How can the tools and instruments be combined appropriately to promote incentives & new managing options whereby lack of financing and resources are available ?

#### **1.5 Definitions of Terminology**

- ◆ *Environmental Impact Assessment (EIA)* : Impact assessment of present conditions or of proposed mitigation measures on the immediate physical and social environment.
- ◆ *Sustainable Development* : Meeting the needs of the present without compromising the ability of the future generation to meet their own needs.
- ◆ *Ecological Modernization* : A pollution control principle which implements cleaner production and consumption. Included in Ecological Modernization are principles such as restructuring of the production-consumption process, waste minimization and recycling.

- ♦ *Clean Technology & Production* : The use of technology to minimize the quantity and quality of pollutant through a change in the production and consumption process resulting in the change of volume and emission principles.
- ♦ *Conventional Technology* : Principles which reduce emissions and waste streams without changing the consumption and production patterns.
- ♦ *Institutional Framework* : The framework of planning and action comprising of the policy, regulatory and operational function. Policy establishes the basis for the organization, and the regulatory and operational actions. Regulatory functions involve the monitoring and enforcement of laws dealing with various environmental objectives. Operational function include planning, implementation and the organizational management of institutional arrangements.
- ♦ *Economic Instruments* : Instruments used to control pollution by means of economic incentives and sanctions (emission charges, tradable permits, subsidies).

## **1.6 Delimitation**

The study is confined to Sari Husada Ltd and tofu home industries in the Urban Agglomeration of Yogyakarta. Only large and small private industries are discussed, as opposed to industries owned by the state.

The study solely covers industrial effluent discharge. Air, soil and noise pollution will not be covered. In addition, solid waste and municipal or domestic effluent management will not be covered..

In the presence of provincial and local legislation & regulations, environmental policy at the national policy level will not be discussed as the focus is on pollution legislation and policing at the decentralized level. Compliant and non compliant behavior of other industries in Yogyakarta are excluded from the report. The research focuses on the adequacy and effectiveness of government policies, thus corporate environmental management policies and effort are only discussed in its relation to corporate participation and compliance for achieving government policy objectives.

The geographical area of the study is limited to the metropolitan area and the Urban Agglomeration of Yogyakarta in the Yogyakarta Special Province, Indonesia.

The depth and extent of industrial wastewater pollution is analyzed based on available (secondary) industrial effluent data.

## **1.7 Data Collection Methods**

Time and resource limitations limit the case study analysis to Sari Husada Ltd, tofu home industries, the local & regional government as actors in charge of management policies, and the affected public. The data collection method is used for analysing the adequacy and effectiveness of present institutional framework through the analysis of present institutional arrangements and the analysis of industrial participation in achieving government policy objectives. To obtain data and information required for the problem-solution analysis, the following data collection methods are implemented.

### **1.7.1 Primary Data**

#### ***Auditing***

Auditing is applied for the production process, and the input and output of materials from Sari Husada Ltd and the tofu home industries. Directly observing the production, consumption and wastewater disposal & treatment methods functions to synchronize the interviews performed with existing methods. Through such auditing the most suitable option for the company (conventional pollution control, waste & emission prevention, cleaner production, clean technology, EMS) can be generated and chosen. A minimum of 45 tofu producers are interviewed for the purpose of data collection regarding pollution control measures taken. Information on the quantity and quality of Sari Husada & the tofu industries' effluent discharge will also be obtained through previous research conducted by universities (Gadjah Mada University & AKPRIND) and the company itself.

#### ***Network Analysis***

Network analysis is used to analyze the interaction among actors who influence the environmental performance of Sari Husada and the tofu home industries. Institutional network analysis of the different agencies responsible for policy formulation and implementation is conducted in order to analyse the adequacy of present institutional arrangements. Industrial network analysis is performed to generate options regarding the feasible combination of tools and instruments for effective pollution control. Network analysis of Sari Husada Ltd and of institutions within the government body leads to the ultimate goal of improving industrial wastewater management in the greater Yogyakarta

vicinity. The criteria are cost saving, little investment, incentive based, and effective and efficient framework in industrial pollution control.

### ***Interviews***

Interviews are conducted with different actors involved in the management of industrial effluent discharge. The actors are individuals from sectoral and semi-autonomous government agencies involved in the production and policy network, as well as tofu producers and representatives from Sari Husada, Ltd. Community members who are affected by industrial effluent discharge are also interviewed to enquire into the relation between the industries and their surrounding communities.

Actors from sectoral agencies include individuals from The Chamber of Commerce (*Depperindag*) and the Department of Public Health (*Depkes*), whereas actors from semi-autonomous government agencies include individuals from *BKPM*, *BAPPEDA Tingkat I* and *BAPEDALDA Tingkat I*. Inquiries forwarded to government officials involve the procedures & mechanisms for promoting coordination and integration, and the effectiveness of such mechanisms to structure the policy formulation and implementation processes. In addition, the head of *KADIN* is also interviewed to acquire information concerning its role in promoting corporate environmental management.

The tofu producers and representatives from Sari Husada (the manager of the production & production process and the head of the environmental directory board) are interviewed concerning corporate motives & measures for securing the environment, constraints & opportunities for adequate environmental management, and company perspectives on disclosure and public participation for achieving long term sustainability. Forty five tofu producers are taken as samples from four different locations, each with its unique ownership system and mode of production (see Chapter IV).

Forty eight community members are taken as samples to enquire into the effectiveness of industrial pollution control measures and the relation between the industries and their surrounding communities. The sampling process ceases when no new additional information is generated.



### ***Discussions and Consultations***

Experts from the following institutions are consulted in conjunction with corporate environmental management and institutional framework for industrial pollution control :

- The Urban & Regional Planning Department, Gadjah Mada University, Yogyakarta, Indonesia;
- United Nations Development Project – PARUL (Poverty Alleviation through Urban Rural Linkages), Jakarta, Indonesia.

#### **1.7.2 Secondary Data**

Secondary data is collected by :

- Reviewing documents from library (Gadjah Mada University, Wageningen University and IHS), government offices, institutions involved in pollution control and research, and industrial associations. Such documents are important for general knowledge concerning environmental policy formulation at the national level within the Ministry of Population & Environment and the National Planning Board. Literature review gathered encompass definitions, concepts and theoretical review related to sustainable development, public administration, Ecological Modernization, clean technology & production, and economic & regulatory Instruments for pollution prevention and control;
- Studying various reports prepared for the purpose of implementing policies related to industrial wastewater management;
  - \* *PROKASIH* Report prepared by the Regional Environmental Impact Management Agency.
  - \* Production Quantity and EMS & *RKL / RPL* report of Sari Husada Ltd.
  - \* Analysis of tofu industries' effluent quality and feasible options for WEP.
- Reviewing ongoing programs for sustainable development in Yogyakarta.
  - \* The *PROKASIH* Clean River Program for large & medium industries.
  - \* WEP & public health programs for tofu producers initiated by the sectoral agencies (*Depperindag & Depkes*).

#### **1.8 Structure of the Report**

The report is divided into seven chapters. The first chapter consists of the background and context, problem definition, objectives, research questions and



methodology for data collection. The second chapter covers the conceptual framework and literature review with its concepts, definitions and state of the art. The third chapter provides an illustration of the public administration system in Indonesia, shows the extent of industrial pollution problems in Yogyakarta, and discusses government initiatives to promote coordination, integration and pollution control. Chapter four covers the case development, including the case description and the samples taken. Chapter five, analysis, presents the findings regarding the adequacy of present institutional arrangements for promoting coordination and integration, and the findings regarding the effectiveness of instruments and tools for industrial pollution control. Chapter six, synthesis, discusses present constraints within the institutional framework and explores possible strategies for overcoming such constraints. The last chapter, chapter seven, consists of the conclusions, summary of recommendations and the suggestions for further research.



Pipe for the Discharge of Tofu Industry Effluent & Pollution of the Winongo River

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Introduction

Protecting the environment from pollution has become one of the central issues in the policy and politics of industrial and post industrial societies. The accident in the nuclear power station in Chernobyl-Ukraine, the 1988 algae blooms and seal deaths in the North Sea states, the Exxon Valdez oil spill and the incidence of "red tides" in Hong Kong highlighted the inadequacy of many national systems of environmental protection and monitoring. The environmental damage done by such disasters is relatively less compared to the mostly unnoticed cumulative damage done by numerous small polluters in various countries of the world. The threat posed by global warming and ozone layer depletion are only some of the effects of the cumulative damages. The dispersal of chemicals in the environment, issues of water supply for drinking and production purposes, and the management of toxic waste have ceased to be the concerns of a few specialists or committed ecologists, and instead are widely discussed and argued about in the media, between citizens and their representatives, and among governments in national and international negotiations (Weale, 1992).

The most obvious feature of such environmental problem is that they concern public good. Weale defines a public good as one in which each individual's consumption leads to no subtraction from any other individual's consumption of that good (Weale, 1992). A public good is both non rival and non excludable, therefore the protection from pollution and environmental degradation always potentially involves a dilemma of collective action. Industry has an impact on the natural environment through the entire cycle of raw material exploration and extraction, transformation into products, energy consumption, waste generation, and use and disposal of the products by the final consumer. The argument that the physical limits to growth can arise from either resource depletion or inability of the ecosystem to absorb additional waste still dominates today's policy debates, and are the basis for environmental management challenges facing today's world.

Three successive waves of environmental concern highlight the global history of ecological awareness and development. In the beginning of the twentieth century the first wave of environmental concern focused on the degradation of natural landscapes due to increasing industrialization and the expansion of cities. During the first phase the emphasis was on demand for the protection of valuable nature areas against the devastating influence of rapid industrialization and urbanization (Mol, 1995). The most significant achievement of the first wave was the expanding environmental legislation and planning, and the rapid increase in the number and membership of environmental NGOs.

The second wave in 1960s and 1970s with its *Report to the Club of Rome* implemented a large number of measures to combat environmental destruction in most of the challenged institutions of modernity (those which play a key role in industrial structure, economic relations and technological developments). However so, such measures "were not deterred from their devotion to a narrowly defined economic progress" (Mol, 1995).

The third wave of environmental concern promoted environment-induced transformation of the institutional order for the ecological restructuring of industrial society. The 1980s saw the environment as moving from the periphery to the center of the social development of industrial societies with its notion of "ecological restructuring of industrial societies". The principles used in the 1960s by Western countries were mainly traditional regulatory framework also referred to as command and control. As pollution problems increased with industrialization, other pollution control strategies were developed and adopted in line with industrial growth, technological and economic development.

Chapter II focuses on the strategies that are developed and used in today's corporate environmental management for ecological restructuring of the industrial society. The chapter also discusses issues and constraints related to public administration and policy implementation. Issues and constraints related to public administration and policy implementation function to identify factors that are required for promoting integration, coordination and collaboration within the policy network.



## **2.2 Directions to Control Industrial Pollution**

The direction to control industrial pollution has evolved from conventional end of pipe treatment and command & control instruments to the reorganization of the social order within industrialised societies. The notion of ecological restructuring of the industrial society gave rise to the concepts of sustainable development and positive sum gain, as well as the theory concerning ecological modernization. The concepts and theory pointed that the institutionalized degradation of nature to promote growth and development constrained the simultaneous approach to achieving prosperity and maintaining the ecological balance. The new directions for industrial pollution control do not consider environmental care contradictory to industrial growth and development, but rather as a factor complementing industrial growth as the environment provides the sustenance base for the production-consumption process. Such new directions include the concept of sustainable development, the new thinking concerning the politics of pollution and the theory concerning ecological modernization.

### **2.2.1 Sustainable Development**

The Brundtland Commission labeled sustainable development in its 1987 report *Our Common Future* as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Allenby, 1994). Therefore sustainable development involves the concern for the interests of future generations. A second feature of sustainability is the question of substitutability between natural resources (including the environment) and human-made capital, including human capital itself. The Brundtland report foresees "the possibility for a new era of economic growth, one that must be based on policies that sustain and expand the environmental resource base" (Allenby, 1994). Such view gives emphasis to the natural environment, but yet sees preservation of the nature as entirely consistent with economic growth. A question involving sustainable development which is being pondered upon is whether compensatory investments in other forms of capital (human knowledge, technique & social organizations) are possible and are undertaken to protect the welfare of future generations.

Sustainable development suggests that environmental management may be referred to as measures taken to balance interactions between society and the natural

environment. The measures are of two kinds : (1) To ensure the balanced use of the natural resources so as to prevent overuse, or to replenish those that have been exhausted to levels threatening their existence; (2) To avoid introduction of any substances or energy which might immediately or in the future cause adverse effects to the natural ecosystem and human being in general (Ojwang, 1993).

The capacity of the natural environment to absorb the pressures of modern human activities such as industries may be limited, and the need for sustainable development and use of natural resources and careful environmental protection is necessary. Therefore the principles of sustainability must be applied to all proposed developments, land use, manufacturing processes, waste generation and disposal. Sustainability cannot be attained in a standstill state, but rather achieved through a process of change in which material exploration and use, investments, technological innovation and institutional changes are in constant balance with present and future needs (Allenby, 1994)

Sustainable development is dependent upon stimulating mechanisms for the government, industries and the public in conjunction with the combining implementation of the different pollution control principles, backed up by the right combination of instruments and supportive institutional framework. Such pollution control principles, instruments and institutional framework depend on the country's policies, level of technology, social and economic development, education, public awareness, industries' motives and many other elements.

### **2.2.2 The New Politics of Pollution**

The shortcomings in the environmental framework strategies of the 1970s left many problems of pollution unresolved or growing worse. Environmental indicators show a widespread increase in pollution and an associated deterioration in environmental quality. There lies significant and long term social and economic development that are contributing to the increase in pollution. Moreover a series of events have occurred in the early 1980s which shows the inadequacy of previous policy and institutional framework response to problems of pollution (Allenby, 1994). However, there is no reason to assume an automatic and unbreakable link between economic growth and environmental degradation. By the end of the 1980s emissions of sulphur dioxide from OECD countries



fell by 25 %, and the link between sulphur dioxide emission and GDP has been broken in countries such as Japan, France, Germany, the UK and Italy (OECD, 1995).

According to the conventional thinking of the 1970s, the pursuit of environmental policy and framework involved a zero-sum game between protection of the environment and a reduction in the costs of economic production : more of one necessarily means less of the other. The sharing of this assumption meant that less attention was necessarily given to creating and nurturing policy institutions whose task it was to find positive-sum solutions to policy and framework problems, by which both environmental protection and economic prosperity could be secured (Weale, 1992). Such assumption was revoked by the third wave of environmentalism, coupled with its principles that the task of the public authorities is not so much to secure the right rules of the game, but rather to worry about the attitudes that players bring to the game.

The persistence and intensification of old pollution problems and the growth of new issues provided the rise for a new politics of pollution to emerge in the 1980s. The new politics reflected the new patterns of interaction within the relevant policy communities and new intellectual thinking and ideological conceptions of the policy or framework issues. Policy and framework were established by representatives of producers, members of the bureaucracy and a limited range of politicians. By the 1980s a much wider range of actors (consumer groups and community organizations) came to be represented in the process. One of the reasons why the policy community was able to incorporate new groups and environmental activists was that they were able to demonstrate technical competence, both in the way that they were able to challenge the premises of policy or institutional framework, and in the way they were able to exploit the political opportunity structures that were open to them (Weale, 1992).

Regulation by legal and administrative instruments is no longer a mechanical matter in which the state plays the role of providing appropriate incentives for compliance. Internalization of externalities as well as finance is important as opportunities arise not between business and the environment, but between progressive environmentally aware business on one hand and short term profit takers on the other. Moreover, consumer behavior becomes important such that the role of the government is not to provide for the existing customer demands and preferences, but rather to provide

support and encouragement of environmentally friendly behavior. The positive sum trade gained through the incorporating of varied sets of interests with competing and different interpretations is encompassed within the ecological modernization theory, a product of the 1970's failure to encompass institutional restructuring on the macro and corporate level.

### **2.2.3 Ecological Modernization**

The concept of ecological modernization stands for a major transformation in modern society, an ecological transformation of the industrialization process into a direction in which the maintenance of the sustenance base can be guaranteed. Ecological modernization implies the possibility of overcoming environmental crisis through the institutions of modernity aiming at modernizing modernity by repairing the structural design flaw in the institutionalized destruction of nature (Mol, 1995). In the context of institutional restructuring of the industrial system, ecological modernization theory focuses on the modification of the production - consumption process in accordance with legitimate ecological criteria. A first essential element of ecological modernization is the emphasis on technological transformations and change. It highlights the shift from traditional first-generation end of pipe or clean up technologies towards second generation environmental technologies geared for clean production processes and products. A second essential element of ecological modernization is the introduction of economic concepts, mechanisms and principles directed at protecting the environment.

The industry and government are moving beyond pollution prevention to incorporate environmental concerns throughout the life cycle of a product from extraction of raw materials to waste disposal. Therefore, in order to come up with a comprehensive strategy that will interact all the stages of the entire cycle, and integrate both economic and environmental concern in the cycle, matching of the whole societal systems is inevitable. Four societal systems have been distinguished (Huber, 1991) : these systems are made up of the realm of technology, natural sciences and manpower : The ordinatorial dimension, containing particularly politics; the allocative dimensions which forms the market and finance realm; the normative realms comprising of laws and ethics; the semiotic dimension, a realm of belief, language and notions. It is important for ecological modernization and environmental policy to note the close interrelationships of these

subsystems in environmental strategies if success is to be achieved. Introducing environmental policy and framework depending on scarcity, renouncement and bureaucratic intervention cannot function, but rather on the concept of competitive market economy and the modern state.

In multi-producer systems, efforts are being made to optimize material flows and integrate the life cycles of diverse products to limit impact to the environment : and industrial development is being planned in such a manner that, waste from one industry becomes raw materials to another, thus reducing the introduction of pollutants to the environmental media : the concept also referred to as industrial complexing (Nemerow, 1995).

The concept of ecological modernization offers less adverse effects on the environment, reduced enforcement costs, reduced industrial production and compliance fees, and media and public participation. In the research the question whether the West's experience with ecological modernization are of much use for Indonesia's corporate environmental management will be discussed.

### **2.3 Actors in the Management of Industrial Effluent Discharge**

The management of industrial effluent discharge involves an intertwined network between the government, industries and the general public. Although different actors assume different roles, the success of policy formulation and implementation rests upon the effectiveness of coordinating mechanisms within and between the different actors. Such coordinating mechanisms should function to promote integration, cooperation and collaboration between the different actors. Before discussing the coordinating mechanisms required for integration, cooperation and collaboration, it is important to understand the roles of the different actors in the management of industrial effluent discharge. Section 2.3 functions to illustrate the roles of the government, industries and the general public.

#### **2.3.1 The Roles of the Government and Industries**

The relation between the state and the industry along with its policy network plays a crucial role in the process of environmental management and protection. Government intervention is required for the administration of legal matters and for the conservation of natural resources which are of public interest. Such collective goods

should be protected and preserved for everyone's needs across time and space. The enacting of laws by the government serves to protect such goods through the use of instruments to intervene in environmental matters. The government has the legal duty to develop an environmental policy and to consider the environmental implications of public operations, policies and strategies. Industries have an obligation to operate within the laws as prescribed. Environmental protection strategy can be successfully implemented when appropriate organizational, technological and economic measures are applied (Mintzberg, 1989).

In the past industries have relied on add on technology when concerned with compliance efforts. However, as waste generation and abundance in type increased and cross media effects became apparent, potential future liability, competitive advantage, company public image, market and public pressure and other factors are forcing industries to innovate and adopt other means of efficient and cost effective pollution control (Allenby, 1994).

An important concept in the institutional framework for corporate environmental management is the "self regulation" concept. Due to transformation in basic social institutions, characteristics in industrial sector such as standardization, maximization and centralization are evolving into de-standardization, de-maximization and de-centralization. Such transformation creates the assumption that not only the government can bring about changes, but other actors are capable as well. Thus the interaction of authorities, institutions, business community and citizens is influencing the promotion and set up of the self regulation system (Weale, 1992). Covenants, product certification, technology innovations are some examples of the above. Implementation of such strategies require conducive circumstances and corporate based policies that will support company initiatives. For ideological reasons the government must rely on cooperative relations when dealing with industries. At the same time, however, the willingness of businesses or sections of an industry to accept the authority of the state along with its legitimacy are relevant factors. Such is a complex power dependence emphasizing the formal power of the central government, but at the same time its dependence on those being regulated for effectively designing and implementing policy (Mol, 1995).

### **2.3.2 The Role of the Civil Society**

Requirements for public disclosure of industrial information concerning pollutants generated are another effective stimulus for industry to introduce cleaner production approaches. Reporting system in the form of public disclosure provides firms with an objective basis for comparing their environmental performance with that of their competitors (OECD, 1995). Public disclosure and discussion also functions as a stimulus as it provides pressure for firms to cut down and improve the quality of its emissions. Public disclosure requires the proactive role of the civil society as a precondition for implementation. The proactive role of public citizens can only be achieved in the presence of environmental awareness, knowledge and motivation among the citizens. Limitations to civil society's participation in public disclosure and discussion include:

- ◆ Lack of awareness, knowledge and motivation on behalf of the public;
- ◆ Difficulties for the public to identify the environmental hazards of cumulative pollution and environmental degradation;
- ◆ Lack of authority and opportunity for the public to fully participate in the public disclosure program and in the monitoring and enforcement programs.

## **2.4 Issues & Theories Related to Industrial Wastewater Management**

Analysis of the adequacy and effectiveness of industrial wastewater management require theories concerning public administration, as well as knowledge of issues related to multiple management entities and policy implementation.. Such theories and issues provide the basis to enquire into the mechanisms and factors required for improving coordination, cooperation and collaboration within and between the different actors. Improvement in coordination, cooperation and collaboration will ultimately lead to the increased adequacy & effectiveness of the management of industrial effluent discharge. Section 2.4 focuses on issues related to the management of multiple resource users and issues related to multiple management entities and policy implementation. Theories discussed include the Organization & Public Administration Theories and the Policy Implementation Theory.

### **2.4.1 Issues Related to Industrial Wastewater Management**

Industrial wastewater management activities can be stated as the initiation and operation of activities to direct & control the acquisition, transformation, distribution and



disposal of resources in a manner capable of sustaining long term development activities, with a minimum disruption of the physical, ecological and social processes (Clark, 1977; Sorensen et al, 1984).

Groundwater (as one of the resources for industrial activities) and surface water (as a medium for industrial effluent discharge) are characterized as the sum of several interrelated ecosystems which are vulnerable to human alteration, and as a biota in which multiple resource users are in existence and multiple management entities operate. Therefore, adequate & effective management of groundwater and surface water should address issues related to the interrelatedness of the ecosystems, and the complexity of resource users and managers. In addition, adequate & effective industrial wastewater management activities should be responsive to issues of policy implementation. More detailed discussions of these management issues are presented below.

#### ***Issues Related to Managing Multiple Resource Users***

Conflicts among multiple users involving groundwater use and the use of medium for industrial effluent discharge may appear due to the problems of externalities and overutilization or overconsumption of common pool resources (Bish et.al, 1975; Ostrom, 1990). The term conflict indicates that some uses have negative effects on other uses, and that the relationships between the resource users need to be taken into account in resource allocation decisions.

The basic problem of externalities is that there are no prices which accrue to the generator that would encourage him to take into account costs generated externally in adjusting levels of his activities to where he is best off. The spillover effects of modern industrial production result in deteriorating environmental quality, an output that the firm does not and could not sell. On the contrary, households and other firms affected by the pollutant spillover experience real opportunity costs in many different forms (Rhoads, 1987).

In addition to external effects, another type of market failure which is of special relevance to issues of multiple resource users is the overutilization of common pool resources. Natural resources may be destroyed through overuse, and market processes may possess incentives which exacerbate rather than ameliorate this problem (Bish et.al, 1975). A common pool resource is one that is available for everyone's use, where



exclusion of use is not feasible or legal, but where one person's use directly reduces the use of the common pools by others. Common pools tend to be overutilized because it is in each individual's interest to use the resource until his additional costs equal his additional benefits – neglecting to take into account the external costs he generates for others (Bish et al, 1975).

Problems of inefficient market economy due to externalities and overutilization of resources may constrain the achievement of the welfare of society. In this situation, government intervention is needed to correct the market imperfections. Government interventions can be categorized into the enactment of legislations and regulations, the enactment of taxations and retributions and the implementation of programs and projects, as reflected in the government's policing, taxation and spending power (Frank et al, 1979). The ability to manage externalities and to respond to overutilization of resources among users become a primary issue of industrial wastewater management in order to achieve efficient allocation of groundwater and adequate utilization of the medium for industrial effluent discharge.

#### ***Issues Related to Multiple Management Entities***

Potential problems associated with the existence of multiple management entities include fragmentation in decision making, overlapping of responsibilities and activities, and conflicts of interests. Fragmentation in decision making, and overlapping of responsibilities and activities are often characterized as inefficient management processes in the field of public administration (Denhart, 1986). In order for effective industrial wastewater management such problems should be reduced in the management processes. Cairns (1991) also states that bureaucratic processes involving the funding system and the administration implementation tend to exacerbate rather than reduce conflicts of interest among agencies.

Conflicts over competing responsibilities and interests among management entities may prevent the achievement of common goals of industrial wastewater management : balancing the broadest possible of long and short range objectives to achieve sustainable economic development for the welfare of society. Such conflicts may not be fully eliminated. However, once enlightened management becomes aware of these problems, they could at least be explicitly addressed.

### ***Issues Related to Implementation***

The process of collective decisions for public policy begins as proposals in political arenas and culminates in the effects on the people in the society. Weimer and Vining (1989) divide this process into two phases : adoption & implementation. The adoption phase begins with the formulation of a policy proposal and ends with its formal acceptance as a law, regulation, administrative directive or other decisions made according to the rules of the relevant political arena. The implementation phase begins with the adoption of the policy and continues as long as the policy remains in effect. Problems in policy implementation may result in ineffective public management achievements. There are five categories of problems which may inhibit the success of policy implementation. They are : problems of unclear, and inconsistent objectives of policy & legislation, an unsound theory underlying the policy (Bardach, 1977), problems of insufficient legal authorities and statutes in the implementation processes to induce compliance of implementors and target groups (Mazmanian & Sabatier, 1981), and the incompatibility of implementation structure to the complexity of problems in the local area (O'Toole, 1990).

According to Weimer and Vining (1989), the problem of inter-organizational cooperation in a decentralized system also arises when central government must rely on lower levels of government for contributions. Even when the central government enjoys nominal authority over units of the lower level government, it faces the problem of monitoring the compliance of multiple jurisdictions that may have different local conditions. Moreover, the reason for noncompliance may vary greatly across jurisdictions, making it difficult for the central government to employ a uniform enforcement strategy.

#### **2.4.2 Theories from Selected Fields Pertinent to Industrial Wastewater Management**

Scholars from the field of industrial ecology, particularly those from the fields of organization & public administration and policy implementation have formulated a number of conceptual suggestions in addition to the ecological modernization theory for addressing issues pertinent to the interrelatedness of environmental concerns, the

complexity of resource uses and the implementation of industrial wastewater management policies and programs.

### ***Organization & Public Administration Theories***

The issue of fragmentation in decisions and actions involving multiple entities has long been the concern of organization and public administration theorists (Alexander, 1993; Daft, 1988). Scholars from these fields have proposed recommendations to minimize problems associated with fragmentation of decision making and overlapping of responsibilities and activities, and to reduce conflicts among entities in the public management sector. Conventional wisdom in public administration and organization theory reinforces recommendation for central public management (Starling, 1982; Wandschneider, 1984). The reform tradition, which has been the standard approach in public administration, emphasizes the deficiencies of fragmented management systems. Fragmented system, according to this view, suffer from overlapping of responsibilities, lack of coordination and diseconomies of scale. A centralized public management system is characterized as having a pyramidal hierarchical structure of management, and emphasizing superior-subordinate relationships with top-down communication. It is based on the principle that authority and responsibility flow in a direct line vertically from the highest level of organization to the lowest level ; this flow is commonly referred to as the chain of command (Starling, 1982).

Some works of scholars in the stream of public choice (Ostrom, 1990) lead to important lessons for the design of public management and organization. Ostrom's works are based on the assumption that rational individuals exercise their rationality with respect to public goods as well as private goods. Public agencies are not viewed simply as bureaucratic units which perform those services which someone at the top instructs them to perform. Rather, public agencies are viewed as means for allocating decision-making capabilities in order to provide public goods and services responsive to the preferences of individuals in different social contexts. Ostrom pursued the logic of public choice to the point of identifying cases in which public enterprises can be operated within specific domains, thus opening the possibility for greater decentralization of power and authority. Ultimately, his proposal is for a form of pluralistic institution, based on multi-



organizational relationships, something the logic of public choice would see not only as more responsive, but also more efficient (Denhart, 1986).

Similarly, modern students of the "New Public Administration" tend to emphasize a more active role for public administrators in the development of public policy and a more equitable approach to the management of public sector. Perhaps most notable in the stream of the "New Public Administration" are the works of Kirkhart (1971) and White (1971), both of whom emphasize open communication, greater equality of power, and the importance of consensus building in organisations (Denhart, 1986).

The key factors for integrating various entities or sectors in the management processes, according to those scholars, are interactive influence, mutual constraints and simultaneous interests. In management practices, these include exchange of information, bargaining and negotiation to achieve commitment, and sharing decisions towards achieving common goals. By examples of the management of industrial effluent discharge, a decentralized-pluralistic management approach is proved viable; bargaining and negotiation, voluntary agreement and coordination enable the decentralized-pluralistic management of industrial effluent discharge to achieve effective management.

### ***Policy Implementation Theory***

Theories and studies in public policy implementation suggest that there are several preconditions needed to achieve successful implementation. Pressman and Wildawsky (1973) present a case study coupled with prescriptive warnings. Although policy formulation and implementation are different phases, according to Pressman and Wildawsky, they are interrelated; flaws in policy formulation processes may create problems in implementation processes. They assert that public policy should be based on a sound theory which identifies the principal factors and their causal linkages. Unavailability of a sound theory underlying the public policy, caused by failures in the policy formulation, may result in ineffective implementation. Mc Laughlin (Smallwood, 1980) states that, within the implementation arena, the amount of interest, commitment and support evidenced by the principal actors have a major influence on the prospects for successful implementation. As part of her analysis she describes three different types of potential interactions between policy makers and implementors: mutual adaptation, cooperation and non-implementation. Mazmanian and Sabatier (1981) propose six

sufficient and generally necessary conditions for effective implementation of policy objectives, ie: clear & consistent objectives, adequate causal theory, legally structured implementation process, committed and skillful implementing officials, support of key legislators & no new changing socio-economic conditions to undermine political support.

Top down approaches suggest that hierarchical integration - ie, coordination through legally structured implementation procedures and mechanisms imposed by higher level agencies - contributes to successful implementation. Theory grounded in a bottom up perspective focuses on the importance of matching implementation structure to the complexity of the policy problems, if implementation outputs and eventual outcomes are to be satisfactory (O'Toole, 1990). The key dimension to explaining and predicting behavior in implementation processes is coordination effort towards dealing with the policy problem rather than the hierarchy. Proponents of the bottom up approach to policy implementation argue that some policy problems require an adaptive implementation mechanism for smoothing the implementation processes. O'Toole (1990) states the need for key actors that can foster cooperation among implementors and between implementors and target groups that is not otherwise induced by the hierarchical mechanisms. Both approaches, the top down and bottom up perspectives, have merit but must be applied carefully based on the condition of the cases.

## **2.5 Instruments**

The changing direction in industrial pollution control gave rise to economic and social or voluntary instruments in the management of industrial effluent discharge. Such instruments are geared to promote conducive condition and to adapt to the corporate based policies which support company initiatives. The conventional command and control nature of regulatory instrument falls short of the objectives to promote conducive condition and to adapt to corporate initiatives for environmental management.

The use of more than one instrument is necessary for efficient and effective environmental management. Different policy instruments are in use in different countries. Such instruments include regulatory and economic instruments, negotiations or voluntary methods, public discussion, etc. In designing environmental management policy the main challenge is to determine the appropriate mix of instruments by taking into account factors such as :

- ◆ The need for efficiency and cost effectiveness;
- ◆ Compatibility with existing institutional framework, economic condition & tax structure;
- ◆ Complexity of application and ease of monitoring & enforcement;
- ◆ Consistency with the overall environmental policy.

The discussion below focuses on the probable instruments for industrial wastewater management, with the purpose of highlighting consideration for application in Yogyakarta, Indonesia.

### **2.5.1 Regulatory Instruments**

The command and control approach to pollution prevention relies on regulatory instruments (standards, permits & licenses, land use controls & Environmental Impact Assessment), whereas the economic approach usually incorporates regulatory instruments as well as economic instruments. Following is a brief description of the principal regulatory instruments for pollution control in both developed and developing countries (Bernstein, 1993).

#### ***Standards***

Standards are the predominant means for direct regulation of environmental quality throughout most of the world. They define environmental targets and establish the permissible amount or concentration of particular substances into the water or consumer products. In addition to effluent, performance and process standards, standards also include technological specifications for the performance or design of equipment facilities and the standardization of sampling or analytical methods. Each of the various types of standards are used to provide a reference for evaluation for legislative action. Standard setting requires the existence of a monitoring agency that sees the polluters' activities and has the power to impose a penalty for non compliance. Standards are typically associated with penalties (non compliance fees, loss of license); polluters can also be prosecuted or at least threatened with prosecution. The standards discussed below include the ambient environmental quality standards, the effluent & emission standards and the product & process standards.

The ambient environmental quality standards are used for protecting air and water quality. Ambient water quality standards specify the minimum conditions that must be



attained for specific parameters at specific locations in a water body. They are based on the amount of damage caused by a known dose of exposure to a pollutant, and also based on the possible uses of a specific body of water. The advantage of this is that they establish the constraints that water quality objectives may impose on economic development, particularly for industrial and urban development. The only way to expand development while ensuring the fixed level of environmental quality is through technological innovation that increases the effectiveness of water treatment. Another advantage of this is that they provide a basis for the evaluation of the effectiveness of controls on discharge. Two problems associated with the above are :

- ◆ When the combined effect of several discharges exceeds the capacity of the receiving water and standards is not achieved, responsibility cannot be assigned to a specific source;
- ◆ The problem of determining acceptable concentrations of various pollutants is complicated by inadequate knowledge of the pollutant's effects on human, animals and plants.

Effluent standards are mean or maximum values for allowable concentrations of pollutant that may be discharged into the water body; they must be achieved by an individual source at the point of discharge. Special effluent standards may be set for particular industries. In some cases, a distinction is made between standards applicable to all industries and standards specific to particular industries. A technology based standard, which does not give firms the flexibility to choose over its technological methods along with the costs entailed, is an effluent standard that specifies particular technologies that firms must use to comply with environmental standards. On the other hand, performance standards specify the amount of pollutants that must be removed, but allows firms to select the best way to meet the standard. Performance standards are more suitable for large & complex enterprises, while technological standards suit small firms with relatively simple operations. The advantage of effluent standards is that they provide a direct and manageable means for controlling pollution with a reasonable degree of predictability regarding the quality of surface water. The disadvantages are :

- ◆ Uniform effluent standards do not take into account the water quality requirements of local water bodies;

- ◆ Where there are numerous waste dischargers, achieving an ambient water quality standard through independent regulation of various discharges will be impossible;
- ◆ Due to spot checks by government, violators may prefer to delay compliance and engage in lengthy legal battles;
- ◆ Enormous administrative and enforcement costs.

The government must coordinate various effluent standards to achieve the desired goals in the receiving water body.

Product and process standards are standards which form a legal ceiling on the amount of polluting products that can be discharged into surface and groundwater. Prohibition of the use of toxic materials contained in the products' ingredients and close substitution of the toxic ingredients are commonly associated with product standards. Outright bans on the use or production of a product that has no close substitutes maybe the strictest form of regulation. However, close substitutions are often available at little extra costs, therefore bans on products and processes may be deemed inefficient.

#### ***Permits and Licenses***

Permits and licenses involves the granting or withholding of permits, licenses or other authorization. The permits are tied to specific water quality standards and are subject to particular compliance code of practice such as the selection of location that minimizes environmental and economic impacts, installation of a treatment plant or pollution control equipment within a certain time period or adoption of other environmentally protective measures. The advantages of permits & licenses are :

- ◆ It facilitates the enforcement of environmental programs by including all of a facility's pollution control obligations in one document;
- ◆ They may be withdrawn or suspended according to the needs of social interests, and often require a fee that can be used to cover the costs of the pollution control program.

The disadvantage is that it involves costly regular monitoring and reporting facilities.

#### ***Land & Water Use Controls***

Land use control involves zoning and subdivision regulations. Zoning is the division of a municipality or other jurisdictions into districts, as well as the regulation within those districts of the allowable uses of land such as the minimum allowable lot sizes and the

population density involved. Zoning can prevent the location of polluting industries in inappropriate areas or control the density of development in specific districts. Performance zoning, whereby any industry in an industrial zone is permitted to discharge as long as its discharges do not exceed certain limits, allows flexibility in design provided that certain standards are achieved. Performance standards are expressed as ratios of open space, density and floor area.

Subdivision regulations are locally adopted laws governing the process of converting raw lands into building sites. Subdivision regulations are accomplished through plan approval procedures; a developer is not permitted to make improvements or divide and sell his land until the plan of the proposed subdivision is approved by the planning authority. Land use controls can have negative effects on local populations in search of affordable housing, moreover land use control are often vulnerable to economic and political pressures (Bernstein, 1993).

#### ***Environmental Impact Assessment (EIA)***

Environmental Impact Assessment is defined as a comprehensive evaluation of the effects of human development activities on the various components of environment. The objective of EIA is to guarantee that the proposed development project will not have an adverse effect upon the local ecology. EIA is a preventive process which avoids costly environmental mistakes in planning, development, operation and maintenance. Other objectives of EIA are (Biswas, 1987) :

- ◆ To incorporate environmental considerations into the development planning of plans and projects;
- ◆ To assess and select alternatives from the relevant ones available;
- ◆ To involve the public in the decision making process

Mostly the developer bears the costs for preparing EIA, but both the developer and the government institution do implement and ensure proper monitoring of agreed recommendations.

EIA requires the development of the legal and institutional framework for its success. Due to the interconnectedness of environmental problems, a high level of coordination and cooperation among actors in the form of participation and coordination of multi-disciplinary sectors and professionals are necessary. Moreover, good

information source is also vital. Such is not easy given the limited amount of information flow. The flow of technology information from developed to developing countries with differing social, economic, physical and institutional conditions has not been simple, but it has been even difficult for the flow of information from South to South (Biswas, 1987).

#### **2.5.2 Economic Instruments**

It would be desirable to have all external environmental costs be fully internalized into markets through proper pricing of environmental values which are now free or underpriced. However, such ideas cannot be achieved in the implementation stage. One method for cost internalization is through the polluter pay or user pay principle. Another method for internalizing environmental costs that is now being considered is to sell limited numbers of marketable pollution rights or permits on open market. While pollution rights raise interesting questions of environmental ethics, such rights do force companies to include at least some measure of their environmental costs as real costs, and thus provide an incentive for companies to reduce them (Allenby, 1995). Examples of economic instruments discussed in this section include charges, liability insurance, subsidies and enforcement incentives (Bernstein, 1993).

##### ***Pollution Charges***

Pollution charges establish the expenditure that is used to control units of incremental pollution. However, it leaves the resulting level of environmental quality uncertain. Their application is appropriate when the damage from incremental units of pollution can be estimated reliably, and least appropriate when regulators require certainty in the level of environmental quality achieved (Bernstein, 1993). Examples of these includes effluent charges, administrative charges and user charges.

Emission charges are fees levied by a government body based on the quantity or quality of pollutants discharged into the environment by an industrial facility. Effluent and emission charges are used in conjunction with standards and permits, and allow ambient water quality standards to be achieved at the least possible cost. To control water pollution, emission charge is based on water quality objectives and the costs for financing a pollution abatement scheme. Under the first scheme, individual sources are induced to take internal measures to reduce quantities of pollutants in discharges and thereby reduce charges for pollutants that affect preexisting water quality standards. The most efficient

charge would vary from location to location and from time to time. Under the second scheme charges are used for financing a basin to be shared by all users so that charges are allocated among dischargers in terms of a given pollution indicator. The third scheme involves charges imposed on all discharges in excess of established standards. To ensure effective implementation a number of institutional, political and technical conditions must exist :

- ◆ The responsible institution should encompass natural boundaries;
- ◆ Institution should have legal authority to impose and enforce charges on polluters as well as a self monitoring concept with periodic verification;
- ◆ Adequate resources to monitor emission must exist;
- ◆ Analytical methods and data to establish the monetary value of damages should exist;
- ◆ There should be legal power over disposition of revenues.

The advantages of effluent charges are :

- ◆ They induce firms to reduce pollution at lower costs than those under a regulatory approach while generating revenues for government;
- ◆ They can compensate for the unpaid costs of industrial activity borne by society at large.

The disadvantages are (Hodge, 1995) :

- ◆ Industry always prefers control through standards over a system of fees with the same abatement costs because payment of the fee on remaining discharges will cost more in total;
- ◆ There is no scientific or politically accepted way to assign monetary values to pollution damage;
- ◆ Local authorities are not strong enough (financially and technically) to handle complexities of pollution sources, planning, monitoring, enforcement and cross jurisdictional negotiations.

Administrative charges are fees paid to authorities for services such as the implementation and enforcement of environmental regulations. They usually are a component of direct regulation and are intended primarily to finance the licensing and control activities of pollution authorities (Hodge, 1995). Administrative charge can have incentive purposes as well. However, in practice the levels of fees are usually low and do



not provide significant incentives for changes in purchasing patterns and revenues for the charge are usually added to the general budget rather than the budget of the pollution authority involved (UNEP, 1992).

User charges are direct payments for the costs of collective or public treatment of pollution. With respect to water pollution control, user charges are fees paid to water authorities to allow discharges of industrial wastes into public sewers. Through these charges, which are related to the quality and characteristics of the effluent, public authority receiving the waste discharge is compensated for the effort involved in its disposal. Moreover, the scale of the charges suggests that the plant has an economic incentive to improve the quality of the effluent (Bernstein, 1993).

### ***Liability Insurance***

Liability insurance is a market creation mechanism in which risks for damage penalties are transferred from individual companies or public agencies to insurance companies. Insurance premiums reflect the probable magnitude of the damage and the likelihood it will occur. An incentive is created by the possibility of lower premiums when industrial processes are more secure or less damaging.

### ***Subsidies***

Subsidies include grants, low interest loans and tax incentives that act as incentives for polluters to change their behavior or reduce the costs of pollution abatement to be borne by polluters. One form of the above is tax incentives. Tax incentives involve tax credits for industrial investments in equipment to abate pollution. This incentive also may take the form of special tax reliefs from firms that adopt management practices and production technologies that minimize the release of environmental pollutants (Hodge, 1995). The extent to which tax incentives can be used for environmental protection depends on the particular taxation system and political structure of the country. Although subsidies can provide incentives for industries to reduce their discharge, the disadvantages of subsidies are:

- ◆ They do not discourage the continuation of highly polluting industries nor do they encourage alterations in polluting production process;
- ◆ The taxpayer, rather than the industry bears the costs of these pollution control subsidies.



### ***Enforcement Incentives***

Enforcement incentives are designed to encourage dischargers to comply with environmental standards and regulations. They include non compliance fees, performance bonds and liability assignment (Bernstein, 1993)

Non compliance fees are fees related to the extent and duration of the violation that exceed the source's estimated costs of compliance. When regulatory rather than economic instruments are the prime method of pollution prevention, enforcement generally is weak in that fines for violations are so low that it pays polluters substantially to break the law. To avoid time consuming prosecution, it is better to use noncompliance fees rather than court cases, provided that these fees are set so that firms have a strong incentive to abide by the regulations.

Performance bonds are payments to regulatory authorities before a potentially polluting activity is undertaken. The payments are returned when the environmental performance of the activity is acceptable. Such instruments ensure that society is protected against incomplete restoration due to intentional or unintentional bankruptcies. In the case of potential risks of innovation, performance bonds allow the introduction of new products or processes without having to await the results of government administered tests. If the government does not trust a firm to meet its obligations without a financial commitment, the firm may convince a bank that its production process is safe. If convinced, the bank may assume the financial liability at a price.

Assignment of liability is an instrument which provides incentives to actual or potential polluters to protect the environment by making them liable for the damage they cause. In contrast to pollution standards or charges, liability rules are administered by the courts after a problem has occurred and payment goes to the victims. This liability is based on the common law of private and public nuisance and is enforceable through the courts, by damaged parties and by the government. The liability payment might be guaranteed by a performance bond. A liability system can be an effective way to deal with environmental problems when information is scarce and expensive. Where environmental injury is long-term in its effects, however, liability assignment may be expensive and impractical (Allenby, 1994).

### ***Eco Labelling***

Eco labelling is closely related to the concept of cost internalization. Eco labelling requires manufacturers to disclose the relative environmental costs attendant to the manufacturing, use and disposal of products, whether those costs are internalized or externalized. Eco labelling requirements that focus on the overall disclosure of environmental costs, as opposed to minimum standards to carry a seal of approval provide an incentive for manufacturers and users to reduce the environmental effects of their activities to the greatest possible extent (Allenby, 1994). Another advantage is that it increases the manufacturers' consciousness by imposing manufacturers to make inventory of their environmental waste along with its costs. One disadvantage in developing countries is the lack of environmental awareness, knowledge and interests on behalf of the consumer.

#### **2.5.3 Negotiations and Social or Voluntary Instruments**

Negotiation and other confidence building mechanisms can be implemented within or outside the regulatory process among government, industry and the civil society. Such instruments are important because they provide a degree of innovation, flexibility and less politicized decision making which aren't usually found in pollution abatement. Credibility is perhaps the most important ingredient in the confidence building process. If the government or industries are perceived as being disingenuous, confidence-building mechanisms will prove futile. Credibility involves many elements on all sides of the negotiating table with regard to the presentation of commitments, positions, rhetoric and available facts (Allenby, 1994). Industry, environmentalists and other stakeholders must be pragmatic about what they think they can achieve through negotiations, and environmentalists must recognize that negotiation is a process of compromise, which requires them to develop their goals and to set priorities.

