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TOWARDS AN INSTITUTIONAL APPROACH FOR ADDRESSING THE CURRENT ENVIRONMENTAL PROBLEMS IN THE PORT OF TANJUNG PRIOK

By

SYAIFUDDIN JALAL TANJUNG
Indonesia

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

in

PORT MANAGEMENT

1999

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessary endorsed by the University.

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ACKNOWLEDGEMENT

First of all, I wish to express my sincere thanks and gratitude to my organisation, Indonesia Port Corporation II Ltd (PT. Pelabuhan Indonesia II), for allowing me to participate in 17-months Port Management course, at the World Maritime University, Malmo, Sweden.

Then, my gratitude thanks to the Global Foundation for Research and Scholarship of Japan, for sponsoring me to study at the University.

Next, I would also like to express my thanks to all the WMU staffs, especially Prof. Shuo Ma, all Port Management’s lecturers and visiting professors for sharing their knowledge and experiences during my study at the World Maritime University. My special thanks also to Prof. Hodgson, for supervising my dissertation with valuable suggestions and guidance.

Finally, my deepest thanks to my beloved wife Hayathie and my beautiful daughters Fathiani Putri Hayasha (Putri) and Anisa Diatri Fridayasha (Aya), for their support, encouragement and prayers, during my study in Sweden.

****
ABSTRACT

Title of Dissertation: Towards an Institutional Approach for addressing the current environmental problems in the port of Tanjung Priok.

Decree: MSc

The study first recognise that the issue of protecting the environment and achieving sustainable development in ports has become a critically important concern of port authorities, whether in developed or developing countries. As a node point of transportation, a port is very vulnerable to environmental deterioration, arising from many activities taking place in and around the port. Setting up policies and practices at environmental protection is one way of achieving and maintaining sustainable development.

The study points out that the port of Tanjung Priok, like many other ports, presently faces a serious environmental problem. The location of the port, where three small rivers have their mouths in the port basins makes its environmental situation even worse, because large quantities of various kinds of pollutants from land-based sources are being deposited by these rivers. Some activities within the port also make an significant contribution to the problem. Some key environmental parameters related to the water quality, as the principal indicator of environmental deterioration, are described briefly, to provide a general overview of the scale of the problem.

The study explains that, to mitigate the pollution, some initiatives in applying an Environmental Management and Monitoring Program have been attempted by the port, but various shortcomings of the program limit its effectiveness. Some of these obstacles to its implementation are examined in order to develop a solution. The
reception facilities, its tariff and utilisation problems, as a part of the port's environmental program, are also assessed.

The study concludes that the problem of the port's environmental deterioration can be effectively solved if all parties related to the cause of the pollution take part in mitigating, managing, and controlling the pollution. To achieve this objective, the institutional approach is recommended by the study. In addition, some solutions for the utilisation of the reception facilities are also suggested.

**KEYWORDS:** Institutional Approach, Executing Bodies, Supervisory Bodies, Reporting Bodies, Environmental Management and Monitoring Program, Urban and Industrial Discharges.
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<tr>
<td>ANDAL</td>
<td>Analis Dampak Lingkungan (Environmental Impact Analysis)</td>
</tr>
<tr>
<td>AMDAL</td>
<td>Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment Approach)</td>
</tr>
<tr>
<td>ADPEL</td>
<td>Administrator Pelabuhan (Port Administrator)</td>
</tr>
<tr>
<td>BOT</td>
<td>Build-Operate and Transfer</td>
</tr>
<tr>
<td>BAPEDAL</td>
<td>Badan Pengendali Dampak Lingkungan (Environmental Impact Management Agency)</td>
</tr>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>COD</td>
<td>Chemical Oxygen Demand</td>
</tr>
<tr>
<td>DGSC</td>
<td>Directorate General Sea Communication</td>
</tr>
<tr>
<td>MARPOL</td>
<td>Maritime Pollution</td>
</tr>
<tr>
<td>MOC</td>
<td>Ministry of Communication</td>
</tr>
<tr>
<td>NTU</td>
<td>Nephelometric Turbidity Unit</td>
</tr>
<tr>
<td>PERTAMINA</td>
<td>Perusahaan Tambang Minyak Nasional (National Oil Company)</td>
</tr>
<tr>
<td>PSC</td>
<td>Port State Control</td>
</tr>
<tr>
<td>RKL</td>
<td>Rencana Pengelolaan Lingkungan (Environmental Management Plan)</td>
</tr>
<tr>
<td>RPL</td>
<td>Rencana Pemantauan Lingkungan (Environment Monitoring Plan)</td>
</tr>
<tr>
<td>TBT</td>
<td>Argonotin Tributyltin</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