Negotiations and consultation between government, industry and environmentalists can result in covenants: voluntary agreements between a number of actors with the status of binding contracts in civil law (Dutch Ministry of Environment, 1994). Covenants represent commitment by industrial sectors to play their part in meeting the environmental objectives. However, covenants do not replace or take priority over existing laws. Upon negotiation and consultation it is important to consider the following:

- ◆ Targets, timetable & measures for implementation;
- ◆ Responsibility of the industry & role of relevant authority in the process of reviewing and enforcement;
- ◆ Internal & external best communication strategies in producing inventory of consumption, emission and best technology;
- ◆ Summary of emission reduction in stages and handling of anticipated implementation problems.

The advantages of covenants are (Snel, 1995):

- ◆ Covenants prove the opportunity for industry to influence measures and timetable during negotiations;
- ◆ When an industry agree on the covenant, it assumes a system of self regulation and thereby a psychological mechanism for itself;
- ◆ Reporting system associated with industry plans enable government to monitor progress and understand problem location;
- ◆ It provides simple speedy implementation of agreements by both government and industry.

The disadvantages of covenants are:

- ◆ Industries may postpone implementation;
- ◆ Covenants aren't covered by the relevant law, thus their enforcement by regulatory agencies become very questionable.

As covenants are new, it should not be expected to yield immediate positive results. Covenants should be considered as a policy instrument in transition from traditional command and control instrument to more participatory regulation or policy formulation (Snel, 1995).

## **2.6 Corporate Pollution Control Strategies**

Legislative pressure, economic & organizational instruments, as well as technological improvements have all been used to control industrial pollution in developing countries. The application of the regulatory framework was the first strategy along with innovation in end of pipe technologies. In the 1980s firms undergo a change incorporating the concept of corporate environmental management in their consumption, manufacturing process, waste generation and disposal through institutional restructuring, policy changes



and technological innovation. The 1990s saw pollution control as extending beyond command and control with its end of pipe technologies; the concept of ecological modernization with the dismantling of the production – consumption process, role of the market dynamic and economic agents, shifting role of the state and innovations in science and technology change the behavior of firms, the government and the civil society altogether. Along with ecological modernization, the concept of industrial ecology which views the industrial metabolism as an ecosystem also plays a role in the development of new approaches in corporate environmental management. Among the new approaches which are discussed below are Environmental Management Systems, Integrated Chain Management and Industrial Symbiosis or Eco-Industrial parks.

The successful application of pollution control principles is influenced by the use of right combinations of instruments and other factors such as economic efficiency of enterprises and the cooperation between the government, industry and the public.

#### **2.6.1 Conventional Pollution Control**

The definition of pollution control is : measures taken to prevent the introduction of any substance or energy which might immediately or in the long run, cause deleterious consequences to the natural resources (Ojwang, 1993). Industries' response to pollution control has been to adopt effluent pre-treatment technologies known as conventional pollution control or end of pipe technology. Such may be insufficient to remove all pollutants, but it could reduce the level to that of the required standard.

There are two methods that can be used to control industrial pollution to a level that can be discharged to water courses. One method is by establishing and enforcing water quality standards for the receiving streams. The standard set depends on the stream's water use and quantity and quality of the available stream flow. The second method makes use of standard for industrial effluent concentration or quantity to limit excessive pollutant discharge (Nemerow, 1995).

Recent developments have shown other approaches in pollution control. Other pollution control approaches such as cleaner production, Environmental Management Systems, Life Cycle Management and eco-industrial parks are discussed below.

### **2.6.2 Cleaner Production**

The United Nations Environmental Program defines cleaner production as: a conceptional and procedural approach to production that demands that all phases of the life cycle of a product or of a process should be addressed, with the objective of prevention or minimization of short and long term risks to human health and to the environment (UNEP, 1992). Cleaner production involves the pollution prevention scheme.

Pollution prevention is defined as the prevention & reduction of the generation of waste and emission by reduction at source and on-site reuse and / or a reduction of the total pollution load (Dutch Ministry of Economic Affairs, 1991). The prevention of pollution has become one of the favored strategies in industrialized countries. Environmental protection, liability, market pressures and the consumer's image of the company are the factors being taken into consideration by industry when deciding on strategy and investment in corporate environmental management. However, the real answer why companies are interested is due to its profit making initiatives and its cost efficiency (pollution prevention pays). This also means lower regulation expenses for government authority and lower prices to consumers. Pollution prevention becomes profitable because of the scarcities created by regulatory measures that allowed disposal of wastes artificially off limits to the economy (Allenby, 1994). Pollution prevention encompasses both reduction at source and on site re-use or recycling.

Methods which are used to reduce pollution from its source include product changes and process changes. Product changes are changes in composition, or the use of intermediate or end products with the objective of reducing waste. Product changes include product substitution, product conservation and change in product composition. Process changes involve the change in manufacturing method encompassing changes in input materials, technology and good housekeeping. Input material changes encompass material purification, material substitution, and the use of less environmentally harmful materials. In material purification highly purified raw materials may be used in the process to limit generation of waste. An example of the substitution is the use of water soluble cleaning agents instead of organic solvents. Technology changes can be considered as investment in clean technology to prevent pollution. Such investment can



enhance efficiency and productivity, improve product quality, and reduce the quantity and costs of raw materials, utilities, handling, etc. Other means include equipment or layout changes, automation and changes in operational setting. Another form of process change is good housekeeping. Good housekeeping is the improvement in the everyday routine of the management, organization and personnel involved in production. Good housekeeping is carried out in manufacturing, maintenance, raw material, product and waste handling and storage. Other practices of good housekeeping include batch production improvements, prevention of emission, waste stream segregation, spill and leak prevention, logistic improvement, and personnel conducts.

A second approach to pollution prevention involves on site re-use and recycling. On site re-use and recycling involve :

- ◆ Introduction of wastes to the same or different production process as raw materials by returning it to the original process or by substituting it for another process;
- ◆ Treating wastes in such a way as to recover materials by processing into useful resources or processing into by-products.

In addition to on site re-use, off site re-use can also be performed. Off site re-use is the re-use of waste materials and emission outside the company or as secondary raw materials or for material reclamation or other useful applications.

Although cleaner production is gaining popularity and progress, there are constraints to successful application of the concept (Allenby, 1994) :

- ◆ Cost of recovering materials in reuse and recycling is high, and there must be a market for the recycled materials in quantity and quality produced;
- ◆ Misconception that waste minimization results in low quality products while generating benefit requires time;
- ◆ Industries are afraid of investing in production processes which save resources, are efficient and more clean in technology because of the costs involved. However, industries do not consider cost to be associated with the use of old dirty technology such as those which unnecessarily consume high raw material and energy use, and results in the production of more rejected products and thus more pollution generation (OECD, 1995);

- ◆ Optimizing resources for environmental protection means loss in safety, efficiency, durability, convenience, attractiveness and price (Allenby, 1994);
- ◆ Since company focus on prevention activities that result in economic benefits, protection of the environment will be at risk with less profitable options.

### **2.6.3 Environmental Management Systems (EMS)**

Environmental Management System is a coherent set of policy based, organizational and administrative measures that focus on controlling and wherever possible limiting the impacts on the environment (Dutch Ministry of Environment, 1994). The main elements in EMS are :

- ◆ Environmental Policy & Planning (environmental aspects, legal requirements, objectives and targets, environmental program);
- ◆ Implementation and operation (organizational structure and responsibilities, training and awareness, communication, documentation, operational control, emergency preparedness);
- ◆ Control and corrective action (monitoring & measurement, records, corrective action, EMS audit);
- ◆ Management review.

From a company's perspective EMS promotes environmental credibility, reduces production costs by reducing the eco taxes and insurance premiums, as well as it provides opportunity for expansion. From the government's perspective EMS stimulate companies to be self responsible in the systematic and continuous environmental care, as well as it reduces permitting and enforcement effort and costs. Disadvantages include high costs (even if it was by project implementation), complex and complicated framework structure requirement, and long investment returns.

### **2.6.4 Lifecycle Chain Management (LCM)**

Lifecycle chain management are management activities directed to the coordination and cooperation of actors in a product chain with the aim of reducing the environmental impact over the whole of the product life cycle. The chain may be viewed as a flow of substance all through the environment, a movement of a certain product from source to sink.

The organizational platform of ICM include powerful companies in the chain, sector associations, product associations, semi governmental organizations and NGOs. Important actors in product chains include producers of materials, half-products, and end products, retailers, customers and waste processing companies.

#### **2.6.5 Waste Reduction Through Eco Industrial Parks**

The alternative solution to industrial waste problems and market for recovered and recycled materials may be through the adoption of the eco industrial complexes. The industrial complexes are planned to have a number of complementary industrial plants, located within the same zone, and practicing successive reuse and recycling (Nemerow, 1995).

The objective is to transfer waste material from one source to become raw materials for others, similarly referred to as waste exchange program. This not only improves environmental performance but also reduce production costs. The success of such complexes or parks depend on designing appropriate combination of plants, a balance of production capacity for optimum generation and re-use, and to ensure industries' cooperation in the whole process and compliance to operating conditions. The constraints for implementation among others are :

- ◆ Complexities in regulating and assessing cost implications of complexing;
- ◆ Difficulties in determining the optimum combination for specific complexes unless there is demand for recycled materials in quality, quantities and for the types available;
- ◆ Challenges in striking a dialogue for locating plants of specific combination within certain complexes.

Such challenges and complexities require the presence of interested industrial supporting institutions, planners, policy makers and the general public for direction and guidance towards industrial complexing (Nemerow, 1995).

### **2.7 Constraints for Participation in Environmental Management**

In the process of designing and implementing institutional framework for improved corporate environmental management, several barriers are faced by the implementing agency, the industries themselves, the government and the public commons. The barriers and constraints can be classified into company management

constraints, technical constraints, economic constraints, attitudinal constraints, government constraints and lack of public pressure (Chandak, 1994).

Company management constraints involve organizational constraints found within the corporation itself. These constraints are in the form of decision making, operational system and inadequate & ineffective management systems. In conjunction to decision making, the chief executive officer is in such a prevalent position to conduct and execute decisions regarding operations and management thus the employees feel alienated in making any initiative that could result in pollution reduction, however cost saving it may be for the production process. In conjunction to corporate operational system, company management put much effort on production, neglecting other activities such as pollution control. Production schedules aren't adhered to worsening environmental conditions. Moreover, lack of records or poor records of utilities such as water, material consumption and ingredient inventory contribute to the difficulties in assessing any measures of pollution control such as waste minimization. Inadequate & ineffective management systems are attributed to the fact that companies tend to limit themselves when it comes to establishing adequate and well defined management systems. Lack of such organized system suppresses reporting lines, responsibility and accountability. Employee incentive will also be affected therefore employees' lacking initiatives in taking up new and challenging tasks such as process modification will be prevalent.

Technical constraints include constraints to build technologies that go beyond end of pipe measures : to innovate new technologies which can be incorporated into the whole production-consumption process with the aim of preventing and minimizing waste emission. Other technical constraints include limited or non availability of trained manpower, especially in the field of environmental engineering & management and limited access to technology & information.

Economic constraints include the availability & low pricing of natural resources, capital availability, and the presence of production related fiscal incentives. Non or low pricing and availability of natural resources encourage irrational use of natural resources resulting in high waste generation. Such attitude also discourages motivation to incorporate pollution abatement measures. In relation to capital availability, financial

institutions in many developing countries aren't aware of, and often not interested in financing industrial pollution control as they are considered non profitable due to the long pay back period. In addition, available fiscal incentives are based on the production parameters. Such incentives may have encouraged industries to put more effort in production maximization, thus other corporate responsibilities receive little attention.

Attitudinal constraints include lack of sound operation norms, resistance to change and fear of failure or loss. Sound operation & management are largely dependent on behavior, not on technical necessity. Although sound O&M can save production costs and instills efficiency in company activities, company executives and workers do not recognize benefits reaped from such practice. Due to resistance to change, industry personnel normally regard deviations from the normal routine operation a burden unless there are immediate benefits from such actions. Such resistance is often found from the top to the bottom of the management line. The fear of failure or loss often discourage companies and employees from participating in waste management programs. This gives rise to the tendencies of waiting to see and learn from others first. Failure of loss is associated with the company's fear for loosing something or gaining nothing by incorporating environmental management whereas others who haven't adopted such environmental management might have a competitive advantage over companies who incorporate environmental management.

Government constraints include inconsistent environmental policy and economic based industrial policy. In many cases environmental policies are not consistent. They do not allow for producers and consumers to include long term consequences in their decisions. Command and control measures are necessary but not always successful, especially not when people are not convinced that legal measures are legitimate. Moreover, policies on industrial development normally relates solely to economic growth, and not for sustainable development.

Pressures from communities and non governmental organizations involving the disclosure of corporate environmental profile and the internalization of environmental aspects are very effective in ensuring that produces take measures for environmental care. However, such pressure is not always present due to the lack of awareness & interest of the public in environmental care.



## **2.8 Industries' Motives Towards Environmental Care**

Although there are regulations and pressures from different directions, factors which influence industries to consider environmental care are also pertinent and vital. Such motives can be divided into four categories (Mintzberg, 1989): social motives, market motives, financial & economic motives and technological advancement motives.

Social motives include promotion of health and well being of employees, protection of the environment, improved corporate image, and improved relation between the company and the society.

Market motives include promotion of sales, market share and new markets, green marketing, environmental product certification, and anticipation of future market requirements.

Financial & economic motives include financing and risk coverage, compliance with environmental regulation, reduction of environmental costs and financial costs, anticipation on future requirements of government regulations and future requirements of the market and the public.

Technological advancement motives include closing the substance cycles in the chain of raw material extraction, production and waste handling, saving of energy together with increasing efficiency and utilizing renewable energy sources, and improving the quality of products.

In order for industries to consider environmental protection in their production – consumption process, some preconditions must be met. These preconditions include (Oates, 1998):

- ◆ There should be a continuous incentive to reduce pollution and to seek technological innovation;
- ◆ Polluters should have the maximum flexibility in which way and how they want to comply with environmental requirements;
- ◆ Complex regulations and economic instruments results in poor compliance, fraud and excessive administrative and compliance costs;
- ◆ All components of implementation costs must be taken into account : monitoring, licensing, enforcement;

- ◆ Environmental policies must be properly integrated and consistent with other sectoral policies having an environmental impact, as well as politically and socially acceptable;
- ◆ Well established environmental awareness of the general public;
- ◆ Development of an industrial policy directed towards technological innovation and market based policies;
- ◆ Economic policy directed towards internalization of environmental costs.

Taking into consideration the preconditions for successful industrial participation in environmental care, some initial steps towards environmental protection can be taken by industries, the government and the general public. Initial actions that can be taken by individual companies include specific end of pipe measures, waste and emission prevention programs based on cost & benefit with short pay back period, organizational change through the market oriented-efficient company, and certification or quality assurance system. Initial actions that can be taken by the government and the general public include improving environmental awareness and environmental care, consistent & cross jurisdictional policies including direct regulation, the use of new policy and industrial network and framework, global technology, and funding transfer for environmental objectives.



**Home of the Tofu Producers & Location of the (Underground) Treatment Tanks**

## CHAPTER III

### INDUSTRIAL WASTEWATER MANAGEMENT IN YOGYAKARTA

#### 3.1 General Background

Indonesia is located in South-East Asia. Its geographical structure is unique. The westernmost and easternmost points of its territory are 5,200 km apart; from north to south the distance is 1,900 km. The land area consists of no less than 13,000 islands ranging from the world's largest island, the New Guinea or Irian Jaya, to mere coral atolls. According to the Topographical Agency of the Indonesian Army, the land area of the country amounts to 1,919,443 sq.km. The sea area claimed by Indonesia amounts to 3,272,160 sq.km. Therefore, the land forms only 37 % of its territory. Its five major islands are : Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya (World Bank Report, *Indonesia : Environment & Development*, 1994).

The population in Indonesia, according to the census in 2000 was 215 million. More than 60% of Indonesia's population live in Java. The current labor force of approximately 57 million is growing at a rate of over 1.8 million per year (BAPPENAS, 2000). Growth in the labor force is expected to continue to exceed the growth in population, given that approximately 55% of the current population is less than 20 years old. These demographic trends will intensify the pressure on the land and resources that have been relied on to support the quality of life of the Indonesian people.

Section 3.1 concerning the general background encompass the geographic and demographic characteristics of Yogyakarta, the government structure and hierarchical order of law, and the general development policy of the Republic of Indonesia

##### 3.1.1 Geographic and Demographic Characteristics of Yogyakarta

The Province of Yogyakarta is located in Central Java, with the municipality of Yogyakarta (*Kotamadya Yogyakarta*) as one of the second level sub-national governments. Four other second level sub-national governments (*Kabupaten*) found in the Province of Yogyakarta are the Districts of Sleman, Kulon Progo, Gunung Kidul and Bantul. The thesis is limited to a milk industry and tofu home industries within the urban

agglomeration of the Yogyakarta municipality (*Kotamadya Yogyakarta*), thereby excluding the peri-urban and rural areas in the other four districts.

The Province of Yogyakarta has an area of 3,185.81 sq. km. The northern part of the province with its area of 117.87 sq.km is located on the slope of the Merapi Mountain. Elevation decreases as one proceeds to the south. Abundant rainfall and volcanic ash contribute to the fertile land of the northern area of the Yogyakarta Province. The eastern part of the province with its limestone mountain running from north to south is unsuitable for farming due to its lack of rain and water, and its dry and infertile land. The western part of the province with its mountain range running north-south is fertile and home to many of the water sources for the river tributaries running through the urban agglomeration and the Province of Yogyakarta. The center of the province is a flat and fertile basin forming the urban agglomeration of Yogyakarta with an area of 1,279.53 sq km.

Rivers present in the urban agglomeration of Yogyakarta include the Progo river (stretching from the northwest to southeast), the Opak river (stretching from the northeast to southwest) and the Winongo, Code and Gadjah Wong rivers (all three of which run parallel from north to south). In the south of the urban agglomeration of Yogyakarta the Winongo branches into the Bedog river, while to the southeast of the urban agglomeration area the Opak river meets the Oyo river. All the rivers above function as a medium for industrial wastewater discharge, and meet in the southern part of the province before emptying into the Indonesian ocean.

In the year 1999 the province of Yogyakarta has a population of 2,989,645, with a population density of 938 persons per sq km (*BAPEDALDA*, 2001). The presence of government institutions, economic activities, higher education and tourism within the urban agglomeration of Yogyakarta contribute to the increasing urban population within the area, causing environmental distress should the government fail to respond accordingly.

In the 1970s the percentage of urban population within the Yogyakarta Province amounts to 22% and the rural population 78%, whereas in the 1990s the urban population increases to 44% and the rural population decreases to 56%. It is estimated that in the



year 2004 the percentage of urban population increases to 70%, and the rural population decreases to 30% (BAPEDALDA, 2001).

The shift in rural-urban population contributes to the changes in the livelihood of its inhabitants. The former agrarian society has evolved into an industrial society, thus causing changes in the nature of pollution and in the quantity and quality of wastewater discharged. The former Yogyakarta has also evolved into one of Indonesia's main tourist attractions, thus causing the sprawls of both international hotels and small motels found in the center and along the urban fringe. Activities which generate the production of wastewater in the municipality of Yogyakarta include industries, hotels, motels and hospitals. The thesis solely concerns industrial wastewater discharge. Institutionalized environmental management is necessary to overcome current problems and anticipate future problems related to wastewater discharge.

### **3.1.2 The Government Structure and Hierarchical Order of Law**

The government structure that exists in Indonesia today was first broadly outlined in the 1945 constitution and then was elaborated at later stages through additional legislation. Indonesia under the 1945 constitution is a republic with powers in the hands of the people. This power is exercised through the People's Consultative Assembly or *Majelis Permusyawaratan Rakyat (MPR)*, the highest level of the government body of the country. Members of this assembly are representatives of political parties, military officials, provincial and local governments, scientists and religious leaders. They are chosen through national election processes. This assembly is responsible for formulating and approving the General Development Policy of the nation and electing the president and vice-president, who each hold office for a term of five years. In this system, the president, although responsible to the People's Consultative Assembly (*MPR*), is the effective executive head of the government in charge of its day-to-day administration. He has overall power over the armed forces, he appoints ministers and governors; and he promulgates laws. However, both in enactment of laws and in the budgetary process he must consult with the People's Representative Council or *Dewan Perwakilan Rakyat (DPR)*. The president is also advised by a Supreme Advisory Council or *Dewan Pertimbangan Agung (DPA)* which can rule on issues raised by the president and has the right to submit proposals to the government.

In conducting his executive tasks, the president is assisted by state ministries and ministerial departments. The state ministries have advocacy and coordinating functions but have limited power in implementation and enforcement of rules and regulations pertaining to government interventions. Environmental concerns fall under the State Ministries for Population and Environment or *Kementrian Lingkungan Hidup (KLH)*. Each ministerial department is responsible for policy making processes in a particular sector of activities; its branches at the provincial and local levels are responsible for implementation of such sectoral policies, programs and regulations.

In addition, the central government in Indonesia is supported by a number of non departmental agencies or boards in different fields that, in most cases, report directly to the president. One of those agencies is the National Planning Board or *Badan Perencanaan Pembangunan Nasional (BAPPENAS)*; it is assigned as a central government body responsible for coordination of sectoral development plans.

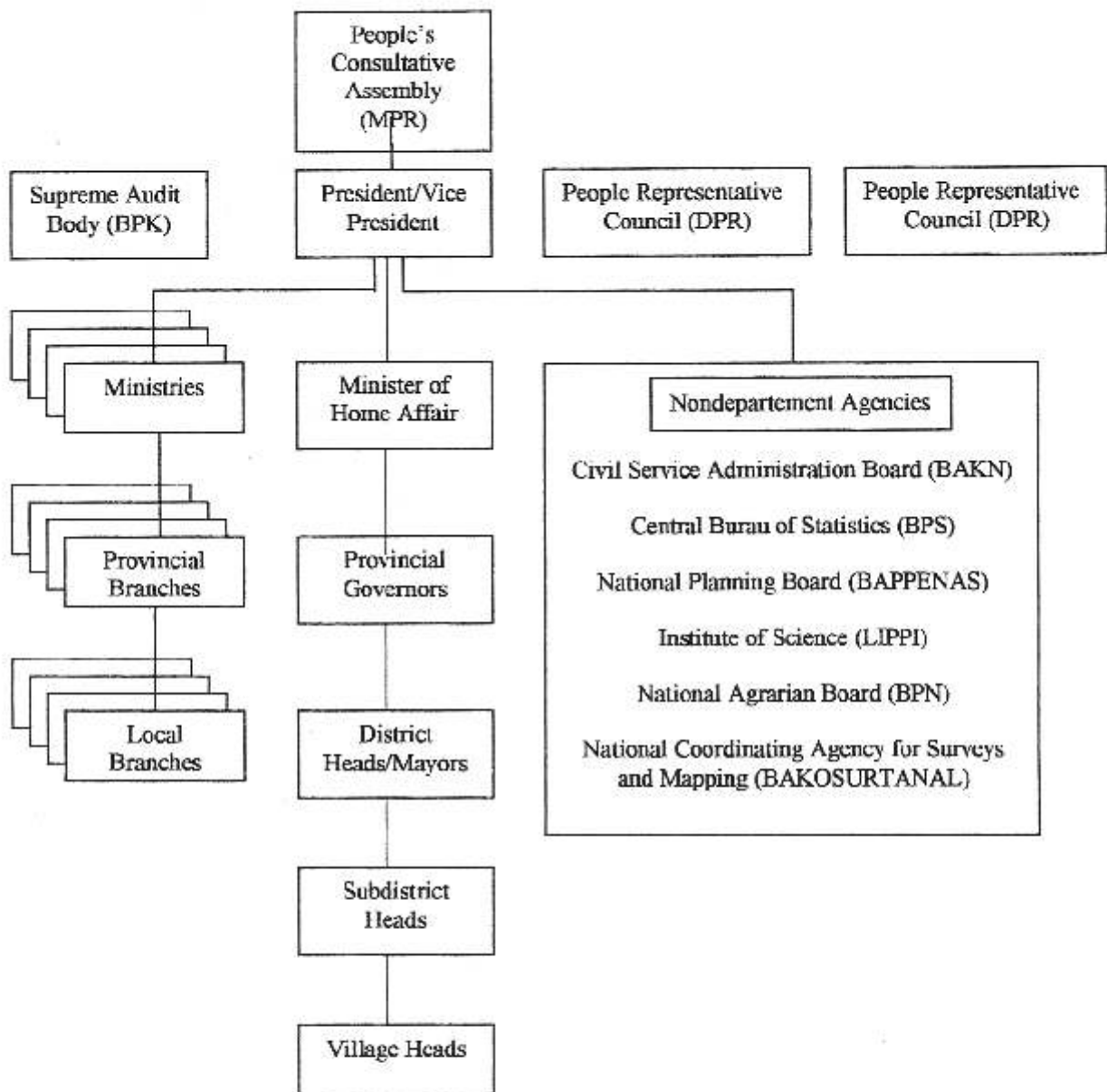
At the sub-national level, Indonesia is divided for administrative purposes under the Ministries of Home Affairs into four levels. The first level is the provincial government. Each province is headed by a governor who is appointed by the president on the advice of the Minister of Home Affairs and the Provincial People's Representative Council or *Dewan Perwakilan Rakyat Daerah Tingkat I (DPRD Tingkat I)*. This provincial council works with the governor in preparing legislation and the provincial budget, but it does not have overriding powers, acting mainly as an advisory body. The governor may have one or more assistant governors to help him, depending on the size of the region, and a secretariat consisting of a number of offices (e.g. finance, audit) which help in administering the province. Governors are appointed for an initial five-year period. Of particular importance at this level of government is the Provincial Planning Board or *Badan Perencanaan Pembangunan Dearah Tingkat I (BAPPEDA Tingkat I)* that advises the governor on planning and coordinates all planning efforts in the province, the Provincial Bureau of Finance (*Biro Keuangan*) that administers the provincial budget, and the Provincial Development Bureau (*Biro Pembangunan*), which has responsibility for the implementation of provincial development programs. The Provincial Bureau of Finance and the Provincial Development Bureau stand under the Provincial Planning Board (*BAPPEDA Tingkat I*). Under the current decentralization process, representative

offices of ministerial departments in each province (*kanwil*) which in the past looked after centrally administered programs & projects are merged with offices (*dinas*) that provide services within a province within a variety of areas including public works, agriculture, health and education. These offices report directly to the governor but receive technical guidance from the relevant central-ministerial departments. The governor is held responsible to the president of Indonesia.

At the second level of sub-national government, the province is divided into a number of districts or municipalities (*kabupaten* or *kotamadya*) depending on population and geographical size. A district may be similar to a county in the case of the US. The structure of government at this local level is patterned on the structure of the provincial level. Therefore, there is a head of a district (*bupati* for the *kabupaten* and mayor for the *kotamadya*) who is appointed for a five-year renewable term by the governor and who works with a district level representative council or *Dewan Perwakilan Rakyat Daerah Tingkat II* (*DPRD Tingkat II*) who must be consulted on important local matters. He has his own secretariat consisting of an office of finance, an office for development implementation and a Municipal Planning Board or *Badan Perencanaan Pembangunan Daerah Tingkat II* (*BAPPEDA Tingkat II*). There are also offices (*dinas*) providing services in various fields which report to the district head as well as their provincial level offices. The district head is responsible on all matters directly to the provincial governor.

The third level of the sub-national government is that of sub-district (*kecamatan*); it is headed by a sub-district head (*camat*). A sub-district (*kecamatan*) consists of several villages. A sub-district head is a civil servant appointed by the district head and is responsible for administering his sub-district. Branch offices (*dinas*) of some offices at the district such as health, agriculture and forestry are established at this level and report to the sub-district head (*camat*) as well as to their district level officers.

At the fourth level, each village is headed by a village headman (*lurah*). In the rural area the village headmen are elected by the villagers. The village headman has a special committee set up to advise him on development activities in his village. The committee consists of himself, village officials and other representatives from the village. The village is divided into several neighborhoods. The government structure of the Republic of Indonesia is shown in figure 3.1.



**FIGURE 3.1**  
**THE GOVERNMENT STRUCTURE OF THE REPUBLIC OF INDONESIA**  
 (Source : MacAndrews, 1986)



In the past the Indonesian administrative structure has been characterized by strong sectoral line agencies and a relatively high degree of centralization of development planning and investment. The decentralization process which began in the mid 1990s function to promote the discretionary power of the provincial and local governments to adjust and modify the national policies and programs according to their specific conditions, and to formulate provincial-local plans and programs, as long as those modifications of plans and programs are consistent with the national goals. The provincial and local powers, however, seem to be limited. This situation has been due to shortages of trained manpower at the provincial and local levels, and by limited revenue generation capacity in most provinces and districts (Mac Andrews, 1986; The World Bank, 1990).

Laws and regulations are formulated and implemented in public administration processes for influencing and controlling the relationships among agencies at the policy and implementation levels, and the relationships among actors at the operational level. There is a hierarchical order of laws and regulations in the administrative government of Indonesia. The higher order of statutes and regulations are the bases for formulating the lower order ones. The highest order is the state ideology and constitution made by the People's Consultative Assembly. The state ideology and constitution are sources of all legal aspects in public administration processes. The second order of written law is called "law" (*UU-Undang Undang*) which is made by the government and the Parliament. Laws are implemented either by Governmental Regulations (*Peraturan Pemerintah*) or Presidential Decree (*Keppres-Keputusan Presiden*). The lower category of written laws consists of Ministerial Regulations (*Peraturan Menteri*) and Ministerial Decisions (*Kepmen-Keputusan Menteri*). Those are written laws issued by the central government. Written laws issued by the provincial government are respectively Provincial Regulations (*Perda-Peraturan Daerah Propinsi*) and Governor's Decision (*Keputusan Gubernur*). Indonesia's hierarchical order of law is shown in table 3.1

The bureaucracy in Indonesian government reflects some important cultural aspects of Indonesian society. (Mac Andrews, 1986) :

- The respect paid towards older people, which is characteristic of most of the traditional culture of Indonesia's many ethnic groups. Allied with this is the



general belief in consensus in decision making, with open opposition to policies being seen as socially incorrect. Consequently, active and open criticism of decisions is unusual, and seniority and age play an important part in all relationships.

- A second aspect which is of particular importance in understanding Indonesian bureaucracy is the way that communication within the bureaucracy occurs. This is predominantly oral, with day-to-day decision making based mainly on oral discussion and only formally finalized, if required, in a letter.

Consequently, the Indonesian bureaucracy tends to be passive in nature, slow in its decision making and formalizing decisions, giving little weight to personal initiatives. Green (1990) characterizes the Indonesian bureaucracy as one that “emphasizes outward harmony rather than clear communication, and directness, and time consuming consensus building rather than directness in defining and resolving conflicts”.

**TABLE 3.1**  
**THE HIERARCHICAL ORDER OF LAW IN INDONESIA**

INSTRUCTIONS	WRITTEN LAW	LAW MAKERS
	State ideology and Constitution	
	Law (Undang-undang)	Central Government and the Parliament
	Governmental Regulations (Peraturan Pemerintah)	Central Government
Instruction of the President	Presidential Decree (Keputusan Presiden)	President
	Ministerial Regulations (Peraturan Menteri)	Ministers
Instruction of Ministers	Ministerial Decision (Keputusan Menteri)	Ministers
	Provincial Regulations (Peraturan Daerah Propinsi)	Governor and Provincial Legislative Body
Instruction of the Governor	Governor's Decision (Keputusan Gubernur)	Governor
	Local Regulations (Keputusan Daerah Tingkat II)	District head/Mayor and Local Legislative Body
Instruction of the District Head/Mayor	District Head's/Mayor's Decision (Keputusan Bupati/Walikota)	District Head/Mayor

### **3.1.3 The General Development Policy**

The General Development Policy of the People's Consultative Assembly (*MPR*) provides the general statement of the long range development goals of the nation and the way such goals will be achieved. In other words, it provides both the general ends and

means for the government and the people of Indonesia. It is the formal source of all development plans and policies. The General Development Policy is segmented into a series of Five Year National Development Plans drawn up by the president and the cabinet. The Soeharto government established in 1966 initiated the first Five Year National Development Plan in 1968. The General Development Policy and the Five Year National Development Plans are the base of sectoral development plans formulated by the sectoral ministries as well as the regional and local development plans proposed by the provincial and local governments respectively. Gradual changes of the objectives of the Five Year National Development Plans are as follow :

- The development objectives of the first Five Year National Development Plan (1968/1969-1973/1974) were political stability within the nation and national economic growth;
- In addition to political stability and economic growth, equitable distribution of development and its benefits became the focus of the second Five Year National Development Plan (1974/1975-1979/1980);
- Natural and environmental conservation for sustaining the long-term economic development was considered as the fourth objective in addition to those previous development objectives in the third Five Year National Development Plan (1980/1981-1985/1986);
- The concern for natural and environmental conservation for sustaining the development became more intense in the fourth and fifth Five Year National Development Plan (1986/1987-1991/1992 & 1992/1993-1997/1998).
- Economic and social instruments in environmental management are beginning to be implemented in the sixth Five Year National Development Plan (1998/1999-2003/2004)

### **3.2 Industries Present in the Urban Agglomeration of Yogyakarta**

In addition to the presence of large industries, the urban agglomeration of Yogyakarta is experiencing a rapid growth of medium and small home industries, both of which lack the resources and expertise to perform adequate measures of pollution control, moreover corporate environmental management. Industries in Yogyakarta which have the

potential to generate significant pollutant in quantity and quality can be categorised into the following groups :

***Large & Medium Industries (Investment >Rp 2 Billion & Rp 600 Million-2 Billion)***

- ◆ Leather Industries : e.g., Sapta Tunggal, Budi Makmur Ltd & Sinar Obor Ltd
- ◆ Textile Industries : e.g., Samitex Ltd & Yogyatex Ltd
- ◆ Printing Industries : e.g., Kanisius, Bayu Indra Grafika, Andi Offset
- ◆ Sugar Industries : e.g., Madukismo, Madubaru
- ◆ Building Construction Industries : e.g., Genteng Mutiara Ltd, Diamond Baru Ltd
- ◆ Metal & Electroplating Industries: e.g., Tom Silver, Kotagede Silver
- ◆ Milk Processing Industries : e.g., Diamond CV, Sari Husada Ltd
- ◆ Food Processing Industries : e.g., Margorejo Ltd
- ◆ Power Generating Industries : e.g., State Owned Electricity Corporation
- ◆ Miscellaneous : e.g., GE Lighting (Lighting Industry), Alcohol industries & Soap and Detergent industries

***Small (Home) Industries (Investment < Rp 600 Million)***

Home industries capable of generating wastewater pollutant can be categorised into the following groups :

- ◆ Food Processing Industries : e.g., Tofu, tempe, pork and beef, coconut sugar industries, butcheries.
- ◆ Craft Industries : e.g., Leather, batik, furniture & rattan industries, dying industries.
- ◆ Metal Industries : e.g., Silver, bronze & aluminum industries
- ◆ Building Construction Industries : e.g., Tatched roof & brick industries

Due its semi-formal and informal nature, many home industries are not registered in the Chamber of Commerce and are experiencing rapid growth without corresponding measures of pollution control in eco-sensitive areas. The scattered location and unobtrusive nature of home industries present a challenge for the government to document their presence, identify potential environmental impacts associated with their activities, and find common ground for probable solutions and mitigation measures. Home industries grew from a common production practice of a group of people living in a certain area, thus location is a factor which determines the type and probable growth of

certain types of home industries. Government effort has been to create centers for uniform types of industries and provide communal end of pipe technology for mitigation measures. Most of the large and medium companies discharge their partially treated wastewater into streams via pipes used specifically for industrial wastewater discharge. Most of the small home industries discharge their minimally treated or untreated wastewater into either a public sewer or directly into streams via ditches or canals dug in surrounding area or in paddy fields.

The Bureau of Statistics lists a total of 119 formal industries which have  $\geq 75$  employees (BPS, 1998), while the Chamber of Commerce lists a total of 36 centres of home industries in the urban agglomeration of Yogyakarta (*Departemen Perindustrian*, 1999). The Code, Winongo & Gadjah Wong rivers which cut across the urban agglomeration of Yogyakarta are used as discharge mediums by the above large, medium and small industries.

Land use plan has long been used as a tool for guiding developments on land with the objective of protecting human health and the environment in general. The most important instrument used to control land use in Yogyakarta are building permits and development inspection system. The investment and development process require that site, land and building permits be acquired before the Nuisance Permit (*Hinder Ordonansi Permit*) is granted. Nuisance Permit is the environmental permit required for acquiring the production permit & land and building certificate. The local government is charged with the responsibilities of monitoring all developments on land to ensure compliance with land use planning regulations. However in recent years land use planning has run short of proper implementation and enforcement, resulting in haphazard land development within Yogyakarta. The site, land and building permit fall short of its objective to ensure effective and efficient land use development, whereas the Nuisance Permit is a permit whose function is seen solely to seek acceptance from surrounding community over the presence of the industries rather than seen as a comprehensive & integrated instrument which combines adequate planning, effective permitting and sound mitigation measures. In addition, the development of home industries has been characterized as one which lacks documentation, planning & coordination, and integrated permitting system.

### **3.3 Sources & Extent of Industrial Wastewater Pollution**

The pollution sources in the urban agglomeration of Yogyakarta can be distinguished from point sources and non point sources. Point sources include effluent from treatment plants, storm water outfalls, discharge from major and small industries, and rivers and streams discharging effluent to the sea. Non point sources are diffused emissions from individual houses, agriculture and other runoffs (*PROKASIH* Report, 1999/2000). Non point sources are outside the scope of this study.

#### **3.3.1 Origins of Industrial Wastewater Effluent**

Industrial wastewater originate from the use of water in industrial plants and trade premises. The characteristics of these liquid wastes depend on the objectives for which the water has been used. Generally, five main uses of water in industries can be distinguished (Edwards, 1995) :

##### ***Water as a Heat Exchange and Cooling Agent***

The main problem with effluent from cooling and heating system is high temperatures associated with such effluent. Boiler blow down of industries such as Sari Husada Ltd and Diamond CV receive partial treatment and partial wastewater cooling before discharged into the Gadjah Wong and Code River. High temperature water and salts resulting from the precipitation of various chemicals present adverse environmental effects to the ecosystem of the receiving body.

##### ***Water as Process Material***

Water is used in chemical processing in order to facilitate chemical reactions. The unwanted products of chemical reactions are sometimes removed using water. In the case of the tofu home industries, water is used to facilitate the chemical reaction for the formation of the soybean essence called curd, and also to separate the curd from the soybean.

##### ***Water as Cleaning Agent***

Water may be used by Sari Husada Ltd and the tofu home industries to clean equipment, bottles or containers. Sari Husada Ltd performs cleaning once a week during product change in which the quantity of wastewater discharged rises, and the amount of BOD and COD contained in the wastewater almost doubles. Water as cleaning agent is the second main source of liquid wastes.



### ***Water as Liquid Material***

Water may be one of the major constituents of a product such as juices or liquid milk which contributes to the flow of liquid wastes in various ways, such as the discharge of rejected or expired products.

### ***Water as a Means for Transport & Storage***

Water being a transport and storage agent is the main source of liquid wastes. Many food and milk processing operations depend on the stream of water to carry the product, and at the same time remove the impurities. The tofu industries rely on water as a mean for overnight storage. The type of pollution will depend on the nature of substances in contact with water. Large and medium size companies usually treat such wastewater to a certain extent, while small home industries usually discharge it directly to the sewage system and streams without any pre-treatment.

#### **3.3.2 Sources of Untreated or Semi-Treated Industrial Effluent**

The industrial effluent sources can be classified into the following categories depending on the wastewater characteristics (Edwards, 1995):

##### ***Oxygen Consuming Wastes (Biodegradable Organic Wastes)***

A large contribution of this waste is from food industries, small pork & beef industries, as well as local butcheries. Wastewater from food industries is characterised by high BOD and COD. In July 1999 the treated effluent from Sari Husada Ltd has been found to contain BOD of 95 mg/L and COD of 188 mg/L, while the recommended effluent standards in Yogyakarta are 30 mg/L and 75 mg/L respectively (PROKASIH Report, 1999/2000). Wastewater from leather and textile industries are also characterized by high concentration of COD & BOD. Large and medium industries treat their wastes to a certain extent while most small industries discharge their wastes directly to streams and the sewerage system.

##### ***Eutrophication Causing Wastes (Inorganic Nutrients)***

These wastes are normally from soap & synthetic detergent industries. The abundance of nitrogen and phosphorus compounds from industries' effluent causes algal blooms in water. The blooms cover the water surface, thus inhibiting oxygen exchange. The algal bloom also creates anaerobic conditions resulting in unpleasant odour.

### ***Toxic Wastes (Heavy Metals and Chemicals)***

The main source of heavy metals (i.e. copper, nickel, zinc, chromium, cadmium, lead, etc) is the waste from electroplating and metal finishing such as pickling. Metallurgy workshops utilize heavy metal compounds in forging of spares. The main materials used are steel, heavy metal compounds, various chemicals and consumables such as oils, paints & lubricants. Most of the heavy metal compounds are used in copper and zinc plating.

The main source of toxic chemical compound is from the leather, textile and printing industries. Effluent discharge from the leather and textile industries contain dyes, caustic soda and bleaching agents which contribute to the sulphur and ammonia present in the river bodies.

### ***pH Lowering Wastes***

Such wastes come from diverse industries, including the tofu home industries. Effluent from textile industries contain acids such as sulphuric, hydrochloric and acetic acid. Such effluent change the alkalinity and acidity of water if disposed off directly or with minimal pre-treatment, as in the case of the above textile mills.

### ***High Temperature Wastes***

Large volumes of hot industrial wastewater discharge affect the oxygen content in the water if discharged with little cooling into the streams and rivers. High temperature wastes originate from industrial discharge and from power generating stations. Industrial effluent in such cases can be much more complex in nature, and are often beyond the assimilative capacity of those streams they are discharged.

#### **3.3.3 Extent of Industrial Wastewater Pollution in Yogyakarta**

A large portion of industrial effluent discharged reaches rivers, water courses and sea either directly or indirectly through runoffs and sea outfalls. The remainder either enters the underground system or gets degraded or deposited through natural processes.

In the year 1999 the PROKASIH Clean River Program estimated that its 32 monitored activities encompassing large & medium industries, hotels & hospitals together released about 101.860 ton BOD/year and 302.158 ton of COD/year. The largest part, about 45% (45.84 ton BOD & 135.97 ton COD) was released into surface water, 40% (40.74 ton BOD & 120.86 ton COD) received partial treatment from communal and

private wastewater treatment, and 15% (15.28 ton BOD & 45.32 ton COD) was discharged into public sewerage or absorbed by the ground (*PROKASIH* Report, 1999/2000). The estimated amounts of BOD & COD released annually by large & medium industries, hotels & hospitals are summarized in table 3.2.

The Clean River Program was initiated in 1992, and since the start of the program there has been a decrease in the load of BOD & COD. However, the year 1995 & 1996 showed an increase in BOD & COD mainly due to increasing production and the wastewater treatment failure of Madu Baru sugar company. In the year 1997 & 1998 the load of BOD & COD decreased because 80% of the monitored activities had taken some waste & emission prevention measures, 50% had treated their wastewater to be in compliance with the regional standard, and environmental awareness of companies and the public have increased in general. In the year 1998 & 1999 an increase in COD & BOD occurred due to the economic crisis and industries were not capable of operating their wastewater treatment effectively due to lack of financing. The levels of metal content in pollutants discharged by the 32 monitored activities of the *PROKASIH* Clean River Program were found to be lower than the provincial standards for the intended industries.

**TABLE 3.2**  
**BOD & COD LOAD OF *PROKASIH*'S MONITORED ACTIVITIES**

YEAR	POLLUTION LOAD			
	BOD Ton / Year	Decrease (%)	COD Ton / Year	Decrease (%)
1992/1993	46,626.742	--	85,095.486	--
1993/1994	--	--	--	--
1994/1995	37,528.432	19.51	53,722.064	36.87
1995/1996	14,717.434	60.78	41,062.154	23.57
1996/1997	38,177.992	--	66,869.734	--
1997/1998	432.549	98.87	914.783	98.63
1998/1999	490.800	98.95	944.100	98.89
1999/2000	206.950	57.83	555.160	41.20
2000	101.860	50.78	302.158	45.57

(Source : *PROKASIH* Report, 1999/2000)

Although the levels of pollutants for the 32 monitored activities of the *PROKASIH* Clean River Program decrease, the quality of river water has not been in accordance with the proposed standards for the different parts of the water body (*PROKASIH* Report, 2000). In the past two years it has been very difficult for the government to upgrade the lower Code river from class C to class B. The fluctuation of river water quantity, the presence of many undocumented and uncontrolled medium & small industries, the increase of untreated wastewater from households not connected to public sewer and the increasing contribution from agricultural runoff all contribute to the challenge. The presence of large industries along with the uncontrolled growth of many undocumented small & medium industries are ranked as the second highest contributor of river pollutant after households (Source : Interview with *BAPEDALDA*'s Head of Environmental Law Dept). Current attempt to research, document and facilitate mitigation measures for small industries as well as households are still very minimal in the urban agglomeration of Yogyakarta. A research on batik, tofu and tempe home industries done by the Yogya Academy of Industry shows the BOD, COD, nitrates and fat, oil & grease (FOG) concentration to be much higher than the regional standard even if it has undergone some treatment in the communal treatment tank (AKPRIND, 1998).

In addition, for small industries the government also sets too stringent a limit (in mg/l) for the maximum allowed level of pollutants discharged into the different parts of the water body, thereby inducing higher level of non compliance among medium and small entrepreneurs lacking the resources to finance corporate environmental management.

### **3.4 Efforts to Control Pollution by Industries & the Government**

The government's interest in industrial growth is its contribution to the economy and the welfare of the people employed in the sector. The government of Indonesia considers that industry should be responsible for the pollution it generates. However, industry's major objective is to maximize profits through manufacturing and marketing of its products. Although large industries are conducting pollution control due to increasing public pressure & competitive advantage, medium and small industries don't act on their own will in pollution control, but rather as a respond to regulatory pressures. Control of pollution among small and medium industries in Yogyakarta is considered the

least priority on pretext of financial, technical and space constraints (Source: Interview with the regional program manager of the Provincial Chamber of Commerce & Industry). Weak regulation enforcement among small and medium enterprises causes lack of seriousness in compliance by industries.

In general any enterprise is obliged by law to abide the regional environmental standards through installation of pollution control equipment and ensure efficient operation and maintenance, to use technical solutions least harmful to the environment and to abide by temporary effluent discharge and product standards. Thus industries are required to pre-treat their effluent to conform with the specified standards. However, only some medium size industries have treatment plants (e.g. Budi Makmur, Samitex), and many small home industries do not have (communal) treatment plants. Reasons for industries' inability to control pollution generated include the heavy investment associated with pollution control equipment, the lack of available trained human resources and the scattered locations of industries (which creates a challenge for the construction of communal wastewater treatment and solving problems associated with mixed waste streams).

Currently there is a non utilisation of the existing R&D institutions for pollution control consultancy in addition to the industry's inadequate managerial and technical capacities to give pollution control a priority. Lack of viable financial institution to fund pollution control and R&D is also a problem, let alone challenges in quantifying economic and financial viability for such measures. Moreover, the absence of a well functioning financial market, and the high interest and inflation rate all inhibit investment in industry and in pollution control measures (Source : Interview with expert from Gadjah Mada University's Postgraduate Planning Department).

Government decisions and activities are also to blame for the industry's inefficiency in environmental care. Inadequacy in investment promotion act and in industrial policy (registration and licensing act) to address environmental protection is a major setback (Source : Interview with *BAPEDALDA*'s head of the Environmental Law Dept). In relation to small home industries, government action has been to provide subsidies for installing pollution control equipment, rather than promoting WEP and inducing home industries to internalize environmental costs into their production costs.



As a result industries do not consider environmental protection in their decisions and operations.

The taxation and permitting system also do not favour the industry's efficiency. The number of permits and taxes imposed by the government is much too cumbersome and its system much too complex, therefore requiring the number of permits and taxes be reduced, and its system be simplified in order to be much more efficient and effective.

Lack of adequate supporting infrastructure such as sewers & storm drains to absorb compliant activities also presents a constraint for industries to observe pollution control measures. Most of the large industries and some of the medium industries have their own treatment and pipes for industrial wastewater discharge. However, many of the small industries located in the urban fringe directly discharge their wastewater into the river with little or no treatment. It is estimated that only 25% of the small industries located within the urban area are connected to the municipal sewerage, and only about 5% of those industries have communal wastewater treatment (*BAPEDALDA* Report, 2001).

### **3.5 Problems Involving Industrial Wastewater Management**

Major problems associated with institutionalized management of industrial effluent discharge in Yogyakarta include fragmentation in decision making, overlapping of responsibilities and activities, and conflicts of interests. Moreover, bureaucratic processes involving the funding system and the administration implementation tend to exacerbate rather than reduce conflict of interests among agencies. In order for adequate & effective industrial wastewater management, such problems should be reduced in the management processes through enhanced procedures & mechanisms for coordination, cooperation and collaboration.

### **3.6 Efforts to Improve Policy Making & Implementation**

Interagency coordination is a critical factor in industrial wastewater management activities. Therefore, it is appropriate to discuss efforts which have been made by the national & provincial governments to induce interagency coordination. Two types of effort have been made by the national & provincial governments to induce interagency coordination in policy and plan formulation and implementation at the national and sub-national level :

- (1) Enhancement of the organizational capacity of the coordinating agencies;
- (2) Improvement of rules, procedures and mechanisms for coordination.

### **3.6.1 Enhancement of the Coordinating Agencies**

There are several key agencies at the national, provincial and local levels responsible for coordinative functions in plan and policy making processes in social-economic development and environmental management.

#### ***The National Planning Board or BAPPENAS***

The National Planning Board or *BAPPENAS* of the present government was formed in 1967 by the Presidential Decree no 80/1967. *BAPPENAS* is a central agency responsible for coordinating sectoral development policies and programs at the national level. It has the authority to approve the budgets for development policies and programs at the national level. It has the authority to approve the budgets for development programs and projects proposed by the sectoral line agencies, as well as budgets by the provincial and local governments. A series of organizational improvements have been made from 1967 to 1989. In 1973, 6 deputies and 25 bureaus within the *BAPPENAS* were established. The six deputies are : deputy for economic issues, deputy for social-cultural issues, deputy for fiscal and monetary issues, deputy for monitoring and implementation of development programs, deputy for regional development issues, and deputy for program administration. Each deputy was responsible for assisting the head of *BAPPENAS* and coordinating the subordinate bureaus. To enhance its function as a coordinating agency at the national level, since 1983, *BAPPENAS* was headed by the Minister for National Planning and Development. A new deputy position was formed (i.e. the deputy for labor force and population issues) and a number of new bureaus were developed. In 1989, the deputy for manpower and population issues was changed into the deputy for population and environmental issues. This change reflected more attention by *BAPPENAS* to issues and problems of conserving the environment for sustaining long-term economic development of the country. In order to induce integration of national development processes, *BAPPENAS* requires that the development policies and programs – proposed by the sectoral line agencies and the provincial and local governments – be consistent with the National Development Plan, in terms of budgetary and plan

consistency. In addition *BAPPENAS* has initiated and developed procedures and mechanisms for enhancing interagency coordination.

#### ***The State Ministry for Population and Environment (KLH)***

The State Ministry for Population and Environment is a free-standing ministry with advocacy and coordinating functions, but limited budget and power. It relies heavily on internalization of environmental functions in sectoral executive ministries and agencies to be effective. The State Ministry for Development Supervision and Environment was formed in 1978. With the adoption of the fourth National Five Year Development Plan in 1983, it was modified, assigned new responsibilities, and called the State Ministry for Population and Environment (*KLH-Kementrian Lingkungan Hidup*). As a state ministry, it has no line responsibilities. In the absence of direct implementation responsibilities, its main objective is to ensure that each sectoral line ministry and agency take environmental considerations into account.

Its primary roles are :

- ◆ Coordinating the formulation of policies and programs on natural resources and environmental development and conservation;
- ◆ Developing regulations for implementation by national, provincial and local government agencies;
- ◆ Providing technical advice and assistance to line agencies;
- ◆ Coordinating the development of environmental awareness and participation.

The *KLH* has four divisions, each headed by an assistant to the minister, with support staff for the following: population, natural resource management, the management of environmental degradation, and support systems for institutional coordination, community participation, information and communication.

#### ***The Provincial Planning Board or BAPPEDA Tingkat I***

The Provincial Planning Boards were established by Presidential Decree no 15/1974 to assist the provincial governors in formulating development plans and coordinating sectoral development policies and programs in provinces. More specifically the *BAPPEDA Tingkat I* is responsible for:

- ◆ Formulating a long-term regional development plan segmented into five-year development plans;

- ◆ Coordinating plans and programs proposed by provincial offices and coordinating sectoral plans and programs proposed by representatives of ministerial departments;
- ◆ Formulating annual development budgets for the province in cooperation with the Provincial Bureau for Finance;
- ◆ Supervising the implementation of provincial development plans and programs;
- ◆ Undertaking research pertaining to regional development problems and issues.

This agency is organized along the line of the National Development Planning Board, i.e., with divisions for research, economic issues, physical and infrastructure issues, and social and cultural issues. An interagency and interjurisdictional coordinating committee was formed within *BAPPEDA* to coordinate proposed plans and programs, and formulate annual development budgets for the province. Members of the coordinating committee are executive heads (esselon III & IV) of the sectoral agencies and the non-sectoral semi-autonomous agencies (i.e. *BAPEDALDA*, *BKPM*).

#### ***The Local Planning Board or BAPPEDA Tingkat II***

Presidential Decree no 27/1980 mandates that every local government should form its Local Planning Board (*BAPPEDA Tingkat II*) which functions as a local planning and coordination body. Prior to the adoption and enactment of Presidential Decree no 27/1980 some local governments had already developed a local planning body. The formation of *BAPPEDA Tingkat II* in each municipal government resulted in the abolition of any previous local planning body, although in most cases *BAPPEDA Tingkat II* is simply the continuation of the previous local planning body. This board is under technical guidance of the Provincial Planning Board (*BAPPEDA Tingkat I*).

#### ***Provincial Environmental Impact Management Agency or BAPEDALDA Tingkat I***

Presidential Decree no 23/1990 mandates that every provincial government should have its Provincial Environmental Impact Management Agency (*BAPEDALDA Tingkat I*). The roles and responsibilities of *BAPEDALDA Tingkat I* are further described in Governor's Decision no 153/1999. Similar to the State Ministry of Population & Environment, *BAPEDALDA* has advocacy & coordinating functions, but limited in budget & power, and it relies on internalization of environmental functions by sectoral agencies. Its main objective is to ensure that each sectoral agency takes environmental considerations into account. Its primary roles are :

- ♦ Coordinating the formulation & implementation of policies and programs on natural resources and environmental management on the provincial level;
- ♦ Proposing & developing regulations for implementation by provincial and local government agencies;
- ♦ Providing technical advice and assistance to line agencies;
- ♦ Coordinating the development of environmental management & environmental awareness within the provincial level through instruments such as permitting, Environmental Impact Assessment, retributions, and programs & projects.

Within *BAPEDALDA* several divisions were established i.e., Legislation and Regulations, Environmental Impact Assessment, *PROKASIH* Clean River Program, Environmental Impact Mitigation Programs and Projects, and Conflict Resolution for ad hoc cases involving environmental pollution and degradation in the provincial level.

*BAPEDALDA Tingkat I* has no authority to enforce permits & licenses (as it is under sectoral authority), to formulate and implement legislations and programs within the municipal and district levels, and to resolve conflicts between small home industries and surrounding communities without consent from the Municipal Environmental Impact Management Agency (*BAPEDALDA Tingkat II*) (as it is under the authority of *BAPEDALDA Tingkat II*).

#### ***Municipal Environmental Impact Management Agency or BAPEDALDA Tingkat II***

The Municipal / District Environmental Impact Management Agency (*BAPEDALDA Tingkat II*) was formed in the year 2000 in conjunction with the decentralization process. The roles and responsibilities of the Municipal Environmental Impact Management Agency are :

- ♦ Coordinating the formulation and implementation of environmental legislations, programs & projects in the municipal / district levels;
- ♦ Providing conflict resolution for ad hoc cases involving environmental pollution and degradation in the municipal / district levels.

*BAPEDALDA Tingkat II* has limited power and budget, and it relies on the provincial sectoral agencies for the success of many of its programs and projects. This agency has no authority to conduct interjurisdictional coordination for law and program formulation and implementation among the different districts / municipalities within the province (as



it is the authority of *BAPEDALDA Tingkat I*), as well as it has no authority to enforce regulations, permits and licenses (as it is the authority of the sectoral agencies).

### **3.6.2 Improvement of Rules, Procedures & Mechanisms for Coordination**

The central government has also formulated rules and procedures for coordination in policy and plan making and implementation; procedures for program formulation and budgeting have also been established and improved, and a decentralized approach in public decision making and budgeting involving the provincial and local governments has been encouraged by the central government. Following are the descriptions of such rules and procedures, and their chronological evolution of efforts for improvement.

#### ***Rules and Procedures for Structuring Horizontal Coordination in Policy & Plan Making Processes at the National Level***

Decisions in sectoral policy and plan making processes are the responsibilities of the sectoral ministries. The missions carried by each ministry differ from one another; some are complementary, but many of them are conflicting. In this regard, harmonization among those policies and plans are required through horizontal coordination, in order to enhance the effectiveness of such policies and plans. Horizontal coordination at the national level can be conducted in several ways. The highest level of coordination forum is the complete cabinet forum headed and initiated by the president and attended by all ministers. The second level of coordination forum is the limited cabinet meeting headed by the president and attended by related ministries. Other coordination forums are regular meetings headed by the State Coordinating Ministries for the purpose of exchanging information, bargaining and negotiation for resolving conflicts among ministerial departments. Issues discussed in the coordination forums include political and national defense issues, economic and monetary issues, social issues and environmental issues. Coordination at the national level may also occur under the coordination of the National Planning Board (*BAPPENAS*) or other non-departmental agencies responsible for specific coordination activities such as the National Coordination for Survey and Mapping, the National Coordination for Foreign Investment, and the National Agrarian Planning Board. The President can also initiate temporary teams – responsible for particular national programs or projects – consisting of several ministers and/or ministerial staffs to

structure the coordination process among sectoral line agencies. In this case, the president designates a particular ministry to serve as the leading agency.

***Rules and Procedures for Structuring Horizontal Coordination in Policy & Plan Making Processes at the Sub-National Level***

Government regulations no 5/1974 and no 6/1988, and Presidential Decree no 20/1981 mandate that the governor and the district heads are coordinators responsible for horizontal coordination at the provincial and local level respectively. In doing so, the governor is assisted by the Provincial Planning Board (*BAPPEDA Tingkat I*) and the district head is assisted by the Local Planning Board (*BAPPEDA Tingkat II*). The head of the Provincial Planning Board gives report on issues and problems of horizontal coordination at the sub-national level to the governor and the National Planning Board; the head of the Municipal Planning Board gives report on issues and problems of horizontal coordination at the local level to the district head, the Provincial Planning Board and the National Planning board. To enhance the horizontal coordination at the sub-national level, the governor could form coordination committees headed by the governor himself or the head of the Provincial Planning Board. Members of a coordination committee may consist of heads of related provincial agencies and boards (including the Environmental Impact Management Agency), the chief of branch of Ministry of Finance, and the head of state owned banks. This committee provides reports to the governor who, in turn, sends the report to the Minister of Home Affairs. The Minister of Home Affairs could bring issues and problems regarding horizontal coordination at the sub-national level to the forum of cabinet. Similarly, the district head could also form coordination committees at the local level. For the purpose of territorial integration and mitigation of conflicts between administrative jurisdictions due to problems of spillover involving two or more local governments, the Minister of Home Affairs can form a permanent interregional commission or a temporary coordinating body, based on the requests of provincial governors. Members of this commission or temporary coordinating body are officials from the Ministry of Home Affairs, officials from related sectoral and non sectoral branches at the provincial level, and heads of related Provincial & Local Planning Boards.

### ***Rules and Procedures for Structuring Vertical Coordination in Policy & Plan Making Processes***

There are four types of formal rules and procedures governing the interactions among agencies in different levels which exist in the government machinery which can be used to enhance vertical coordination :

- ◆ Command line that governs the relationships between the superior and its subordinates; examples of this are the relationships between sectoral ministries and their provincial and local branches;
- ◆ Consultation which facilitates interactions of agencies at different levels to solicit their views; examples of this are the relationships between *BAPPENAS & BAPPEDA Tingkat I* and between *BAPEDALDA Tingkat I* and *BAPEDALDA Tingkat II*;
- ◆ Technical guidance which facilitates the relationships between related units within the provincial government and related units within the local government;
- ◆ Negotiation and bargaining between the central government and the provincial governor and the district heads who implement the decentralization policy in his autonomous region or district.

According to the regulation no 5/1974, the governor and the district heads serve as the head of the decentralized governance system. This implies that the governor and the district head has an authority to coordinate sectoral branches and non departmental agencies at the provincial and local level. This regulation emphasizes that the decentralization authority is vested in the local level where development activities and projects are located. However, limited revenue generated from provincial and local sources and shortage of trained manpower are causes of the lack of balance of power between the central authority and provincial and local government in decision-making processes.

### ***Rules & Procedures for Project Formulation and Budgeting***

Prior to the second Five Year National Development Plan, the development planning approach in Indonesia was characterised as a top down planning approach. Initiation and decision regarding the development policies and programs were merely the task of the central government. With the adoption of the second Five Year National Development Plan (1973/1974-1978/1979), this approach was modified. Incorporation of provincial

and local needs was encouraged in the development planning processes. The procedure for proposing and formulating projects and budgets shows the central government's efforts to encourage the provincial and local levels in the development planning processes. There are two types of development projects : sector development projects initiated by sectoral ministries at the national level and implemented by sectoral branches at the provincial and local levels; and projects initiated and implemented by the provincial and local governments. The steps involved in annual-sectoral project formulation and budgeting are typically as follow :

- (1) Typically, each ministry is divided into a number of directorate generals which in turn are divided into several directorates. All directorates of all ministries prepare lists of "proposed projects", setting out the project description, objectives and budgets. These lists are based on proposals submitted by the sectoral branches at the provincial and municipal levels to the directorates.
- (2) The lists of proposed projects are sent to the directorate generals for approval from the appropriate ministries.
- (3) The lists are then sent to the *BAPPENAS* for project approval, and then to the Ministry of Finance for budget approval. The role of *BAPPENAS* is to harmonize all project proposals and to ensure that such projects are consistent with the objectives of the Five Year National Development Plan and accordingly the goals of long-range National Development Plan.
- (4) Upon receiving acceptance of the proposals, each directorate prepares a list of project descriptions which is essentially a duplication of the previous list, but it includes further project details and budget. This list is again circulated through all the above steps.
- (5) After having project approval from the *BAPPENAS* and budget approval from the Ministry of Finance, the lists of projects are then sent to the ministries, and letters of authorization for releasing budget for the projects are issued by the Ministry of Finance.

The procedures for provincial and local projects and budget proposals are similar to the procedures stated above. In this regard, the Ministry of Home Affairs and its directorates

are responsible for preparing lists of proposed projects and budget based on proposals submitted by the governors.

The adoption and enactment of government regulation no 5/1979 and Presidential Decree no 20/1981 are considered further steps to encourage the bottom-up approach. Government Regulation no 5/1979 emphasizes the importance of villages – administrative units under the subdistricts- in the national development processes. This implies that the procedures for project formulation should encourage people participation. Presidential Decree no 20/1981 mandates that all sectoral and non-departmental projects and programs proposed by the sectoral branches and non departmental agencies at the provincial and local levels (including the Environmental Impact Management Agency) should be communicated and discussed with the governor, the district head and with *BAPPEDA Tingkat I* and *BAPPEDA Tingkat II*. The *BAPPEDA Tingkat I & BAPPEDA Tingkat II* then send reports on assessments of all proposed projects in its administrative jurisdictions to the *BAPPENAS*. Proposed projects and programs at the provincial and local levels must be approved by the provincial and local legislative bodies.

#### ***Rules and Procedures for Coordination of Implementation Processes***

Implementation of environmental programs and projects funded from the provincial and local sources are the responsibility of the Bureau for Development in conjunction with the Provincial and Local Environmental Impact Management Agency (*BAPEDALDA*). Supervision and monitoring of physical performance and budget of the programs and projects are carried out by related ministries and the Provincial Planning Agency (*BAPPEDA Tingkat I*). Presidential decree no 20/1981 mandates that all development programs and projects within the provinces and local areas be under the coordination of the governors and the district heads respectively. Accordingly, the chief of the sectoral development programs and projects should periodically prepare and submit progress reports to the governors and district heads. In coordinating the implementation of policies, programs and projects, the governor is assisted by the Provincial Bureau for Development (*Biro Pembangunan Propinsi*); the district head is assisted by the Local Bureau for Development (*Biro Pembangunan Daerah*). The district heads send their reports on the implementation of programs and projects carried by the sectoral branches and non departmental agencies at the local level to the governors and the Minister of



Home Affairs. The Basic Provisions for the Management of Living Environment (Law no 4/1982) mandates that the provincial government is also responsible for environmental management at the provincial level. The authority vested in the provincial governor is wide-ranging, including to set standards, to license and check new development projects, to monitor adherence to environmental laws and to enforce the laws.

#### ***Rules and Procedures for Representation in Policy & Program Implementation***

Public representation in government activities at the sub-national level may take place through people's representatives in the legislative body at the local and provincial levels (*DPRD II - Dewan Perwakilan Rakyat Daerah Tingkat II* and *DPRD I - Dewan Perwakilan Rakyat Daerah Tingkat I*), and through direct involvement of target groups in program and project implementation. Prior to the adoption and enactment of government statutes and regulations, those laws and regulations must be approved by the legislative body. In this regard executive agencies carry the proposal of laws and regulations to the legislative body to receive approval. Discussion and bargaining may occur between the legislators and executives. The procedure for public representation – through people's representatives in the legislative body – requires that the executives prepare the draft proposal for new statutes, regulations and amendments and distribute them to members of the legislative body in such a way that those members receive sufficient time and opportunity for reviewing the proposal. Formal meeting between legislators and executives can be conducted upon the request of either party. In this formal meeting, members of the legislative body may raise questions regarding the appropriateness of particular existing statutes and regulations, and demand further investigation and institutional change. Another form of people representation & participation is the involvement of participants in program and project implementation through information-feedback processes as stated in the rules and procedures for program and project formulation.

### **3.7 Integrated Industrial Wastewater Management Initiatives**

Until the present moment there has been no Industrial Wastewater Management Act that guides and regulates the cooperation among the national, provincial and local governments in formulating integrated industrial wastewater management regulations and programs. Instead policies and organisations have evolved from the existing legislative

framework, responding to opportunities and needs for solving problems and conflicts involving industrial wastewater discharge. However, several initiatives have been made both by the national and subnational levels to contribute to the development of integrated industrial wastewater management practices. There are four categories of policies, programs and taxation system which contribute to the development of integrated industrial wastewater management practices :

- ♦ Industrial wastewater management oriented policies, laws and regulations;
- ♦ Broader intersectoral industrial effluent & surface water management programs;
- ♦ Area specific industrial effluent management programs;
- ♦ Groundwater withdrawal tax and industrial effluent discharge retribution.

### **3.7.1 Industrial Wastewater Discharge Policies, Laws & Regulations**

Indonesia's Agenda 21 for Sustainable Development promulgates policies and targets in the effort to control industrial pollution. The national environmental policy for the year 1998-2003 emphasizes four main areas of wastewater control in Indonesia : Management of Water Resources, Development of Sustainable Settlements, Health & Environment, and Sustainable Production & Consumption Processes. In regard to sustainable production-consumption and industries, targets for the year 1998-2003 include :

- ♦ Policy evaluation and cleaner production in private and public entities;
- ♦ Wastewater minimalization in the production process through economic incentives;
- ♦ Cleaner production processes;
- ♦ EIA & investment screening for clean technology and life cycle assessment;
- ♦ Increase public awareness through clean consumption orientation & campaigns.

In regard to programs and projects, industrial wastewater discharge policies, laws and regulations provide technical and political support for integrated industrial wastewater management in Yogyakarta. Regulations, standards, permits & licenses related to the management of industrial effluent discharge are depicted in table 3.3 below.

In 1982 the legislature enacted "Basic Provisions for Management of the Living Environment" (Law no 4/1982), a cornerstone for environmental law in Indonesia serving as an umbrella for more detailed regulations and decrees. In Law no 4/1982 provincial governors were given executive power over provincial environmental matters, and each sectoral ministry was made responsible for environmental affairs in its particular sector.

**TABLE 3.3**  
**INDUSTRIAL EFFLUENT LAWS & REGULATIONS**

<b>UNDERLYING ENVIRONMENTAL LAWS FOR WASTEWATER &amp; INDUSTRIES</b>					
<b>Legal Base</b>	<b>Name</b>	<b>Level</b>	<b>Target Groups</b>	<b>Objectives</b>	<b>Responsible Authority</b>
Law No 4/1982	National Environmental Law	National	Central & Regional Government Agencies; Sectoral Activities; Private Activities; NGOs; The Public	Provides legal foundation for future legislation; Promotes EIA & management of environment by private/public entities; Acknowledges right of NGOs & public	Ministry of Population / Environment; Environmental Impact Management Agency;
Law No 5/1984	Laws Concerning Industrial Activities and Its Relation to Environmental Impacts	National	Large, Medium & Small Private and Public Industries	Promotes sustainable development & corporate environmental care in conjunction with industrial activities; Acknowledges rights of NGO & the public.	Ministry of Population / Environment; Environmental Impact Management Agency;
Presidential Decree No 53/1989	Presidential Decree Concerning Industries & Industrial Areas	National	Large, Medium and Small Private and Public Industries	Promotes sustainable production-consumption through zoning, permits & licenses, EIA & adequate infrastructure in industrial areas; Establishes responsibility of lower government	Ministry of Environment; Environmental Impact Management Agency; Provincial Government
Law No 20/1990	Water Pollution Mitigation Law	National	Large, Medium & Small Private and Public Industries; Sectoral Activities; The Public	Provides legal foundation for provincial regulations & standards concerning discharge & river quality, permits & sanctions.	Central, Provincial & Local Gov't; Env Impact Management Agency
Law No 23/1997	Environmental Pollution & Degradation Mitigation Law	National	Large, Medium & Small Private and Public Industries; Sectoral Activities; The Public	Promotes role of sectoral & non departmental agency in environmental management through auditing, monitoring, land use, permits & law.	Central, Provincial & Local Gov't; Env Impact Management Agency
<b>AMBIENT WATER QUALITY STANDARDS</b>					
<b>Legal Base</b>	<b>Name</b>	<b>Level</b>	<b>Target Groups</b>	<b>Objectives</b>	<b>Responsible Authority</b>
Governor's Decision No 214/1991	Surface Water Quality Standards for Yogyakarta	Provincial	Large & Small Private/ Public Industries; Households; Sectoral Activities	Specify standards for pollutants discharged into surface water; Improve water quality	Provincial & Local Gov't; Env Impact Management Agency
Governor's Decision No 153/1992	Water Classes at Specific Locations of Different Water Bodies	Provincial	Large & Small Private/ Public Industries; Households; Sectoral Activities	Specify the possible uses of specific locations of different water bodies; Identify intensity of exposure to pollutants	Provincial & Local Gov't; Env Impact Management Agency

**TABLE 3.3 (Continue)**  
**INDUSTRIAL EFFLUENT LAWS & REGULATIONS**

<b>EFFLUENT STANDARDS</b>					
<b>Legal Base</b>	<b>Name</b>	<b>Level</b>	<b>Target Groups</b>	<b>Objectives</b>	<b>Responsible Authority</b>
Governor's Decision No 281/1998	Industrial Effluent Standards for Milk Industries	Provincial	Small, Medium, Large Public and Private Milk & Ice Cream Industries	Specify standards for pollutants discharged into surface water; Improve water quality	Provincial & Local Gov't; Env Impact Management Agency
Governor's Decision No 281/1998	Industrial Effluent Standards for Tofu & Tempe Industries	Provincial	Small & Medium, Private Tofu & Tempe Industries	Specify standards for pollutants discharged into surface water; Improve water quality	Provincial & Local Gov't; Env Impact Management Agency
<b>PERMITS &amp; LICENSES</b>					
<b>Legal Base</b>	<b>Name</b>	<b>Level</b>	<b>Target Groups</b>	<b>Objectives</b>	<b>Responsible Authority</b>
Ministerial Decision No 10/1994	Environmental Management & Monitoring Plans ( <i>Rencana Pantau/Kelola</i> )	National	Medium & Large Industries Investment Rp 600 Million – 2 Billion & Rp 2 Billion <; Public & Private Activities Requiring & not Requiring EIA	To monitor & report quantity & quality of wastewater; To build commitment for mitigation measures	Provincial & Local Chamber of Commerce
Ministerial Decision No 10/1994	Letter of Intent for Environmental Management & Monitoring (SPPL)	National	Medium & Small Industries Investment ≥ Rp 600 Million ; Tofu Industries using < 300 ton Soybean / Year ; Small Scale Activities not Requiring EIA	To monitor & report quantity & quality of wastewater; To build commitment for mitigation measures	Provincial & Local Chamber of Commerce
Provincial Regulation No 3/1997	Environmental Management & Monitoring Plans for Wastewater Discharge	Province	Small, Medium & Large Private and Public Industries; Public & Private Activities Requiring & not Requiring EIA	To monitor & report quantity & quality of wastewater; To build commitment for mitigation measures; establish wastewater discharge permit	Provincial & Local Chamber of Commerce
Law No 4/1982	Environmental Impact Assessment	National	Small, Medium & Large Industries Investment Rp 600 Million – 2 Billion ; Rp 2 Billion <; Rural Industries 500 ha ≤	Provide impact assessments prior to development of investments, programs & projects	Investment Coordination Board; Environmental Impact Agency
Ministerial Regulation No 6/1968	Investment Permit	National	Medium & Large Industries Investment Rp 600 Million – 2 Billion ; Rp 2 Billion <	Screening, Development of Impact Assessment & Mitigation Measures prior to investment	Investment Coordination Board; Provincial Environmental Impact Agency
Staatsblad 450/1940 Ministerial Regulation No 7/1993	Nuisance Permit	National	Small, Medium & Large Industries ; Public & Private Activities Requiring & not Requiring EIA	Ensures minimal disturbance in the form of pollution & environmental degradation	Economic Department of Local Government
Gov't Regulation No 13/1995	Site Permit	National	Small, Medium & Large Industries ; Public & Private Activities Requiring & not Requiring EIA	Land use and land zoning to mitigate environmental impacts	Urban/Spatial Planning Dept of Local Government



**TABLE 3.3 (Continue)**  
**INDUSTRIAL EFFLUENT LAWS & REGULATIONS**  
**PERMITS & LICENSES**

Legal Base	Name	Level	Target Groups	Objectives	Responsible Authority
Ministerial Regulation No 7/1993	Land/ Building Permit	National	Small, Medium & Large Industries ; Public & Private Activities Requiring & not Requiring EIA	Adequate land use to mitigate environmental impacts	Economic & Spatial Planning Dept of Local Government
Gov't Regulation No 13/1995	Activity Permit	National	Industries whose Investment is Rp 5 Million <	Standardization of process & products to mitigate impacts	Provincial & Local Chamber of Commerce
Provincial Regulation No 10/1998	Ground Water Usage Permit	Province	Private & Public Commercial Activities Using Groundwater 50 Cubic M < or 50,000 L / Month	Monitoring of groundwater usage; water resource conservation	Economic & Mining Dept of Provincial & Local Government

Law no 5/1984, also a cornerstone for environmental laws in industrial ecology, functions to establish the roles and responsibilities of industries in environmental care, as well as stipulating the Ministry of Industry and the Chamber of Commerce the duty to act as facilitators for corporate environmental management. Through Presidential Decree No 53/1989, the Ministry of Trade & Industry, the lower levels of government and the Investment Coordination Board are appointed responsible for integrated and sustainable land zoning and permitting system. Law no 20/1990 concerns pollution of surface and groundwater, while Law no 23/1997 concerns broader activities such as forest concessions, mining and coastal resource management. Provisions in Law no 20/1990 include the appointing of provincial and local governments to document and monitor pollutants, to conduct integrated permitting and retribution system, and to fund monitoring from the provincial and local sources.

Governor's Decision no 153/1992 specifies the different categories of water at specific locations along the rivers found in Yogyakarta : Category A for water that may be used directly as drinking water without any prior treatment; Category B for water that may be used as raw drinking water; Category C for fisheries and livestock; Category D for agricultural purposes, industries and hydro-electric power generation. Category B is the intended category for water bodies where effluents from tofu industries & Sari Husada are discharged. Effluent Standards pertinent to the thesis include wastewater effluent standards for milk & ice cream industries and effluent standards for tofu and



tempe industries. Both effluent standards are embodied in Governor's Decision no 281/1998, and are valid in the Province of Yogyakarta.

Provincial Regulation no 3/1997 dictates that all industries are required to submit Environmental Management and Monitoring Plans (*RKL & RPL*), whereas in the past Environmental Management and Monitoring Plans only apply to :

- ♦ Large & medium industries whose impacts are potentially significant and requiring Environmental Impact Assessment (*AMDAL*) or Evaluation of Environmental Impacts (*SEMDAL*);
- ♦ Industries present before the requirement for EIA was established;
- ♦ Large & medium industries whose impacts are manageable and not requiring EIA.

However, presence of different permit requirements entail that large and medium industries are obliged to have detailed & elaborate Environmental Management and Monitoring Plans (especially in the event of addition of new equipment or production process), whereas small and home industries are obliged to submit a Letter of Intent for *RKL & RPL* (*SPPL*) to the Local Chamber of Commerce. Such letter specifies small industries' agreement to perform mini *RKL & RPL*.

For those requiring EIA or *SEMDAL*, *RKL* and *RPL* are conducted after performing detailed assessment report as part of the EIA or *SEMDAL* process. After the EIA process and submission of the *RKL & RPL*, the Regional Investment Coordination Board along with the Provincial Environmental Impact Management Agency are to review corporate environmental care for issuance of investment permit in the case of foreign and domestic investments.

Acquisition of the nuisance permit (which must be renewed every five years) is a prerequisite to acquiring other permits such as land & building permits and activity permit. Nuisance permit is issued by the mayor of Yogyakarta or the chief of the district for enterprises determined to be potential nuisances (in pollution and environmental degradation) according to regional law and custom. Acquisition of the nuisance permit, the site permit and the land & building permits applies to all industries regardless of size and nature.

However, large & medium industries had been present prior to the implementation of land use plans & the enactment of site permit, while tofu industries grew from the

informal sector of the lower income communities found along Yogyakarta's many rivers. Therefore, locations of many large, medium and small industries fall short of the objectives of the land use plan and site permit.

### **3.7.2 Taxes and Retributions**

The number of taxes and retributions required by the national and local government are numerous. Corporate & production tax, sales tax and import duties are just some of the taxes levied by central government. Local government levies property tax, land & building tax, operating license, and in addition also road toll, sewerage infrastructure charge, etc. Taxes and retributions can be said to have little or no connection with environmental care, moreover promote mitigation measures. An example illustrates that for small and home industries using the public sewerage, the sewerage infrastructure charge cannot be based on volume, but rather based on the activities which generate wastewater (households, motels, small industries), and the price standards for the different criteria of households, motels and small industries are lacking and unclear. An additional problem is the covert nature of small home industries, leading to the perception that small home industries are identical to households, therefore the sewerage infrastructure charge for small home industries is the same amount as the charge for households.

However, the provincial government along with the Regional Environmental Impact Management Agency recently introduced a new tax & a new retribution geared towards integrated industrial wastewater management. The tax and retribution related to industrial wastewater management include the groundwater withdrawal tax and the industrial effluent discharge retribution.

Provincial Regulation no 3/1997 mandates that medium and large industries pay effluent discharge retribution in accordance to the volume of wastewater generated. Payment for effluent discharge is mandatory in order to acquire the wastewater discharge permit (issued by *BAPEDALDA*) which must be renewed every five years. Companies are obliged to check their wastewater quality in a laboratory designated by *BAPEDALDA* on a monthly basis, and report their wastewater discharge to the Environmental Impact Management Agency (*BAPEDALDA*) every three months, while the agency has the duty to evaluate corporate wastewater management on a yearly basis. Effluent discharge

retribution is prioritized for large and medium industries targeted in the *PROKASIH* Clean River Program.

Provisions within Provincial Regulation no 10/1998 mandates that industries utilizing groundwater resources exceeding 50 cubic meter per month are obliged to pay groundwater tax in accordance to the volume of groundwater extracted. Such payment would be made to the local government, with consent and permit obtained from the Provincial and Local Mining Department.

### **3.7.3 The *PROKASIH* Clean River Program**

A nationally coordinated program involving the Provincial Environmental Impact Management Agency and the provincial government called the Clean River Program or *Program Kali Bersih (PROKASIH)* was initiated in June 1989 due to the rapidly deteriorating water quality of the nation's rivers. The real accomplishment of *PROKASIH* is the development of an integrated national and provincial program within a system that had no previous foundation or infrastructure necessary to carry out such a program. The *PROKASIH* program and data results are being centrally coordinated by the National Environmental Impact Management Agency. Within the individual provinces the *PROKASIH* program is the responsibility of the Provincial Environmental Impact Management Agency under the continued direction of the governor. Objectives of the *PROKASIH* program include :

- ♦ Preventing the decline of and improving water quality & viability in water sources where pollution has reached unacceptable intensity or in water sources with strategic designation;
- ♦ Increasing momentum for development of necessary environmental institutions at the regional level;
- ♦ Improving the quality of information & data relevant to the prevention of water pollution.

Implementation of *PROKASIH*, including the decision which rivers are to be included in the program, is the responsibility of each province. In general, implementation involves the following actions :

- (1) Determining the rivers, and the specific reach(es) of each river to be included in the program based on extent of pollution and high industrial point source pollutant loads;

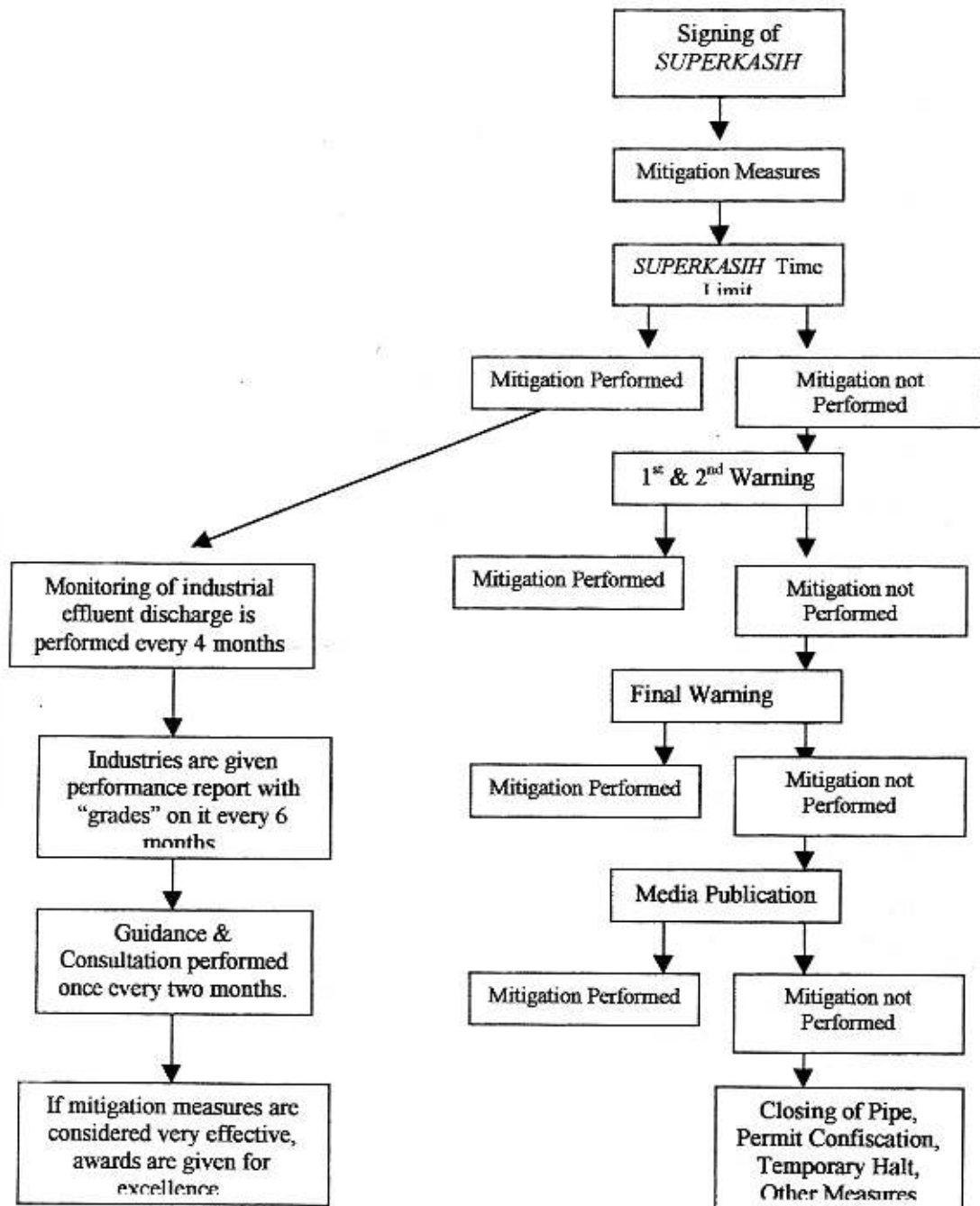
- (2) Determining the categories of each river reach based on designated use and the minimum water quality standard associated with that category;
- (3) Conducting an inventory of the industrial and other activities that discharge waste to the river basin;
- (4) Determining wastewater discharge targets (expressed as quantitative targets or percentage reduction in loadings) for each priority industry;
- (5) Monitoring and evaluating the quality and quantity of wastewater produced by the facilities that have signed the *SUPERKASIH* agreement (covenants) on a quarterly basis based on a single sample grab;
- (6) Monitoring and evaluating the ambient quality and pollutant quantity of the rivers; Data collection, data processing and reporting to the National Environmental Impact Management Agency;
- (7) Surveillance, inspection and enforcement activities relating to non-compliance with existing law, regulations and decrees;
- (8) Ongoing responsibilities, including institutional and manpower development of those parties involved in *PROKASIH*, and the development of incentives for pollution reduction.

Three basic levels of reports that should be produced are technical summary reports containing all water quality information required for a specified time period; summary reports prepared annually containing assessment of data along with its potential implications and management recommendations; and reports for the public & educational purposes concentrating on simplified graphical summaries of the data and conclusions. The steps in program enforcement is depicted in figure 3.2.

Monitoring of industrial effluent discharge & river water quality is performed by the Regional Environmental Impact Management Agency every four months, whereby industries are required to submit a report concerning the quantity and quality of its effluent discharged. A report concerning the industries' performance is given every six months, while guidance and consultation is held once every two months. Awards are given if mitigation measures are considered very effective.

In accordance to Government Regulation no 20/1990 concerning water pollution mitigation, the monitoring and consultation in the *PROKASIH* Clean River Program is

financed by revenue from provincial and local sources. Individual industries are held responsible for financing mitigation measures and for compensating environmental destruction caused by their own actions.



**FIGURE 3.2**  
**STEPS in PROKASIH PROGRAM ENFORCEMENT**  
 (Source : PROKASIH Report, 1999/2000)



Within the Yogyakarta vicinity the *PROKASIH* program is targeted for large and medium industries. Currently 32 large and medium industries in the urban agglomeration of Yogyakarta which are considered significant polluters are the targets of the *PROKASIH* program. The different industries include Sari Husada Ltd, and ranges from textile and leather industries to food processing and printing industries.

#### **3.7.4 Specific Programs Related to Industrial Wastewater Management**

In relation to industrial wastewater management and public participation, Indonesia's Agenda 21 for Sustainable Development highlighted the following classifications of program in order to achieve the 1998-2003 targets (stated in section 3.7.1) concerning the production process :

- ◆ Campaigns to increase the awareness of government officials, industries and the public concerning cleaner production methods and the economic advantages of sustainable development;
- ◆ Prioritization of waste and emission prevention in industrial wastewater management programs;
- ◆ Implementation of economic instruments and incentives by providing subsidy, soft loans & tax free royalty for import of end of pipe technology;
- ◆ Awards for adequate mitigation measures by companies;
- ◆ Implementation of retributions such as discharge fees;
- ◆ Institutionalization of cleaner production via the EIA & Environmental Audits during the investment evaluation stage;
- ◆ Promotion of clean technology, maintenance and good housekeeping.

Based on the above program classifications, the provincial and local government have initiated and implemented specific programs related to industrial wastewater management :

##### ***Programs involving Economic Instruments***

- ◆ Providing subsidies for the construction of communal wastewater treatment for small home industries;
- ◆ Providing soft loans to form common production house and communal wastewater treatment for small home industries;

- ♦ Providing tax free royalty for large & medium industries for import of wastewater treatment facilities;
- ♦ Providing tax reduction for the import of clean technology.