I.1. Environmental friendliness as a part of a quality port service

Quality of service has become a decisive factor in business, especially in a tight competitive environment. In other words, quality is vital if one is to be a ‘winner’ in the competition. Customers are demanding increased quality so the service choice of customers may well depend on the level of quality offered by a company. Port service, as a commercial operation has also to be quality minded so that satisfactory services can be offered to their customers.

What is quality service in the port business? Nowadays, the quality of service in ports is not limited to commercial or operational aspects, such as turn-around time, crane output, ship output, etc; but extends to a wide range of other factors: availability, reliability, user-friendliness, flexibility, security, safety and environmental friendliness. With regard to the environmental friendliness, there is a trend, where port communities are becoming more environmentally minded as a result of an increased awareness among the public, especially port users. In other words, a clean port has become a more important consideration for potential port users, in the choice of port for their business, because business activities is only possible if high quality business site are available and clean business locating conditions are applied. Port management has to be increasingly concerned about this matter to show their social responsibility toward environment, because port business should not only to be an efficient port, but also to be a clean and safe one.

Port business is recognized as being a key factor in the national economic performance of a country and is often a decisive factor in a national or regional economy. Therefore a port
has to compete with other ports to attract business. In response to this situation, a main preoccupation of a port authority must be its economic performance. As part of this economic performance, protection of the environment should be seen as a commodity as well.

I.2. Port of Tanjung Priok and its environmental problems.

Ports are nodal points, where the various modes of transport come together and industrial activities take place. This means that in port areas the environmental components such as water, air and soil are at risk of being contaminated as a result of a large number of activities within a relatively small area. Hence, protection of the environment is an essential consideration if a port authority is to be allowed to fulfill its major obligation: to ensure continuity of the activities carried out in the port. This means that in the decision-making process the environment must be considered alongside economic aspects (IHPH, 1981, 7)

A port is strategically located at the interface of sea and land. In modern times, ports have become flourishing industrial and manufacturing zones. They are busy commercial, industrial and transport nodes playing a key role in the economic development of their countries. Consequently, the risk of environmental damage has increased significantly.

Water and air pollution in a port area is not only caused by ship activity and cargo handling operations but also by the direct impact of industrial discharge into the port area. Pollution can come from land based sources that include effluents of various industrial activities, run-off from agricultural activities, chemical products and sewage discharges from population centers.

This is essentially the situation being faced by the port of Tanjung Priok. The port nowadays is facing a serious environmental problem. There are several sources of this problem. Besides port activities, some industrial activities located in the port area are having a significant environmental impact on the port. Other causes of the pollution are
coming from urban areas which produce solid waste and which are discharged into the port through three small rivers, which flow into the port basin. Through these rivers various kinds of pollutants not only garbage—but also harmful chemical substances, are discharged into the port basin. The garbage has been identified as coming from households situated along the river, while the substances are coming from industrial activities located along the rivers.

Thus, generally, the cause of the problem can be divided into two sources, firstly from internal sources: port activities i.e. ship operation, cargo handling etc; and industrial and office activities in the port area and secondly from external sources: from population centers, and industries located along the rivers. While the port of Tanjung Priok has undertaken an Environmental Impact Analysis and Environmental Management and Monitoring Program, these have not covered all aspects of all activities as mentioned above.