#### ***Orientation, Consultation and Disclosure for Small Home Industries***

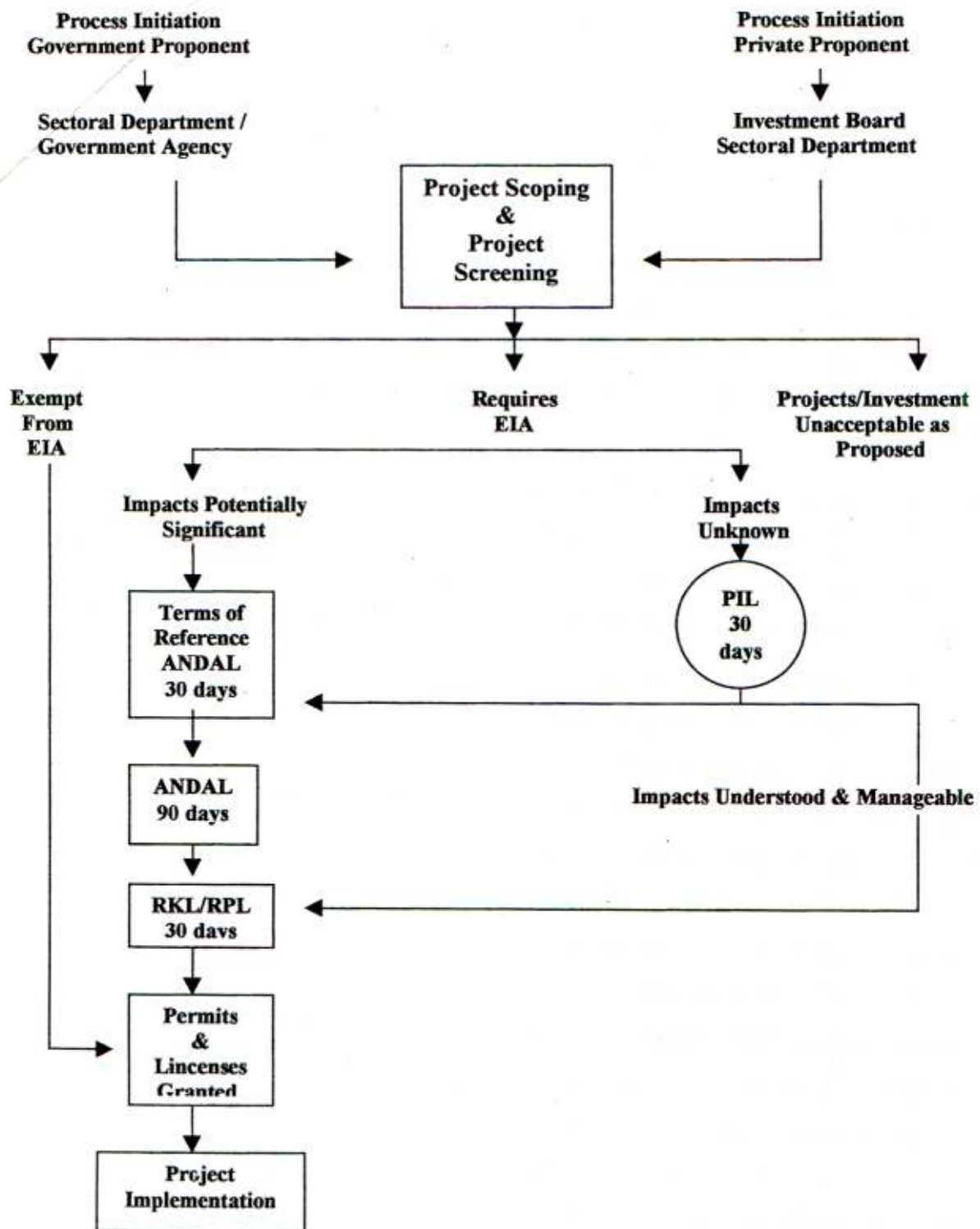
- ♦ Orientation & consultation on management, production & relation between production process and the environment (Capacity Building for Home Industries);
- ♦ Orientation and consultation on public health and clean living & working environment; Monitoring the quality of surface and groundwater;
- ♦ Orientation and consultation on end of pipe technology and waste & emission prevention;
- ♦ Disclosure of information and discussion with the public.

Through orientations, consultations and discussions with the public the provincial and local governments hope to improve wastewater management of small home industries, while through the *PROKASIH* program the government hopes to improve wastewater management of large and medium industries.

Institutions involved in programs for small home industries include the Chamber of Commerce & Industry, *BAPEDALDA Tingkat I & II*, local government bodies and the Department of Public Health. The *BKPM* and the regional government are responsible for screening the use of clean technology and the taxation associated with import of wastewater treatment facilities. Revenues generated from provincial and local sources are the sources of funding for the programs, subsidies and loans for small home industries. However, the home industry capacity building programs and the orientations & consultations on public health and clean environment are funded by sectoral departments in the form of central government grants. Programs and projects under the guidance of the sectoral departments are funded by grants from the national budget, whereas most programs and projects under the guidance of *BAPEDALDA* are funded by provincial and local generated revenues.

#### **3.7.5 Environmental Impact Assessment**

“The Basic Provisions for the Management of the Living Environment” (Law no 4/1982) mandates that every development project and investment initiated by sectoral



**FIGURE 3.3**  
**EIA PROCESS STRUCTURE FOR NEW INVESTMENTS**  
 (Source : EMDI Report, 1994)

line ministries, provincial and local governments and private sectors undergo environmental impact analysis (*AMDAL*). A procedure and institutional framework for carrying out Environmental Impact Assessment (*AMDAL – Analisis Mengenai Dampak Lingkungan*), however, was established in 1986 (Government Regulation no 29/1986), four years after the enactment of Law no 4/1982. The *AMDAL* process is depicted in figure 3.3.

The institutional structure of the *AMDAL* process constitutes the *AMDAL* Technical Team, the Central Commissions (consisting of its technical and working group), and the Regional Commissions (consisting of its technical team and the *BKPM*). The *AMDAL* Technical Team is a national inter-agency committee established to provide a policy-making forum for *AMDAL*. This committee is chaired by the Deputy II of the National Environmental Impact Management Agency (*BAPEDAL*). Members are usually secretaries & representatives from the *AMDAL* Technical Team of the Central *AMDAL* Commissions. The Central *AMDAL* Commission reviews investments and development projects requiring *AMDAL* at the central government level. These Commissions are established and chaired by each sectoral or non-departmental government agency. At the central level, *BAPEDAL* participates in project reviews as a permanent member of all Commissions. Central *AMDAL* Commissions have been established in 14 departments, and most of the Commissions have established Technical Teams & Working Groups to assist with project reviews. The Ministry of Industry has Technical Teams in each of its General Directorates. The Regional *AMDAL* Commissions are established by the Governor of each province and chaired by a representative of the Provincial Development Planning Board (*BAPPEDA*) and a representative of the *BAPEDALDA*. At the provincial level, *BAPEDALDA* participates in project reviews as a permanent member of the Commissions. Most of the provincial *AMDAL* Commissions have also formed Technical Teams to assist in project reviews.

### **3.8 Institutional Arrangements for Effluent Management Programs**

Institutional arrangements for integrated industrial effluent management programs can be characterized as networked arrangements that rely on existing authorities of relevant agencies and administrative jurisdictions. Participatory role of industries becomes key as integration of various policy objectives is pursued through interagency

and interjurisdictional coordination among government key agencies and entities responsible for directing, implementing & monitoring industrial effluent management programs. Government agencies are responsible for : sectoral plan & policy making and implementation of the programs, coordination in plan & policy making and implementation, and environmental matters at each government level.

A key agency is usually assigned to take the role in administering and leading in the coordination of policy & program formulation and implementation. The designation of the lead agency is made through statutes or executive orders issued by the higher authority. In conducting coordination for program formulation and implementation, the lead agency may utilize existing coordinating procedures and mechanisms, executive orders and ask the help of the National or Regional Planning Board (*BAPPENAS* & *BAPPEDA*). A planning committee may be formulated and is headed by the lead agency. Members of this committee are representatives of involved sectoral line agencies and of related local governments. This committee functions as a coordinating mechanism at the level of policy and program formulation and implementation.

Vertical coordination between the national agencies and the subnational government is conducted through communication, consultation and bargaining between the national agencies and the district. At the provincial and local level the implementation of programs funded by national government grants and programs funded by local & provincial governments are the responsibilities of the sub-national departmental and non departmental government agencies. A lead agency may also be assigned and a coordination committee be established to induce interagency coordination in implementation. This coordination committee is headed by the governor or district head, and members of this committee also include the head of lead agency and members from related departmental agency. The sub-national lead agency responsible for Environmental Impact Assessment & the Clean River Program - *BAPEDALDA Tingkat I* - is assigned the task of implementation coordination.

The following are the institutions responsible for implementing programs related to industrial wastewater management among tofu producers :



**TABLE 3.4**  
**INSTITUTIONS INVOLVED IN PROGRAMS FOR TOFU INDUSTRIES**

	<b>Program</b>	<b>Lead Agency</b>	<b>Supporting Agencies</b>
1	Orientation/Consultation on Management/Production (Capacity Building)	Provincial Chamber of Commerce & Industry	---
2	Orientation/Consultation on Clean Living & Working Environment	Department of Public Health	Municipal Government or Municipal/Provincial Environmental Impact Agency
3	Monitoring the Quantity & Quality of River Water Across Jurisdictions	Department of Public Health	Municipal Environmental Impact Management Agency
4	Orientation/Consultation on End of Pipe Technology & Waste Emission Prevention	Provincial or Municipal Environmental Impact Management Agency	Chamber of Commerce & Industry Municipal Government
5	Disclosure & Discussion with the Public & Surrounding Communities	Provincial Environmental Impact Management Agency	Chamber of Commerce & Industry
6	Subsidy for Wastewater Treatment Tank & Piping Facilities	Provincial or Municipal Environmental Impact Management Agency	Municipal Government
7	Low Interest Loan for Construction of Common Production House & WWT	Provincial Government (Governor)	Chamber of Commerce & Industry Provincial Environmental Impact Management Agency

### **3.9 Government Measures Supporting the Industrial Sector**

Supportive measures for industries have been taken by the government, functioning to encourage environmental considerations for the management of effluent discharge. The following are measures taken by the government to support the industrial sector :

- ◆ The promotion of free market economy in the early 1990s paved the way for trade liberalization and use of market forces, replacing the use of government regulated instruments;
- ◆ Deregulation of economic protection policy in 1996 has encouraged entrepreneurs to invest in areas traditionally reserved for public sector (i.e. State Owned Electricity Company, National Oil and Petroleum Corporation);
- ◆ Financial sector reform program started in 1998 is aimed at strengthening the financial framework to develop a competitive, autonomous and solvent financial system, and create a source for long term lending;

- ◆ Efforts are currently conducted by Bank Indonesia to drop interest rates through reduction in money supply growth and circulation to achieve positive real interests for improving saving mobilization and allocation of credit and capital for industries;
- ◆ Enhancement of product standards and quality control by the National Food and Drug Administration to instil product competence in the local, national and foreign market.



The Communal Production House & the Centre for Producer Association in Ngoto

## CHAPTER IV

### DESCRIPTIVE BACKGROUNDS OF THE CASE STUDIES

#### 4.1 The Primary Case : Tofu Home Industries

In 1997 the Province of Yogyakarta has 841 tofu producers who are members of the Tofu & Tempe Cooperative Association. Four hundred forty producers are from the Yogyakarta Municipality, 136 from Sleman Regency, 82 from Bantul Regency, 112 from Kulon Progo and 71 from the Gunungkidul Regency. Tofu industries are commonly located along river bodies in the peri-urban areas where groundwater depth are shallow. Without presence of adequate wastewater storage, treatment and disposal method contamination of surface water and soil occurs. Soil and surface water pollution poses a further danger of groundwater resource contamination. Tofu industries originate from informal home industries whose production activities are initiated from the common interest of a community living in a particular area. Although such industries & producers tend to form clusters in particular areas along the river bodies, locations of tofu industries and producers are scattered throughout the peri-urban areas. Government effort in forming the centralization of tofu industries have been to develop clusters into larger centres through capacity building programs and through subsidy & loans for infrastructure development (WWT, roads, etc). Another form of effort has been to unite producers in scattered locations through local associations (*Paguyuban*) in the effort to form clusters of tofu producers in the near future. It is through these local associations or *Paguyubans* that the government implements its environmental programs and projects in the form of orientation, consultation, subsidies and capacity building. .

The total amount of soybean required for production in the tofu and tempe industries altogether amounts to 176,793 ton/day, whereas the ratio between the amount of soybean used and the quantity of water required for production is 1 : 10. It is estimated that 90% of the water used in the production process becomes wastewater. From the above findings it is estimated that the total amount of water required is  $\pm$  1,767.93 cubic meter/day, and the total amount of wastewater generated is 1,591.137 cubic meter/day (AKPRIND, 1997/1998). On the average, a producer who produces 1 ton of soybean per

in ownership, in mode of production and in equipment used for the production process. All of the selected samples have been given the same government programs and projects, and are subjected to the same regulation and taxation/retribution system in conjunction with industrial wastewater management.

Selected samples involve tofu home industries in the following areas : Ngoto, Bantul-Yogyakarta; Wirobrajan, Yogyakarta; Tawang Sari, Bantul-Yogyakarta; Somodaran, Kulon Progo-Yogyakarta.

Tofu producers in Ngoto, Bantul-Yogyakarta have a common production house and a common wastewater treatment as stated above. Seventeen to twenty producers share the common production house and are responsible for paying the initial loan of Rp 115 million with 0.6% interest per year in three to four years. Loan & maintenance costs are paid weekly by individual producers dependent upon the number of kilograms of soybean processed by each producer. Rp 50 / kg soybean is the charge for returning the loan, while Rp 300 / kg soybean is the charge for maintenance cost and labourers' fees. The producers in Ngoto receive Rp 8 million from the Chamber of Commerce for investment in communal wastewater treatment in October 1998. Ten producers are taken as samples from the Ngoto area.

The production house in Wirobrajan belongs not to the tofu producers, but to a financier or investor who made the initial investment. Eleven to fifteen producers in Wirobrajan take turns using the equipment & facilities in the investor's production house while paying Rp 3,000 / kg soybean processed for fuel and rent of cooking place & equipment. The investor is also a landlord whose properties are rented by many of the tofu producers. Producers complain of the monopoly the investor has on the price of tofu processing. Unfortunately the government is "legitimizing" the monopoly by providing full subsidy to the investor or financier for the construction of a wastewater treatment tank in June 2000. Ten producers are taken as samples from the Wirobrajan area.

The production house in Tawang Sari, Bantul belongs to three investors. Around fifteen producers take turns processing their soybean in the production house. The difference with the case of Wirobrajan is that producers in Tawang Sari do not perform the job themselves, producers are only to monitor the production process while hired labourers are provided by the investors to perform the manual labour. The cost for fuel,

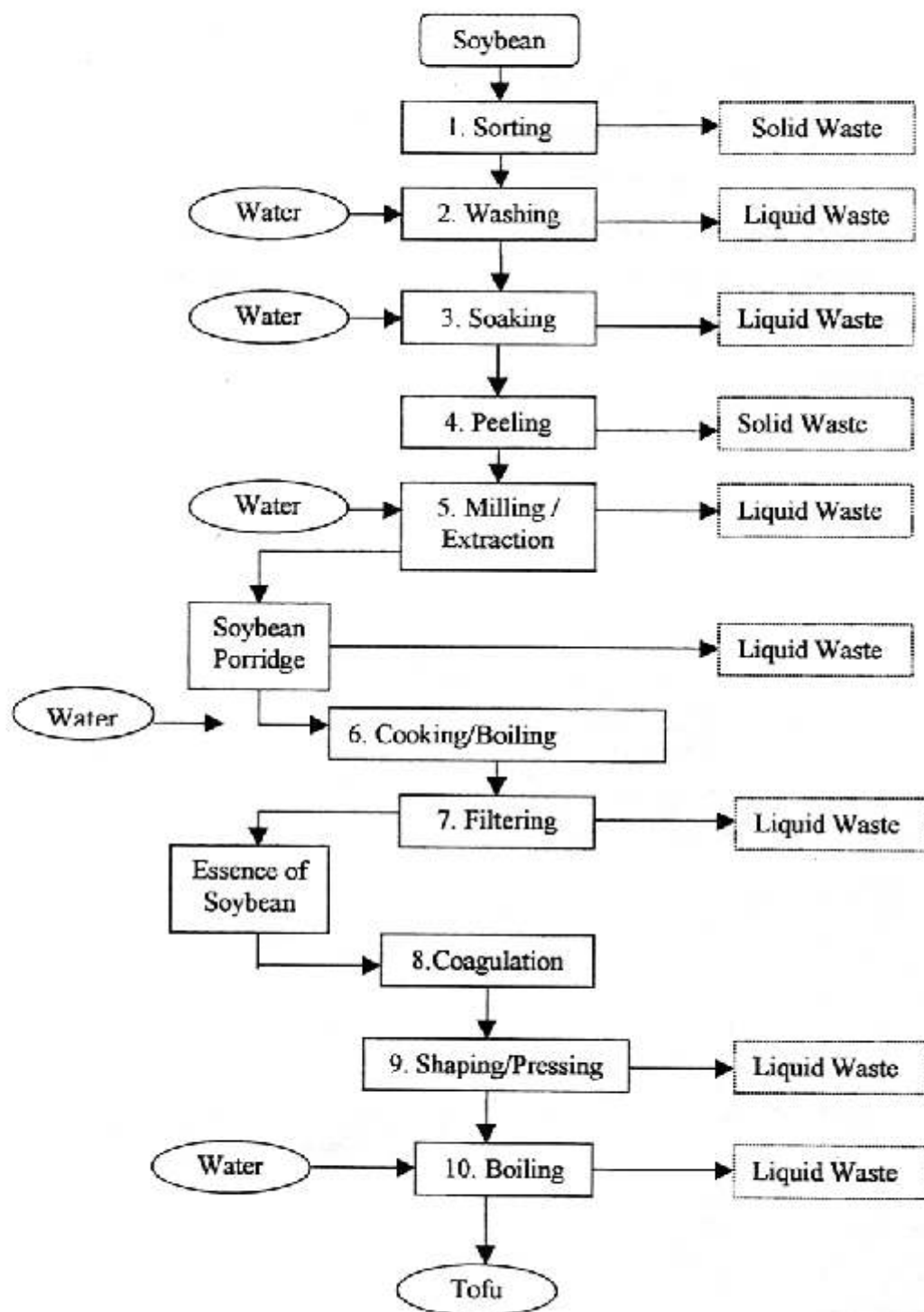


renting of place & equipment and labour is Rp 2,000 kg/soybean. In November 1999 the local government provided the above production house with a wastewater treatment tank. Ten producers are taken as samples from the Tawang Sari & Gedongkiwo areas.

The production facilities and equipment in Sodomaran are not centralised as in the previous examples. Each tofu producer in Sodomaran, Kulon Progo has a small and modest tofu processing facility and equipment, thus their individual houses also function as a modest production house. The number of tofu producers scattered throughout the Sodomaran area ranges from 18-25. Topography of the area is unlevel with the western part being higher in elevation than the eastern part. Therefore, without the presence of a centralised & communal production house, determining the most strategic & feasible location(s) for construction of communal wastewater treatment(s) accessible to many would be very challenging. Through the Provincial and Municipal Environmental Impact Management Agency government effort has been to fully subsidize the construction of three communal wastewater treatment tanks : one for the three main producers in the western part and two others for the six main producers in the lower eastern part of Sodomaran. These were constructed in September 1999, April 2001 and June 2001 respectively. Fifteen producers are taken as samples ; seven of whom do not have access to a wastewater treatment tank while the other eight do have access to a communal treatment tank.

#### **4.1.2 The Production Process**

The production process involves sorting of raw material; washing, soaking & peeling of soybean; milling & extraction; cooking & boiling; filtering; coagulation; shaping & pressing; boiling and storage (see figure 4.1). Sorting raw material is important to obtain high quality soybean and to separate the soybean from residues. Washing the soybean is performed afterwards to clean the soybean from dirt. The next step is to soak the soybean for 6-12 hours to facilitate the peeling process. During this step the soybean absorbs water & increases in weight. After peeling the soybean, grinding or extraction is performed by adding hot water. The soybean product after grinding takes the form of a white porridge containing soft, strandlike texture ready for boiling. The next step involves cooking & boiling the mixture for 15-30 minutes in hot



**FIGURE 4.1**  
**THE TOFU PRODUCTION PROCESS**  
 (Source : AKPRIND, 1997/1998)

water. Filtering is performed afterwards in order to obtain the essence of the soybean for curd formation. Curd formation is achieved through the addition of  $\text{CaSO}_4$  and vinegar into the mixture. Blending of the two ingredients should be done carefully to avoid the acidic taste. Before the final step of boiling and storage, the mixture of curd is first shaped and pressed to give the tofu its square shape. Boiling the tofu before final storage in water is recommended to avoid premature decay of the product.

#### 4.1.3 Programs for Industrial Participation in Environmental Care

Programs held by sectoral departments and government agencies within the area of selected samples of tofu industries includes orientation & consultation, disclosure & discussion with the public, subsidy for wastewater treatment facilities and low interest loans for construction of communal production house. Table 4.2 illustrates programs given within the area of selected samples along with their frequency.

**TABLE 4.2**  
**FREQUENCY OF PROGRAMS IN SAMPLED AREAS**

<b>Locations</b>	<b>Ngoto, Bantul</b>	<b>Wirobrajan, Yogya</b>	<b>Tawang Sari &amp; Gedongkiwo</b>	<b>Somodaran, Kulon Progo</b>
<b>Programs</b>				
Orientation & Consultation on Management (Capacity Building)	1993-1998 Program held once a year	1989-1997 Program held once every two years	1987-1995 Program held once every two years	1990-1997 Program held every 1,5 years
Orientation & Consultation on Clean Living & Working Environment	1998-2000 Program held three times a year	1994-1999 Program held twice a year	1995-1999 Program held once a year	1996-2000 Program held once a year
Orientation & Consultation on End of Pipe Technology & Waste Emission Prevention	January & March 2000 Program held twice	July & September 2000 Program held twice	1995-1999 Program held once a year at the same time as above	Program held twice after the installation of wastewater treatment
Disclosure & Discussion with the Public & Surrounding Communities	January & March 2000 Program held twice	---	---	May 2000 Program held once
Subsidy for Wastewater Treatment Tank & Piping Facilities	October 1998 Program held once	June 2000 Program held once	Tawang Sari is in November 1999 Gedongkiwo is in December 2000	1) September 1999 2) April 2001 3) June 2001 4) 1994
Low Interest Loan for Construction of Common Production House & WWI	February 1998	---	---	---

The wastewater treatment constructed is that of a four compartment underground wastewater treatment tank consisting of equalization, neutralization, sedimentation and filtration tanks. The wastewater treatment in Ngoto, Bantul is that of a one compartment sedimentation tank built above the ground. Two of the treatment tanks in Somodaran are in the form of septic tank. Orientation concerning end of pipe technology includes the topic of wastewater treatment maintenance and the needs for wastewater storage prior to proper discharge.

The waste prevention techniques proposed by the Provincial Environmental Impact Management Agency is that of using the dry method (by grinding & using fan) for separating the cotyledon from the skin, employing hydration as a substitute for immersion of soybean and using the steam process for cooking and boiling. However producers tend to consider the above techniques costly, inefficient and poor for sustaining their product quality. The table below shows the amount of water which could be salvaged using the proposed model by the Yogyakarta Academy of Industry (AKPRIND).

**TABLE 4.3**  
**COMPARISONS OF DIFFERENT TOFU PRODUCTION PROCESSES**

No	Process in Somodaran, Kulonprogo	Process in Wirobrajan, Yogya	Process in Ngoto, Bantul	Suggested Model
1	Soaking in water 500 l	Soaking in water 400 l	Soaking in water 450 l	Grinding & dry peeling of skin
2	-	Boiling in water 200 l	Boiling in water 150 l	-
3	Peeling skin with water 250 l	Peeling skin with water 200 l	Peeling skin with water 150 l	-
4	-	-	Soaking with water 200 l	Hydration
5	Boiling with water 250 l	Boiling with water 200 l	Boiling with water 200 l	Boiling without water ; with steam
6	Milling / grinding with hot water 500 l	Milling / grinding with hot water 450 l	Milling / grinding with hot water 350 l	Milling / grinding with little water 200 l
7	Cooking with water 200 l	Cooking with water 250 l	Cooking with water 200 l	Cooking without water ; with steam
8	Filtering while discharging water	Filtering while discharging water	Filtering while discharging water	Filtering while discharging water
9	Coagulation	Coagulation	Coagulation	Coagulation
10	Shaping & pressing while discharging water	Shaping & pressing while discharging water	Shaping & pressing discharging water	Pressing discharging water
11	-	Boiling with water 100 l	Boiling with water 50 l	Boiling with water 100 l
12	<b>Total Water 1700 l</b>	<b>Total Water 1800 l</b>	<b>Total Water 1750 l</b>	<b>Total Water 300 l</b>

(Source : AKPRIND, 1997/1998)

Disclosure and discussion with the public is held to develop a mutual understanding between producers and surrounding communities on the need to improve production quality and quantity, and the need to develop (better) corporate environmental management plans. Although public disclosure and discussion do not function to seek specific options and instruments for industrial wastewater management, they provide the basis for wastewater management initiatives, and function as a voluntary mitigation instrument based on common consensus & agreement.

## **4.2 The Supplemental Case : Sari Husada, Ltd**

Sari Husada Ltd, a leading producer in infant & baby formula, is taken as the supplemental case to analyse the adequacy of institutional framework for management of industrial wastewater discharge in the general context, and in the more specific context the effectiveness of government interventions in industrial wastewater management. Government interventions applicable to Sari Husada in the forms of management tools and legal & economic instruments are analysed and discussed for comparison and contrast to the tools and instruments used in industrial wastewater management of tofu home industries. A synthesis and proposal are prepared afterwards for improvement of the institutional framework for industrial wastewater management.

### **4.2.1 Description & History of Sari Husada, Ltd**

Sari Husada Ltd is a private-public milk corporation specializing in the production of infant and baby formula. It's products are powder milk & powder base cereal for babies & infants. A company of  $\pm$  700 employees, the organizational structure of Sari Husada comprises of a chief executive officer, four directors, eight middle line managers, and operators & foremen. Corporate environmental management falls under the director and manager of the production process. Currently more than 65% of its stock is owned by Nutricia Holland, and corporate management has received the ISO 9002 certification. Sari Husada's main products includes : milk formula for babies of 0-6 months old (SGM), follow up milk formula for babies of 6-24 months (SGM & Vitalac 2), milk formula for infants and children (SGM Junior & Provikid), LLM milk formula for lactose intolerant consumers, SNM & Nutricia Cereals for infants, food supplement from milk products for women (Vitanova & Lactamil) and Full Cream Milk Powder. Additional products includes Morinaga cereals and Unilever rice flakes.



In its history Sari Husada was founded in 1954 as a soybean milk producer with the name NV Saridele to fulfill the country's demand for protein. Funding for investment in production facilities and equipment was provided by the Food & Agricultural Organization, and management was the responsibility of the Indonesian Development Bank. In 1962 NV Saridele became a state owned enterprise with the name Perusahaan Negara (PN) Sari Husada. To improve baby and infant nutrition the Minister of Health & Human Services ordered PN Sari Husada to produce milk and baby formula in 1965. In August of 1968 management of PN Sari Husada was transferred from the Indonesian Development Bank to Kimia Farma Ltd, a food and drug administration agency under the Ministry of Health & Human Services. A joint venture agreement between Kimia Farma Ltd and Tiga Raksa Ltd was held in 1972 for investment of new production equipment and facilities leading to the change in status from PN Sari Husada to Sari Husada Ltd. On June 4, 1983 Sari Husada acquired a permit from the central government to sell its stock in the Jakarta Stock Exchange. Current investments in the corporation has replaced old production machineries into more modern ones capable of reducing pollutant quantity and improving pollutant quality, but also capable of increasing production, therefore generating additional volume of wastewater.

#### **4.2.2 Production Level & Corporate Initiatives Towards Environmental Care**

Production process applicable to the milk products includes compounding, clarification, pasteurization, homogenization, cooling, spray drying, can cleaning, can sterilizing, filling, closing and clinching, vacuumizing & gasing and seaming. First compounding, the mixing of fresh milk with water, fat and powder, is performed using the eductor and centrifugal pump. Clarification is performed next to separate clusters of undissolved particles such as undissolved protein from the ingredient. Pasteurization and homogenization are performed to kill pathogens and reduce the size of granules. Before storage in temporary tank cooling is done to avoid protein degradation and to sustain homogeneity. Powder milk is formed by spray drying the liquid formula. Before filling, can cleaning and sterilization are performed using ultraviolet rays. To preserve the content vaccuming and nitrogen gasing are performed after closing the cans. The ultimate step is seaming of the can and printing of the expiration date.

Significant increase in production occurred from 1993 to 2000. In the year 2000 total production of powder base milk and cereal products reach its highest with 30,418.923 kg, more than double the total production in 1992 (see table 4.4). Increasing foreign investments entered the company in 1995 (e.g. Morinaga, Nutricia in 1996) resulting in increase of total production starting from the year 1995. In 1998 the drop in total production is attributed to the 1998 riot and the economic crisis starting in 1997.

As the source of water supply, groundwater is extracted from two wells located within the vicinity. Approximately 1700 cubic meter of water is extracted per day. Washing & cleaning of production equipment produces 600 cubic meter of wastewater per day while housekeeping and production activities involving the blowdown boiler produces 800 cubic meter of wastewater per day. However, the wastewater treatment capacity for effective treatment is only 1000 cubic meter per day.

**TABLE 4.4**  
**PRODUCTION QUANTITY OF POWDER MILK & CEREAL PRODUCTS**

Year	Original Products	NIS & Nutricia Products	Additional Products	Total (in Kg)
1968	593.189	---	---	593.189
1970	1,313.575	---	---	1,313.575
1975	2,903.181	---	146.423	3,049.604
1980	5,690.704	---	756.776	6,447.480
1985	5,025.918	---	721.341	5,747.260
1990	6,549.918	158.815	1,655.030	8,363.763
1991	7,764.805	194.505	1,382.574	9,341.884
1992	7,621.239	345.567	1,980.415	9,947.221
1993	10,210.951	556.182	2,562.013	13,329.146
1994	12,323.274	508.427	3,081.931	15,913.632
1995	15,536.932	648.517	2,059.192	18,244.641
1996	15,740.201	340.446	1,320.507	17,401.153
1997	16,652.572	518.970	2,330.661	19,502.203
1998	12,098.601	432.020	1,442.777	13,973.398
1999	18,437.815	2107.334	1,781.025	22,326.173
2000	22,438.594	5159.989	2,820.339	30,418.923

(Source : Sari Husada Corporate Profile, 2000)

The Monitoring done by the Regional Environmental Impact Management Agency through the *PROKASIH* Clean River Program specified that prior to 1997 the parameters for pH, BOD, COD and total suspended solids had never exceeded the specified effluent standards for milk and ice cream industries. However during the months of May, July and November of 1998 & 1999 the *PROKASIH* team found the above parameters to be well above standards (*PROKASIH* Report, 1998/1999). Such may be attributed to the decrease of corporate investment in 1998 and the production increase

in 1999. Sari Husada receives approximately 10-15 complaints every year for its wastewater odour, however complaints from surrounding community heightened and tension between Sari Husada and the neighboring Muja Muju community occurred in late 1998 and early 1999. Discussion with the public and distribution of free milk were performed to redeem the tension.

Sari Husada Ltd had long been present before the enactment of the Environmental Impact Assessment law. Therefore Sari Husada was required to prepare an Evaluation of Environmental Impact (*SEMDAL – Studi Mengenai Dampak Lingkungan*) for every new project which will be underway. The *SEMDAL* included the Preliminary Environmental Evaluation (*PEL – Penyajian Evaluasi Lingkungan*) and Environmental Evaluation Study (*SEL – Studi Evaluasi Lingkungan*). *PEL* and *PIL* documents were prepared in 1993 for construction & implementation of Niro Spray Dryer and the upgrading of wastewater treatment facilities. The *PEL* & *PIL* documents were followed by the Environmental Monitoring & Management Plans in 1995.

Prior to October 1999 wastewater management initiatives taken by Sari Husada includes the adoption of conventional pollution control methods, enactment of cleaner production (e.g. technological changes & good housekeeping) and implementation of on site resource recovery. Pollution control methods adopted includes the construction of wastewater treatment tanks made up of five important components namely the equalization tank, the anaerobic & aerobic tanks, the sedimentation tank and the sludge digester. Changes in technology includes replacement of the previous Roger's Spray Dryer with the new Niro Spray Dryer and implementation of the NIRO technological system for the cooling involved in the production process. Although quantity of wastewater increases due to the presence of Niro Spray Dryer, the quality improves because less organic particles (15-20 kg compared to the previous 150-200 kg) are attached to the Niro Spray Dryer during cleaning. The NIRO technological system provides an interval of 2 hours between each successive groundwater extraction process, therefore giving time for water resources to replenish themselves. Good housekeeping and resource recovery includes adoption of prevention measures to avoid spills and accidents and re-use of cleaning water. Sari Husada acted as the proponent and facilitator

while the Provincial Environmental Impact Management Agency through its Technical Monitoring Laboratory was responsible for monitoring.

Coupled by the need to extend its market and public demand to manage its waste, Sari Husada decided to implement Environmental Management System (EMS) in October of 1999. Control and corrective actions of the implementation of EMS are performed every six months. In July 2000 Sari Husada received the ISO 14001 certification.

#### **4.2.3 Program to Promote Industrial Wastewater Management**

A government program intended for Sari Husada is that of the *PROKASIH* Clean River Program. Every four months with supervision from the Technical Monitoring Laboratory Sari Husada submits a report of its wastewater discharge. Although in the mid 1998, 1999 and early 2000 the BOD, COD, pH and total suspended solid are exceedingly higher than the specified standards for milk industries, by the beginning of 2001 the above parameters are below the standards. Such progress lead to the *PROKASIH* award given to Sari Husada in the year 2001.

In addition to participation in the *PROKASIH* program, Sari Husada is also required to have a permit for groundwater withdrawal and wastewater discharge. Tax and retribution applicable to Sari Husada includes the groundwater withdrawal tax and the wastewater discharge retribution. Facilities enjoyed by Sari Husada includes tax free royalty for import of wastewater treatment facilities and reduction of import tax for clean technology. The Regional Investment Coordination Board functions to facilitate the bureaucracy & taxation involved in the import of clean technology and wastewater treatment facilities.





**Filtering the Soybean Essence for Curd Formation (Tofu Industries)**



**The Communal Production House in Ngoto, Bantul**



## **CHAPTER V**

### **ANALYSIS OF THE INSTITUTIONAL ADEQUACY AND EFFECTIVENESS OF THE TWO CASE STUDIES**

#### **5.1 Introduction**

Analysis of the institutional adequacy and effectiveness of the two case studies is performed by assessing the adequacy of present institutional framework and analysing the effectiveness of government effort to control industrial effluent discharge. Analysis of the communities' opinion on the effectiveness of government and industrial effort is also performed to further examine the effectiveness of efforts spent to control and manage industrial effluent discharge. The assessment on the adequacy of present institutional framework examines the relationships between the different institutional variables on the macro level, employing evidence from in-depth selected case studies. Such assessment functions to identify key institutional attributes that should be present in order to achieve successful integrated industrial wastewater management. The analysis on the effectiveness of government effort and the analysis on the communities' opinion examine the relation between the different policy, industrial and societal networks, highlighting the micro context of industrial wastewater management. Such analysis is superimposed through the government's effort in implementing its regulations, programs and retributions for industrial wastewater control. An evaluation of the adequacy and effectiveness of present institutional framework is provided to supplement the research with suggestions & recommendations for policy formulation & implementation involving industrial wastewater management.

#### **5.2 Analysis of the Adequacy of Present Institutional Framework**

The analysis on the adequacy of present institutional framework focuses on the general institutional framework and the level of movements on the macro scale, highlighting the larger context of industrial wastewater management. In this analysis institutional elements necessary for promoting integration and coordination among government entities responsible for directing and controlling industrial wastewater

management are assessed. Based on Public Administration & Policy Implementation Theories from both the “top down” and “bottom up” streams (Chapter II – Theories on Public Administration & Policy Implementation), there are several conditions that can enhance or constrain effective integration & coordination effort in policy formulation and implementation involving industrial wastewater management :

- (1) Clarity and consistency of objectives and legal directives;
- (2) Interagency coordination;
- (3) Adequacy of statutes to structure the implementation processes;
- (4) Commitment of implementing officials to the objectives of environmental regulations & programs;
- (5) Participation of target groups in program implementation processes;
- (6) Presence of skillful actor(s) for facilitating implementation processes.

Analysis and assessment of the above factors are conducted for the purpose of diagnosing problems associated with integration and coordination efforts at the macro level. A separate analysis of the Environmental Impact Assessment Procedures and the *PROKASIH* Clean River Program are included to supplement the analysis on the adequacy of present institutional framework for industrial wastewater management.

Interviews with 18 government officials and legislators involved in industrial wastewater management of tofu home industries and Sari Husada Ltd were conducted. Respondents are executives (esselon IV & V) selected based on their field(s) of expertise relating to the formulation and implementation of legislations, programs & instruments (economic & social instruments) for the management of industrial effluent discharge (i.e The Regional Program Manager and the Head of the Legal Department are selected from the Chamber of Commerce). The head of each agency provides recommendations for the most suitable person(s) to be interviewed when concerned with industrial wastewater management. The data collection process is terminated when no new information is generated. Five groups of respondents were interviewed for this research :

- ♦ Executives of the lead-coordinating agency (*BAPEDALDA* & *BKPM*) involved in the formulation and implementation of regulations & programs (5 respondents);
- ♦ Executives of sectoral agencies at the provincial level involved in the formulation and execution of laws and programs (4 respondents);

- ♦ Executives of the Provincial Planning Agency - *BAPPEDA* (3 respondents);
- ♦ Executives of local government agencies (3 respondents);
- ♦ Legislators at the provincial level (3 respondents).

#### ***Existing Efforts in Industrial Wastewater Management***

In response to questions concerning efforts which have been made to facilitate a more comprehensive and integrated industrial wastewater management, respondents identified several means to achieve the objectives :

**TABLE 5.1**  
**EFFORTS MADE TO FACILITATE INTEGRATED INDUSTRIAL**  
**WASTEWATER MANAGEMENT**

<b>Efforts</b>	<b>Respondents Stating such Efforts ( of 18)</b>
Law No 20/1990 pertaining to industrial wastewater management provides opportunities for provincial and local agencies to participate in law formulation and implementation.	4
Presidential Decree No 53/1989 & Law No 23/1997 facilitate integrated industrial wastewater management through the permitting & licensing system, land use, EIA and environmental auditing.	11
Provincial government formulated and enacted standards, groundwater extraction & effluent discharge permits and <i>RKL</i> & <i>RPL</i> in the effort to strengthen provincial regulatory framework for industrial wastewater management.	7
Provincial government enacted the groundwater withdrawal tax and the industrial wastewater discharge retribution.	5
Key agencies conduct coordination for exchange of information, consultation and collaboration in regard to program formulation, implementation and budgeting.	15
Procedures formulated & established for improving coordination in law formulation & implementation enhanced coordination to collaboration along the vertical and horizontal lines.	12

Coordination among key agencies for consultation and collaboration regarding program implementation and budgeting is manifested in the coordination performed by *BAPPEDA*, *BAPEDALDA*, The Chamber of Commerce & Industry and the Department of Public Health for the formulation, implementation and budgeting of government programs for tofu industries. In the regional level, the formulation, implementation and budgeting of the *PROKASIH* Clean River Program involves coordination between *BAPPEDA*, *BAPEDALDA*, The Chamber of Commerce & Industry and *BKPM*.

An illustration of the last item in the table involves the procedure for the formulation of new environmental laws at the provincial level : *BAPEDALDA* is given right by the Governor to amend a new set of industrial effluent standards, however the Governor, acting as the head of *BAPEDALDA* and the sectoral agencies, has the higher



power to approve or veto such an amendment with consent and approval from the provincial legislative body and the related sectoral agencies.

#### 5.2.1 Clarity & Consistency of Objectives & Legal Directives

The considerations involving clarity and consistency of objectives which will be discussed are :

- ♦ Whether there are problems associated with lack of clarity and consistencies;
- ♦ How efforts to resolve lack of clarity and consistencies been made.

In response to the question whether there are problems associated with lack of clarity in the objectives and functions of present regulatory framework, respondents identified several potential problems :

**TABLE 5.2**  
**LACK OF CLARITY IN THE PRESENT REGULATORY**  
**FRAMEWORK**

<b>Lack of Clarity</b>	<b>Respondents Stating such Lack of Clarity (of 12)</b>
The function of the Nuisance (HO) Permit : A legal instrument directed for integrated environmental management or simply an instrument to ensure approval from surrounding community & to establish agreement to minimize potential nuisances ?	6
The function and target group of Ministerial Decision No 10/1994 concerning the Letter of Intent for performing <i>RKL &amp; RPL</i>	5
Provincial Regulation No 3/1997 concerning the Environmental Management & Monitoring Plans ( <i>RKL / RPL</i> ) for Wastewater Discharge	5
Lack of clarity in the intent of Governor's Decision No 214/1991 concerning Water Quality Standards : to set ambient water quality standards for different categories of water bodies or to set effluent discharge standards at certain locations ?	2
Article 5 of Presidential Decree No 53/1989 dictates that no permits will be issued until after approval of the <i>RKL &amp; RPL</i> . However, Article 5 is not specific about which permits it applies to.	3
<b>Miscellaneous</b>	<b>Respondents Having Opinion on the Left (of 6)</b>
No Lack of Clarity Exist	4
No Answer	2

Respondents identified lack of clarity in the function and target group of Ministerial Decision no 10/1994 concerning the Letter of Intent & in Provincial Regulation no 3/1997 concerning the Environmental Management & Monitoring Plans for Wastewater Discharge : If corporate activities of small industries are required to submit Environmental Management & Monitoring Plans (*RKL & RPL*), then what is the purpose of having to submit a separate letter of intent for *RKL & RPL* ? In the course of implementation, a letter of intent for conducting environmental management &

monitoring plans (*SPPL*) functions as a mini *RKL* & *RPL* for small industries incapable of conducting *RKL* & *RPL* (which were initially intended for large & medium industries). The *SPPL* for small industries is based on *RKL* & *RPL* and lacks clarity in its objectives & directives. Moreover, in order to be legally enforceable the *RKL* & *RPL* must be reflected in permits and licenses, whereas legal directives specifying the permit(s) requiring *RKL* & *RPL* is absent.

The Environmental Management & Development Project in Indonesia (EMDI) also states that there is a lack of clarity in the administrative procedures to apply and acquire permits related to corporate environmental management (EMDI Project, 1994). Many different departments & agencies are responsible for issuing the numerous required permits and licenses, whereas clear information concerning the procedures and departments or agencies involved in permitting is very much lacking. In addition permits are issued by individual sectoral departments and *BAPEDALDA* has no power to administer permits and licenses, except the wastewater discharge permit. The number of permits and licenses must be reduced, their functions rationalized and procedure simplified if effective integrated wastewater management is to be achieved through the permitting and licensing system.

In response to question whether there are problems associated with lack of clarity in the objectives and functions of government programs, respondents identified several potential problems shown in table 5.3.

**TABLE 5.3**  
**LACK OF CLARITY IN THE DIRECTIVES OF GOVERNMENT PROGRAMS**

<b>Lack of Clarity</b>	<b>Respondents Stating such Lack of Clarity (of 8)</b>
The orientation & consultation program on industrial pollution control & end of pipe treatment for tofu producers contain straightforward statement of the target, but lack clear guidance to follow.	3
Public health orientation & consultation program for tofu producers aiming to control industrial pollution and promote end of pipe treatment simply prescribe in vague terms some desired future state of task & lack clear guidance for implementors to follow when concerned with pollution control & end of pipe treatment	5
<b>Miscellaneous</b>	<b>Respondents having Opinions on the Left (of 10)</b>
No Lack of Clarity Exist	3
Respondents not involved in wastewater management programs	7



Respondents identified lack of clarity in the objectives of orientation & consultation program concerning industrial pollution control and end of pipe treatment for tofu producers. Does the program function to simply monitor and encourage tofu producers to store and discharge their wastewater properly, or rather to provide a comprehensive guidance and procedures for proper discharge and maintenance of end of pipe technology as well as to seek alternatives for producers without access to wastewater treatment ? Such lack of clarity also pertains to the orientation & consultation program on public health whose main goal is to control industrial wastewater pollution through end of pipe technology.

In response to the question whether there are problems associated with lack of clarity in the taxation & retribution system, only 5 respondents identified lack of clarity in the present taxation & retribution system.

The 5 respondents stated that the objective of the wastewater discharge retribution is unclear : is the retribution payment simply an administrative charge required for acquiring & renewing permits to discharge wastewater, or does the payment function as an effluent charge in order to promote water conservation and internalization of environmental costs, or both ? Legal directive states that the fee be based on volume of wastewater generated, thus functioning as an economic instrument to induce individual sources to take internal measures to reduce quantities of pollutants. However, legal directives also instruct that the fee be paid only every four years for the acquisition and renewal of the wastewater discharge permit. If fee is not paid in regular intervals and only every four years, how can the wastewater discharge retribution promote periodic monitoring and induce regular measures to reduce pollutant quantity ? Moreover, the fee is so small that it does not provide incentives for changes in discharge pattern.

The respondents above stated that such lack of clarity does not pertain to the groundwater withdrawal tax : in addition to the required effluent charge based on the volume of groundwater used, an administrative fee is also mandatory for the acquisition of groundwater withdrawal permit.

In response to the question whether there are problems associated with inconsistencies and conflicts, respondents identified several potential conflicts among objectives :

**TABLE 5.4**  
**INCONSISTENCIES & CONFLICTS AMONG OBJECTIVES**

<b>Inconsistencies &amp; Conflicts in Government Policies</b>	<b>Respondents Having such Opinions (of 18)</b>
Policy to increase welfare of low income group by promoting home industries could be conflicting without adequate guidance for implementation of end of pipe technology & WEP and adequate legal directives for land use.	7
Policy to promote trade and industry for regional economic growth could be conflicting in the absence of adequate instruments, programs and environmental impact assessment measures.	11
<b>Inconsistencies &amp; Conflicts in Legal Directives</b>	<b>Respondents Having such Opinions</b>
Legal directives which give the sectoral ministries and departments the supreme power to execute, monitor and enforce environmental laws and regulations could be in conflict with Presidential Decree No 77/1994 which gives the Environmental Impact Management Agency the power to coordinate the formulation, execution, monitoring and enforcement of environmental laws for increased integration and effectiveness.	4
Implementation of Agrarian Law 1960 article 7,10,14,17 to provide lands for settlement & production activity of low income group is in conflict with legal directives from national & provincial land use planning agency specifying that settlements and buildings be $\geq 150$ meters from each side of the river body.	3
<b>Inconsistencies &amp; Conflicts in Legal Guidance</b>	<b>Respondents Having such Opinions</b>
Legal guidance by Chamber of Commerce for promoting increased production among tofu producers while maintaining lenient corporate environmental management is in conflict with objectives of WEP programs & Ministerial Decision No 10/1994 concerning <i>RKL &amp; RPL</i> & effluent & water quality standards.	5
In the absence of adequate legal directives for land use and zoning, programs to promote capacity building of tofu industries could be in conflict with <i>BAPPEDA</i> 's objective to promote centralization of small industries.	5
The program to fully subsidize the construction of wastewater treatment tanks for tofu producers is in conflict with legal directive to use economic instruments for the purpose of internalizing environmental costs.	6

The provincial & local government of Yogyakarta uses the Agrarian Law 1960 Article 7,10,14,17 to provide lands (i.e. land on each side of river bodies where seasonal flooding occurs) for settlement & production activity of tofu producers to uplift their socio-economic condition. According to 3 respondents this is in conflict with legal directives from the national & provincial land use planning agency which specifies that settlements and buildings be  $\geq 150$  meters from each side of the river body. Moreover, most of the tofu industries are located in eco-sensitive areas where settlement is prohibited by law.

In the effort to improve integrated industrial wastewater management, respondents were inquired concerning efforts that have been made to resolve

inconsistencies and conflicts of objectives and legal directives. Responses stated by the respondents are shown in table 5.5.

**TABLE 5.5**  
**EFFORTS TO RESOLVE CONFLICTS & INCONSISTENCIES**

Efforts	Respondents Stating such Efforts (of 18)
The status of the governor as a coordinator in implementation of all development programs in the province was strengthened by Government Regulation No 6/1988.	11
An interjurisdictional & intersectoral committee lead by representatives from <i>BAPEDALDA</i> was formulated and established to promote collaboration, bargaining and negotiation : representatives of several agencies are appointed as committee members.	10

### **5.2.2 Interagency Coordination**

In this analysis emphasis is given to institutions (i.e., rules, procedures, mechanisms, organizational capacity) for inducing interagency coordination in policy formulation and implementation processes. Variables employed are based on issues related to multiple management entities and issues related to policy implementation stated in the theoretical review (Chapter II - Issues Related to Multiple Management Entities & Policy Implementation.). The variables employed are :

- (1) The presence of adequate procedures and mechanisms for coordination;
- (2) The willingness of related agencies and entitites to participate in the coordination of policy formulation and implementation;
- (3) The organizational capacity of the lead coordinating agency;
- (4) The presence of skillful actors capable of inducing cooperative actions across organizational boundaries & resolve conflicts.

#### ***Presence of Adequate Procedures & Mechanisms for Coordination***

According to respondents three categories of procedures and mechanisms are employed for the coordination of policy formulation and implementation of industrial wastewater discharge. The categories stated by the respondents are depicted in table 5.6.

In addition to inquiries concerning procedures and mechanisms used to promote coordination, respondents were also inquired concerning the factors which enhanced or reduced the adequacy of the procedures and mechanisms for coordination. The three factors which enhanced the adequacy of the procedures and mechanisms for coordination are depicted in table 5.7, whereas factors which reduced the adequacy of procedures & mechanisms for coordination are shown in table 5.8.

**TABLE 5.6**  
**CATEGORIES OF PROCEDURES & MECHANISMS FOR**  
**COORDINATION**

Categories	Respondents Stating such Mechanisms (18)
Procedures and mechanisms mandatory for general coordination of sectoral policies & programs imposed by central government (e.g. long and short term national development plans, procedures for program and budget proposal, and procedures for Environmental Impact Assessment).	13
Mechanisms formulated to improve policy coordination within the province (e.g. formation of <i>BAPPEDA</i> 's intersectoral & interjurisdictional coordination committee responsible for reviewing budget proposals for proposed provincial programs, and formation of <i>BAPEDALDA</i> 's interjurisdictional & intersectoral coordination committee headed by a representative from <i>BAPEDALDA</i> functioning as the lead coordinating agency in policy formulation & implementation).	5
Informal coordination instruments (i.e. informal meetings between executives) for resolving conflicts of interests and achieving commitments across sectoral agencies and jurisdictions.	6

**TABLE 5.7**  
**FACTORS WHICH ENHANCED PROCEDURES FOR COORDINATION**

Factors	Respondents Stating such Factors (of 18)
Legitimization or formalization for coordination among sectoral program & project proposals under the National and Provincial Development Budget imposed by the central and provincial government.	7
Gradual improvement of these procedures and mechanisms made by the central and provincial government to accommodate provincial and local needs.	3
Opportunities given to related agencies within and among levels to meet together, for exchanging information, soliciting other's views, resolving conflicts and discussion for searching common ground.	11

**TABLE 5.8**  
**FACTORS WHICH REDUCED THE ADEQUACY OF PROCEDURES & MECHANISMS FOR COORDINATION**

Factors	Respondents Stating such Factors (of 18)
The combination of vertical and segmented-sectoral oriented approach in the bureaucratic public administration systems hinder coordination efforts at the provincial and local government level conflicts.	6
The combination of vertical and segmented-sectoral approach in public administration tended to increase conflicts in the directives of the integrated permitting system.	6
Because major initiatives for planning the development budget were made by the national-sectoral agencies, planning at the provincial and local levels became largely a matter of formulating specific plans to meet nationally determined goals.	4
Limited time allotted for the process of consultation and negotiation.	2
Heavy reliance on oral communication which caused problems of ineffective exchanges of information, consultation, collaboration and negotiation among agencies.	3
Inadequate budget and capacity of local government agencies to provide information.	1

### *The Willingness of Agencies to Participate in Coordination*

All respondents stated that their agencies or entities need to perform coordination with other agencies for particular purposes. Each respondent asserted that his or her agency has more than one reason for participating in the coordination process. Reasons to perform coordination according to the respondents are :

**TABLE 5.9**  
**REASONS FOR THE NEED TO PERFORM COORDINATION**

<b>Reasons</b>	<b>Respondents Stating such Reasons (of 18)</b>
The need to acquire information	17
The need to comply with requirements for budget approval imposed by the central and provincial government	10
The need to solicit other agencies' views	3
The need to clarify overlapping responsibilities and to seek common ground for resolving conflicts of objectives and interests	2
The need for negotiation through bargaining and seeking agreement to maximize mutual gains	5
The need for qualified personnel	1

However, six of the respondents pointed that the efforts spent by their agencies in the coordination process is somewhat ineffective. Several factors which weaken the effectiveness of such efforts are shown in table 5.10.

**TABLE 5.10**  
**CONSTRAINTS TO EFFECTIVE COORDINATION**

<b>Constraints</b>	<b>Respondents Stating such Constraints (of 6)</b>
Difficulties in seeking common ground for clarifying responsibilities and resolving conflicts (e.g. when conflicts occurred among agencies, a particular party often use legal instruments for supporting its interests which are inconsistent with legal institutions employed by other parties).	2
Coordination meetings for the purpose of making agreement among related agencies are often attended by representatives who do not possess authority for making the decision on behalf of their agencies.	1
Semi autonomous agencies (e.g. <i>BAPEDALDA</i> , <i>BKPMD</i> ) have inadequate power to influence sectoral agencies to participate in coordination since they have no control over sectoral budget allocation	3
Lack of adequate information & evidence over environmental issues.	1

### *Organizational Capacity of the Coordinating Agency*

The organizational capacity of the coordinating agency is measured by the adequacy of formal authority granted to program leaders to control program funding, and the adequacy of the location of the lead coordinating agency (*BAPEDALDA*) in the administrative system.



Respondents' opinions concerning the adequacy of formal authority granted to program leaders to control funding are depicted in table 5.11.

**TABLE 5.11**  
**ADEQUACY OF AUTHORITY GRANTED TO PROGRAM LEADERS TO**  
**CONTROL PROGRAM FUNDING**

Program Leaders	Adequate	Quite Adequate	Inadequate
Non sectoral & Semi-autonomous Agencies (of 18)	9	5	4
Sectoral Departments (of 18)	11	4	3

In regard to the adequacy of formal authority granted to program leaders (i.e. *BAPEDALDA*, The Chamber of Commerce and The Department of Public Health) to control the funding of programs, all respondents from *BAPEDALDA* asserted that this semi-autonomous agency have inadequate power to allocate budget for the formulation and implementation of programs and projects. Furthermore *BAPEDALDA* lacks budget for its operation and organizational development.

In addition, all the respondents from *BAPEDALDA* also stated that the sectoral departments (i.e. the Chamber of Commerce & Industry and the Department of Public Health) also have limited authority in controlling allocation of sectoral development budget for development of environmental protection measures & programs within the individual sectors. They have to rely on the authority and power of the *BAPPEDA* & *BAPPENAS* in order to influence decision of the sectoral budget allocation on the provincial and national level.

In regard to the adequacy of the location of the lead coordinating agency *BAPEDALDA* in the administrative system, 13 respondents stated that the location of the semi-autonomous *BAPEDALDA* is adequate & favourable for inducing interjurisdictional and intersectoral coordination because its location is directly under the provincial governor, thus is similar at a level as the minister.

However, 7 respondents stated that *BAPEDALDA*'s location in the administrative system was inadequate for resolving interagency and interjurisdictional conflict of interests because the semi-autonomous nature of *BAPEDALDA* leads to heavy reliance on the sectoral agencies to internalize industrial wastewater management measures.

Response concerning the adequacy of *BAPEDALDA*'s location in the administrative system for inducing coordination and resolving conflicts of interest is shown in table 5.12 below.

**TABLE 5.12**  
**ADEQUACY OF THE LOCATION OF THE COORDINATING AGENCY**  
***BAPEDALDA***

Function	Adequate	Quite Adequate	Inadequate
Adequacy of location to induce horizontal & vertical coordination (of 18)	13	5	0
Adequacy of location to resolve interagency & interjurisdictional conflict (of 18)	6	5	7

***Presence of Skillful Actors Who Could Bridge the Gaps Among Agencies***

Besides adequate coordination mechanisms, the presence of skillful actors or fixers are often needed to bridge the gaps among agencies in the coordination of policy making and implementation. In the province of Yogyakarta those fixers are : the mayor & district heads (*Bupatis*), and the staffs of the Regional Planning Board (*BAPPEDA*). Table 5.13 shows the response concerning the effectiveness of their effort to bridge the gap between agencies.

**TABLE 5.13**  
**EFFECTIVENESS OF EFFORTS BY SKILLFUL ACTORS OR FIXERS**

Actors or Fixers	Effective	Quite Effective	Ineffective
Mayors and District Heads (of 18)	14	4	0
Staffs of the <i>BAPPEDA</i> (of 18)	11	7	0

Fourteen of the respondents stated that the efforts by the mayor or *bupatis* in inducing cooperative actions and in minimizing gaps among agencies are effective. The mayor and *bupatis* can urge sectoral and non sectoral agencies to participate in coordination for achieving commitment and contributing to the objectives of industrial wastewater management policy by bringing the issue to higher authorities to receive political support from higher authorities (i.e. the governor, the inter-ministerial meeting).

**5.2.3 Adequacy of Statutes to Structure the Implementation Processes**

The adequacy of statutes to structure the implementation of industrial wastewater management policy (i.e. regulations and programs) could be perceived as a combination of two variables :

- (1) The adequacy of financial support provided by statutes for implementation;
- (2) The presence of adequate incentives and sanctions.

### *The Adequacy of Financial Support Provided by Statutes*

Response concerning the adequacy of financial support provided for the implementation & enforcement of both the *PROKASIH* Clean River Program (for large & medium industries) and the programs for tofu home industries is depicted in table 5.14.

**TABLE 5.14**  
**ADEQUACY OF FINANCIAL SUPPORT FOR PROGRAM IMPLEMENTATION & ENFORCEMENT**

Program	Adequate	Quite Adequate	Inadequate
<i>PROKASIH</i> Clean River Program (of 18)	11	7	0
Programs for tofu home industries (of 18)	2	2	14

Four respondents from *BAPEDALDA*, 2 legislators from the provincial level and 1 executive from *BAPPEDA* stated that the budget for the *PROKASIH* Clean River Program is quite adequate. However, these respondents also stated that without aid from the national development budget, the provincial budget would not have the means to finance a continuous-multiyear program such as the *PROKASIH* Clean River Program.

A majority of the respondents (14) stated that the budget for implementation of environmental programs and projects intended for tofu producers and small home industries is inadequate. Such inadequacy is attributed to the following reasons :

**TABLE 5.15**  
**REASONS FOR INADEQUACY OF FINANCIAL SUPPORT FOR PROGRAMS INTENDED FOR SMALL HOME INDUSTRIES**

Reasons for Inadequacy	Respondents Stating such Reasons (of 14)
Promoting and ensuring proper wastewater management among tofu producers or small home industries require adequate budget for continuous yearly programs, whereas budget allotted for the program is only enough to finance the initial stage	5
Frequency of budget availability is haphazard and not on a routine basis	7
Budget proposed in programs for tofu producers have not been included in the "Blue Book of the <i>BAPPEDA</i> " ; this situation has created problems of uncertainty regarding the availability of budget for environmental programs intended for small home industries.	2

Funding for natural resource and environmental management program in Indonesia is very limited. Budget from the National Development Budget allotted for the natural resource and environmental sector was less than 2 % of total budget in the fiscal year 1994/1995. (World Bank Report, 1994).

### *Incentives and Sanctions to Enhance the Compliance of Target Groups*

The pricing approach to environmental management (i.e. incentives or tax reduction for production processes that promote less pollution) has just been introduced in Indonesia. Policy makers are still in favour of direct controls through regulations and sanctions. Article 33 of the Constitution specifies that land, forest, mining deposits, water and other natural resources have social functions and all matters regarding their utilization and distribution are controlled by the state as the representative of the people. Any person or group who uses or distributes those resources without permission from the government and intentionally or unintentionally ruins such resources is violating the government regulations and is subject to penalties.

In line with this article, several regulations and sanctions are formulated and implemented by the government. Failure to comply with those regulations and activities results in fines and prosecutions. Interagency coordinating teams at the provincial and local levels responsible for monitoring environmental conditions and enforcing environmental regulations have been established. In this regard, the strength or weakness of enforcement of those regulations, therefore to a large extent would determine the success or failure of implementation of such regulations.

In responding to question regarding the strength of enforcement of environmental regulations among small home industries and medium industries excluded from the *PROKASIH* Clean River Program, 12 respondents stated that such an enforcement is weak, while 6 stated that it is very weak. Factors contributing to poor enforcement stated by respondents are shown in table 5.16.

In regard to interjurisdictional conflicts, provincial agencies are unable to resolve conflicts between society and tofu producers over inadequate wastewater management because the authority to resolve such conflicts is under another agency belonging to a different administrative jurisdiction; the provincial *BAPEDALDA* in the municipality of Yogyakarta could not directly enforce authorities to resolve conflicts in the Regency of Bantul, Kulon Progo or Sleman since the local *BAPEDALDA* within those individual Regencies are the agencies endowed with such power and authority. Such inadequacy leads to the fragmentation of effort in industrial wastewater management.



**TABLE 5.16**  
**FACTORS CONTRIBUTING TO POOR ENFORCEMENT**

<b>Factors</b>	<b>Respondents Stating such Factors (of 18)</b>
Inadequate budget and staffs in the sectoral and non sectoral agencies for monitoring pollutant quantity & quality, and enforcing regulations	6
Problems associated with poor socio-economic conditions, unavailable or limited job alternatives for income generation, and low awareness of environmental management among local people	11
Enforcement of industrial wastewater discharge regulations (permitting, <i>RKL</i> or <i>RPL</i> , standards) is performed by the individual sectors (e.g. Chamber of Commerce & Industry, Department of Public Health), whereas semi autonomous coordinating agency ( <i>BAPEDALDA</i> ) is not granted such power and authorities	4
Problems associated with the complexity of environmental issues involving various resource users	1
Conflicts associated with externality involving more than one administrative jurisdictions	2

#### **5.2.4 Commitment of Implementing Agencies**

In the effort to promote integration and coordination among government entities, respondents were inquired over the commitment of implementing agencies in policy implementation. Agencies and entities were asked to evaluate *other* agencies' commitment in policy implementation involving industrial wastewater management. Table 5.17 summarizes the findings of the evaluation by respondents.

All respondents from the Provincial Environmental Impact Management Agency (*BAPEDALDA*) asserted that commitment from sectoral agencies in implementing industrial wastewater management policy is somewhat lacking. All respondents from *BAPEDALDA* stated that commitments of sectoral agencies and the semi-autonomous *BKPM* to the objectives of wastewater management regulations, programs and instruments are influenced by individual (sectoral) interests which are in conflict with goals & objectives of the instruments & programs intended for industrial wastewater management.

**TABLE 5.17**  
**COMMITMENT OF IMPLEMENTING AGENCIES IN POLICY IMPLEMENTATION**

<b>Agency</b>	<b>Total Respondents</b>	<b>Commitment Sufficient</b>	<b>Commitment Somewhat Lacking</b>	<b>Commitment Very Much Lacking</b>
<i>BAPEDALDA</i>	14	13	1	0
<i>BKPM</i>	17	11	6	0
Sectoral Agencies	14	8	6	0



### 5.2.5 Participation of Target Groups in Program Implementation Processes

Legitimization and formalization of industrial participation in program implementation is stated in Government Regulation no 5/1979, Presidential Decree no 20/1981 and institutions designed to encourage the participation of large, medium and small industries in the implementation of industrial wastewater management.

Executives of implementing agencies and officials of coordinating agencies in implementation were asked about the extent of industrial participation conducted in program formulation and implementation processes (the *PROKASIH* Clean River Program & programs related to industrial wastewater management for tofu producers).

Representatives of implementing agencies stated that industrial participation is intended to encourage industries to participate in design and implementation of programs that have direct effects on their production & production process, including involvement in program direction and activities. All respondents agree that initiatives within the *PROKASIH* Clean River Program are supported by the target groups' motivation to contribute in decision making processes regarding program direction and activities, and supported by the social or voluntary instruments used to achieve negotiation and collaboration.

However, when applied to tofu producers such initiatives are not without constraints. Twelve respondents from a total of 18 stated that tofu producers are hesitant to participate in program formulation and implementation. Table 5.18 shows the constraints stated by the 12 respondents.

**TABLE 5.18**  
**CONSTRAINTS FOR TOFU INDUSTRY PARTICIPATION IN PROGRAM IMPLEMENTATION**

<b>Constraints</b>	<b>Respondents Stating the Constraints (of 12)</b>
Lack of motivation among tofu producers to attend & join programs related to industrial wastewater management.	4
Due to economic constraints tofu producers tend to favor immediate income generated from conventional production process rather than sustainable production incorporating end of pipe & WEP which promotes cost efficiency in the long run.	9

Two experts from the Planning Department at Gadjah Mada University stated that public participation enables local people to hear and be heard, but under this condition, there is no assurance that their views are heeded by the implementing agencies. Factors

which lead to such a problem, among others are : (1) Implementors tend to simplify people participation processes without giving the local producers opportunities to be involved in decision making processes for determining their own needs, (2) Local people have no adequate power to influence the decision in program formulation & implementation.

On one hand implementors tend to blame the industries' behavior for the hindrance to people participation; on the other hand experts consider the attitude of implementors and the inadequacy of mechanisms as factors which constrain such a process.

#### **5.2.6 Presence of Key Actors for Facilitating the Implementation Process**

Differing perceptions and interests between implementors and target groups often create problems or gaps in implementation of programs and legal & economic instruments. In this regard, in addition to adequate formal coordination mechanisms, the presence of key actor(s) are often needed for smoothing the implementation process. Respondents were inquired concerning the importance of the actors & their roles, as well as the effectiveness of their efforts.

All respondents stated that the presence of key actor(s) is important to bridge the gaps between implementors and target groups. Actors who bridge the gaps are Non Government Organizations (i.e. WALHI and KEHATI) and informal leaders of tofu producers.

Their roles range from helping local producers to express their needs & motivating the local people to participate in industrial wastewater management programs, to bridging the communication gaps between implementors and the local people. Moreover, Non Government Organisations play an important role in promoting sustainable production process among tofu producers in Tawangsari, Gedongkiwo & Ngoto by providing guidance for continuous monitoring of quantity & quality of wastewater discharged and promoting end of pipe technology & waste prevention. All respondents considered their efforts to be effective in promoting environmental management among tofu producers and in mobilizing the local media to "monitor" the development of the *PROKASIH* Program and the continuous commitment of *PROKASIH*'s targeted industries.

However, five of the respondents stated that only a limited number of localities of tofu home industries have received attention from local & national environmental NGOs. Many are still in need of legal guidance from government institutions and Non Government Organisations when concerned with corporate environmental management.

#### 5.2.7 Environmental Impact Assessment

The first environmental impact analysis (*ANDAL*) in Indonesia was produced in 1974 for a cement factory. The second, for a transmigration site, was published in 1976. Environmental analysis was semi-institutionalized around 1976 in two departments : Mines and Energy for oil-related projects, and Public Works for swampland development. In 1978 the Minister of Industry issued a directive that required all new industrial developments, starting in 1979, to complete an environmental impact analysis (*ANDAL*). A procedure for integrated Environmental Impact Assessment (*AMDAL*) encompassing the environmental impact analysis (*ANDAL*) was established through Government Regulation no 29/1986. It is an integrated review process to coordinate the planning and approval of proposed investment activities. *AMDAL* includes a parallel process, *SEMDAL* (Evaluation of Environmental Impacts), which applies to corporate investments which were underway or under construction in 1987, but for which environmental impacts had not yet been assessed.

Advancement of *AMDAL* in Indonesia included the institutionalization of *AMDAL* process and procedures manifested in legislations & regulations, institutional structure, information management systems, educational programs, and procedures for *AMDAL* budget proposal & approval.

In regard to the institutionalization of *AMDAL*, four respondents from *BAPEDALDA* (the lead agency for *AMDAL*) were asked the following question : how adequate is the institutionalization of *AMDAL* in Indonesia when analysed through its intent and focus, institutional structure, procedures, and human & fiscal resources ? Respondents' response is shown in table 5.19 below.

**TABLE 5.19**  
**ADEQUACY OF THE INSTITUTIONALIZATION OF *AMDAL***

Aspects (of 4)	Very Adequate	Adequate	Quite Adequate	Inadequate
Intent & Focus	1	3	0	0
Institutional Structure	0	4	0	0
Procedures	0	3	1	0
Human-Fiscal Resource	0	0	2	2

Adequacy of human and fiscal resources was identified as the main constraint by the respondents. The second main constraint identified by respondents was the procedure for *AMDAL* : *AMDAL* has not been fully integrated into the permitting and licensing system for new investments.

In addition to the adequacy of the institutionalization of *AMDAL*, respondents also stated that progress in the institutionalization of *AMDAL* has been made. Such progress stated by the respondents are shown in table 5.20.

**TABLE 5.20**  
**PROGRESS IN THE INSTITUTIONALIZATION OF *AMDAL***

Progress	Respondents Stating such Progress (of 4)
The intent of <i>AMDAL</i> has shifted to provide a comprehensive project planning process	2
Central <i>AMDAL</i> Commissions have been established in 14 departments (including the Ministry of Industry) with Technical Teams & Working Groups to assist with project reviews	1
A representative of <i>BAPEDALDA</i> chairs the Regional <i>AMDAL</i> Commissions established by the Governor of each province	3
The formulation of laws & regulations to integrate <i>AMDAL</i> into the permitting and licensing system	3
<i>BAPEDALDA</i> is responsible for overall <i>AMDAL</i> policy, coordination and quality control in the provincial level, therefore <i>BAPEDALDA</i> is endowed the power to formulate budget proposals for <i>AMDAL</i> activities in the province	1
Strategies for Evaluation of Environmental Impacts ( <i>SEMDAL</i> ) for investment activities prior to the presence of <i>AMDAL</i> have been adopted and revised	1

However, despite tremendous progress in the institutionalization of *AMDAL*, numerous factors function to constrain effective implementation. Constraining factors stated by executives from the EMDI Project (Environmental Management Development Project in Indonesia) encompass :

- (1) The intent & focus of *AMDAL*;
- (2) The institutional structure and procedure for *AMDAL*;
- (3) Human & fiscal resources;
- (4) The procedure for Evaluation of Environmental Impacts (*SEMDAL*) for investments prior to the presence of *AMDAL*.

(EMDI Project Report, 1994).

The constraining factors stated by executives from the EMDI Project are elaborated below.

### ***Intent & Focus of AMDAL***

Factors which constrain effective implementation due to problems in the intent & focus of *AMDAL* include :

- ◆ Legal guidance and legal directives for the process & procedures of *AMDAL* have altered the focus & intent of *AMDAL* to a narrow preoccupation with environmental impact analysis rather than a comprehensive project planning process;
- ◆ Lack of focus and clarity concerning the initiation and termination of the *AMDAL* process;
- ◆ The intent of the detailed environmental analysis (*ANDAL*) and the Environmental Management & Monitoring Plans (*RKL & RPL*) are not reflected in the activity and nuisance permit (HO permit);
- ◆ The intent & focus of the linkages between *AMDAL* and other integrated planning and regulatory tools are unclear due to a cumbersome and complicated permitting system.

(EMDI Project Report, 1994)

### ***Institutional Structure***

Factors which constrain effective implementation due to problems in the institutional structure include :

- ◆ Lack of coordination and consistency between departments and agencies due to the absence of formalized coordination both within the process of *AMDAL* and between the process and other levels of planning;
- ◆ Lack of consistency in *AMDAL* interpretation and direction within the different levels of the *BAPEDAL* offices;
- ◆ Lack of clear distinction between the respective roles of regional and central governments : even where roles have been defined, the directives of different sectoral departments sometimes conflict in cases where jurisdictions overlap.

(EMDI Project Report, 1994)

### ***Procedures & Process***

Factors which constrain effective implementation due to problems in the procedure and process of *AMDAL* include :



- ◆ Impact scoping and screening do not require inter-agency & public consultation and Preliminary Project Information;
- ◆ For investments of medium size industries, there is a tendency to use the Preliminary Environmental Information (*PIL – Penyajian Informasi Lingkungan*) as a mini Environmental Impact Analysis (*ANDAL*), whereas the *PIL* should function solely as an information collecting and scoping document;
- ◆ Terms of Reference is often not required after the preparation of the Preliminary Environmental Information;
- ◆ Legal directives do not stipulate submission of *ANDAL* be accompanied with submission of the *RKL / RPL*.  
(EMDI Project Report, 1994)

### ***Human & Fiscal Resources***

Factors which constrain effective implementation due to lack of human and fiscal resources include :

- ◆ Insufficient budget allocation by *BAPPENAS* & the Ministry of Home Affairs for *AMDAL* administration in the Regional *AMDAL* Commissions;
- ◆ Lack of planning and capital budget from *BAPPENAS* for full *AMDAL* compliance of government sponsored investments;
- ◆ Delivery of *AMDAL* courses is not a priority in the budgeting proposed by the Regional *AMDAL* Commissions;
- ◆ Absence of expert teams for particular projects, investments or ecosystem types;
- ◆ Absence of human resource development plans for staff members of the *AMDAL* Bureaus.

(EMDI Project Report, 1994)

### ***Evaluation of Environmental Impacts (SEMDAL)***

In regard to the process and procedures for *SEMDAL*, achievements attained involve the adoption of strategies to simplify the *SEMDAL* process and improvement in the screening decision to determine which investments and projects require *SEMDAL*. According to the 1994 EMDI Report, problem in *SEMDAL* implementation is the perception that *SEMDAL* requirements are the same as *AMDAL* requirements : Indonesia simply does not have the financial or human resources to include all existing projects &

investments in *SEMDAL*, nor does project magnitude and importance always require *SEMDAL* (EMDI Project Report, 1994). The Regional Commission has made an inventory of investments potentially subject to *SEMDAL*, screening decisions and criteria for those decisions, and determining the status of *SEMDAL* implementation after the screening is conducted.

However, lack of effectiveness still prevails due to the presence of several setbacks in the process and procedures for *SEMDAL* (EMDI Project Report, 1994) :

- ♦ Absence of rigorous scoping and screening;
- ♦ Lack of additional screening alternatives (i.e. permits and licenses, environmental audits, cumulative impact assessment);
- ♦ Many departments (including the Provincial Chamber of Commerce) report *SEMDAL* documents which solely require the approved *PEL* & *SEL* documents to be finished, while in most cases the *RKL* & *RPI* within the *SEMDAL* documents are not yet approved;
- ♦ Screening criteria are not always provided, and where they are, they are often based on big projects (requiring *SEL* reports) versus small projects (requiring *PEL* reports).

#### 5.2.8 The PROKASIH Clean River Program

In regard to the discussion on the *PROKASIH* Clean River Program, variables used to determine the adequacy of program implementation are :

- ♦ Clarity of goals and focus;
- ♦ Institutional arrangement for promoting legal enforcement;
- ♦ External control through public pressure;
- ♦ Human & financial resources

Executives from *BAPEDALDA* were inquired concerning key elements which enhance the implementation of the program, and their response is shown in the table below :

**TABLE 5.21**  
**KEY ELEMENTS WHICH ENHANCE PROGRAM IMPLEMENTATION**

Key Elements	Respondents Stating such Key Elements (of 4)
The program is conceptual, with clear goals and mandates	1
Legal groundwork is being developed for legal action against polluters	2
The program is high in profile and constantly in the media	1
Budget for <i>PROKASIH</i> is prioritized by <i>BAPPEDA</i>	2

Below are key elements which enhance the program implementation according to Jardine (1995), an executive from the EMDI Project :

- ♦ The program is focused and manageable to facilitate immediate results;
- ♦ Mechanisms for compliance continue to be developed;
- ♦ Control of the program rests at the provincial level with managers as the highest official, and close control of the program at the internal and external level exists;
- ♦ The program is innovative and flexible.

However, many constraints to successful implementation have existed since the inception of the program, and further constraints continue to be identified as the program develops. Some of the problems which must be overcome according to respondents from *BAPEDALDA* are:

**TABLE 5.22**  
**CONSTRAINTS TO SUCCESSFUL IMPLEMENTATION**

Constraints	Respondents Stating such Constraints (of 4)
Lack of funding for program implementation in the provinces	4
Lack of adequate human resources in the provinces	1
Deficiencies in laboratory capacity and capability	1

Additional elements which act as constraints to successful implementation according to Jardine (1995) are :

- ♦ Lack of regulatory framework for prosecutions, leading to inadequacy in enforcement capability by police, prosecutors and judges;
- ♦ Absence of a comprehensive wastewater management scheme;
- ♦ Lack of technical capability in the provinces for inspection, monitoring and management of the program;
- ♦ Lack of technical capability in the industrial sector, both for consulting on the designing and construction of wastewater treatment works, and for the operation of the treatment systems;
- ♦ Data tend to be variable and inconsistent within the province.

In conjunction with the lack of capability for inspection and monitoring, according to Jardine (1995) the reasons for obtaining inadequate information from assessment programs are :

- ♦ The objectives of the monitoring program are not properly defined;

- ♦ The monitoring system is installed with insufficient knowledge of the water body;
- ♦ There is inadequate planning of sample collection, handling, storage and analysis;
- ♦ Data is poorly archived and improperly interpreted & reported.

Moreover, the usefulness of information obtained from monitoring is also severely limited unless an administrative and legal framework, together with an institutional and financial commitment to appropriate follow-up actions exist at the local, regional and national level.

### **5.3 Analysis of Results of Government Efforts in Industrial Effluent**

#### **Control**

The analysis on results of government efforts in wastewater control focuses on the relation between the different policy and industrial networks, highlighting the micro context of industrial wastewater management. A preliminary analysis on the response and level of compliance of tofu industries and Sari Husada Ltd to regulatory measures is conducted to analyse the effectiveness of government effort in implementing its regulation and taxation & retribution system. Analysis of the industries' response to government programs is also conducted to test the effectiveness of government programs in promoting environmental management among industries. The relation between the industrial network and the policy network is thus superimposed through the results of government efforts to implement its regulation, program and taxation system for industrial wastewater control. Such analysis contributes to the assessment on the effectiveness of the institutional framework for integrated industrial wastewater management.

Forty five tofu producers are selected as samples. Selected samples of tofu producers in each locality is to encompass the different categories of producer :

- ♦ Producers who act as investors in the construction of the communal production house, therefore acting as the rightful owner (as in the case of Wirobrajan, Tawang Sari, & Gedongkiwo);
- ♦ Producers who are not investors & owners of the communal production house, but use facilities & equipment in the production house for the production process (as in the case of Wirobrajan, Tawang Sari & Gedongkiwo);

- ♦ Producers who have their own production house, but have no access to wastewater treatments (as in the case of Somodaran);
- ♦ Producers who have their own production house and have access to wastewater treatments (as in the case of Somodaran);
- ♦ Producers who act as financiers and owners of the communal production house, who use more modern technology for production ( i.e. steam with less water) and whose corporation resemble more of the machine organization (as in the case of Ngoto).

The (village) headman or *lurah* is consulted for recommendations concerning the individuals who can be consulted and interviewed. The data collection process is terminated when no new information is generated.

### **5.3.1 Analysis of Industries' Response to the Regulation & Taxation System**

The industries' response to the regulation and taxation system is measured through :

- (1) The extent of Sari Husada and the tofu industries' compliance to acquire the necessary permits & licenses;
- (2) The extent of Sari Husada and the tofu industries' compliance to monitor & control their wastewater discharge;
- (3) The extent of Sari Husada and the tofu industries' compliance to internalize environmental costs through the taxation & retribution system.

#### ***Compliance in the Effort to Acquire Necessary Permits & Licenses***

The permits and licenses required for tofu industries are the nuisance permit (HO), site permit, land & building permit, wastewater discharge permit, Environmental Management & Monitoring Plans (*RKL & RPL*) or Letter of Intent for Environmental Management & Monitoring Plans (*SPPL*), activity license and industrial effluent standards for tofu industries. The activity license solely pertains to tofu producers in Ngoto, Bantul whose initial investment is above Rp 5 million. Table 5.23 shows the number of tofu producers aware of the presence of legal directives to acquire the above permits. Table 5.23 shows that only 6 (13%) of the tofu producers from a total of 45 are aware that the nuisance permit (HO permit) is mandatory and that absence of the nuisance permit results in legal action by government statutes. Such leads to the assumption that government statutes have been granting other permits and licenses



regardless of the absence of the prerequisite nuisance (HO) permit. Moreover, none of the tofu producers are aware of the need to acquire the *RKL & RPL* or *SPPL*.

**TABLE 5.23**  
**PERMITS & LICENSES REQUIRED ACCORDING TO PRODUCERS**

Permits	Nuisance (HO) Permit	Site Permit	Land & Building Permit	Wastewater Discharge Permit	RKL & RPL or SPPL	Activity License
Producers aware of presence of legal directives to acquire above permits	6	14	14	0	0	18
Percentage (of 45)	13 %	31 %	31 %	0 %	0 %	40 %

Lack of knowledge among tofu producers over the presence of legal directives to acquire the nuisance permit, the wastewater discharge permit and the *RKL & RPL* is one of the reasons leading to the non compliance of tofu producers in acquiring such permits. The tofu producers' extent of compliance to acquire necessary permits & licenses is depicted in table 5.24 below.

**TABLE 5.24**  
**EXTENT OF TOFU INDUSTRIES' COMPLIANCE TO ACQUIRE NECESSARY PERMITS & LICENSES**

Permits	Nuisance (HO) Permit	Site Permit	Land & Building Permit	Wastewater Discharge Permit	RKL & RPL or SPPL
No of Tofu Producers Acquiring Permits	0	10	22	0	0
Percentage (of 45)	0 %	22 %	49 %	0 %	0 %

Table 5.24 shows that none of the tofu producer from a total of 45 acquire the nuisance permit, the wastewater discharge permit and the *RKL & RPL* or *SPPL*. However, 22 producers (49 %) from a total of 45 acquire the land and building permits, and 10 (22%) acquire the nuisance (HO) permit. It is evident that government statutes have been granting other permits and licenses regardless of the absence of the prerequisite nuisance (HO) permit and the *RKL & RPL* or *SPPL*.

The case with Sari Husada Ltd differs from that of the tofu home industries. Sari Husada Ltd, a large joint venture milk producer, acquire all the necessary permits and licenses due to its social and market motives (Source : Fieldwork Interview with government officials from *BAPEDALDA*, the Local Planning & Spatial Department, *BKPM* and the Chamber of Commerce).

However, during the months of May, July and November of 1998 & 1999 the *PROKASIH* team found the pH, COD and BOD in Sari Husada's effluent to be well above standards (1998 & 1999 *PROKASIH* Report). Sari Husada complained that the 1998 Effluent Standards for milk industries are too stringent and required too abrupt of a measure for the alteration in the management & production process if the new standards are to be accounted for. Sari Husada also complained that the environmental standards and regulations do not offer maximum flexibility in the techniques and ways in which they want to comply (Source : Fieldwork Interview with the Manager of the Production & Production Process). Government effort to resolve such problem have been through negotiations as part of the *PROKASIH* Clean River Program, whereby Sari Husada is allowed the flexibility in the techniques and ways for compliance.

#### ***Compliance in the Effort to Monitor & Control Industrial Wastewater Discharge***

In the effort to monitor industrial wastewater discharge, Provincial Regulation no 3/1997 concerning the Environmental Management and Monitoring Plans (*RKL & RPL*) and *SPPL* require that all industries :

- (1) Provide a groundwater extraction metering or measuring device;
- (2) Provide a wastewater metering device;
- (3) Record wastewater quantity and quality;
- (4) Report the quantity and quality (approved by designated laboratories) of wastewater discharge to the Chamber of Commerce on a monthly basis;
- (5) Record changes in production capacity;
- (6) Install a separate pipe & outlet for industrial effluent discharge.

Data from the field shows that none of the tofu producers perform tasks number 2, 3, 4 & 5 above. From a total of 45 tofu producers, 18 producers (40%) use barrels or buckets to measure groundwater extraction on a daily basis, while only 2 producers (.04%) observe (not record) the quality of their wastewater discharge.



The extent of tofu producers' compliance to install or use pipes and outlets for industrial wastewater discharge is depicted in table 5.25.

**TABLE 5.25**  
**EXTENT OF TOFU INDUSTRIES' COMPLIANCE TO USE PIPES**  
**& OUTLETS FOR WASTEWATER DISCHARGE**

<b>Mandatory Actions to be Performed</b>	<b>Using Pipes &amp; Outlets Specifically for Discharge</b>
<b>Number of Producers Adhering to the Legal Directive</b>	36
<b>Percentage (of 45)</b>	80 %

Thirty six producers (80%) from a total of 45 installed or have access to pipes and outlets specifically for industrial wastewater discharge. The high percentage is attributed to the fact that large number of producers in Wirobrajan, Tawang Sari, Gedongkiwo and Ngoto share a communal production house whereby wastewater treatments and pipes & outlets for discharge are available due to government subsidies. Most of the tofu industry clusters in Yogyakarta resemble the above. However, there are also some tofu industry clusters which do not have communal production houses and communal wastewater treatments (i.e. Somodaran), and producers in these clusters lack access to pipes and outlets specifically for industrial wastewater discharge.

In the case of Sari Husada Ltd, prior to the implementation of the Environmental Management System (EMS) in 1999, through the Environmental Management and Monitoring Plans (*RKL & RPL*) the milk producing company agreed to monitor its groundwater extraction and wastewater discharge in conjunction to the installation of the Niro Spray Dryer and the construction and upgrading of the wastewater treatment facilities. Currently monitoring of the extraction of groundwater and wastewater discharge is incorporated into the Environmental Management System whose control and corrective actions are performed every six months.

In the effort to comply with existing laws and regulations, the tasks of industries extend beyond the monitoring of industrial wastewater discharge. Effort to control effluent discharge is asserted in Law no 20/1990 (Water Pollution Mitigation Law) & Provincial Regulation no 3/1997 (*RKL / RPL*), resulting in fines and imprisonment for violations.

Extent of tofu producers' compliance to control industrial wastewater discharge is measured by :

- ♦ The presence of or access to wastewater treatment for industrial wastewater discharge;
- ♦ The percentage of the actual wastewater which receives (partial) treatment.

The extent of tofu producers' compliance to control industrial wastewater discharge is shown in the table below :

**TABLE 5.26**  
**WASTEWATER DISCHARGE LOCATIONS OF TOFU INDUSTRIES**

Locations	Wastewater Treatment (Having Access to WWT)	Streams & Rivers (No Access to WWT)	Sewerage / Drainage * (No Access to WWT)
No of Producers Discharging to above Locations	36	9	5
Percentage (of 45)	80 %	20 %	11 %

\* Number of producers who also discharge their wastewater to sewerage or drainage in addition to the discharge to streams & rivers

Table 5.26 shows that 36 out of the 45 sampled producers (80%) have access to wastewater treatments due to the presence of communal production house and / or the presence of subsidized communal wastewater treatment facilities. Most of the tofu industry clusters in Yogyakarta have communal production houses with fully subsidized treatment facilities. However, tofu producers living in scattered locations where communal production houses are absent lack access to communal wastewater treatment facilities which are provided by the municipal or provincial government. Such is the case with the remaining 20% of the sampled producers lacking access to treatment facilities.

Table 5.26 shows that 36 or 80% of the tofu producers have access to wastewater treatment facilities. However, when producers are inquired concerning the actual amount of wastewater which is discharged or treated in the treatment tank, the response stated by the respondents are disappointing as shown in table 5.27. Table 5.27 shows that 26 producers (58%) from a total of 45 treat 50% < 70% of their wastewater in the treatment tank, while only 1 producer treat  $\geq$  70% of his wastewater in the treatment tank. Eventhough producers have access to wastewater treatment, many of the producers have



discharge pipes leading directly to streams and unlined canals, and many refuse to discharge a large amount of their wastewater into the treatment tank.

**TABLE 5.27**  
**NUMBER OF TOFU PRODUCERS TREATING THEIR WASTEWATER**  
**ACCORDING TO THE PERCENTAGE OF THE ACTUAL WASTEWATER**  
**TREATED**

Amount	0	< 25 %	25 % ≤ 50 %	50 % < 70 %	≥ 70 %
Producers Treating Wastewater to the Above Percentage	9	1	8	26	1
Percentage of Producers (of 45)	20 %	2 %	17 %	58 %	2 %

In regard to effluent standards for tofu home industries, table 5.28 shows that although treatment facilities reduce the content of total suspended solids and pH to a level below the specified standards, the BOD and COD content is still well above the 1998 effluent standards.

**TABLE 5.28**  
**POLLUTANT CONTENT IN TOFU INDUSTRIES' WASTEWATER EFFLUENT**

Parameter	Treated Effluent in Ngoto (mg/l)	Treated Effluent in Somodaran (mg/l)	Treated Effluent in Wirobrajan (mg/l)	1998 Tofu Industry Effluent Standards
BOD	190	210	220	75
COD	375	425	400	200
Suspended Solids	26	28	28	75
Sulfide	Undetected	Undetected	Undetected	0.05
pH	6.7	6.5	6.4	6.0 – 9.0

(Source : BAPEDALDA, 2000)

In the effort to control industrial wastewater discharge Sari Husada Ltd constructed wastewater treatment tanks 500 meters from its production house. Wastewater is transported from the production house to the location of the treatment tank by pipes specifically used for wastewater discharge. The Gadjah Wong river serves as the medium for the final discharge of Sari Husada's wastewater effluent.

In the year 2000 total production of powder base milk and cereal products reached its highest with 30,418.923 kg (Company Profile, 2000). Along with production increase is the increase in groundwater consumption and industrial wastewater discharge. Presently Sari Husada extracts 1700 cubic meter of groundwater and discharges 1400 cubic meter of wastewater per day. During total cleaning which takes place once a week the quantity



of wastewater discharged reaches up to 2000 cubic meter, whereas the content of BOD and COD more than double the daily content (EMS Sari Husada, 2001). However, for effective treatment the capacity of Sari Husada's present wastewater treatment is only for 1000 cubic meter per day. During total cleaning wastewater overflow in the treatment tank occurs and steps taken by Sari Husada include the utilization of an additional anaerobic tank to provide for the overflow.

The quality of Sari Husada's effluent discharge is shown in table 5.29 below :

**TABLE 5.29**  
**POLLUTANT LEVEL IN SARI HUSADA'S WASTEWATER DISCHARGE**

Parameter	BOD (mg/l)	COD (mg/l)	pH (mg/l)	TSS (mg/l)
<b>Standards Prior to 1999</b>	<b>40</b>	<b>100</b>	<b>6-9</b>	<b>50</b>
January 1998	22.86	45	7.6	23
March 1998	18.72	56.31	7.9	11
May 1998	73	137	7.8	19
July 1998	96.24	162.23	6.7	27
November 1998	76.5	154.62	7	16
<b>Standards from 1999 Onwards</b>	<b>30</b>	<b>75</b>	<b>6-9</b>	<b>30</b>
January 1999	32	63	7.6	16
March 1999	29	21.50	8.4	11
May 1999	75	160	6.8	32
July 1999	70	188	7.0	55
November 1999	95	282	8.2	80
December 1999	13	26	7.1	10
January 2000	29	73	7.7	27
March 2000	75	21.50	8.4	11
May 2000	65	157	8.5	13
September 2000	9.40	54	8.5	4
December 2000	20.70	50	7.0	8

(Source : *PROKASIH* Clean River Program Report 1998, 1999 & 2000)

Prior to 1998 Sari Husada never exceeded the 1991 standards for wastewater effluent discharge (Source : Fieldwork Interview with the *PROKASIH* Program Manager & the Head of the Law Department from *BAPEDALDA*). In 1998 and 1999 the wastewater parameters for BOD, COD and TSS fluctuate greatly whereby in the first months of 1998 & 1999 (January & March) the parameters were in compliance with the 1991 & 1998 standards. However, during the months of May, July and November of 1998 & 1999 the *PROKASIH* team found the COD & BOD of Sari Husada's effluent to be well above the 1991 & 1998 effluent standards for milk industries (1998 & 1999 *PROKASIH* Report). In mid 1998 & 1999 and early 2000 tension between Sari Husada Ltd and the neighboring

Muja-Muju & Wirobrajan Communities heightened due to problems involving wastewater odour and wastewater discharge into the Gadjah Wong river which causes deterioration of the river environment and the surrounding communities. In the year 2000 its wastewater parameters for BOD, COD and TSS also fluctuates, with May 2000 being exceedingly higher than the 1998 effluent standards.

***Compliance in the Effort to Internalize Environmental Cost through the Taxation & Retribution System***

Taxes and retributions pertaining to corporate environmental management required among tofu producers are : (1) Land & Building tax, and (2) Wastewater discharge retribution. Other taxes and retributions such as the corporate & production tax, operating license and sewerage infrastructure retribution are not discussed due to their lack of pertinence and significance to corporate environmental management. The land and building tax are paid on a yearly basis, with the amount larger from that of regular households to account for the production activities of the tofu producers.