This study proposes to offer a comprehensive and integrated solution which will involve Jakarta local government as the institution responsible for managing the city the Ministry of Industry, the Ministry of Environment, the Ministry of Communication and other institutions dealing with environment and port policies. Finally, this study will draw conclusions and make necessary recommendations to overcome and solve the problem.

I.3. The structure of the dissertation

The purpose of this dissertation is to propose a solution to the environmental problem in the port of Tanjung Priok. Institutional and management approaches to implementing the environmental program in the port of Tanjung Priok will be proposed to the management of the port, Which has the authority and responsibility for maintaining its environmental condition. Other interested parties or institutions having responsibilities for the condition of the port will also be involved so that the study can be seen as a comprehensive and integrated solution to the problem.
This dissertation consists of 5 chapters. In order to propose the solution, it is important to have a clear picture of the condition. This is set out in Chapter I. The succeeding chapter, chapter II will describe the existing environmental condition in the port of Tanjung Priok; particularly, water, air and sediment; and identify the sources of pollution and associated circumstances related to the cause of the pollution. This chapter will also examine and identify the contribution of each activity as mentioned above to the pollution.

Next, chapters III will describe the existing environmental program in the port and examine the obstacles behind its implementation. The institutional bodies, which have responsibility for managing environmental matters in Indonesia, especially in the sea transport sector, will also be described, together with the legislative framework, related to environmental protection. In this chapter, the problem of utilizing reception facilities in the port will also be discussed. This chapter together with chapter II will become the basics for proposing the solutions, which will be offered in chapter IV.

In Chapter IV, an intersectoral or institutional approach will be proposed in order to attain a comprehensive and integrated solution to the problem. This solution will involve the local government, private companies, ministries of the environment, communications, and other ministries and departments with responsibilities for industrial activities. An alternative solution to increase the utilization of reception facilities will be proposed as well.

Finally, this study will draw some conclusions and make necessary recommendations to overcome the problem, which will be given in Chapter V.
CHAPTER 2

THE PRESENT ENVIRONMENTAL CONDITION
IN THE PORT OF TANJUNG PRIOK AND THE CAUSES

2.1. The port of Tanjung Priok in Brief

2.1.1. Location

Tanjung Priok is the biggest and most important port in Indonesia and is located at the northern part of the capital city of Indonesia, Jakarta, in the area named Jakarta Utara. The port is also situated in the bay named the Jakarta Bay. Because the port is situated on the north coast of Java Island, it has direct access to the Java Sea and the Sunda Straits, which is a key maritime route in South East Asia.

The port of Tanjung Priok is positioned directly adjacent to the most crowded residential region of the city so that the activity of the port directly impacts the people. At the west side of the port there also exists a big recreational complex called Ancol Dunia Fantasi and one marina facility called Marina Ancol, which is provided especially for tourism.

With regard to the subject of this dissertation, it is also important to know that the port of Tanjung Priok is traversed 3 small rivers that flow directly into the port basin. These rivers and the canal are named River Japat (Kali Japat) at west part of the port, River Sunter Baru (Kali Sunter) at the east part of the port and the Koja canal in the middle of the port area (see lay out of the port at figure 1). These two rivers and the one canal play important roles as the principal conveyor of outflowing of pollutant from the hinterland to the port area.
2.1.2. Administration of the port

The port of Tanjung Priok is managed and operated by the Indonesia Port Corporation II (PT. Pelabuhan Indonesia II), a state owned company under the responsibility of Ministry of Communication. The aim of the port is to implement and support the government policies and programs of national economic and development, and as for the company itself, to make profits by providing port services and other related industry. There are 14 branch ports operated under the company, and the port of Tanjung Priok is a main port where the head office of the company is located.

2.1.3. Main Facilities (infrastructures)

As the main port of the country, the port plays an important, and at the same time a strategic role in the economic development and activities of the country, especially for the regional economy where the port is located. Statistically, currently more than 50% of all Indonesian imports and exports are handled through the port of Tanjung Priok.