Table 5.30 shows the extent of tofu producers' compliance to internalize cost of externalities through payment of the land & building tax and payment of the wastewater discharge retribution.

**TABLE 5.30  
EXTENT OF TOFU INDUSTRIES' COMPLIANCE TO PAY TAX &  
RETRIBUTIONS**

<b>Taxes/Retributions</b>	<b>Land &amp; Building Tax Paid on a Yearly Basis</b>	<b>Wastewater Discharge Retribution</b>
<b>Producers Paying Above Tax &amp; Retribution</b>	38	0
<b>Percentage (of 45)</b>	84 %	0 %

The table shows that 38 producers from a total of 45 (84 %) pay the yearly land & building tax, while none of the tofu producers pay the required wastewater discharge retribution.

In regard to the internalization of externalities through the payment of tax and retribution, Sari Husada Ltd is in full compliance with laws and regulations concerning tax and retribution (Source : Interview with government officials from *BAPEDALDA*,

Municipal Economic & Land Use Departments, Chamber of Commerce & Industry and *BKPM*). Taxes and retributions which are enacted upon Sari Husada, among others are : corporate & production tax, sales tax, import duties, land & building tax, operating license, road toll, groundwater withdrawal tax and industrial wastewater discharge retribution. The charge for the groundwater withdrawal tax and the wastewater discharge retribution are based on the volume of water extracted and discharged respectively.

Sari Husada Ltd stated that through the *BKPM*'s assistance, reduction in import tax for import of clean technology and wastewater treatment facilities is made possible, although the company was not entitled to tax free royalty for import of wastewater treatment facilities. On the other hand, Sari Husada also stated that the process involved in the acquisition of import tax reduction is bureaucratically complex. Complaints by Sari Husada in conjunction with the taxation and retribution system include :

- ◆ The number of taxes and retributions involved;
- ◆ The lack of clarity and information available concerning the function of taxes relating to environmental management;
- ◆ The complex system and bureaucracy involved;
- ◆ The lack of corporate incentives offered by the taxation and retribution system.

(Source : Interview with the Manager of the Production & Production Process and the Head of the Environmental Directory Board)

### **5.3.2 Analysis of the Industries' Response to the Programs**

In this section government programs to promote environmental awareness and corporate environmental management among entrepreneurs and industries are analyzed. Mission of environmental programs for the two selected case studies can be stated as "to promote environmental awareness and adequate corporate environmental management among industries in order to reduce pollution loading of wastewater discharged to acceptable levels for sustainable development" (Agenda 21 Indonesia - Ministry of Population & Environment, 2000). The success of the mission of government programs is analysed through case studies of the tofu home industries and Sari Husada Ltd.

To measure the success of mission of government programs, the following are analyzed and discussed :

- (1) The participation of target groups in achieving the mission (in the case of Sari Husada and the tofu home industries), and the attendance of target groups in the programs (in the case of the tofu home industries);
- (2) Changes in the level of environmental awareness and in entrepreneurs' attitude towards problems of externalities;
- (3) Changes in the effort to incorporate environmental management into the production process.

The discussion focuses on programs intended for tofu producers (see Chapter III-Programs for Small Home Industries), as well as the *PROKASIH* Clean River Program intended for Sari Husada, Ltd.

#### ***Participation of Target Groups in Government Programs***

The programs' success is dependent upon the participation of target groups in achieving the programs' mission, and in the case of the tofu home industries, it is also dependent upon the target groups' attendance in the program.

Table 5.31 shows the attendance frequency of tofu producers in government programs. The table shows few respondents attending the orientation & consultation programs on capacity building and public health (29% & 24% respectively). Although many of the respondents (67 %) attended the programs on WEP & end of pipe technology at least once, public discussion is only attended by 29 % of the respondents.

In regard to the participation of tofu industries to reduce pollution loading to acceptable level for sustainable development, the large amount of untreated wastewater discharged and the quality of (semi) treated wastewater which failed to comply with the 1998 standards show the level to be unacceptable for sustainability.

In regard to Sari Husada Ltd, from January 2001 until the present the milk corporation has been able to reduce the pollution load of the specified BOD, COD, pH and Total Suspended Solids to that below the 1998 effluent standards (Source : Interview with the Head of the Legislation Department in *BAPEDALDA*). Such improvement lead to the award given by the *PROKASIH* team in the year 2001.



**TABLE 5.31**  
**ATTENDANCE FREQUENCY OF TOFU PRODUCERS IN GOVERNMENT PROGRAMS**

Frequency of Attendance Programs	Number of Tofu Producers who Attended the Programs According to the Specified Frequency			
	Never	Seldom or Rarely	Sometimes	Often
Orientation & Consultation on Management (Capacity Building) : Program held once to twice per year (of 45).	1 (2 %)	13 (29 %)	18 (40 %)	13 (29 %)
Orientation & Consultation on Public Health & Clean Living Environment : Program held once to three times per year (of 45).	7 (16 %)	21 (47 %)	6 (13 %)	11 (24 %)
Orientation & Consultation on End of Pipe Technology & WEP : Program held once or twice only (of 45).	Never Attended the Program		Attended Program Once or Twice	
	15 (33 %)		30 (67 %)	
Disclosure & Discussion with the Public & Surrounding Communities : Program held once or twice only (of 35).	Never Attended the Program		Attended Program Once or Twice	
	15 (43 %)		10 (29 %)	

Sari Husada's success in reducing its pollution load in the year 2001 is not solely attributed to government effort in the *PROKASIH* Clean River Program. Additional drives which promote the successful reduction of pollution load in the year 2001 includes the social, market, economic and technological advancement motives (Source : Fieldwork Interview with the Manager of the Production & Production Process). Such motives, which promote the corporation's willingness to participate in voluntary environmental management, are reflected through Sari Husada's effort to implement the Environmental Management Systems and to obtain the ISO 14001 certification.

***Changes in the Level of Environmental Awareness and in the Attitude of Entrepreneurs Towards Problems of Externalities***

In regard to the tofu home industries, changes in the level of environmental awareness and in the attitude of tofu producers towards problems of externalities are measured through :

- ♦ Their attentiveness to environmental issues;
- ♦ Their opinion concerning the graveness of pollution due to wastewater externality.

Attentiveness of producers towards environmental issues can be measured through the number of respondents who are more attentive to issues of water supply & conservation, and respondents more attentive to promoting clean environment. Response from respondents concerning their attentiveness to issues of water supply and clean environment during post implementation period are as follow :

**TABLE 5.32**  
**TOFU PRODUCERS MORE ATTENTIVE TO ENVIRONMENTAL**  
**ISSUES AFTER THE IMPLEMENTATION OF GOVERNMENT**  
**PROGRAMS**

No of Tofu Producers More Attentive to Issues of Water Supply & Conservation after Implementation of Government Programs	No of Tofu Producers More Attentive to Promoting Clean Living&Working Environment after Implementation of Government Programs
25 (of 45)	40 (of 45)
56 %	89%

Table 5.33 depicts the tofu producers' opinion concerning the graveness of (river) pollution caused by wastewater externality from their activities. From a total of 45 respondents the table shows that no producer consider their wastewater discharge to have serious effect on the river water and its surrounding environment, and ten out of 45 producers (22%) have no opinion concerning the matter. Such respond shows the reason behind the lack of environmental measures taken by tofu industries in Yogyakarta.

**TABLE 5.33**  
**TOFU PRODUCERS' OPINION CONCERNING GRAVENESS OF**  
**POLLUTION DUE TO WASTEWATER EXTERNALITY**

Graveness	Serious	Quite Serious	Not Serious	No Opinion
Number of Producers (of 45)	0	4	31	10
Percentage	0 %	9 %	69 %	22 %

Reasons stated by the thirty one respondents who consider their wastewater discharge to have no serious effects on the environment vary, and are shown in table 5.34.

**TABLE 5.34**  
**REASONS FOR LACK OF SERIOUS EFFECTS OF EFFLUENT DISCHARGE**

Reasons	Respondents (of 31)	Percentage
The presence of the wastewater treatment effectively treats their wastewater prior to discharge	20	44 %
It has always been the custom to discharge wastewater into the river and the people are accustomed to it	8	18 %
It does not affect the health of the people because no outbreak ever occurred before	2	4 %
The river water flows rapidly, therefore the river and its surrounding environment is immediately cleansed with clean water	5	11 %

To enquire into Sari Husada's view towards present and probable problems posed by its wastewater discharge, the manager of the production process and the head of the environmental directory board were inquired concerning the graveness of the effects of its industrial wastewater discharge to the river ecosystem.

Interviewees from Sari Husada stated that present environmental management effort through the Environmental Management System minimizes the quantity and improves the quality of its wastewater discharged to a level which causes no serious harm to the river ecosystem and its surrounding environment.

However, interviewees from Sari Husada also stated that the challenges posed for compliance to effluent standards and for reduction of its pollutant levels are, among others :

- ◆ Continuous increase in production;
- ◆ The higher level of pollutant generated during the total cleaning period;
- ◆ The modifications required in the management and technical fields to account for the abrupt increase in production.

***Changes in the Production Pattern to Incorporate Environmental Management***

In conjunction with the mission of the programs which is directed to promote adequate corporate environmental management, analysis on the extent of environmental management performed by the tofu producers and Sari Husada Ltd are conducted.

In regard to tofu producers, the analysis is focused on Waste & Emission Prevention measures advised in government programs for tofu industries. Table 5.35 shows the number of respondents implementing waste & emission prevention. Many tofu producers commented that the use of dry skin peeling and steam for cooking and boiling

would lead to inconveniences, increased production cost and decreased product quality in terms of taste.

**TABLE 5.35**  
**TOFU PRODUCERS IMPLEMENTING WASTE PREVENTION**

Activity	Re-Use Water after Washing & Soaking Soybean for Next Batch	Less & reuse water for cleaning equipment	Dry Skin Peeling & Hydration	Use Steam for Cooking & Boiling (no water)	Grinding with less water	No Measures Taken
Number of Producers (of 45)	16	26	0	0	4	19
Percentage	36 %	58 %	0	0	9 %	42 %

The experience of Sari Husada shows that voluntary collaboration in environmental management lead to the 2001 award given by the *PROKASIH* team for the reduction of pollutant quantity in its wastewater discharge. However, the presence of social, market, economic and technological motives are necessary to facilitate voluntary collaboration in environmental management. Such motives are the primary drives behind Sari Husada's corporate environmental management, whereby such motives are absent among tofu producers, leading to the lack of producers' interest in environmental management.

#### **5.4 Analysis of the Communities' Opinions**

To supplement the analysis on institutional effectiveness of the primary and secondary case, an analysis of the communities' opinion regarding the effectiveness of government effort and the effectiveness of corporate initiatives for management of industrial wastewater discharge is performed. The analysis conducted covers the communities' opinion concerning :

- (1) The effectiveness of present government regulations;
- (2) The effectiveness of government programs & projects;
- (3) The effectiveness of corporate initiatives towards environmental care; and
- (4) The quality of industrial wastewater discharge & its receiving body

The total number of respondents used as samples is 48. Respondents chosen are those living along the river tributaries, 75-500 meters downstream from the discharge location of the tofu home industries & Sari Husada, Ltd. The (village) headman or *lurah* is consulted for recommendations concerning the individuals who can be consulted and



interviewed. The data collection process is terminated when no new information is generated. The following table illustrates the number of samples taken in each of the location, as well as the industries which directly affect the different communities.

**TABLE 5.36**  
**SAMPLES OF RESPONDENTS REPRESENTING THE COMMUNITIES**

Location	Number of Respondents (of 48)	Industries Affecting Respondents
Muja-Muju, Yogyakarta	5	Sari Husada
Warungboto, Yogyakarta	5	Sari Husada, Budi Makmur (Leather)
Wirobrajan, Yogyakarta	10	Tofu Industries
Tawang Sari, Bantul	5	Tofu Industries
Gedongkiwo, Bantul	5	Tofu Industries
Ngoto, Bantul	10	Tofu Industries
Somodaran, Sleman	8	Tofu Industries

#### **5.4.1 Effectiveness of Government Regulations**

In regard to the effectiveness of the institutionalization of industrial wastewater management, respondents from the different communities were inquired concerning the effectiveness of present government regulations in promoting wastewater management and control among tofu industries and Sari Husada Ltd. The table below shows the respondents' response :

**TABLE 5.37**  
**EFFECTIVENESS OF GOVERNMENT REGULATIONS**

Effectiveness	Very Effective	Effective	Quite Effective	Ineffective	No Answer
Respondents	1	11	8	17	11
Percentage (of 48)	2 %	23 %	17 %	35 %	23 %

#### **5.4.2 Effectiveness of Government Programs & Projects**

In addition to the effectiveness of government regulations, respondents from the different communities were also inquired concerning the different programs present for tofu industries and Sari Husada Ltd, along with the programs' effectiveness to manage and control industrial wastewater discharge. Table 5.38 shows the respondents' opinion concerning the different programs implemented by government institutions, while table 5.39 shows the respondents' opinion concerning the programs' effectiveness.

Table 5.38 shows that only 4 respondents (8 %) from a total of 48 were aware of the presence of public discussion programs to facilitate negotiation between industries and the surrounding communities. The four respondents above are all from Warungboto, Yogyakarta who attended the public discussion between Budi Makmur (a leather industry near Warungboto) and the surrounding community. This lead to the assumption that



when public discussion programs were held, residents from surrounding community were usually unaware of the presence of such program, and that community leaders received notification & attendance priority over individual residents. Such is evident from the lack of respondents from Ngoto & Somodaran who stated the presence of such program in their locations.

**TABLE 5.38**  
**GOVERNMENT PROGRAMS & PROJECTS PRESENT ACCORDING TO**  
**COMMUNITY MEMBERS**

Programs	Respondents (of 48)	Percentage
Subsidized construction of Wastewater Treatment	19	40 %
Providing Legal Guidance for End of Pipe Technology	10	21 %
Public Disclosure & Discussion	4	8 %
No Program Conducted	6	13 %
No Answer	11	23 %

Moreover, all the respondents from Muja-Muju stated that the government has not facilitated public discussion between Sari Husada and the surrounding communities since, according to these respondents, public discussion frequently takes place behind close doors involving only the industries, government officials and district heads.

**TABLE 5.39**  
**EFFECTIVENESS OF GOVERNMENT PROGRAMS & PROJECTS**

Effectiveness	Very Effective	Effective	Quite Effective	Ineffective	No Answer
Respondents	0	16	7	9	16
Percentage	0 %	33 %	15 %	19 %	33 %

Table 5.39 shows that more respondents believed government programs to be more effective (19% stated ineffective and 15% stated quite effective) than government regulations (35 % stated ineffective and 17 % stated quite effective).

#### **5.4.3 Effectiveness of Corporate Initiatives Towards Environmental Care**

Regarding corporate initiatives towards environmental care, respondents were inquired concerning corporate initiatives for industrial wastewater management and their effectiveness to prevent and control pollution due to externalities.

Table 5.40 shows that the construction & maintenance of wastewater treatment is the response stated by most of the respondents (75%). Response concerning the effectiveness of corporate initiatives is depicted in table 5.41. Table 5.41 shows that 8 % and 35 % of the respondents regarded corporate initiatives to be quite effective and

ineffective respectively, while 38 % regarded the effort to be effective (see table 5.41 below).

**TABLE 5.40**  
**CORPORATE INITIATIVES TOWARDS WASTEWATER MANAGEMENT**

Initiatives	Respondents (of 48)	Percentage
Wastewater Treatment Construction & Maintenance	36	75 %
Compliance to Regulatory Measures	1	2 %
Cleaning Environment by Means of Spraying Water	1	2 %
Holding Public Meeting	1	2 %
No Measures Taken	5	10 %
No Answer	4	8 %

**TABLE 5.41**  
**EFFECTIVENESS OF CORPORATE INITIATIVES**

Adequacy	Very Effective	Effective	Quite Effective	Ineffective	No Answer
Respondents	1	18	4	17	8
Percentage (of 48)	2 %	38 %	8 %	35 %	17 %

#### **5.4.4 Quality of Wastewater Discharged & its Receiving Body According to the Community**

In addition to opinion concerning the effectiveness of government effort & corporate initiatives, community members' opinion concerning the quality of wastewater discharged and its receiving body (i.e. surface water or river) are also conducted to supplement the analysis on the effectiveness of institutionalization of industrial wastewater management.

**TABLE 5.42**  
**PRESENCE OF SURFACE WATER POLLUTION**

Presence of Pollution	Yes	No	No Answer
Respondents	29	18	1
Percentage (of 48)	60 %	38 %	2 %

Table 5.42 shows that 29 respondents (60 %) from a total of 48 acknowledge the presence of surface water pollution due to industrial wastewater discharge. Eighteen respondents (38 %) stated the absence of surface water pollution : however, analysis of the river body and the quality & quantity of wastewater discharge from tofu industries and Sari Husada shows the presence of pollution in discharge medium (*PROKASIH* Report, 1998-2000), therefore the high response over the absence of surface water pollution (38 %) is not necessarily attributed to such absence of pollution, but rather to the lack of environmental awareness among community members.

The following are the respondents' opinion concerning the quality of surface water used as discharge mediums for industrial effluent from tofu industries and Sari Husada, Ltd.

**TABLE 5.43**  
**SURFACE WATER QUALITY**

Parameter	Odour		Clarity				Insects	
	Yes	No	Clear	Quite Turbid	Turbid	No Answer	Yes	No
Respondents	39	9	2	1	30	15	29	19
Percentage (of 48)	81 %	19 %	4 %	2 %	63 %	31 %	60	40%

All respondents from Muja-Muju who are directly affected by the odour from Sari Husada's wastewater discharge stated that during discharge hours odour is unbearable to a point of distraction. All respondents from Wirobrajan, Tawang Sari, Gedongkiwo, Ngoto and Somodaran stated that the wastewater from tofu industries is acidic and repugnant in odour.

Opinion concerning the adequacy of groundwater quality is also conducted to examine possible occurrence of groundwater contamination. The table below shows the respondents' opinion concerning the adequacy of their groundwater quality.

**TABLE 5.44**  
**ADEQUACY OF GROUND WATER QUALITY**

Presence of Pollution	Adequate	Quite Adequate	Inadequate
Respondents	42	3	3
Percentage (of 48)	88 %	6 %	6 %

Most respondents stated their groundwater quality to be adequate (88%), with only 3 respondents from a total of 48 (6%) stating their groundwater quality to be both quite adequate and inadequate. Respondents who stated their groundwater quality to be quite adequate and inadequate were those from the Warungboto vicinity, whereby all five respondents reported lack of clarity and the presence of metallic & acidic odour in their groundwater. The cause of such odour and lack of clarity are currently being investigated by BAPEDALDA and the Environment Study Centre in AKPRIND & Gadjah Mada Univ.

**TABLE 5.45**  
**GROUND WATER QUALITY**

Parameter	Odour		Clarity		
	Yes	No	Clear	Quite Unclear	Coloration
Respondents	6	42	42	6	1
Percentage	13 %	88 %	88 %	13 %	2 %

In addition, respondents were inquired concerning compensation provided by the tofu industries and Sari Husada Ltd. All five respondents from Muja-Muju, Yogyakarta received compensation from Sari Husada Ltd : 3 respondents in the form of free milk, 1 in the form of meat and 1 in the form of school fee aid. One respondent from Gedongkiwo, Bantul received compensation from tofu producers in the form of discounted tofu price. From the 6 respondents who received compensation, only one was satisfied with the compensation, while all 6 responded that the compensation was not sufficient to make up for the loss in environmental degradation.

**TABLE 5.46**  
**RESPONDENTS RECEIVING COMPENSATION FROM INDUSTRIES**

Providing of Compensation	Respondents (of 48)	Percentage
Yes, Compensation Provided	6	13 %
No, Compensation not Provided	42	88 %

## **5.5 Evaluation of Results**

Evaluation of the adequacy & effectiveness of present institutional framework for industrial wastewater management is conducted based on the interview results. The evaluation of the adequacy of present institutional framework is conducted for the purpose of diagnosing problems associated with integration, coordination and implementation. Evaluation of the effectiveness of government effort in industrial wastewater control is performed for the purpose of contrasting effectiveness of government effort when applied to different scales and nature of industries (i.e. large or medium industries and small home industries).

Evaluation of the adequacy of present institutional framework to promote integration, interagency coordination and effective implementation is shown in table 5.47, along with the explanation for each of the points evaluated. Evaluation concerning the effectiveness of government effort in industrial wastewater control for tofu industries and Sari Husada Ltd is shown in table 5.48. The table shows that regulatory instruments, economic instruments and programs that are proven effective and quite effective for Sari Husada Ltd are ineffective and quite ineffective for the tofu home industries.



**TABLE 5.47**  
**DIAGNOSIS OF PROBLEMS ASSOCIATED WITH INTEGRATION,**  
**COORDINATION & IMPLEMENTATION**

<b>Institutional Variables</b>	<b>Adequacy of Variables to Induce Integration, Coordination &amp; Implementation</b>	<b>Key Factors</b>
<b>Clarity &amp; Consistency</b>		
Clarity of Regulations	*	Principal permits & licenses ( <i>HO, RKL/RPL</i> ) lack clarity in legal directives & process & procedures.
Clarity of Legal Directive in Programs for Tofu Industries	**	Programs lack clear guidance for implementors to follow in most occasions.
Clarity of <i>PROKASIH</i>	****	Program is focused with clear mandates.
Clarity of Economic Instruments	**	Groundwater withdrawal tax is clear, but discharge retribution lacks clarity in its function, procedures & target groups.
Consistency in Regulation	**	Sectoral Agencies are given power for law enforcement over <i>BAPEDALDA</i> .
Consistency in Programs for Tofu Industries	*	Paternal attitude in legal guidance is conflicting with regulatory measures.
Consistency in Economic Instruments	**	Full subsidy of WWT conflicting with retributions.
<b>Interagency Coordination</b>		
Presence of Adequate Procedures & Mechanism for Coordination	**	Interjurisdictional & intersectoral committee have been formed, yet the vertical & sectoral approach hinder coordination.
Willingness of Agencies to Perform Coordination	***	Though agencies are willing to participate, difficulties occur for clarifying roles and promoting horizontal coordination.
Organizational Capacity of the Lead Coordinating Agency <i>BAPEDALDA</i>	**	Location suitable for inducing coordination, but not for resolving conflict & control of funding.
Presence of Actors to Promote Cooperation	***	Mayor / <i>Bupatis</i> effort is effective, but <i>BAPPEDA</i> Staffs lack sufficient authority due to sectoral and vertical bureaucracy.
<b>Adequacy of Statutes to Structure Implementation</b>		
Adequacy of Financial Support for <i>PROKASIH</i>	***	Without national aid, provincial budget is not enough for the multi-year <i>PROKASIH</i> Program.
Adequacy of Financial Support for Tofu Industry Program	*	Frequency of budget availability is haphazard & a lack of comprehensive budget planning by <i>BAPPEDA</i> exists.
Presence of Adequate Incentives or Sanctions for Tofu Industries	*	Sanctions & incentives are absent & enforcement by government is weak.
Presence of Adequate Incentives or Sanctions for <i>PROKASIH</i>	***	Although mechanisms for compliance is developed, enforcement capability through prosecution is inadequate. In addition, there's an absence of economic incentives & sanctions, and an absence of internal & external best communication strategies in producing inventory of consumption, emission and best technology.

**Key :** \*\*\*\* Adequate, \*\*\* Quite Adequate, \*\* Quite Inadequate, \* Inadequate

**TABLE 5.47 (Continue)**  
**DIAGNOSIS OF PROBLEMS ASSOCIATED WITH INTEGRATION,**  
**COORDINATION & IMPLEMENTATION**

Institutional Variables	Adequacy of Variables to Induce Integration, Coordination & Implementation	Key Factors
<b>Commitment of Implementing Agencies</b>		
<i>BAPEDALDA</i>	****	Staffs of <i>BAPEDALDA</i> are very much committed to managing the environment.
Sectoral Agencies	***	Commitment to the <i>PROKASIH</i> Program is adequate, but commitment to medium & small industries is inadequate.
<b>Participation of Target Groups in Program Implementation</b>		
<i>PROKASIH</i>	****	Initiatives within the program were supported by target groups' participation.
Tofu Industry Programs	**	Although programs have promoted discharge into WWT & some WEP, producers are still very reluctant to act.
<b>Presence of Skillful Actor(s) for Facilitating Implementation Process</b>		
Presence of NGOs to facilitate policy implementation for small industries.	***	NGOs' efforts are effective, but a limited number of small industry localities have received attention from NGOs.
NGOs' presence to facilitate implementation for Sari Husada	****	NGOs' effort to monitor the development of <i>PROKASIH</i> & the implementation of regulations & taxation instruments are effective.

Key : \*\*\*\* Adequate, \*\*\* Quite Adequate, \*\* Quite Inadequate, \* Inadequate

**TABLE 5.48**  
**DIAGNOSIS OF PROBLEMS ASSOCIATED WITH GOVERNMENT EFFORTS**  
**IN INDUSTRIAL WASTEWATER CONTROL**

Variables	Effectiveness to Promote Wastewater Control	Key Factors
<b>Government Regulations</b>		
Acquisition of Environmental Permits among Tofu Industries	*	Producers don't acquire them due to lack of knowledge, paternal attitude of agencies & lack of monitoring.
Acquisition of Environmental Permits by Sari Husada	****	Full compliance due to the many corporate motives.
Acquisition of Other Permits among Tofu Industries	**	Although producers are knowledgeable of such permits, many still don't acquire it.
Acquisition of Other Permits by Sari Husada	****	Full compliance due to the many corporate motives.
Monitoring of Wastewater Discharge by Tofu Industries	*	Lack of monitoring by industry occurs due to inadequate industrial resource base, lack of government guidance and inadequacy of legal provisions.
Monitoring of Wastewater Discharge by Sari Husada	****	Full compliance due to corporate economic and market motives.

Key : \*\*\*\* Effective, \*\*\* Quite Effective, \*\* Quite Ineffective, \* Ineffective

**TABLE 5.48 (Continue)**  
**DIAGNOSIS OF PROBLEMS ASSOCIATED WITH GOVERNMENT EFFORTS**  
**IN INDUSTRIAL WASTEWATER CONTROL**

Variables	Effectiveness to Promote Wastewater Control	Key Factors
<b>Government Regulations</b>		
Control of Wastewater Discharge by Tofu Industries	**	Although it has promoted treatment, producers are still reluctant to use WWT due to odour problem & broken WWT, lack of guidance on end of pipe, lack of monitoring & inadequacy of provisions.
Control of Wastewater Discharge by Sari Husada	***	Although Sari Husada received the 2001 <i>PROKASIH</i> Award, fluctuation in quality occurs frequently in the past due to lack of sound operation norms & enforcement.
<b>Taxes &amp; Retributions</b>		
Land & Building Tax for Tofu Industries	***	Most tofu producers acquire such taxes.
Land & Building Tax for Sari Husada	***	Company is in full compliance to acquire the tax, but there is a lack of methods & data to establish value for damages and legal power over disposition of revenues.
Wastewater Discharge Retribution for Tofu Industries	*	No tofu producers pay such tax due to their lack of knowledge concerning the tax's existence, lack of monitoring & paternal attitude of sectoral agencies.
Wastewater Discharge Retribution for Sari Husada	***	Company is in full compliance to acquire the tax, but there is a lack of methods & data to establish value for damages and legal power over disposition of revenues.
<b>Government Programs</b>		
Participation of Tofu Industries in the programs	**	Many producers are not present during program implementation due to lack of information reaching individuals and prioritization of programs for leaders.
Changes in Awareness Level for Tofu Industries	**	Although programs have made producers more aware, they are reluctant to accept that wastewater cause significant impacts.
Changes in Awareness Level for Sari Husada	***	Although programs contribute to improved awareness, corporate motives are more dominant and important.
Changes in Production Pattern for Tofu Industries	**	42% of respondents take no WEP measures due to resistance to change, unpreparedness of producers and failure of agencies to provide routine guidance.
Changes in Production Pattern for Sari Husada	***	Although <i>PROKASIH</i> promotes changes, it lacks framework for enforcement through prosecutions, and lacks comprehensive planning for emission reduction (i.e. lacks planning of stages, strategies and solutions to anticipated implementation problems).

**Key : \*\*\*\* Effective, \*\*\* Quite Effective, \*\* Quite Ineffective, \* Ineffective**

Evaluation regarding the communities' opinion on the effectiveness of present institutional framework for industrial wastewater management is shown below in table 5.49.

**TABLE 5.49**  
**EVALUATION OF THE COMMUNITIES' OPINION REGARDING THE**  
**EFFECTIVENESS OF PRESENT INSTITUTIONAL FRAMEWORK**

<b>Instruments</b>	<b>Effectiveness of Instruments</b>	<b>Key Factors</b>
<b>Government Regulations</b>	<b>**</b>	Community members reported significant surface water pollution due to industrial wastewater discharge.
<b>Government Programs &amp; Projects</b>	<b>**</b>	Many respondents stated that public discussions are not intended for their participation and representation.
<b>Corporate Management Initiatives</b>	<b>**</b>	Respondents felt that companies are not sincerely committed to environmental management.

**Key : \*\*\*\* Effective, \*\*\* Quite Effective, \*\* Quite Ineffective, \* Ineffective**





**The Wastewater Treatment in Ngoto, Bantul which is Located Behind the Communal Production House**



**The (Underground) Communal Wastewater Treatment Tanks in Somodaran are Covered by Piles of Wood, Showing Lack of Maintenance. The Wood is Used for Cooking Fuel.**



## **CHAPTER VI**

### **STRATEGIES FOR IMPROVEMENT IN INTEGRATED INDUSTRIAL WASTEWATER MANAGEMENT**

#### **6.1 Introduction**

Sustainable industrial wastewater management can be facilitated & implemented through : (1) The presence of suitable preconditions to promote the internalization of externalities, and (2) The utilization of adequate and effective institutional framework encompassing appropriate legal, organizational and economic instruments. Although measures have been taken to promote suitable conditions for the internalization of externalities (see Chapter III – Government Measures Supporting Industrial Sector), achievements fall short of their objectives due to factors such as the absence of a well functioning financial market, high interest rates & inflation, and the lack of economic policy directed towards internalization of externalities (see Chapter III – Efforts to Control Pollution by Industries & the Government). Such situation is further complicated by the absence of motives towards environmental care among small industries.

In addition, present instruments used for industrial wastewater management are lacking in adequacy and effectiveness, especially when concerned with small home industries. In improving them, the wide range of experience from economically developed countries is important in order to adopt the best solutions. The key elements that may be considered for better environmental protection and industrial effluent management include :

- ◆ Suitable preconditions for the internalization of externalities;
- ◆ Comprehensive & consistent environmental law;
- ◆ Adequate & effective organizational structure of environmental protection authorities;
- ◆ Effective legal, economic and social instruments adapted to the size, nature and corporate motives of the different industries present;
- ◆ Effective monitoring system supported by adequate law enforcement;

- ◆ Economic mechanisms to promote incentives and sanctions for compliance of environmental protection measures;
- ◆ Employment of science and technology in environmental protection.

Industrial wastewater management tools ranging from conventional end of pipe treatment to waste prevention and clean technology have been implemented complementing one another. Various economic and social instruments have also been applied to promote effective compliance. The primary purpose of this chapter is to seek efficient and cost effective instruments and tools that can be implemented by the government to encourage industries to abate pollution to a minimum level. The secondary purpose is to seek organizational strategies for present institutions in the effort to improve coordination, collaboration and the adequacy of statutes to structure the implementation processes. The instruments and tools available depend on various factors such as the region's level of economic development, environmental awareness of industries and the general public, and the size & nature of the different industries.

In Yogyakarta command and control is still the main tool used to control industrial wastewater pollution. The *PROKASIH* Clean River Program was initiated in the early 1990s to promote collaboration between large and medium industries and the government for voluntary reduction of pollution load into surface water. Programs for small industries include government subsidy for the construction of wastewater treatment, and orientation for the promotion of waste & emission prevention. Both *BAPEDALDA* and the sectoral departments lack financing, whereas interjurisdictional & intersectoral coordination and cooperation have been hindered by the vertical and sectoral approach to environmental management. This reflects the lack of adequacy of the institutional framework for industrial wastewater management.

The government's motives and the industries' motives for performing environmental management is that of a different nature. Industries are interested in environmental care due to its social, market and technological advancement motives, while the government's motive is to secure the environment for sustainability purposes. Moreover, the small home industries' target is to maximise profit and production to gain advancement in the narrow competition, while the medium and large industries' target is to maximise profit and widen the market through production increase and cost effective corporate strategies.

Such corporate strategies encompass the social, market, economic and technological advancement motives which can function as drives for corporate environmental management (Chapter II, pp. 40).

In this chapter various organizational measures and pollution control instruments & tools will be evaluated with the objective of providing options that can address conflicting interests between the government and industry, and addressing other constraints to industrial pollution control in Yogyakarta. Instruments evaluated involve the use of direct legislation, economic instruments and social or voluntary measures through programs and public discussion. Tools discussed include conventional technology, cleaner production measures, Environmental Management System and the implementation of eco-industrial parks, whereas organizational measures discussed include measures for improving clarity & consistency, and measures for promoting coordination and the adequacy of statutes to structure the implementation processes. Specific constraints associated with the implementation of such instruments, tools and organizational measures are pointed out, while management strategies for overcoming such constraints will be proposed. Political and social factors will not be discussed in this analysis.

It is hoped that such strategies will be useful in improving the adequacy and effectiveness of present institutional framework for integrated industrial wastewater management in Yogyakarta.

## **6.2 Preconditions for Sustainable Industrial Effluent Management**

The ecological modernization theory, a theory aiming at modernizing modernity by dismantling the production-consumption pattern, pointed that corporate environmental management are promoted through opportunities created by the market economy, rather than through mandatory statutes imposed by relevant authorities. Ecological modernization was developed based on the following presumptions : (1) Existence of a welfare state, (2) Advanced technological development in a highly industrialised society, (3) A state of free market economy with an adequate financial market, and (4) Widespread environmental consciousness. These conditions are different from most conditions in Indonesia, thus it cannot be applied directly. However, the concept of ecological modernization can be adopted gradually as favourable conditions emerge.

Existing preconditions which do not facilitate the rise of ecological modernization and the internalization of external costs through corporate environmental care are, among others :

- ◆ Development is concentrated within the political, social and economic realms, whereas environmental care is in its first stage – i.e. the attitude of utilising environmental potentials to stimulate economic growth;
- ◆ Technological development is slow, resources are lacking, and technology transfer has been difficult due to present political and economic situations;
- ◆ Absence of a well functioning market, lack of market competition, high interest rates and inflation inhibit investments in industries and in environmental measures ;
- ◆ The role of industrial change as a driving force for environmental improvement has not been widely examined, and direct regulations & prescriptive measures are much more predominantly used when compared to communication to induce behavioural change and market oriented instruments to internalize external costs;
- ◆ Lack of environmental awareness and interests among the general public.

To facilitate the development of corporate environmental care, the government should provide a framework within which industry can pursue their own goals (without prescribing the conditions for economic development), integrate environmental considerations across the whole government policy, facilitate information, assistance and guidance for the implementation of pollution prevention measures, and adapt corporate environmental management measures to local conditions for increased suitability and effectiveness.

### **6.3 Instruments for the Management of Industrial Effluent Discharge**

#### **6.3.1 The Use of Direct Legislation**

The use of direct legislation is the oldest method for pollution control, and most prevalent in developing countries. These are legal and organizational measures which control the quantity and quality of raw materials and externalities without changing the production and consumption patterns or processes. A description of the different types of legal instruments, along with their advantages and disadvantages can be found in Chapter II. Specific constraints associated with the formulation and implementation of laws & regulations related to industrial wastewater management are, among others :



- ◆ Highly sectoral oriented laws and regulations cause lack of consistency, and lack of comprehensiveness and integration (i.e. Agrarian Law 1960 in conflict with legal directives from land use planning agency & legal directives in Water Pollution Mitigation Law No 20/1990 concerning role of sectoral department is in conflict with Presidential Decree No 77/1994) ( See Table 5.47 – Consistency in Regulations) ;
- ◆ The Nuisance Permit, whose legal directives concerning environmental management need to be reformed, is used to derive other permits and licenses (*RKL, RPL & SPPL*) which act impartial and lack suitability for the different nature of industries present (See Table 5.47 – Clarity of Regulations & Table 5.48 – Monitoring & Control of Effluent Discharge by Tofu Industries) ;
- ◆ Weakness of the institutional framework for law enforcement for industries outside the *PROKASIH* Clean River Program due to lack of financing, human resources and conflicting interests among government agencies (See Table 5.47 – Presence of Adequate Incentives & Sanctions for Tofu Industries & Table 5.48 – Acquisition of Environmental Permits among Tofu Producers) ;
- ◆ Fragmentation of duties and lack of coordination in the implementation of laws & regulations (i.e. issuing of permits & licenses) due to the vertical and sectoral approach in the bureaucratic public administration system (See Table 5.47 – Presence of Adequate Procedures & Mechanisms for Coordination) ;

The proposed strategies to overcome the above constraints fall into 3 different categories : (1) Restructuring of the regulation and permitting system, (2) Alteration in the bureaucratic public administration system, and (3) Improvement of the national integrated environmental policy.

### ***Restructuring of the Regulation & Permitting System***

To improve existing laws and regulations related to industrial wastewater management, first it is necessary to perform a detailed study of present sectoral laws, while addressing those that might be outdated and conflicting. The next step would be to ratify new procedures and mechanisms which can function as potential legal directives to improve consistency and integratedness across horizontal and vertical lines. Particular elements of the environment (i.e. water, air, soil, agriculture) should be addressed while ensuring the superordinate position of such provisions in regard to sectoral laws.

Presently the Nuisance (HO) Permit lacks clarity in legal directives and procedures for acquisition, thus it is necessary to specify that the Nuisance (HO) Permit functions as a legal instrument directed to promote comprehensive and integrated environmental management, as well as it is necessary to require that conditions in the Nuisance Permit (and Activity Permit) reflect the intent of the *RKL & RPL*. Moreover, it is important to differentiate legal directives of *RKL & RPL* intended for large & medium industries and *RKL & RPL* intended for small home industries. To improve the overall permitting and licensing system, the government would have to abolish multiple permitting, reduce the number of permits & licenses and rationalize their functions.

#### ***Alteration in the Bureaucratic Public Administration System***

One of the constraints for adequate & effective implementation of industrial effluent laws & regulations is that *BAPEDALDA*, the lead coordinating agency for environmental management, is not endowed the authority to enforce laws and regulations. Such lack of authority causes the ineffectiveness of *BAPEDALDA* to control industrial effluent discharge. Due to its function as leader and coordinator of the management of environmental and natural resources, *BAPEDALDA* should be endowed the authority to execute, monitor and enforce environmental laws and regulations on behalf of the sectoral departments, while ensuring collaborative effort between *BAPEDALDA* and the sectoral agencies for adequate and effective law implementation. In addition, *BAPEDALDA* should negotiate (and be given the power to negotiate) with *BAPPEDA* and the Ministry of Home Affairs (on behalf of *BAPPENAS*) to ensure adequate planning & sufficient budget allocation for monitoring and enforcement in the provinces.

Other constraints to effective implementation of regulations concerning industrial effluent management include the paternal attitude of sectoral agencies when concerned with permit acquisition, the complicated procedures and numerous agencies involved in permitting, and the lack of knowledge among small entrepreneurs over the presence of environmental permits, licenses and standards. If effective regulatory measures are to be achieved, sectoral agencies should abolish its paternal attitude towards small home industries, small entrepreneurs are to be associated with environmental permits, licenses

and standards, and the number of agencies involved in permitting should be reduced and synchronised.

#### ***Improvement of the National Integrated Environmental Policy***

To improve the adequacy and effectiveness of law formulation and implementation related to industrial wastewater management, it is also important to enhance the legal directives within the national integrated environmental policy. Steps which can be taken to enhance legal directives within the national environmental policy include elaborating priorities and targets for the management of industrial effluent discharge, elaborate principles and instruments which provide corporate incentives to induce technological and management innovations, defining the approach for implementation, monitoring and evaluation, and defining interagency and intersectoral coordination and collaboration strategies.

#### **6.3.2 The Use of Economic Instruments**

In recent years many industrialized countries have adopted economic instruments to introduce more flexibility, efficiency and cost effectiveness to pollution control measures. In the current five-year development plan Indonesia has begun to implement economic instruments for the control of industrial effluent discharge. It is hoped that by the year 2003 economic instruments will be institutionalized into the policy framework, and in laws and regulations concerning environmental management. The different types of economic instruments, along with their advantages and disadvantages are discussed in Chapter II. Specific constraints associated with the formulation and implementation of economic instruments are, among others :

- ♦ Complex taxation system with the absence of clear and consistent legal directives over the procedure, function & target groups of taxes and retributions related to industrial wastewater discharge (See Table 5.47 – Clarity & Consistency of Economic Instruments) ;
- ♦ Fragmentation of duties and lack of coordination in the implementation of tax and retribution due to vertical and sectoral approach in the public administration system (See Table 5.47 – Presence of Procedures for Coordination & Willingness of Agencies to Perform Coordination) ;

- ◆ Economic instruments are designed for large & medium industries, thus small home industry lacks adequate & appropriate economic mechanisms for internalization of externalities (See Table 5.48 – Wastewater Discharge Retribution for Tofu Industries);
- ◆ Inadequate monitoring and enforcement capacities, and lack of knowledge over presence of environmental taxes and retributions among small industries, leading to lack of compliance (See Table 5.48 – Wastewater Discharge Retribution for Tofu Industries).

Proposed strategies to overcome the above constraints fall into 3 different categories :

- (1) Improvement in legal directives to promote clarity and consistency of present economic instruments,
- (2) Alterations in the bureaucratic public administration system,
- (3) Formulation of adequate and appropriate economic instruments adapted to the different size and nature of industries present in Yogyakarta.

#### ***Improvement in Legal Directives to Promote Clarity, Consistency & Effectiveness***

The present industrial wastewater discharge retribution lacks clarity & consistency in objective, function and the basis to which the charge is accrued. To promote clarity and consistency of present economic instruments, it is important to have legal directives which stipulate that the wastewater discharge retribution is not an administrative charge for acquiring & renewing wastewater discharge permit, but rather a retribution to account for the discharge of wastewater effluent. For industries in the *PROKASIH* Program, consider that the effluent discharge retribution be based on volume and quality of effluent discharged paid on a regular interval (an incremental charge would be more preferable as opposed to a flat charge).

Moreover, for industries in the *PROKASIH* Program, consider changing the groundwater withdrawal tax from a flat charge to an incremental charge based on volume of groundwater extracted, and consider increasing the fee of the groundwater withdrawal tax and the wastewater discharge retribution

As a general rule, the government should reduce the number of taxes & retributions, and rationalize their functions and objectives.

### ***Alterations in The Bureaucratic Public Administration System***

Procedures for payment of taxes and retributions are exceedingly complex and lacking in clarity, leading to the ineffectiveness and inefficiency of the taxation system. Moreover, many agencies and departments are not accountable for enforcement and monitoring of taxes received and spent. To increase the effectiveness and efficiency of the taxation system, the process & procedures for payment of taxes and retributions need to be simplified, and the number of agencies or departments involved need to be reduced and synchronized (i.e. require that the same agency or department administer the groundwater withdrawal permit and enforce the groundwater withdrawal tax). In addition, agencies and departments involved in taxation need to be held accountable for enforcement and monitoring of taxes received and spent.

In regard to the lack of compliance among home industries to pay the industrial effluent discharge retribution, sectoral agencies should abolish their paternal attitude, and together with *BAPEDALDA* ensure that small home industries are aware over the presence and importance of such retribution.

### ***Economic Instruments for the Different Nature of Industries Present***

The different size, nature and motives of industries require a differentiation in the economic instruments used. Such differentiation would not only be adapted to the different corporate motives for environmental management, but also adapted to their preparedness in implementing such taxes and retributions. Tofu home industries could not be expected to pay the effluent discharge retribution based on quantity and quality of the effluent discharged because such industries neither have the means nor the equipment to conduct such measurements. Therefore, the charge and nature of economic instruments used for large & medium industries should be differentiated from that of small home industries. For tofu home industries, consider the wastewater discharge fee be based on the number of kilogram of soybean processed, and consider relating corporate environmental performance of large and medium industries with reduction and increase in import duties & production tax. Moreover, the effects of inflation and the dates for specific rate increase should be taken into account in taxes & retributions related to industrial wastewater management.



### **6.3.3 The Use of Social Instruments & Public Discussion**

The use of social instruments in the forms of covenants have been evident in the *PROKASIH* Clean River Program with its *SUPERKASIH* Agreement. In regard to small industries, in addition to providing guidance and consultation on WEP, government effort has been to facilitate public discussion between tofu producers and the surrounding community to bring about agreement and commitment for industrial wastewater management. Although progress in the use of social instruments and public discussion have been proven effective for the control of industrial effluent discharge, constraints to adequate and effective implementation of social instruments and public discussion still prevail. Specific constraints associated with the implementation of the above instruments are :

- ◆ Compliance becomes questionable since covenants and agreements with the public, are not covered by relevant law, and a lack of enforcement capability by police, prosecutors and judges exist (See Table 5.47 – Presence of Adequate Incentives or Sanctions within *PROKASIH* & Table 5.48 – Control of Wastewater Discharge by Sari Husada) ;
- ◆ Covenants and agreement with the public do not bind industries enough to honour the agreement due to lack of economic incentives offered by covenants and public agreements (See Table 5.49 – Corporate Management Initiatives) ;
- ◆ Inadequacy of mechanisms to the promote public participation and public involvement (See Table 5.49 – Government Programs and Projects).

Proposed strategies to overcome the above constraints fall into 2 different categories: (1) Improvement in the techniques to promote compliance, and (2) The use of economic incentives in conjunction with covenants.

#### ***Improvement in the Techniques to Promote Compliance***

Public participation and public involvement in disclosure and open discussion programs are constrained by the fact that attendance for public discussion is prioritized solely for community leaders. Moreover, regular public hearing to bridge the gap between industries and the general public is absent. In order to promote the industries' compliance, attendance for public discussion should be prioritized for the affected community members, and not solely for the community leaders. In addition community

members should be involved in the whole process, from the formulation to the monitoring and enforcement of the agreements and covenants. A parallel effort in conjunction to the public disclosure & discussion program should be held to provide a comprehensive measure for corporate environmental management. Such parallel effort can be the facilitating & ensuring of regular consultations to generate flexibility and corporate incentives in the techniques for compliance.

In regard to the *SUPERKASIH* Agreement within the *PROKASIH* Clean River Program, the number of warnings before the final press announcement should be changed from three to one, and the award for corporate environmental management should be based on comprehensive measures taken by industries.

#### ***The Use of Economic Incentives in Conjunction with Covenants***

Covenants are much more effective when related to incentives and disincentives. Incentives & disincentives function as push and pull factors in the effort to promote and adopt corporate environmental management. In relation to large and medium industries, the government may consider implementing a reduction or an increase in production tax & import duties depending on the company's environmental performance and the company's effort to honour the covenants. In relation to tofu home industries, the government may consider providing tofu producers with soft loans from tofu associations and cooperatives for improved environmental performance and honouring agreements.

### **6.4 Tools to Control Industrial Wastewater Discharge**

#### **6.4.1 The Use of Conventional Technology**

Conventional technology are measures which reduce emission and waste streams without changing the process of production and consumption. The conventional industrial wastewater treatment known as end of pipe technology is a popular method in the field of industrial pollution control. The use of end of pipe technology for treatment of industrial wastewater among small home industries is limited in Yogyakarta. However, adoption of conventional technology can be promoted through efficient institutional framework for guidance & enforcement, availability of pollution control technology and information, the use of economic instruments, and increased environmental awareness of the general public. The following are constraints facing the implementation of conventional pollution control in Yogyakarta :

- ◆ Lack of adequate institutional framework for monitoring and enforcement among industries outside the *PROKASIH* Program (See Table 5.47 – Presence of Adequate Incentives & Sanctions for Tofu Industries) ;
- ◆ Medium & small industries' refusing to discharge wastewater into treatment tanks due to resistance to change, lack of environmental awareness & inadequate operational system of present wastewater treatments (See Table 5.48 – Control of Wastewater Discharge by Tofu Industries) ;
- ◆ Lack of financing and resources among medium and small industries for installation & proper operation and maintenance of end of pipe technology (See Table 5.48 – Control of Wastewater Wastewater Discharge by Tofu Industries) ;
- ◆ Scattered locations of small industries, lack of space and rolling landscape create a challenge for installation of communal end of pipe treatment as evidenced with the case of Somodaran and Wirobrajan.

Proposed strategies to overcome the above constraints fall into 2 different categories :

(1) Managerial strategies, and (2) Technical approach.

#### ***Managerial Strategies***

Many of the tofu producers' wastewater treatments are inadequate due to lack of proper utilization and maintenance (i.e. solid waste problem, blockage, broken pipes). Such constraints can be overcome through : (1) Regular monitoring and consultation programs for tofu producers having access to wastewater treatment, and (2) The presence of clear targets and guidance to follow concerning the utilization & maintenance of wastewater treatment tanks. However, before implementing such guidance & consultation programs government officials need to be motivated and provided with proper training concerning end of pipe technology. To facilitate research and development of end of pipe technology, coordination between government institutions, industries and research institutes should be improved. To overcome financial constraints, the Tofu & Tempe Association & Cooperatives should be encouraged to seek & provide soft loans or partial subsidy to producers for the construction of communal wastewater treatments.

### ***Technical Approach***

To facilitate maintenance it is best to utilise simple technologies (i.e. use of neutralization, sedimentation & filtration tanks) and to avoid locating treatment tanks underground wherever possible. Odour from the treatment tank is a major problem, causing many producers to abandon their wastewater treatments. To avoid odour problem, locate treatment tanks away from residential areas wherever possible. Due to the high level of acidity in the tofu industries' effluent discharge, ensure the neutralization of wastewater discharge when using septic tanks (i.e. through application of husk, lime or calcium carbonate). For large industries such as Sari Husada, consider the use of the Upflow Anaerobic Sludge Bed (UASB) reactor for improved efficiency.

#### **6.4.2 Cleaner Production Measures**

Cleaner production measures are technological and other norms of practices which change the process of production and consumption. Such structure oriented approach automatically results in changes in the emission oriented approach. Cleaner production is quite a new measure in controlling pollution in developing countries. Cleaner production is favoured because of its benefits to industries, the government and the environment in general. Given the existing situation on industrial pollution control in Yogyakarta, cleaner production is considered one of the most feasible options due to : (1) Its voluntary nature, (2) Its potentiality to induce participation of NGOs, donor agencies, entrepreneurial associations and individual industries, (3) Its profit generating incentives, (4) The presence of ongoing cleaner production programs in Yogyakarta for tofu producers and industries in the *PROKASIH* Program. However, the implementation of cleaner production is not without constraints. Constraints facing the implementation of cleaner production are, among others :

- ♦ Lack of tofu producers implementing WEP technologies due to resistance to change, unpreparedness of producers, and misconception of product quality (See Table 5.48 – Changes in Awareness Level of Tofu Producers & Changes in Production Pattern of Tofu Industries);
- ♦ Lack of financing and human resources for the associating & facilitating of Cleaner Production and WEP Technology among small home industries (See Table 5.47 - Adequacy of Financial Support for Tofu Industry Programs) ;

♦ Limited access to technology and information.

In order to overcome the financial constraints associated with the implementation of cleaner production, *BAPEDALDA* should negotiate with *BAPPEDA* and Home Affairs (on behalf of *BAPPENAS*) to ensure sufficient planning & budget for implementing WEP programs beyond the initial stage, as well as encourage the Tofu & Tempe Cooperatives to seek financial assistance (i.e. soft loans, subsidies) from donor agencies (i.e. Indonesian Development Bank) for the implementation of clean technology. The introduction of WEP technology is most commonly met with resistance, unpreparedness of producers to implement such measures, and misconception of the product quality. Therefore, it is important to promote WEP Technologies which are simple and likely to be adopted by small & medium industries (i.e. the promotion of steam which utilizes little water as opposed to the promotion of steam which utilizes no water). Moreover, it is also important to provide straightforward objectives, targets and legal guidance for implementors to follow during cleaner production programs, as well as to ensure the attendance of individual producers and industries. However, government institutions are also limited in resources, and are incapable of promoting effective cleaner production measures without aid from external parties. Coordination & collaboration with NGOs and the Provincial Entrepreneurial Association is important to provide regular monitoring, guidance and consultations, and to associate small & medium industries with cleaner production and WEP.

Although government institutions, NGOs and other non governmental body play an important role in facilitating and promoting cleaner production, the industries themselves play a pivotal role in initializing and developing cleaner production measures. Due to the importance of the industries' role in developing cleaner production, possible corporate strategies for overcoming constraints associated with such measures are discussed below.

In the effort to implement cleaner production, it is important for industries to improve organisational measures for corporate environmental management (i.e. training for employees in WEP, conducting awareness seminars, delegation of decision making powers, motivate good performers for good housekeeping, emphasize non production issues), as well as it is important to improve record keeping, reporting and procedures for data compilation. In the event of production increase, industries should provide adequate



planning for increased wastewater quantity, ensure effective supervision, and develop physical infrastructure, facilities and technical knowledge to support the implementation of cleaner production.

#### **6.4.3 Environmental Management System & The Formation of Industrial Estates**

Strategies in environmental management have undergone modernisation from regulatory framework to standards, and from end of pipe technologies to pollution prevention strategies. Ecological modernization, a concept which promotes strategies to tackle pollution from its source, functions to complement end of pipe measures and regulatory instruments prevalent in most developing countries. New strategies encompassed within the ecological modernization concept include Environmental Management System (EMS), Lifecycle Chain Management, and the formation of industrial estates. In this section principles of Environmental Management System and the development of industrial estates will be discussed in relation to its applicability in developing countries, especially in Yogyakarta. Principles of Lifecycle Chain Management will not be discussed as large joint venture industries are still initiating their EMS implementation, and medium & small industries are still initiating cleaner production measures.

The industrial base of Indonesia is undergoing diversification and moving more in capital intensive areas such as metal products, chemicals, machinery and equipment. The growth of these industries means pollution increase and resource exhaustion, unless care is taken to control pollution and waste generation, and recycling & reuse is promoted. However these options have to be profitable for industries to adopt, and such options are not without constraints. Constraints to effective implementation of EMS are, among others :

- ◆ Unsuitability of present condition for stimulating and facilitating the development of EMS (Section 6.2 - Preconditions for Sustainable Industrial Effluent Management);
- ◆ Lack of resources on behalf of small & medium industries (See Table 5.48 – Changes in Production Pattern of Tofu Industries);
- ◆ Continuous commitment of industry is challenged as benefits take long to achieve and uncertainties on costs prevail (See Table 5.48 – Changes in Production Pattern of Tofu Industries & Sari Husada);

- ◆ Defensive attitude of industries (See Table 5.48 – Changes in Awareness Level of Tofu Producers & Table 5.49 – Corporate Management Initiatives);
- ◆ Lack of market for recycled materials and products due to the inadequacy and absence of industrial estates.

Government effort to develop industrial estates among small home industry is aided by the original cluster formation of home industries in peri-urban areas. However, such industrial estates are usually of a uniform type, thereby lacking adequate mixture of the right combinations of industry to promote waste recycling and resource recovery. In relation to large & medium industries, efforts to relocate industries from urban areas and promote eco-industrial parks have been constrained by the original development of those industries around market centres. Additional constraints to the formation of industrial estates in peri-urban areas and the construction of communal production house for small home industries include :

- ◆ Absence of laws & regulations requiring for industrial complexing and for location of industries to be in peri-urban areas;
- ◆ Tofu producers own private land and settlement within close proximity to the production house, thus the initial relocation process is deemed inefficient;
- ◆ Investment for the construction of communal production house and housing settlement within close proximity to the production house is too costly;
- ◆ Lack of government effort and funding to stimulate the growth of industrial complexes (i.e. lack of effort to provide infrastructure and facilities within industrial estates to promote growth & development);
- ◆ Absence of incentives (i.e. lower insurance premiums & utility rates, tax break) & sanctions (i.e. higher insurance premiums, utility rates and tax) to promote industrial complexing and relocation from densely populated areas.

To explore the feasible options for promoting the development of industrial estates, elaboration of possible strategies & mechanisms are depicted below.

Strategy within the legal framework involves the adoption of legal directives which stipulate industrial complexing and the location of industrial activities be in peri-urban areas. Such legal directives would be relevant to large and medium market based industries located within the urban areas, and industries in the urban fringe outside the

confines of industrial estates. In Yogyakarta it is necessary to have a spatial planning involving the sitting of new industries and urban development. Urban planning should focus on problems involving wastewater treatment facilities and problems involving water supply and facilities. Promoting industrial estates among small home industries require legal guidance and financial aid (i.e. for the construction & upgrading of communal production house & infrastructure) in addition to the presence of legal directives and economic incentives & disincentives.

Proposed strategies to promote the development of industrial estates include : (1) Providing subsidy and soft loans to tofu producers for building communal production houses and affordable housing close by, (2) Creating incentives (i.e. lower insurance premiums & utility rates, tax break) & disincentives (i.e. higher insurance premiums, utility rates and taxes) to discourage industrial activities outside the confines of industrial estates, (3) Allocating government land, and abolishing complex subdivisions associated with land transfer, and (4) Providing infrastructure & facilities (i.e. accessible roads, lighting, wells) within the area of the communal production house and the industrial estates to attract producers as well as large & medium industries to relocate.

Government institutions are limited in resources, especially financial resources for the investment and maintenance of infrastructure facilities. However, small home industries are incapable of investing in the construction of communal production houses due to financial constraints. In such cases it is important that *BAPEDALDA*, the sectoral agencies and the municipal government encourage and aid the Tofu & Tempe Associations in seeking funding from donor agencies (i.e. public development banks, private businesses). To provide funding for the development of infrastructure facilities within industrial estates, sectoral agencies should negotiate with *BAPPEDA* & Home Affairs to allow sufficient budget for initiating the infrastructure development, as well as seek funding from international funding agencies.

To facilitate and promote EMS among large & medium industries, the preconditions stated in section 6.2 are required. Such preconditions would also function to promote the implementation of Life Cycle Management in addition to EMS. Among the most important preconditions for promoting EMS are : (1) Providing a framework within which industry can pursue their own goals, (2) Facilitating information and assistance for



the implementation of end of pipe, cleaner production and Environmental Management System, and (3) Adapting corporate environmental management measures to local conditions for increased suitability and effectiveness.

### **6.5 The PROKASIH Clean River Program**

The *PROKASIH* Clean River Program plays a major role in the control of industrial effluent discharge and surface water pollution. The success of the *PROKASIH* Program resulted in the reduction of pollution load in Jakarta's rivers by 50 % within the first two years alone (EMDI Report, 1995). Mechanisms for compliance developed within the program promotes the use of economic and social instruments, instruments new for the Indonesian context of environmental management. Due to its leading role in controlling industrial effluent discharge and its importance to promote new instruments, a separate discussion on constraints facing the program's implementation is performed. Strategies to overcome such constraints will be discussed afterwards.

Constraints to successful implementation have existed since the inception of the program, and further constraints continue to be identified as the program develops. Constraints within the institutional framework are, among others :

- ◆ Lack of resources (i.e. financial & human resources, laboratory capacity) for program implementation, inspection and monitoring in the provinces (See Table 5.47 – Adequacy of Financial Support for *PROKASIH*);
- ◆ Inadequacy in enforcement capability by prosecutors and judges (See Table 5.47 – Presence of Adequate Incentives & Sanctions for *PROKASIH* & Table 5.48 - Control of Wastewater Discharge by Sari Husada);
- ◆ Overemphasis of the program on wastewater discharge, leading to the narrow preoccupation with wastewater standards & regulatory measures as opposed to achieving a collaborative agreement based on a comprehensive planning process (See Table 5.48 – Changes in Production Pattern of Sari Husada);
- ◆ Economic mechanisms to promote incentives and sanctions for compliance is absent in Yogyakarta (See Table 5.47 – Presence of Adequate Incentives & Sanctions for *PROKASIH*).

Constraints associated with the inspection and monitoring system according to Jardine (1995) are, among others :

- ◆ Monitoring system was installed with insufficient knowledge of water body;
- ◆ Inadequate planning of sample collection, handling, storage and analysis;
- ◆ Data were poorly archived and improperly interpreted & reported;
- ◆ River classification lacks clarity and adequacy.

Proposed strategies to overcome the above constraints are categorized into : (1) Improvement in the classification of river water, (2) Enhancement of the program's monitoring system, and (3) Management tools & additional support systems required.

#### **6.5.1 Improvement in the Classification of River Water**

River classification is based on the river's principal or dominant usage for the respective area, or on existing spatial planning. It is not based on the present quality of its water. In the event the water quality of a river has dropped below an acceptable level, the river's zoning will still be based on its advantage, while at the same time it is observed that river water has been polluted and needs to be purified. Therefore, river classification should neither be based on dominant usage of the respective area nor on existing spatial plans, but on the present quality of its water. Moreover, tributaries of rivers that are not yet designated should follow their main rivers, and zoning or designation of a river that runs through more than one province will be coordinated by the Minister or Department of Public Works.

#### **6.5.2 Enhancement of The Monitoring System**

Prior to monitoring, it is important that the type and nature of the water body be fully understood, particularly with spatial and temporal variability. To facilitate a uniform and consistent data collection and interpretation, all monitoring activities conducted by the government should be coordinated by the respective governors (as far as objectives, locations, parameters and time frames are concerned), and sample methods, sample preservation, analysis and precisioning should follow the directives issued by the State Minister for Population and Environment. Moreover, the sampling and analytical quality of the data must be regularly checked through internal and external control. Data maintenance and frequent updates will be required, as well as a system for screening data.

In relation to the parameters involved, for waste quality it is advisable that only general parameters are to be analysed during the first stage, while in the following stages additional key parameters should be analysed in accordance to the waste's typical



characteristics. For river quality only general parameters need to be analysed. Ultimately the data should be given to decision makers not merely as a list of variables and their concentrations, but interpreted and assessed by experts with relevant recommendations for management action.

### **6.5.3 Management Tools & Additional Support Systems Required**

In Yogyakarta the *PROKASIH* Clean River Program overemphasizes the quality of wastewater discharged, leading to the narrow preoccupation with wastewater standards & regulatory measures. To provide a comprehensive coverage, covenants & awards should cover a comprehensive planning for emission reduction in stages, strategies and handling of anticipated implementation problems. In addition, internal and external best communication strategies in producing inventory of consumption, emission and best technologies should be highlighted.

Thus far the *PROKASIH* Clean River Program in Yogyakarta lacks economic mechanisms to promote incentives and sanctions for compliance. Corporate environmental performance should be closely related to economic incentives & sanctions (i.e. tax increase or reduction, accessibility to soft loans) for increased effectiveness of covenants and agreements within the program.

To ensure sufficient funding and adequate enforcement capability by prosecutors and judges, procedures and legal directives for budgeting & prosecutions are required, and *BAPEDALDA* should have the authority to influence budgeting for the *PROKASIH* program in the regional and national level. Moreover, it is advisable that the number of warning before the publication of non compliant activities be reduced.

In addition to the above factors, support systems are also required for adequate and effective implementation of the program. Such support systems include : (1) Advanced training for provincial managers, technical staff, wastewater treatment engineers, legal practitioners and enforcement officers, and (2) Expanded laboratory facilities to include facilities for analysis of industry specific and site specific parameters.

## **6.6 Environmental Impact Assessment**

The importance of Environmental Impact Assessment (*AMDAL*) & Evaluation of Environmental Impacts (*SEMDAL*) for environmental protection extend beyond the corporate level of environmental management as it functions to encompass sustainability

through integrated and comprehensive investment planning process. The *AMDAL* process, a process requiring complex institutional framework and adequate supporting system, is susceptible to constraints in its integrative and comprehensive approach to planning. Such constraints which are elaborated in Chapter V (5.2.7) encompass the intent & focus of *AMDAL*, the institutional structure & procedure for *AMDAL*, availability of resources to structure the implementation process, and the evaluation of environmental impacts (*SEMDAL*). Strategies proposed by the Environmental Management & Development Project (1994) are, among others :

#### **6.6.1 The Intent & Focus of *AMDAL***

Legal guidance & legal directives for the implementation of *AMDAL* has altered the focus & intent to a preoccupation with impact analysis. In order to move from the narrow preoccupation with environmental impact analysis, the government should advocate legal guidance & legal directives which promote procedures for the comprehensive planning of projects and investments.

Due to the lack of clarity in the relation between *AMDAL* and other regulatory instruments, often the intent of *AMDAL* and *RKL* & *RPL* are not reflected in the Nuisance Permit. Therefore, it is important : (1) To stipulate that no final permits and licenses can be granted until project approval has been given, and (2) To require that conditions in the activity and nuisance permits reflect the intent of *RKL* & *RPL*. In general, the government would have to improve the linkage between *AMDAL* and other integrated planning & regulatory tools, and in particular a much reduced and rationalized permitting system.

#### **6.6.2 The Institutional Structure & Procedure for *AMDAL***

Currently there is a lack of coordination and consistency in *AMDAL* interpretation and direction between departments and agencies and within the *BAPEDAL* offices in the regional level. In order to overcome such constraints it is necessary to : (1) Formalize provincial interagency coordination within *BAPEDALDA* & the sectoral departments by instituting *AMDAL* Steering Committee, *AMDAL* Technical Team and *AMDAL* Working Groups, (2) Establish an *AMDAL* Review Committee in *BAPEDALDA* comprising of *BAPEDALDA* Directorates and representatives from *BAPEDA* and the sectoral departments.

In addition to the lack of coordination and consistency, legal directives in the process and procedure for *AMDAL* promote partial compliance & implementation, and fail to promote integration of the different elements required. In order to overcome such constraints the *AMDAL* Committee at the national level should : (1) Introduce a Project Prospectus, and require the preparation of Terms of Reference, (2) Specify that *PIL* is to be used only as an information collecting and scoping document in cases where not enough information exists to allow for the preparation of TOR in *ANDAL*, (3) Require that the *RKL* & *RPL* be submitted with the *ANDAL* assessment, and be clearly separated from ongoing operational management & monitoring;

#### **6.6.3 Human & Fiscal Resources**

Currently there is a lack of human and fiscal resources in the province for the administration and implementation of *AMDAL*. Negotiation with *BAPPEDA* & Home Affairs is important to ensure sufficient budget allocation for administration in the Regional *AMDAL* Commission and to ensure adequate planning and capital budget for full *AMDAL* compliance of government-sponsored investments.

In the area of human resources it is necessary to establish priorities for delivery of *AMDAL* courses & necessary to develop expert teams for particular project or ecosystem types, drawing experts from the government, consulting industry, universities and the donor community.

#### **6.6.4 Evaluation of Environmental Impacts (*SEMDAL*)**

A general rule to the application of *SEMDAL* is that Indonesia simply does not have the resources to include all existing projects & investments in *SEMDAL*. Therefore, to determine existing projects which require *SEMDAL*, priorities should be based on predicted environmental & social consequences and sensitivities, as well as the amount of *SEMDAL* Report the National & Provincial Committee can handle.

Constraints associated with scoping and screening can be overcome by requiring rigorous scoping and screening, and by adopting additional screening alternatives (i.e. permits and licenses, environmental audits, cumulative impact assessment). To ensure that the submission of documents contain the approved *RKL* & *RPL*, require the interpretation of *SEMDAL* deadline to be a formal commitment by the proponents to submit all necessary *SEMDAL* documents.

## **6.7 Criteria for Choice of Policy Instruments**

Government choices of policy instruments have a strong political basis and are governed by a variety of considerations. In order to support an appropriate choice, instruments are evaluated against a number of selection criterias. The main selection criterias are :

- ◆ The extent to which the instruments succeed in reducing environmental impacts in relation to targets, and to which the instruments achieve policy goals (effectiveness);
- ◆ The extent to which the instruments promote economic efficiency on resources; and
- ◆ The extent to which the instruments can properly be implemented and enforced without incurring problem (acceptability).

Additional criterias include compatibility with current institutional framework and budgets, suitability with existing macro-economic and tax structure, and consistency with present environmental policy and international agreements. Therefore, the choice of policy tools & instruments extend beyond theoretical & academic arguments.

The use of incentives and sanctions for environmental management in Indonesia is relatively new. Economic analysis suggests that incentives promote cost efficiency leading to economic growth. However, the choice of policy to be implemented also depends on costs of other alternatives and their political acceptability. The challenge to achieving adequate policy measures lie in choosing the right mix of instruments for promoting economic prosperity while simultaneously maintaining sustainable development.

Selected combinations of policy instruments have economic & institutional implications at the national and local levels of government. Given present conditions and resources available, Indonesia (more specifically Yogyakarta) has limited capacity to adequately develop and implement standards, regulations, economic instruments and covenants. Such capacity is constrained by :

- ◆ Inadequate expertise, funds & equipment;
- ◆ Limited political will and public participation;
- ◆ Inadequate capacity to coordinate institutional responsibilities;
- ◆ Lack of management and control over instruments.



In order to overcome such constraints, implementation of adequate mix of policy instruments and the reorganization of the national and local institutions will be required.

### **6.8 Feasible Options for Integrated Use of Instruments and Tools**

Favourable economic policies and governments' motives to support the industrial sector lead to Yogyakarta's rapid industrial growth. Industrial growth, whose environmental consequences are eminent, results in abundant resource use and waste generation. Due to rapid industrialisation & advancement in technology, Indonesia has neither the resources nor the time to delay its sustainable economic development policy. The challenge, therefore, lies in implementing the right choices between immediate economic benefits to meet short term and urgent development needs, and long term sustainability in the long run.

Solutions to Yogyakarta's prevailing industrial effluent problems cannot be through a single technological or management option, or a single actor responsible for implementation of sustainable development policy ; but rather through the matching of technological and management options with available financial and manpower resources, given present socio-economic conditions and graveness of environmental impacts.

In accordance to the positive sum principle, trade off between economic development and environmental benefits need not take place provided that adequate condition and the presence of appropriate mix of policy instruments promote effective environmental management. Implementation of cleaner production as supplementary initiative is deemed most probable for achieving positive sum gain in Yogyakarta's economic development & environmental protection. However, cleaner production benefits can only be maximised when supported by conventional pollution control, consultation programs and effective regulatory framework. Therefore, implementation of a combination of the four measures above is necessary in order to attain effective industrial wastewater management. The reason behind the choice is that pollution prevention will still require :

- ◆ End of pipe technology to process the remaining waste generation;
- ◆ Guidance & consultation to promote the adoption of cleaner production measures and technology, and
- ◆ Regulatory instruments for enforcement of industrial pollution control .

Other reasons include accident anticipation and delays in implementing cleaner production measures.

However, it is not advisable for cleaner production measures to become part of the environmental legislation because regulation enforcement may limit industrial participation and flexibility in achieving its anticipated objectives in the field of pollution prevention. The best way to implement it is through the adoption of promotion & consultation programs, dialogues and covenants between government institutions, industries and the affected public since enterprises are different in size, efficiency and quantity & quality of waste generation.

The use of economic incentives & sanctions in conjunction with regulatory measures is of prime importance to promote the development of industrial estates. Reasons behind the choice are : (1) Economic incentives & sanctions are directly related to corporate financial performance, and (2) Absence of legal directives enforcing the formation of industrial estates leads to the lack of legal base for enforcement and prosecutions. The case with small industries, however, require measures beyond regulations and economic incentives. Programs to access soft loans for building communal production house & affordable housing and programs to provide consultation for improving organizational management are important to ensure effectiveness and adequacy. However, government measures to provide infrastructure & facilities in industrial estates of large & medium industries should also be conducted in order to attract industries to relocate.

Implementation of prevention measures for large & medium industries such as substance bans and technology specifications may be taken later when pollution levels have been reduced to a level approaching the specified standards.

## **6.9 Institutional Responsibilities & Industrial Involvement in Pollution**

### **Control**

Effective implementation of mix of policy instruments require the reorganization of national and local institutions. Such reorganization would function to promote interagency coordination & collaboration, to improve the adequacy of statutes to structure the implementation process, and to increase the participation of target groups in government programs. This section functions to explore and provide strategies for the

reorganization of present national and local institutions in improving the adequacy and effectiveness of industrial wastewater management policies. Discussion of the required institutional attributes will be followed by the proposed institutional responsibilities for industrial pollution control.

#### **6.9.1 Key Institutional Attributes Required to Achieve Adequate & Effective Industrial Wastewater Management**

This section suggests proposals for improving institutional attributes in conjunction with industrial wastewater management in Indonesia. These proposals are based on the overall institutional framework for industrial wastewater management and my exploration of the relationships between institutional arrangements & policy effectiveness.

Initiatives for formulating efforts to solve critical problems and improve industrial pollution control may come from either the central or local governments. Regardless of which level of government initiates such efforts, the initiator should not ignore significant roles of the non-initiator in contributing to a successful improvement effort. Basically there are two efforts which should be conducted simultaneously by initiators in improving the institutional arrangements for industrial wastewater management :

- (1) Changes necessary to facilitate conducive condition for effective institutional arrangement;
- (2) Designing the institutional arrangement for the formulation and implementation of policy related to industrial effluent management.

To create a more conducive condition, first it is necessary to disseminate information regarding sustainable development and probable management options to staffs of agencies in the province, as well as to the different industries present. Such information will not only enhance their awareness over the importance of sustainable development, but will also stimulate industries & agencies to explore the most effective and cost efficient option(s) for industrial pollution control. However, as a prerequisite there should be a development of data base regarding resources, present environmental condition, and the effects of development activities on such resources.

A second prerequisite to achieving a more conducive condition involves the delegation of power and the enhancement of skills of government officials. Delegation of

significant powers (i.e. budgets & authorities) from central agencies to local authorities and semi-autonomous government agencies (i.e. *BAPEDALDA*, *BKPM*) regarding the management of natural resources and the distribution of benefits generated from such resources is very essential. Such delegation of power enables leaders of semi-autonomous agencies and local government to conduct bargaining and negotiation for achieving agreement with the central & sectoral agencies, and induce coordination for policy implementation across horizontal and vertical lines. In addition, the enhancement of government officials' managerial and technical skills are also important due to their role as motivators and facilitators. Enhancement of the managerial and technical skills of staffs in the formulation and implementation of integrated wastewater management can be achieved through training, discussions and seminars, and .

The designing of institutional arrangements for the formulation and implementation of industrial effluent management policy should encompass the formulation of management objectives in the provincial level, the formation and formalization of a lead coordinating agency, and the enhancement of rules & mechanisms for inducing coordination.

Formulation of management objectives serves as the basis for designing the institutional arrangements. Efforts to formulate management objectives should be preceded by identifying present condition & problems in industrial pollution control. To gain recognition, commitment and support from government agencies and NGOs, opportunities should be given to lead agency and leaders of provincial & local government to determine the choice of management objectives. A committee comprising of representatives of agencies and leaders could be employed as the management device. To avoid interjurisdictional conflicts, the geographic jurisdiction of management objectives should at least cover locations of major generators of pollutants regardless of the size and nature of industries.

A lead agency (i.e. *BAPPEDALDA*) should be formalized & legitimized in administering, coordinating & enforcing policy formulation & implementation. It is required that the lead agency have a horizontal mission and a broad scope of intervention power. Legitimation from central & provincial decision makers (i.e. related ministries, *BAPPENAS*, *BAPPEDA*) and consensus of coordinating participants is needed by the



agency to induce coordination, cooperation and collaboration. To expand the geographic jurisdiction, interagency & interjurisdictional coordination should be sought by the lead agency. Adequate geographic jurisdiction of the management objectives should enable lead agency to urge sister agencies to participate in coordination and impose contracts between conflicting parties.

The designing of institutional arrangements for policy formulation and implementation also involves the enhancement of mechanisms for coordination. To enhance mechanisms for coordination it is necessary to formalize and legitimize Interagency Coordination Committee(s) supported by provincial decision makers and coordinating participants (i.e. *BAPEDALDA* & *BAPPEDA*'s Interagency Coordination Committee). This coordinating instrument serves as a communication medium and bargaining arena for achieving integrated management objectives among coordinating participants. Members of this committee should also include executives of sister agencies (i.e. *BAPEDALDA* at the provincial & municipal levels) and leaders of local governments. Agendas for regular meeting should be established to maintain interaction among participants.

A second method to enhance the coordination mechanism involves the formulation of the Integrated-Comprehensive Effluent Management Plans. Such plan would serve as the basis of new sectoral policies and programs for industrial pollution control. Due to its integrative & comprehensive approach the plan should : (1) Take into account key factors and their interactions which have significant impacts on groundwater use and industrial pollution, (2) Emphasize efforts and programs necessary for resolving critical problems associated with industrial pollution control, and (3) Direct efforts towards achieving integrated goals.

In most cases involving provincial regulations and programs in industrial pollution control the decisions of provincial governors and district heads are not binding, and procedures & requirements for insuring consistency between various sectoral plans and programs are inadequate. Prerequisites are therefore necessary to achieve such consistency. Such prerequisites involve the recognition of the management plan by various actors, and the designation of agencies responsible for determining and enforcing consistency. To ensure that the plan is recognized by various actors, opportunities and



roles should be given to sectoral & semi-autonomous agencies and leaders of local government to influence decisions in plan making. In order to ensure & enforce consistency, the local *BAPEDALDA* and *BAPPEDA* could become appropriate agencies responsible for enforcing consistency of various sectoral & non sectoral plans and programs. In addition to formal rules and mechanisms, the presence of skillful actors well placed in the communication channels (i.e. staffs of *BAPPEDA* or *BAPPENAS*, *Bupatis*) are often needed to bridge the gap among key agencies and to stimulate coordination which cannot be induced by formal rules, procedures and mechanisms.

In order to achieve effective coordination in the implementation of industrial wastewater management programs, program managers should form a coordination committee at the municipal level, promote public participation, and ensure the presence of fixers who can bridge communication gap among implementors and between implementors and producers. The coordination committee above serves as a coordination mechanism which have direct contact with the reality of issues (i.e. for resolving conflict of legal directives & reducing conflict of interests among actors). Such committee can be headed by *BAPEDALDA* in the local level or the *bupati* or mayor. To ensure public participation, two approaches should be employed : (1) To include local leaders (i.e. formal & informal leaders) as members of the coordination committee, and (2) To make existing Village Consultative Body and *paguyubans* a medium for communication and bargaining between implementors and producers.

#### **6.9.2 Proposed Institutional Responsibilities for Pollution Control**

Implementation of the proposed combination of instruments and tools require the re-arranging of present institutional responsibilities. Such changes in institutional responsibilities are necessary to enhance the effectiveness of policy implementation and the adequacy of present institutional arrangements. The proposed institutional responsibilities for pollution control are depicted in table 6.1 below. In addition to enhancing effectiveness and adequacy, it is also hoped that such proposed institutional responsibilities would enhance present condition in stimulating industries to implement pollution control measures.

**TABLE 6.1**  
**PROPOSED INSTITUTIONAL RESPONSIBILITIES FOR POLLUTION**  
**CONTROL**

<b>Institutions</b>	<b>Current Responsibilities</b>	<b>Proposed New Responsibilities</b>
<b>BAPPENAS</b>	<ul style="list-style-type: none"> <li>- Coordinating sectoral development policy</li> <li>- Approve budget for development project</li> <li>- Ensure consistency with National Plan</li> <li>- Develop Procedures for Coordination</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure participation of local govt &amp; semi-autonomous agencies in policy formulation &amp; budgeting</li> <li>- Ensure consistency of sectoral policy</li> </ul>
<b>KLH</b>	<ul style="list-style-type: none"> <li>- Ensure sectoral agencies adopt environmental measures</li> <li>- Coordinate formulation of policy &amp; program</li> <li>- Develop regulations for implementation</li> <li>- Provide assistance to line agencies</li> </ul>	<ul style="list-style-type: none"> <li>- Provide KLH authority to enforce legislation upon sectoral agencies</li> <li>- Formulate a team which assesses and enforces consistency and clarity of policy related to the environment</li> </ul>
<b>BAPPEDA Tingkat I</b>	<ul style="list-style-type: none"> <li>- Formulate regional development plan &amp; budget</li> <li>- Supervise implementation of policy &amp; plans</li> <li>- Undertaking research for development</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure <i>BAPEDALDA</i>'s participation in policy formulation &amp; budgeting</li> <li>- Enforce sectoral policy consistency</li> </ul>
<b>BAPPEDA Tingkat II</b>	<ul style="list-style-type: none"> <li>- Formulate municipal development plan &amp; budget</li> <li>- Supervise implementation of policy &amp; plans</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure sufficient budget allocation for programs involving small home industries</li> </ul>
<b>BAPEDALDA Tingkat I</b>	<ul style="list-style-type: none"> <li>- Coordinate formulation &amp; implementation of environmental policy at the provincial level</li> <li>- Propose &amp; develop implementation regulations</li> <li>- Provide technical assistance to line agencies</li> <li>- Coordinate development of awareness &amp; participation through legal &amp; economic instruments</li> </ul>	<ul style="list-style-type: none"> <li>- Formulate integrated-comprehensive wastewater management plans legitimized by <i>BAPPEDA</i> &amp; sectoral agencies</li> <li>- Provide the authority to enforce legislation upon sectoral agencies &amp; industries</li> </ul>
<b>BAPEDALDA Tingkat II</b>	<ul style="list-style-type: none"> <li>- Coordinate formulation &amp; implementation of policy at the municipal level</li> <li>- Provide technical assistance to sectoral agencies</li> <li>- Provide conflict resolution for ad hoc cases involving pollution &amp; degradation</li> </ul>	<ul style="list-style-type: none"> <li>- Enforcement of licensing, permitting &amp; economic instruments</li> <li>- Perform monitoring, dialogue &amp; covenant with small industries</li> <li>- Authority to influence budgeting</li> </ul>
<b>Depperindag</b>	<ul style="list-style-type: none"> <li>- Formulate, implement &amp; enforce sectoral policies and programs</li> <li>- Technology transfer</li> <li>- Demonstration &amp; consultation programs</li> <li>- Trade Promotion</li> </ul>	<ul style="list-style-type: none"> <li>- Establish industrial consulting &amp; development organisations</li> <li>- Promote research &amp; development</li> <li>- Recommend policy changes</li> <li>- Facilitate development of estates</li> </ul>
<b>Depkes</b>	<ul style="list-style-type: none"> <li>- Formulate, implement &amp; enforce sectoral policies &amp; programs</li> <li>- Research &amp; Development on management of groundwater &amp; surface water resources</li> </ul>	<ul style="list-style-type: none"> <li>- Develop awareness among industries</li> <li>- Collaborate with <i>BAPEDALDA</i> for enforcement</li> <li>- Be involved in the EIA process</li> </ul>
<b>BKPM</b>	<ul style="list-style-type: none"> <li>- Screen investments</li> <li>- Incentives &amp; sanctions related to export tax &amp; import duties</li> </ul>	<ul style="list-style-type: none"> <li>- Collaborate with <i>BAPEDALDA</i> to ensure consistency and adequacy within the EIA process</li> </ul>
<b>Local Government</b>	<ul style="list-style-type: none"> <li>- Licensing, permitting &amp; groundwater tax</li> <li>- Industry siting &amp; land use planning</li> </ul>	<ul style="list-style-type: none"> <li>- EIA implementation</li> <li>- Recommend policy changes</li> <li>- Dialogues with industries</li> </ul>
<b>DPRD</b>	<ul style="list-style-type: none"> <li>- Approve &amp; promulgate provincial legislation</li> <li>- Ratify the development budget proposed by <i>BAPPEDA</i></li> </ul>	<ul style="list-style-type: none"> <li>- Ensure participatory approach in promulgation of law and approval of budget</li> </ul>
<b>KADIN</b>	<ul style="list-style-type: none"> <li>- Information on production &amp; trading</li> <li>- Dialogue with government</li> <li>- Advisory to industries</li> </ul>	<ul style="list-style-type: none"> <li>- Implement control projects and programs</li> <li>- Reduce anti-trust attitudes</li> </ul>
<b>LIPPI &amp; Environmental Study Centres</b>	<ul style="list-style-type: none"> <li>- Industry research</li> <li>- Pollution reduction technology research</li> <li>- Research on policy and programs for environmental management</li> </ul>	<ul style="list-style-type: none"> <li>- Consultant &amp; advisory to KLH &amp; <i>BAPEDALDA</i></li> <li>- Waste Assessment</li> <li>- Transfer of options to industries</li> <li>- Dialogue &amp; working with industries</li> </ul>

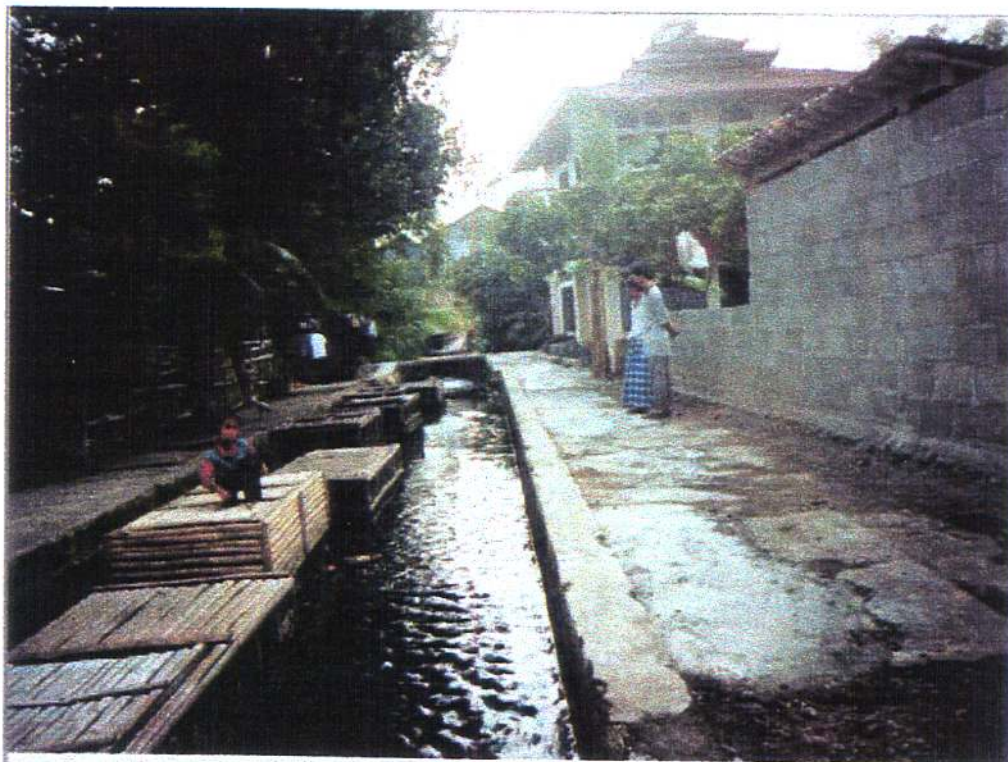
**TABLE 6.1 (Continue)**  
**PROPOSED INSTITUTIONAL RESPONSIBILITIES FOR POLLUTION CONTROL**

<b>Institutions</b>	<b>Current Responsibilities</b>	<b>Proposed New Responsibilities</b>
<b>Food &amp; Drug Administration</b>	<ul style="list-style-type: none"> <li>- Product Quality Control</li> <li>- Standardization</li> <li>- Testing</li> </ul>	<ul style="list-style-type: none"> <li>- Product quality control related to environmental view</li> <li>- Promotion of process &amp; material product substitution &amp; conservation</li> <li>- Transfer &amp; introduction of new technology</li> </ul>
<b>Financial Institutions</b>	<ul style="list-style-type: none"> <li>- Financial investment on production</li> <li>- Low interest loans, subsidies.</li> </ul>	<ul style="list-style-type: none"> <li>- Enhance corporate environmental obligations</li> <li>- Finance pollution control &amp; research</li> </ul>
<b>Tofu &amp; Tempe Associations</b>	<ul style="list-style-type: none"> <li>- Savings and loans</li> <li>- Advisory to industry on management</li> <li>- Dialogue with government</li> </ul>	<ul style="list-style-type: none"> <li>- Seek aid from financial institutions and sponsors</li> <li>- Advisory to industry on cleaner production &amp; end of pipe technology</li> </ul>
<b>NGOs</b>	<ul style="list-style-type: none"> <li>- Develop information &amp; awareness</li> <li>- Aid in implementation of programs</li> <li>- Recommend environmental legal forms</li> <li>- Mobilize media &amp; public participation</li> </ul>	<ul style="list-style-type: none"> <li>- Form environmental pressure groups</li> <li>- Seek dialogue with officials &amp; industry &amp; react on govt decisions</li> <li>- Ensure public is represented in government decision.</li> </ul>





**Groundwater Used for the Production Processes in Industries**



**Surface Water Used for Fish Breeding (Fish is Inside the Rectangular Rattan Boxes)**



## CHAPTER VII

### CONCLUSIONS AND RECOMMENDATIONS

#### 7.1 Introduction

Analysis of the two cases shows a lack of adequacy and effectiveness in the management of industrial effluent discharge. The lack of adequacy is attributed to the absence of key institutional attributes required for promoting increased coordination, collaboration and cooperation, while the lack of effectiveness is mainly attributed to the failure of government effort to control wastewater pollution among small & medium industries. Moreover, present conditions are also inadequate for promoting environmental management among industries. Chapter VII functions to summarize present constraints to achieving adequate and effective industrial wastewater management while simultaneously providing recommendations to improve current measures in industrial pollution control. Suggestions for further research are provided after highlighting the conclusions & recommendations.

#### 7.2 Preconditions to Facilitate Industrial Wastewater Management

Adequate preconditions are required to facilitate the development and improvement of corporate environmental management. According to the ecological modernization theory, such preconditions include the existence of a welfare state, the presence of technological development in a free market economy, and the presence of widespread environmental consciousness. In the case of Indonesia such preconditions are lacking, thus the adoption & development of environmental management is most often attributed to conflict-resolution of ad hoc environmental cases rather than through a comprehensive restructuring of the production-consumption process. Identified constraints which do not facilitate corporate environmental management and ecological modernization are, among others:

- ◆ Slow technological development, lack of resources, and difficulties in technology transfer;
- ◆ Absence of a well functioning market, high interest rates and inflation;

- ◆ The role of industrial change as a driving force has not been widely examined, and prescriptive measures are much more predominantly used with small & medium industries;
- ◆ Lack of environmental awareness and interests among the general public.

### **7.3 Adequacy & Effectiveness of the Institutional Framework**

Regulations, incentives and programs related to industrial wastewater management are formulated and implemented for the purpose of controlling industrial effluent discharge and promoting sustainability in the production-consumption process. The institutional arrangement for policy formulation and implementation could be categorized as a networked model which rely on interagency coordination. The adequacy of such model is essential for inducing consistency, and promoting integration, collaboration and cooperation among the different actors. Inadequacies within present institutional arrangement would altogether impede the effective formulation and implementation of policies related to industrial pollution control. Constraints leading to the inadequacy of present institutional arrangement for pollution control are, among others :

- ◆ Regulatory measures, economic instruments and programs for tofu producers are lacking clarity and consistency due to its highly sectoral nature and incomprehensive directives;
- ◆ The combination of vertically and sectorally oriented approaches in public administration systems hinder coordination efforts in the provincial and local government level;
- ◆ *BAPEDALDA* & its Interagency and Intersectoral Coordinating Committee has very limited authority to control program funding, to enforce industries to comply, and to induce other agencies to participate in collaboration & cooperation for avoiding conflicts of interest;
- ◆ Very limited human and financial resources in the province, and limited authority from central agencies to local authorities and semi-autonomous government agencies to influence allocation of national budget;
- ◆ Inadequate conditions to promote industrial participation in decision making processes and to promote public involvement in covenant enforcement.