Because of its size and importance, the port has been equipped with complete facilities and modern equipment to handle both general cargo and specialized cargo such as container, dry bulk as well as liquid cargo. These specialized cargoes are handled at special or dedicated terminals. At the present time, there are three container terminals in the port of Tanjung Priok of which: container terminal I and container terminal II, have been operating for the past 20 years. The other third is a new container terminal called Koja Terminal, which was constructed, in a joint cooperation with a private company in the form of build-operate and transfer (BOT).

With regard to the liquid terminal facilities, there is one oil terminal and one chemical cargo terminal. The oil terminal belongs to the National Gas and Oil Company called PERTAMINA, which was established for the import of refined oil for local consumption. The chemical terminal belongs to a private company that handles raw materials for some industries in the hinterland of the port. The other special terminals are for handling grain
(wheat), clinker, soda ash and scrap iron. In the port of Tanjung Priok, there is also one passenger terminal for embarking and disembarking passengers both for domestic passenger and foreign passenger (cruise ship).

The port has an access channel of 8,000-meter length, and with a depth ranging from 11 to 12.9 meter LWS. The total water area of port is 424 ha which are divided into 6 main basin namely: Nusantara Basin (Kolam Nusantara), Perahu Basin (Kolam Perahu), Basin I, Basin II, Basin III and the Oil Basin (Kolam Minyak). The port is protected by breakwater, which has length of 8.456 meter. There are also industrial activities existing in the port area. The total area of the industrial complex in the port is about 10 % of the total land area, which is some 604 ha. The total length of wharf facilities for conventional cargo as well as passenger terminals is 7,883 meters while for dedicated wharf (container, wheat, chemical and oil terminal) is 1,868 meters. The detailed data on the wharves are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Wharf</th>
<th>No. of Berth</th>
<th>Total Length (m)</th>
<th>Depth (m LWS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Cargo</td>
<td>36</td>
<td>5,596</td>
<td>4-11</td>
</tr>
<tr>
<td>2</td>
<td>Multi purpose</td>
<td>2</td>
<td>322</td>
<td>5-9</td>
</tr>
<tr>
<td>3</td>
<td>Dry Bulk</td>
<td>9</td>
<td>1,577</td>
<td>8-11</td>
</tr>
<tr>
<td>4</td>
<td>Liquid Bulk</td>
<td>6</td>
<td>320</td>
<td>5-9</td>
</tr>
<tr>
<td>5</td>
<td>Container</td>
<td>7</td>
<td>1,330</td>
<td>8-13</td>
</tr>
<tr>
<td>6</td>
<td>Passenger</td>
<td>1</td>
<td>150</td>
<td>6</td>
</tr>
</tbody>
</table>

*Source: Port of Tanjung Priok, Jakarta, 1998*
2.1.4. Traffic

The port receiving some 2,321 oceangoing ships and approximately 8,797 inter-island ships in the year 1997. In addition, as the port that supports passenger traffic to almost all points in Indonesia, the port served ferry traffic transporting 785,098 passengers in 1977, both for embarkation and disembarkation. The cargo and passenger traffic is shown in table 2 and 3 below:
Table 2: Ship call (unit) in Tanjung Priok 1993-1998

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OCEAN GOING</td>
<td>2,700</td>
<td>2,291</td>
<td>2,341</td>
<td>2,183</td>
<td>2,321</td>
<td>1,029</td>
</tr>
<tr>
<td>INTER ISLAND</td>
<td>5,604</td>
<td>5,924</td>
<td>7,396</td>
<td>8,261</td>
<td>8,797</td>
<td>4,439</td>
</tr>
<tr>
<td>CONTAINER SHIPS</td>
<td>1,748</td>
<td>2,038</td>
<td>1,682</td>
<td>1,839</td>
<td>2,280</td>
<td>1,397</td>
</tr>
<tr>
<td>TANKER</td>
<td>592</td>
<td>599</td>
<td>517</td>
<td>542</td>
<td>723</td>
<td>502</td>
</tr>
<tr>
<td>OFFSHORE</td>
<td>2,886</td>
<td>1,886</td>
<td>1,173</td>
<td>1,463</td>
<td>1,020</td>
<td>640</td>
</tr>
<tr>
<td>TOTAL</td>
<td>13,525</td>
<td>12,733</td>
<td>13,109</td>
<td>14,288</td>
<td>15,141</td>
<td>8,007</td>
</tr>
</tbody>
</table>

Note: *) Up to July
Source: Port of Tanjung Priok, Jakarta, 1998

Table 3: Passenger Flow (person) in the port of Tanjung Priok 1993 – 1998

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBARKATION</td>
<td>361,335</td>
<td>426,724</td>
<td>510,337</td>
<td>386,322</td>
<td>430,230</td>
<td>292,764</td>
</tr>
<tr>
<td>EMBARKATION</td>
<td>345,719</td>
<td>354,649</td>
<td>512,253</td>
<td>413,713</td>
<td>354,868</td>
<td>282,983</td>
</tr>
<tr>
<td>TOTAL</td>
<td>707,074</td>
<td>781,373</td>
<td>1,022,590</td>
<td>800,035</td>
<td>785,098</td>
<td>575,747</td>
</tr>
</tbody>
</table>

Note: *) Up to July
Source: Port of Tanjung Priok, Jakarta, 1998

The figures above show the activities within the port that relate to ship services and cargo handling activities. The author will further show that there are other activities, besides these mentioned above, which are also important, and which make a significant contribution to the national, as well as regional economic development in terms of creating employment and value added contributions to both the regional and national GDP. However, the further discussion of those activities will not be addressed in relation to their contribution to economy development, but rather in relation to the impacts on the environmental conditions in the port area.

2.2. The port activities as they relate to the cause of the pollution

As we all know, both the development of a port and its subsequent operation may give rise
to a wide range of impacts on the environment. However, in relation to the source of the impact on the port, only the impact caused by port operations and from other activities and sources such as from land based and industrial activities in the port area will be described in this dissertation. In other words, the impacts resulting from development or new construction of the port will not be addressed.

In general, there are several specific impacts associated with port operations as follows:

- From ship operations (water pollution, air and noise pollution)
- From cargo handling and cargo storage activities (water pollution, air and noise pollution)
- From port maintenance activities
- Generated by industrial activities within the port (waste or Industrial discharges, gas emissions).
- Generated from office or business activities.

2.2.1. Ship Operation

2.2.1.1. Water pollution

Ship operations in the port present potential dangers for the environment. Ship collision, ship grounding, shipwreck, damage or accident on board e.g. explosion, fire, spill, may have serious consequences in terms of pollution by fuel oil being discharged into the water. Generally, there are four basic categories of ship generated wastes as it has been stated under the 'International Convention for the Prevention of Pollution from ship of 1973, with protocol of 1978' (MARPOL convention73/78) namely:

1. Oily waste, which usually consist of some oil mixed with a much larger quantity of sea water, and also fuel residues, and sludge.
2. Chemical substances, noxious liquid substances carried in bulk in parcel tankers and dry bulk carrier, ballast water or water from tank cleaning..
3. Sewage, generated by passengers and crew
4. Garbage, originating from the crew and passengers.

Ship coming to a port generally produce oil wastes such as fuel residues, sludge, bilge water, ballast water, tank cleaning water, lubricant oil and other residues in machinery spaces. Discharge and spills of these wastes cause problems of water quality. Once an oil or oily compound is discharged into the water, it is spread on the surface by winds and currents, forming a thin layer. On the surface of seas in tropical or temperate zones, oils can be polymerized gradually by biodegradation and eventually form dense particles which sink (ESCAP, 1992, 14). This leakage and spill of the waste may cause direct damage to the aquatic biota and coastal habitat.

Another problem related to the water quality in a port area arises from sewage and garbage. These two pollutants are generally generated from ship crew and passengers. Sewage generally is produced from sanitary rooms and kitchens and even though it is usually less harmful than the previously mentioned materials (since it concerns biodegradable component), it is prohibited to discharge such material in the port water. Garbage could be organic garbage (i.e. food leftovers) or inorganic garbage i.e. plastic. Organic garbage may have as toxic effect on the aquatic biota if it is precipitated because it has a high oxygen demand when it is being degraded by bacteria. Inorganic garbage such as plastic is also to be considered undesirable material in the sea or port water. It is known that the quantities of persistent plastic dumped by all kinds of ship at sea are enormous. If this is occurred in the port area it would cause visual pollution in port.