In addition to the lack of adequacy within present institutional arrangements, lack of effectiveness of tools and instruments also prevail. The constraints to effective implementation of tools and instruments are highlighted below. Such constraints are derived from analysis of the relation between government institutions, industries & the general public. Constraints identified are, among others :

- ◆ Absence of differentiation of regulatory and economic instruments adapted to the different size and nature of industries present, leading to inability of small & medium industries to comply;
- ◆ Permits, taxes & retributions are too cumbersome in number, irrational in function, and involve too many agencies leading to a lack of synchronization;
- ◆ Lack of adequate monitoring and enforcement, and inadequate capacity of the institutional framework for prosecution;
- ◆ Government's lack of effort to provide small industries with guidance and regular consultations on end of pipe & WEP demotivates tofu producers in minimizing & controlling industrial effluent discharge;
- ◆ Very limited collaboration with universities, NGOs and Entrepreneurial Associations to formulate and implement WEP techniques & programs, and to seek donor agencies;
- ◆ Frequency of disclosure and discussion between government institutions, industries and the surrounding communities are extremely limited, moreover public discussion is prioritized for community leaders only.

#### **7.4 Recommendations to Improve Industrial Pollution Control**

Recommendations for improving industrial pollution control encompass the preconditions necessary to facilitate ecological modernization, the key institutional attributes required to increase the adequacy of present institutional arrangements, and the tools & instruments essential for increased effectiveness of industrial pollution control measures.

Probable actions which can be taken to facilitate the development of ecological modernization and corporate environmental care are, among others :

- ◆ Providing a framework within which industries can pursue their own goals;

- ◆ Examining the role of industries as a driving force for environmental management, and emphasizing the use of effective communication and market oriented strategies;
- ◆ Facilitating information, assistance and guidance for the implementation of pollution prevention measures,
- ◆ Adapting corporate environmental management measures to local conditions for increased suitability and effectiveness.

The measures required to increase the adequacy of present institutional arrangements are, among others :

- ◆ Establishing authorised agencies comprising of executives from *BAPPENAS & KLH* (at the national level) and executives from *BAPPEDA & BAPEDALDA* (at the regional level) to enforce clarity and consistency of national and regional policies;
- ◆ Providing *BAPEDALDA* the authority to enforce regulations and control program funding, and providing *BAPEDALDA*'s Interagency Coordination Committee adequate jurisdiction for coordination across horizontal and vertical lines;
- ◆ Increasing coordination and collaboration between agencies for qualified personnel, and providing local authorities and semi-autonomous government agencies power to influence allocation of national budgets;
- ◆ Establishing an Integrated-Comprehensive Industrial Wastewater Management Plan in the regional level;
- ◆ Stipulating minimum condition for communication with producers & community members.

Probable measures to improve tools and instruments for industrial pollution control are, among others :

- ◆ Provide integrated & clear legal directives over the function, target groups and procedures for acquiring *RKL*, *RPL*, *SPPL* and the HO or Nuisance Permit;
- ◆ Reduce the number of permits, licenses & retributions, rationalize their functions, and synchronize the agencies involved in permitting and taxation;
- ◆ Differentiate regulatory and economic instruments to accommodate the size, nature and environmental motives of the different enterprises;
- ◆ Provide adequate and routine monitoring, and negotiate with *BAPPEDA* to ensure sufficient budget for monitoring and program implementation;



- ◆ Promote coordination & collaboration with the judicial body and law enforcement officials to conduct prosecutions and avoid lengthy & ineffective legal battles;
- ◆ Promote economic incentives & sanctions for the development of industrial estates among large & medium industries;

## **7.5 Suggestions for Further Research**

There are several suggestions for further research based on findings and conclusions drawn from my research. The following section presents major suggestions for future research :

### **Utilization of a Larger Set of Cases to Further Analyse the Institutional Arrangements**

The objective of my research is to examine the adequacy of the relationships between institutional variables, employing evidence from in depth selected case studies. In order to gain further confidence regarding the findings and conclusions, a larger and more diverse set of cases should be employed in future research. The use of a larger set of cases enables us to test the imperativeness of such attributes in enducing coordination and integration among the different actors . The main research questions would be :

- ◆ Are the presence of those attributes required for improving the adequacy of present institutional arrangements ?
- ◆ How do social, political, psychological and other factors influence that set of key institutional attributes ?

### **Utilization of a Larger Set of Cases to Further Analyse Tools & Instruments**

A second objective of this research was to analyse the effectiveness of policy formulation and implementation, employing the different tools and instruments used for environmental management. A follow up research could be done to assess the influence social & political factors and the influence economic transitions have on such tools and instruments. The main research questions would be :

- ◆ How do social & political factors and the transition to market economy require the modifications of present tools and instruments ?
- ◆ What social, political and economic factors are necessary for facilitating effective implementation of such tools and instruments ?

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### APPENDIX III.1 MAP OF THE REPUBLIC OF INDONESIA



### APPENDIX III.2 CENTRAL JAVA & THE PROVINCE OF YOGYAKARTA





**APPENDIX III. 3**  
**AMBIENT WATER QUALITY STANDARDS**  
**FOR WASTEWATER QUALITY**  
**IN THE PROVINCE OF YOGYAKARTA**  
**(GOVERNOR'S DECISION No 214/KPTS/1991)**

No	Parameters	Unit	Class of the Surface Water			
			I	II	III	IV
1	Temperature	C	35	40	45	45
2	Dissolved Particles	mg/l	1500	2000	4000	5000
3	Suspended Particles	mg/l	100	200	300	400
4	pH	mg/l	6-9	6-9	6-9	6-9
5	Iron (Fe)	mg/l	1	5	10	20
6	Manganese (Mn)	mg/l	0.5	2	5	10
7	Barium (Ba)	mg/l	1	2	3	5
8	Copper (Cu)	mg/l	1	2	3	5
9	Zinc (Zn)	mg/l	2	5	10	15
10	Chrome Hexavalent (Cr)	mg/l	0.05	0.1	0.25	0.6
11	Total Chrome (Cr)	mg/l	0.1	0.5	1	2
12	Cadmium (Cd)	mg/l	0.01	0.05	0.1	0.5
13	Mercury (Hg)	mg/l	0.001	0.002	0.005	0.01
14	Lead (Pb)	mg/l	0.03	0.1	1	2
15	Stanium (Sn)	mg/l	1	2	3	5
16	Arsen (Ar)	mg/l	0.05	0.1	0.5	1
17	Selenium (Se)	mg/l	0.01	0.05	0.5	1
18	Nickel (Ni)	mg/l	0.1	0.2	0.5	1
19	Cobalt (Co)	mg/l	0.2	0.4	0.6	1
20	Cyanide (Cn)	mg/l	0.02	0.05	0.1	0.5
21	Sulfide (H <sub>2</sub> S)	mg/l	0.01	0.05	0.1	1
22	Flouride (F)	mg/l	1.5	2	3	5
23	Chlorine (Cl <sub>2</sub> )	mg/l	0.5	1	2	5
24	Ammonia (NH <sub>3</sub> )	mg/l	0.02	1	5	20
25	Nitrate	mg/l	10	20	30	50
26	Nitrite	mg/l	0.06	1	3	5
27	Chloride (Cl)	mg/l	600	800	1000	1200
28	BOD 5	mg/l	30	50	150	300
29	COD	mg/l	60	100	300	600
30	Methyl	mg/l	0.5	5	10	15
31	Phenol	mg/l	0.01	0.5	1	2
32	FOG (vegetable)	mg/l	1	5	10	20
33	FOG (mineral)	mg/l	1	10	50	100
34	Radioactivity	mg/l	-	-	-	-
35	Pesticide	mg/l	-	-	-	-

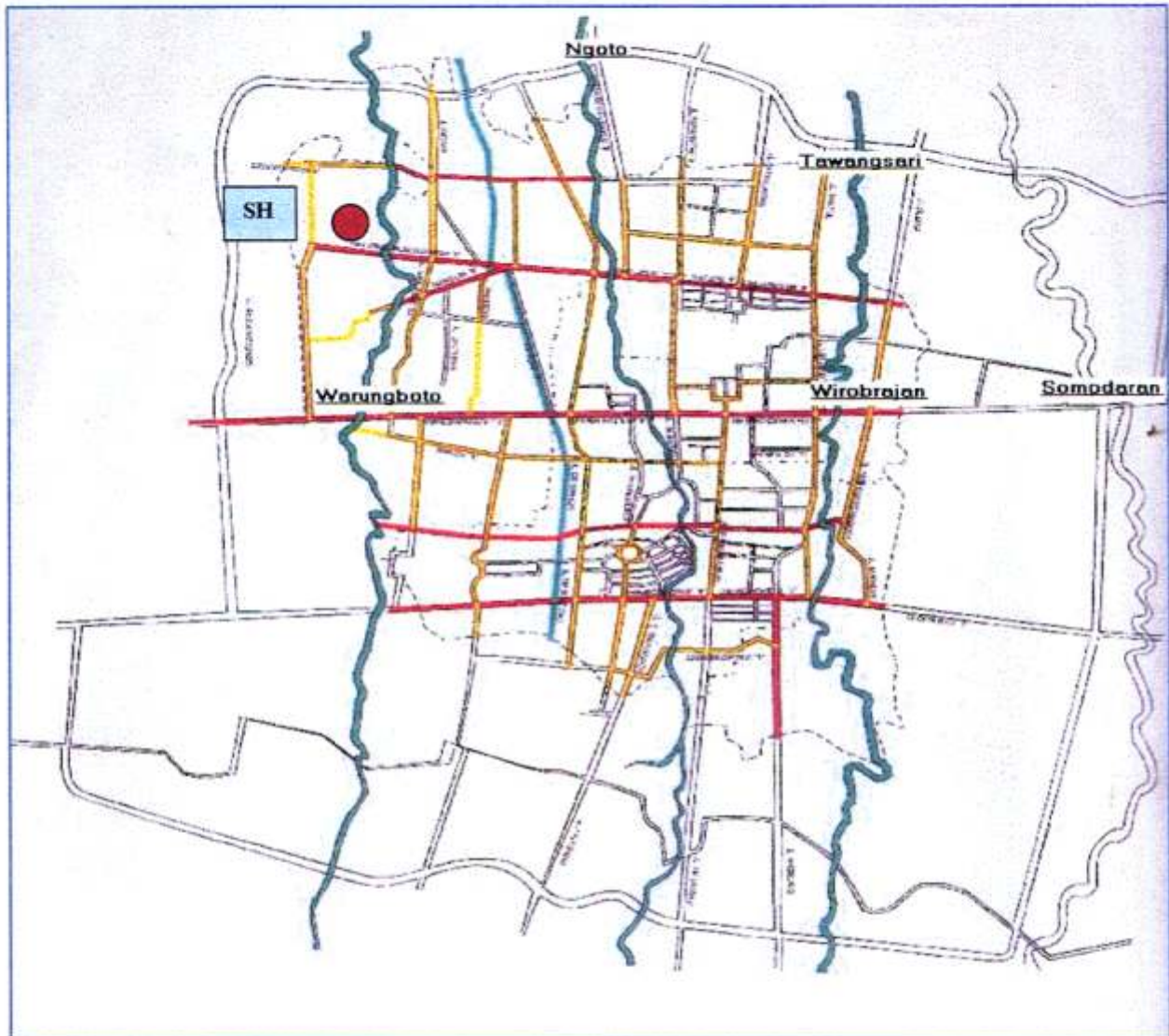
**APPENDIX III. 4**  
**EFFLUENT STANDARDS FOR TOFU INDUSTRY IN THE**  
**PROVINCE OF YOGYAKARTA**  
**(GOVERNOR'S DECISION No 281/KPTS/1998)**

PARAMETERS	Maximum Limits for Tofu Industry	
	Maximum Content (mg/l)	Maximum Pollutant Load (kg/ton)
BOD	75	1.125
COD	200	3.00
TSS	75	1.125
Sulfide (H <sub>2</sub> S)	0.05	0.00075
pH	6.0 – 9.0	
Maximum Effluent Volume	15 cubic meter / ton of soybean	

**APPENDIX III. 5**  
**EFFLUENT STANDARDS FOR MILK INDUSTRY IN THE**  
**PROVINCE OF YOGYAKARTA**  
**(GOVERNOR'S DECISION No 281/KPTS/1998)**

PARAMETERS	Maximum Limits for Tofu Industry	
	Maximum Content (mg/l)	Maximum Pollutant Load (kg/ton)
BOD	30	0.06
COD	75	0.15
TSS	30	0.06
pH	6.9 – 9.0	
Maximum Effluent Volume	2 L / kg powder milk	

# APPENDIX IV. 1 LOCATION OF SARI HUSADA, LTD & LOCATION OF SELECTED CLUSTERS OF TOFU INDUSTRIES



## **Key**

- |  |  |   |                                    |
|--|--|---|------------------------------------|
| <span style="border: 1px solid black; padding: 2px;">SH</span>   | = Sari Husada, Ltd                       | <span style="display: inline-block; width: 10px; height: 10px; background-color: red; border-radius: 50%;"></span>      | = Sari Husada Wastewater Treatment |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: yellow; border: 1px solid black;"></span> | = Main Drainage/Sewerage Line            | <span style="display: inline-block; width: 20px; height: 10px; background-color: red; border: 1px solid black;"></span> | = Secondary Drainage/Sewerage      |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: green; border: 1px solid black;"></span>  | = The Gadjah Wong, Code & Winongo Rivers |   |                                    |

# **APPENDIX IV. 2** **TOFU PRODUCERS SELECTED AS INTERVIEWEES**

No	NAME	LOCATION
1	Mr. Soewandi	Wirobrajan, Yogyakarta
2	Mr. Ponidi	Wirobrajan, Yogyakarta
3	Mr. Jumianto	Wirobrajan, Yogyakarta
4	Mr. Hardiyanto	Wirobrajan, Yogyakarta
5	Mr. Poniran	Wirobrajan, Yogyakarta
6	Mr. Hadi Martono	Wirobrajan, Yogyakarta
7	Mr. Tukijo	Wirobrajan, Yogyakarta
8	Ms. Amini	Wirobrajan, Yogyakarta
9	Ms. Mardani	Wirobrajan, Yogyakarta
10	Mr. Wahyu	Wirobrajan, Yogyakarta
11	Mr. Ponijan	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
12	Mr. Mulyo Sudarmo	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
13	Mr. Samingun	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
14	Mr. Tukiran Mulyo	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
15	Mr. Jupriwiharjo	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
16	Mr. Sutopo Mulyo	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
17	Mr. Waryadi	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
18	Ms. Supriyati	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
19	Mr. Santo	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
20	Mr. Dalikin	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
21	Mr. Abdul Azis	Ngoto-Bantul, Yogyakarta
22	Mr. Ngadikin	Ngoto-Bantul, Yogyakarta
23	Mr. Seto	Ngoto-Bantul, Yogyakarta
24	Mr. Miskiran	Ngoto-Bantul, Yogyakarta
25	Mr. Inam Bukori	Ngoto-Bantul, Yogyakarta
26	Mr. Ribut	Ngoto-Bantul, Yogyakarta
27	Mr. Paryono	Ngoto-Bantul, Yogyakarta
28	Ms. Pacran	Ngoto-Bantul, Yogyakarta
29	Mr. Gito Utomo	Ngoto-Bantul, Yogyakarta
30	Ms. Darkumi	Ngoto-Bantul, Yogyakarta
31	Mr. Dadipranyoto	Somodaran-Sleman, Yogyakarta
32	Mr. Setyomadiyono	Somodaran-Sleman, Yogyakarta
33	Mr. Wignyosumarto	Somodaran-Sleman, Yogyakarta
34	Mr. Madyoutomo	Somodaran-Sleman, Yogyakarta
35	Mr. Sajipawiro	Somodaran-Sleman, Yogyakarta
36	Ms. Leo Sumardi	Somodaran-Sleman, Yogyakarta
37	Ms. Pawiro	Somodaran-Sleman, Yogyakarta
38	Mr. Kismo	Somodaran-Sleman, Yogyakarta
39	Ms. Pairah	Somodaran-Sleman, Yogyakarta
40	Mr. Budianto	Somodaran-Sleman, Yogyakarta
41	Mr. G. Sumarto	Somodaran-Sleman, Yogyakarta
42	Ms. Juwariah	Somodaran-Sleman, Yogyakarta
43	Mr. Narto	Somodaran-Sleman, Yogyakarta
44	Mr. Suharto	Somodaran-Sleman, Yogyakarta
45	Mr. Notopeno	Somodaran-Sleman, Yogyakarta



**APPENDIX IV.3**  
**INTERVIEWEES FROM SARI HUSADA, LTD**

<b>No</b>	<b>Name</b>	<b>Occupation</b>
1	Mr. Dwiyatno Siswosumarto	President Director
2	Mr. Arista	Manager of the Production & Production Process
3	Ms. Lucy Widjaja	Head of the Environmental Directory Board

#### APPENDIX IV. 4

##### COMMUNITY MEMBERS SELECTED AS INTERVIEWEES

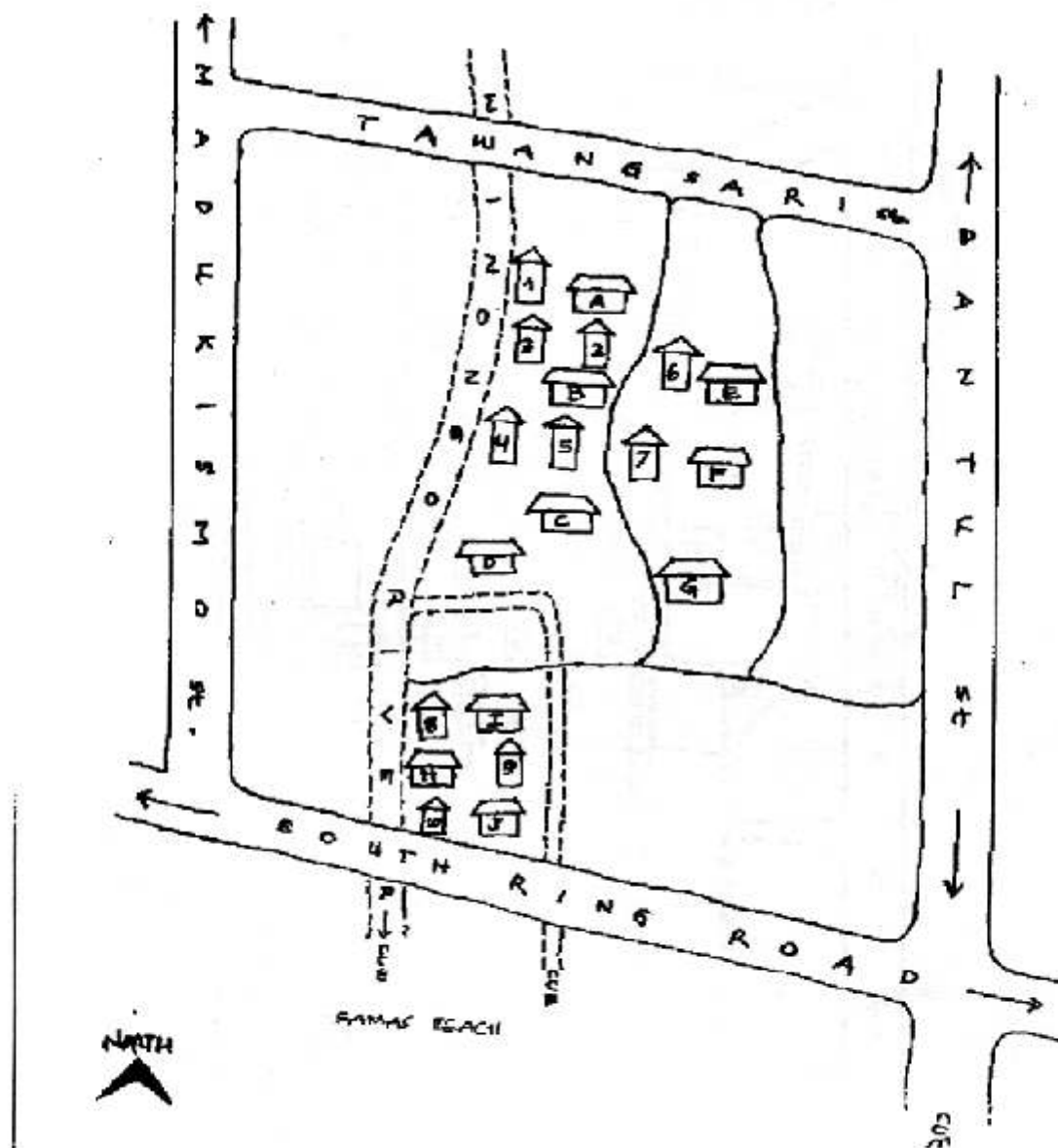
No	NAME	LOCATION
1	Mr. Widiatmoko	Wirobrajan, Yogyakarta
2	Mr. Sapari	Wirobrajan, Yogyakarta
3	Mr. Hery Gunawan	Wirobrajan, Yogyakarta
4	Mrs. Sulanjari	Wirobrajan, Yogyakarta
5	Mr. PD Suyono	Wirobrajan, Yogyakarta
6	Mr. Saptono	Wirobrajan, Yogyakarta
7	Mr. Kuntoro	Wirobrajan, Yogyakarta
8	Mr. Tatang	Wirobrajan, Yogyakarta
9	Mr. Marsudi	Wirobrajan, Yogyakarta
10	Mr. Wibowo	Wirobrajan, Yogyakarta
11	Mr. Wasiman	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
12	Mr. Ikhsan	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
13	Mr. Sukirman	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
14	Ms. Ningsih	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
15	Ms. Ruswati	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
16	Ms. Lastri	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
17	Ms. Rubiyani	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
18	Mrs. Daiman	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
19	Mr. Achmad Zaelani	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
20	Mr. Ngadimun	Tawang Sari / Gedongkiwo-Bantul, Yogyakarta
21	Mr. Heri Nugroho	Ngoto-Bantul, Yogyakarta
22	Mrs. Sunarnohadi	Ngoto-Bantul, Yogyakarta
23	Mr. Khozin	Ngoto-Bantul, Yogyakarta
24	Mrs. Lasidah	Ngoto-Bantul, Yogyakarta
25	Mrs. Ludimah	Ngoto-Bantul, Yogyakarta
26	Mrs. Yuriyah	Ngoto-Bantul, Yogyakarta
27	Mr. Sarno	Ngoto-Bantul, Yogyakarta
28	Mr. Warsito Mujiharjo	Ngoto-Bantul, Yogyakarta
29	Mr. Tatack Nirbito	Ngoto-Bantul, Yogyakarta
30	Ms. Wartini	Ngoto-Bantul, Yogyakarta
31	Mr. Arjo Sentono	Somodaran-Sleman, Yogyakarta
32	Mr. Ngadiran	Somodaran-Sleman, Yogyakarta
33	Mr. Dalijo	Somodaran-Sleman, Yogyakarta
34	Mr. Teguh Wiratno	Somodaran-Sleman, Yogyakarta
35	Mr. Sugito	Somodaran-Sleman, Yogyakarta
36	Mr. Hartono	Somodaran-Sleman, Yogyakarta
37	Mr. Joko Santoso	Somodaran-Sleman, Yogyakarta
38	Mr. Marjio	Somodaran-Sleman, Yogyakarta
39	Ms. Oktaviani	Warungboto, Yogyakarta
40	Ms. Endah Sari	Warungboto, Yogyakarta
41	Ms. Wasti	Warungboto, Yogyakarta
42	Mrs. Etty Asrori	Warungboto, Yogyakarta
43	Mr. Muhadi	Warungboto, Yogyakarta
44	Mr. Tri Suratno	Warungboto, Yogyakarta
45	Mrs. Ratna Suratno	Warungboto, Yogyakarta
46	Mrs. Slamet	Warungboto, Yogyakarta
47	Mr. Bambang Hermansyah	Warungboto, Yogyakarta
48	Mr. Fajar Gunawan	Warungboto, Yogyakarta

[illegible]

**Houses with Numbers = Tofu Producers**  
**Houses with Letters = Sampled Community**  
**\_\_\_\_\_ = Village Roads**

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**APPENDIX IV. 6**  
**LOCATION OF SAMPLED TOFU INDUSTRIES**  
**AND COMMUNITIES IN TAWANGSARI & GEDONGKIWO**  
**BANTUL, YOGYAKARTA**

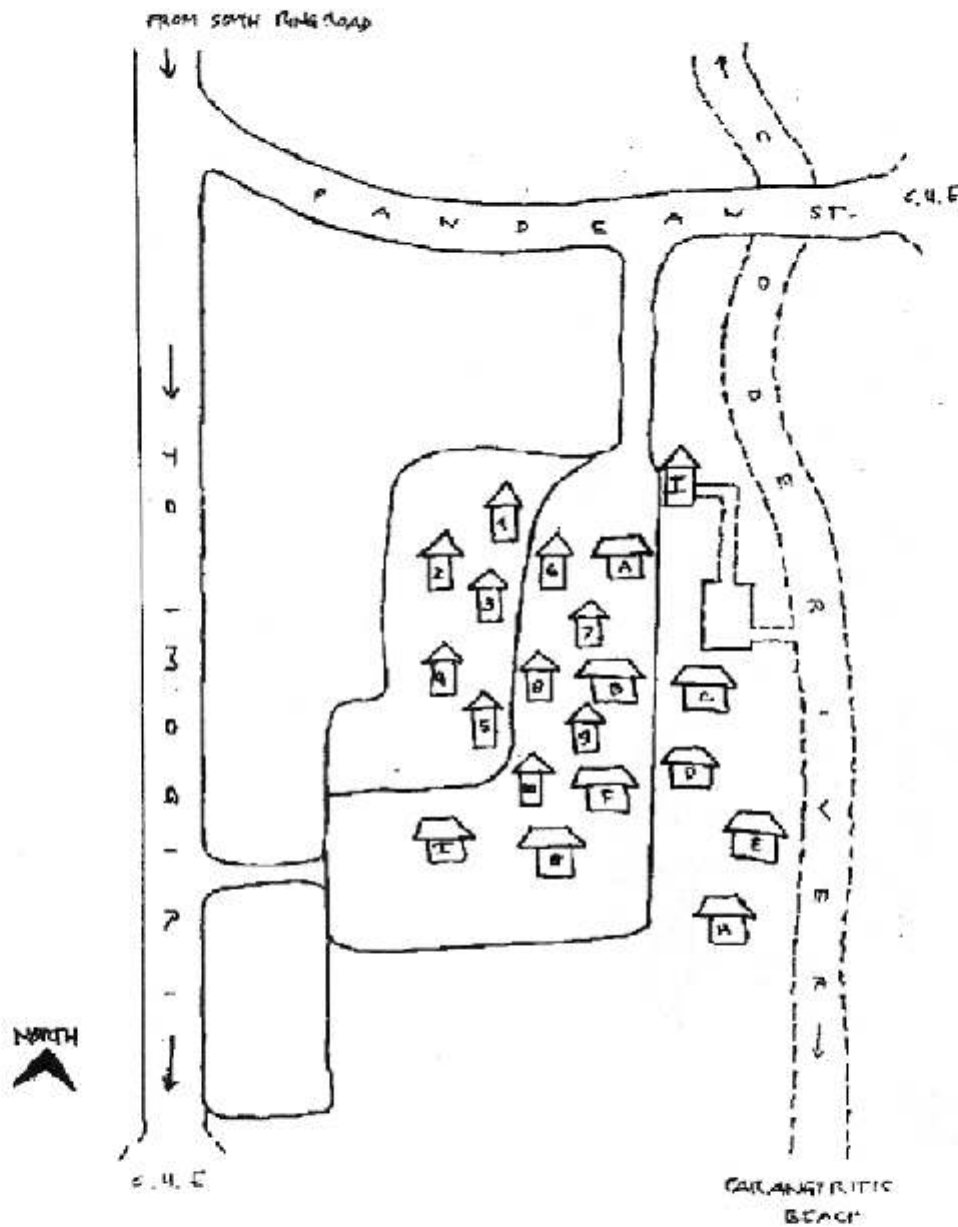


**Key**

- |  |                              |
|--|------------------------------|
|  | = Unlined Discharge Canals   |
|  | = Tofu Producers             |
|  | = Sampled Community          |
|  | = Village Roads              |
|  | = Municipal Roads / Highways |



# **APPENDIX IV. 7** **LOCATION OF SAMPLED TOFU INDUSTRIES** **AND COMMUNITIES IN** **NGOTO, BANTUL, YOGYAKARTA**



## **Key**

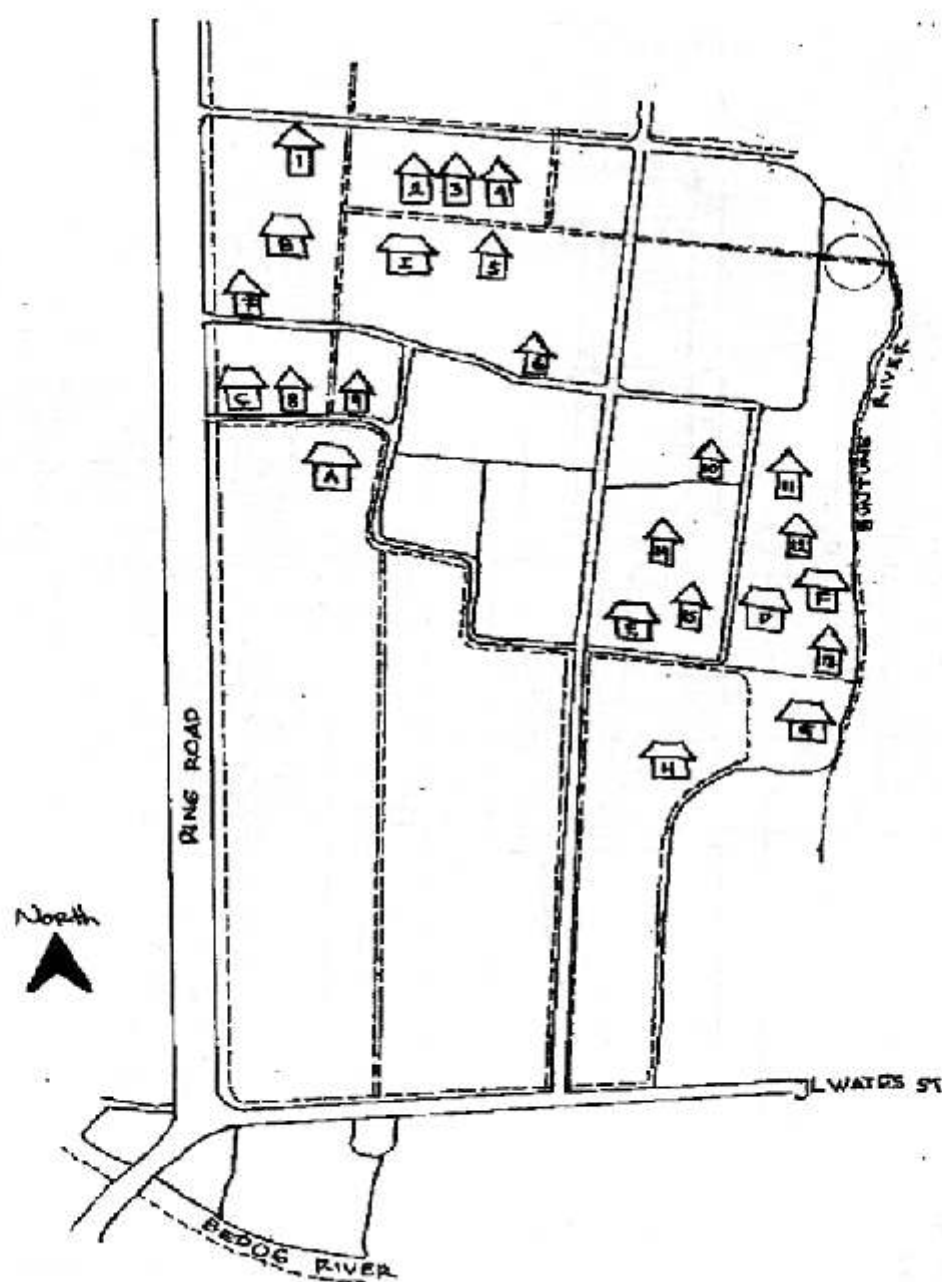
Houses with Numbers = Tofu Producers

Houses with Letters = Sampled Community




\_\_\_\_\_ = Village Roads

\_\_\_\_\_ = Municipal Roads / Highways

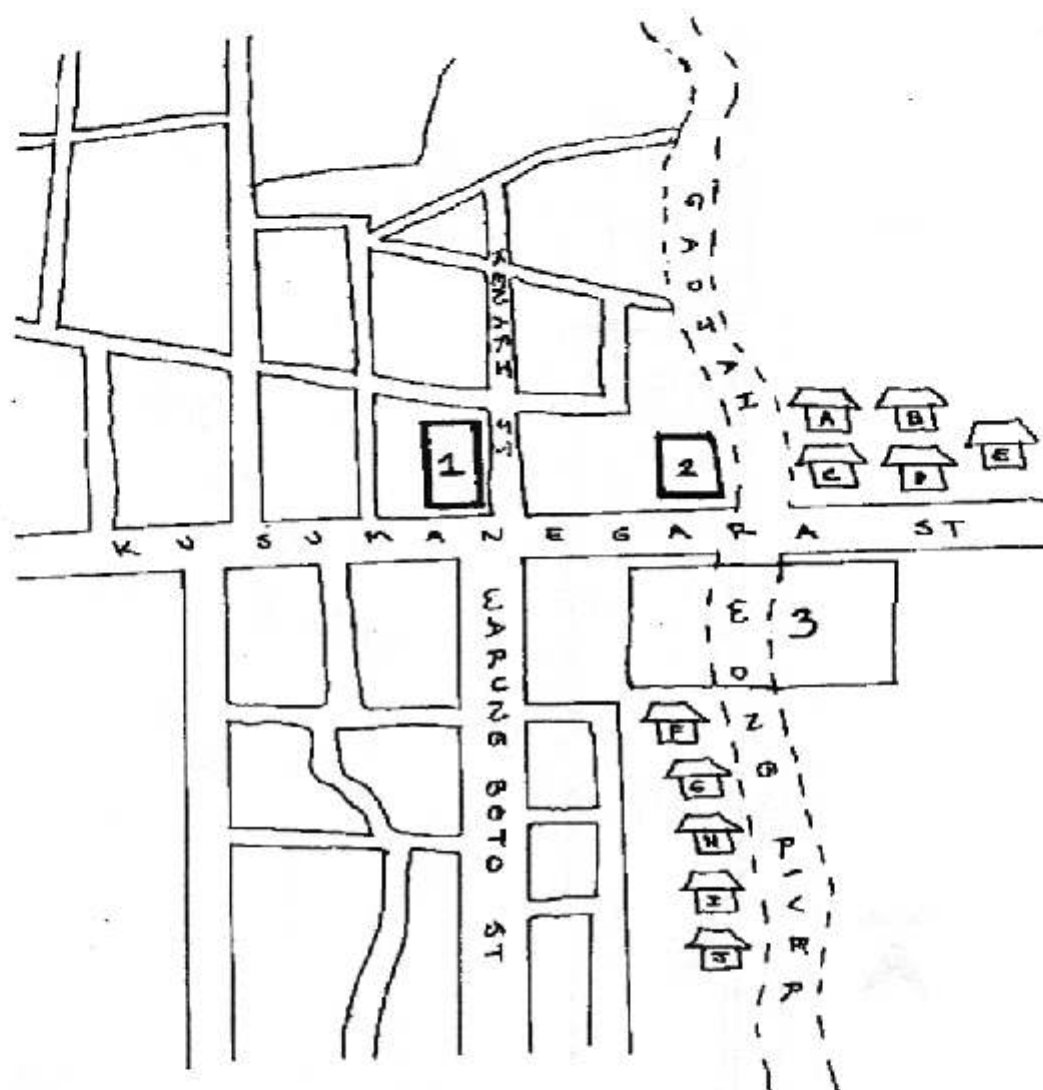
**APPENDIX IV. 8**  
**LOCATION OF SAMPLED TOFU INDUSTRIES**  
**AND COMMUNITIES IN SOMODARAN, YOGYAKARTA**



**Key**

- |   |                              |
|---|------------------------------|
|  | = Unlined Discharge Canals   |
| <b>Houses with Numbers</b>  | = Tofu Producers             |
| <b>Houses with Letters</b>  | = Sampled Community          |
|  | = Village Roads              |
|  | = Municipal Roads / Highways |

**APPENDIX IV. 9**  
**LOCATION OF SARI HUSADA, LTD AND SAMPLED**  
**COMMUNITIES IN WARUNGBOTO, YOGYAKARTA**



**Key**

- |                     |  |
|---------------------|--|
| Number 1            | = Location of Sari Husada, Ltd                   |
| Number 2            | = Location of Sari Husada's Wastewater Treatment |
| Number 3            | = City Zoo                                       |
| Houses with Letters | = Sampled Community                              |
| _____               | = Village Roads                                  |
| _____               |  |
| _____               | = Municipal Roads / Highways                     |

**APPENDIX V.1**  
**INTERVIEWEES FROM GOVERNMENT AND NON**  
**GOVERNMENT AGENCIES**

<b>NO</b>	<b>NAME</b>	<b>AGENCIES</b>	<b>CATEGORY</b>	<b>LEVEL</b>
1	Mr. Sarjuni	BAPEDALDA	Lead Agency	Provincial
2	Mr. Hendra	BAPEDALDA	Lead Agency	Provincial
3	Mr. Abdi Waluyo	BAPEDALDA	Lead Agency	Provincial
4	Ms. Trihastuti	BAPEDALDA	Lead Agency	Provincial
5	Mr. Sumaryono	BKPMD	Lead Agency	Provincial
6	Mr. Sayidi Jauhar	Depperindag	Sectoral Agency	Provincial
7	Ms. Sumiyati	Depperindag	Sectoral Agency	Provincial
8	Dr. Sarminto	Depkes	Sectoral Agency	Provincial
9	Mr. Wiwok	Depkes	Sectoral Agency	Provincial
10	Mr. Bayudono	BAPPEDA	Coord/Planning	Provincial
11	Mr. Surajimadal	BAPPEDA	Coord/Planning	Provincial
12	Mr. Harsono	BAPPEDA	Coord/Planning	Provincial
13	Ms. Sri Marsiatun	Economic Unit, Yogya	Local Gov. Agency	Local
14	Ms. Hatimi Husein	Spatial Planning Dept	Local Gov. Agency	Local
15	Mr. H. Tantular	Spatial Planning Dept	Local Gov. Agency	Local
16	Mr. Widodo	Legislative Body, Yogya	Legislative Body	Provincial
17	Mr. B. Sulistiono	Legislative Body, Yogya	Legislative Body	Provincial
18	Mr. H. Wibisono	Legislative Body, Yogya	Legislative Body	Provincial
19	Mr. Haryono	KADIN	Associations	Provincial
20	Dr. Kawik Sugiana	URPL-UGM University	Expert	



## **APPENDIX V. 2**

### **INTERVIEW QUESTIONS FOR GOVERNMENT OFFICIALS**

#### **Clarity & Consistency of Policies**

1. What efforts have been made by the national & provincial government to facilitate integrated industrial wastewater management ?
2. Are there lack of clarity i the present regulatory framework ? If yes, please describe.
3. Are there lack of clarity in the directives of government programs for tofu industries & *PROKASIH* ? If yes, please describe.
4. Are there lack of clarity in present economic instruments related to industrial wastewater management ? If yes, please describe.
5. What inconsistencies & conflicts are present in government policies ? in legal directives ? in legal guidance for government programs ?
6. What efforts have been made to resolve conflicts & inconsistencies of policies ?

#### **Interagency Coordination**

1. What procedures & mechanisms are present to induce coordination ?
2. What are the factors which enhance & reduce the adequacy of such mechanisms ?
3. What are the reasons for performing coordination ?
4. How effective is the coordination process for promoting collaboration & resolving conflicts ?
5. What factors function to constrain effective coordination ?
6. How adequate is the authority granted to semi-autonomous agencies & sectoral departments for controlling program funding ? (adequate, quite adequate, inadequate)
7. How adequate is the location of *BAPEDALDA* for inducing coordination & resolving interagency conflicts ? (adequate, quite adequate, inadequate)
8. Are skillful actors present to bridge the gaps among agencies ? If yes, who & how effective are their efforts ?

#### **Adequacy of Statutes to Structure the Implementation Processes**

1. How adequate are financial support for *PROKASIH* & environmental programs for tofu producers ? (adequate, quite adequate, inadequate). If quite adequate or inadequate, please specify the reasons.
2. How is the strength of enforcement of environmental regulations among small & medium industries ? (adequate, quite adequate, weak, very weak)
3. If enforcement is weak or very weak, what factors contribute to such poor enforcement ?

#### **Commitment of Implementing Agencies**

1. How is the commitment of *BAPEDALDA* in the management of industrial wastewater discharge ? (sufficient, somewhat lacking, very much lacking)
2. How is the commitment of *BKPM* & Sectoral Agencies in the management industrial effluent discharge ? (sufficient, somewhat lacking, very much lacking)

#### **Participation of Target Groups in Program Implementation Processes**

1. Are initiatives within the *PROKASIH* Program supported by the participation of target groups in program formulation & implementation ? If not, why not.

2. Are initiatives within programs for tofu industries supported by the participation of target groups in program formulation & implementation ? If not, why not.

#### **Presence of Key Actors for Facilitating the Implementation Processes**

1. Are key actors present to facilitate the implementation processes ? If yes, who are they & what are their roles ?
2. How effective are their efforts in bridging the gaps between implementors and industries ?

#### **Environmental Impact Assessment**

1. How adequate is in the institutionalization of *AMDAL* when analysed through : (1) Intent and Focus, (2) Institutional Structure, (3) Procedures, (4) Human & Fiscal Resources ? (Very Adequate, Adequate, Quite Adequate, Inadequate)
2. What progress have been made in the institutionalization of *AMDAL* ?

#### **The *PROKASIH* Clean River Program**

1. What are the factors which enhance the implementation of the program ?
2. What are the constraints to successful implementation of the program ?

## **APPENDIX V.3**

### **INTERVIEW QUESTIONS FOR TOFU PRODUCERS**

#### **Industries' Response to Regulations**

1. What permits & licenses are required by the government for tofu industries ?
2. What permits & licenses do you acquire ?
3. Do you record your production capacity, along with the changes ?
4. Do you have a groundwater extraction & wastewater discharge metering device ? If not, how do you quantify them ?
5. Do you keep a record of your wastewater discharge quality ?
6. Do you report your wastewater discharge to the Chamber of Commerce ? If, yes, how often ?
7. Do you have separate pipes & outlets specifically for industrial effluent discharge ?
8. Where do you dispose your wastewater discharge ? Do you have access to a wastewater treatment facility ?
9. (For those having access to a WWT facility) Do you dispose all your effluent in the WWT each time prior to discharge ? If not, approximately how many percent of your effluent is disposed in the WWT beforehand ?

#### **Industries' Response to Taxations and Retributions**

1. What taxes are you held accountable for (land & building tax and wastewater discharge retribution) ?
2. How often do you pay such taxes ?

#### **Industries' Response to Government Programs**

1. How often do you attend government programs (Programs on capacity building, clean environment, end of pipe & WEP and public discussion) ?
2. How have government programs helped shape your perception on issues of water supply and pollution control ?
3. How serious is pollution due to industrial wastewater discharge (serious, quite serious, not serious, no opinion) ? If not serious, why ?
4. Do you implement WEP measures ? If yes, how (reuse water for soaking, less water for cleaning, dry skin peeling, steam for cooking, little water for grinding, etc) ?

## **APPENDIX V. 4**

### **INTERVIEW QUESTIONS FOR SARI HUSADA, LTD**

#### **Corporate Environmental Management**

1. What are the corporate motives for implementing environmental management ?
2. What are the past successes and failures of associated with Sari Husada's effort to secure the environment ?
3. What are the bottlenecks and constraints within present corporate environmental management measures ?
4. What opportunities are present to overcome such constraints ?

#### **Government Policies**

1. What is your opinion on the adequacy of past and present regulations for industrial effluent management ?
2. What is your opinion on the adequacy of present taxation & retribution system for promoting integratedness and environmental management ?
3. What is your opinion on the adequacy of the *PROKASIH* Program for promoting industrial wastewater management ?

#### **Industries & The Public**

1. How does the public react to the pollution caused by Sari Husada ?
2. How does the public react to the environmental management measures implemented by Sari Husada, Ltd ?
3. How many complaints do you receive on a monthly basis ?
4. Has there been a court case filed against you ?
5. What efforts have been conducted to promote public participation in corporate environmental management ?

## **APPENDIX V. 5**

### **INTERVIEW QUESTIONS FOR COMMUNITY MEMBERS**

#### **Effectiveness of Government & Corporate Initiatives**

1. How effective are government regulations to control industrial pollution (Very effective, effective, quite effective, ineffective) ?
2. What government programs and projects are present to promote industrial wastewater management ?
3. How effective are government programs & projects in controlling pollution ?
4. What corporate initiatives have been taken to control industrial effluent pollution ?
5. How effective are corporate initiatives in providing measures for pollution control ?

#### **Groundwater & Surface Water Quality**

1. Is surface water pollution present ?
2. How is the quality of the surface water (odour, clarity, insects) ?
3. How adequate is groundwater for domestic use (adequate, quiteadequate, inadequate) ?
4. How is the groundwater quality (odour, clarity, colour) ?

#### **Public Discussions & Compensations**

1. Has the government and industries facilitated your presence in public discussions between industries and the public & surrounding communities ?
2. Have the industries provided you with compensation ? If yes, what type of compensation ?
3. Are you satisfied with the compensation ?
4. Is the compensation adequate to make up for the loss in environmental degradation ?