2.2.1.2. Air and noise pollution

Other sources of pollution generated by ships include exhaust-gas emissions to the air (auxiliary engine, boiler, etc), noise from ship engines and emission of cargo vapors from tanks (UNCTAD, 1993, 18). NO₂ and SO₂ are typical pollutants generated by ships while both maneuvering and berthing and may effect air pollution in the hinterland (ESCAP, 1992, 14). Noise pollution could result from ship engines when maneuvering, ship ramps when heavy cars are passing the ramps, and ferry terminal car parks. Noise pollution not only
impacts the workers within the port but also the causes annoyance and discomfort to the nearby properties or residential areas.

2.2.2. Cargo Handling

There is no doubt that cargo-handling activities within a port can have a negative impact on the environment. The impact can vary depending on the type of cargo being handled. The most common impacts are water pollution, air pollution, noise pollution and visual pollution.

2.2.2.1. Water pollution

Liquid cargoes such as oil, oil products, and other liquid chemicals may cause water pollution if they are not handled properly. Petroleum as an oil product for instance, has varying properties, but most of them are flammable and toxic to humans and biota. Virtually, all petroleum products are harmful to the environment when released (UNCTAD, 1993,9). A spill of this substance into the water body can occur when there is a failure in the pipeline connection or valve, manifold between ship and shore.

2.2.2.2. Air and noise pollution

The major pollutant generated from cargo handling operations are dust and gas emission. Air pollution, especially dust, can occur when dry bulk cargoes such as grain, clinker, coal, ore are being handled. This pollutant can cause serious health problems not only to the workers in the handling terminal but also to the people living in residential area around the port. Emission of gasses from cargo handling equipment and cargo traffic by truck in the port can also be sources of air pollution. The most common gas emissions produced are SO$_2$, NO$_2$, CO, and Hydro Carbon (HC). In container terminals for instance, straddle carriers used for moving containers in container yards can produce a lot of gas emission from their engines, which leads to the air pollution.
Noise pollution generated from port activities in general, and particularly from cargo handling activities, must also not be neglected. This pollution may become a serious problem if the level of noise is exceeding the permissive level. This high level of noise creates a potential risk to the hearing of workers, and therefore was consequences for the safety of working.

2.2.3. Cargo Storage

Cargo storage is another important activity within the port, which can also pose a threat to the environment. Generally, the pollutants generated from these activities can result from the storage of liquid cargoes, dry bulk cargoes as well as general cargoes. The threat becomes bigger if these kinds of cargoes are an IMDG class of dangerous goods.

Liquid cargo, which is usually stored in tanks may pose a potential danger if the tank is not properly maintained and regularly checked. Leakage from tanks and/or pipeline connections can cause spills of the cargo into the ground, and then may cause pollution to the soil and water in particular groundwater. Because of nature of some special liquid cargoes that are flammable and/or toxic, the risk of fire, explosion and emission of the product vapors also can not be neglected. Hence, storage of these kind of cargoes must be done following some procedures.

Storage of dry bulk cargoes such as grain, clinker, phosphate, mainly creates dust and smell. The dust may pollute soil, or deteriorate commodities or equipment stored in the open air. When the dust is blown in the water, contamination of the seabed and its sediments may result (UNCTAD, 1993, 12).

2.2.4. Port maintenance

Regular maintenance of ports is an essential agenda of a port authority to ensure the availability of port infrastructures and facilities. In general, there are two important elements that are regularly need to be maintained, namely:
• Depth of port basin and access channel
• Equipment and other facilities

2.2.4.1. Maintenance of port basin and access channel

In order to maintain the depth of basin and access channel, maintenance dredging must be undertaken regularly, especially for those ports which are located at the estuary or mouth of rivers whose silt and other material is carried downstream to where it settles in the basin or access channel. In fact, there are some negative possible effects of dredging such as dispersal and settlement of re-suspended sediment, loss of bottom habitat for benthic communities and release of harmful substances into the water column (Curtis, 1991).

Another issue arising from dredging works is disposal of dredged material. If the material is of a suitable nature then it can be used for reclamation for instance or other engineering purposes. But, if the material have been contaminated, the disposal of the material may cause a problem, because whenever it is disposed of, there is a risk of serious impact to the environment. Dredge spoil is transported from its original site to a dumping site. Clearly any contamination associated with the spoil will also be transported to the dumping site. The immediate effect of spoil is to cover the surface sediment with solids, which may have a harmful effect on the benthos. If dumping is extensive the long-term changes in animal populations or marine benthic organisms may occur (Preston, 1998). Hence, to avoid this negative impact, the selection of dumping site is critical, especially for contaminated material, when it is dumped at sea.

The volume of maintenance dredging in the port of Tanjung Priok is approximately 500,000 cubic meters per year. The maintenance dredging is needed due to the extensive sedimentation taking place, especially at the mouth of River Japat, River Sunter Baru and the Koja canal. For dumping the material, the port has selected and analyzed one of the most possible dumping sites in Jakarta bay, in the area named Muara Gembong about 10 km northeast of the port.
2.2.4.2. Maintenance of port equipment and facilities

Some port equipment and facilities are need to be regularly cleaned and repainted. These works can result in pollution of the water and soil as a result of the paint or other materials used being sprayed, or falling into the water or soil. Repair work on the equipment, which is usually done in a workshop, may also cause water and soil pollution, mainly by grease and oil. All of these works also generate noise and present a potential source of accidents such as fire and explosion.

2.2.5. Industrial activities within the port

Recently, it has been become a trend to establish industrial complex as within the port area, especially for export oriented industries to get the most economical benefit of logistic cost or transport cost reductions due to their location close to the port as a part of transportation chain.

The industrial activities within the port are no doubt becoming an important source of pollution within the port especially if the industrial discharges are not treated properly. The industrial activities produce some effluents which may include toxic and harmful substances, unsanitary wastes, oily wastes and other hazardous materials. These kinds of materials may be disposed into the port water without treatment.

At the moment, there are 9 factories or industries established within the port of Tanjung Priok, which are located in two separate complexes. One is at the west part of the port at the mouth of River Japat, around the ‘Nusantara’ Basin and the other one is at the eastern part of the port, around PERTAMINA oil terminal or ‘oil’ basin (see figure 1). Beside the factories in these two locations, there are also 5 ship repair yards and one electrical power plant.

These factories/industries are as follow:
• **Paint Factory**
  The factory produces various kinds of paint for housing and industrial building. Because of the nature of this industry that involves extensive use of chemical materials, the possible pollutants generated from this activity can be lead (Pb), Cadmium (Cd), Zinc (Zn), Copper (Cu) and Mercury (Hg).

• **Assembly Plant**
  This factory assembles cars for one particular brand name of car, both for the local market and for export. Some works like painting, anti-rust spraying, welding, molding and other processing works can produce some chemical substances. Grease and oil are another pollutant which are very often generated from these kinds of activities.

• **PVC resin factory**
  This factory produces PVC resin which is used as a raw material in plastic or pipe industries, stationary and house appliance industries. This industry also produces some possible pollutants like heavy metal and other chemical substances.

• **Soya bean processing plant**
  This factory processes soya bean seed (soya max) to produce palm oil. The process produces some amounts of wastewater containing oil and alkali, and can influence the BOD, COD and pH level of the port water if the waste is not treated before discharge into the water.

• **Shipyard and repair**
  There are 5 ship repair yards located in the port of Tanjung Priok. Four of them belong to a state-owned company while the other belongs to a private company. It has been recognized that shipyard and repair activities produce pollutants such as heavy metal and organotin tributyltin (TBT) which are contained in antifouling paints. Antifouling paint is used to coat the bottom of the ship to prevent sea life such as algae and molluscs attaching themselves to the hull thereby slowing down the ships and increasing fuel consumption (IMO/b, 1998, p.12). This compound slowly ‘leach as’ into the seawater, killing barnacles and other marine life that have attached themselves to the ship. But studies have shown that these compounds continue to exist in the water, killing sea life, harming the environment and possibly entering
the food chain (IMO/b, 1998, p.12).

- **Power Plant**
  
  The power plant was built to supply electricity for the city of Jakarta, including for the industrial complex. Since the electrical generation process uses water for cooling of its engines, it may release heated water into the water body where the water is discharged, which posing direct threat to the marine biota.

### 2.2.6. Office or business activities

Last but not least, another source of pollution in the port area is office or business activity. As a port becomes a center of business or logistic platform, so it is usual for all related companies or institutions such as shipping companies, ship agent, freight forwarders, customs, police, immigrations, coast guard, port administrators, and the port company itself establish their office in the port area. All kinds of activities involving about 13,000 people, may create some pollutants like garbage, and sewage. If in the port, there is no an adequate system for treatment or disposal of these wastes then pollution on both the land and water areas will occur.

### 2.3. Pollution from land based sources

#### 2.3.1. Output from the rivers

Bearing in mind that the port of Tanjung Priok is surrounded in the city of Jakarta, the pollution from the land-based sources is also a serious problem along the coastline and particularly in and around the port where major populations concentrate in the city. The kind of pollution from this source is generally massive outflows of effluent of industrial waste, sewage and garbage from the population area through the River Japat, River Sunter Baru and Koja canal. These pollutants not only affect the water quality but also affect the sedimentation in the port basin due to material settling in the port basin.

#### 2.3.2. Pollutant from population area
Since the early of 1970's, the urban sprawl of the city of Jakarta has grown into the adjacent province of West Java. For developing and planning purposes, this large urban area is known as Jabotabek, an acronym for Jakarta, and its West Java satellite town of Bogor, Tangerang and Bekasi.

Presently, the population of Jakarta is about 11 million people. Population growth is high, as the city is a magnet for migrants from other area of Indonesia. As the population become higher, the environmental problem increases as well. Sewage and garbage from houses is a major problem in the city because there is no an adequate and efficient system of sewage and garbage disposal. As a result, the sewage and garbage is dumped into the rivers, mainly by poor and uneducated people who live along the rivers. However, sewage disposal has been a problem (recognized or unrecognized) ever since humans started to live in large communities. Option for the disposal of sewage on land are limited and for many years rivers, estuaries and the seas have been used as a means of solving the problem (Preston, 1998, 15). It is now this situation that the port of Tanjung Priok is facing of, where a lot of solid garbage and sewage comes into the port through the rivers. Sewage from residential or population area in the city of Jakarta may also contain coliform bacteria and may cause undesirable contamination of the port water.

2.3.3. Pollution from industrial discharge

Due to creation of an industrial complex in the city and/or in the hinterland of the port in the wake of rapid economic progress throughout the period of high level of economic growth in the last decade there has been a serious increase in pollution. There are a lot of industries located along the rivers and they are not only big scale industries but also many small scale or ‘home’ industries. In this connection, most of the causes of pollution in the port are from the home industries that are located along the rivers and within and around the city of Jakarta.

It has been reported, based on some studies carried out by the Environmental Control
Agency (BAPEDAL) that most factories in Indonesia have a strong tendency to dump wastewater without treatment into rivers. Therefore, due to these common practices, the pollution will not only affect the area where the factories are located but also reach the port or ocean through the rivers that flow into them.

2.4. Present environmental conditions at the port of Tanjung Priok.

One of the objectives of the study is to identify the present problem and type of pollution in the port of Tanjung Priok. The description will be focused on water quality as a main issue of the problem, but sediment quality will also be presented in this sub-chapter in order to present an overall picture of the environmental condition.

2.4.1. Standard level used

Indonesia is one of the countries, which has had in force some regulations concerning environmental protection. Regarding permissible standards value, several regulations including on water and air quality have been introduced. For purposes of analyzing the environmental conditions in the port of Tanjung Priok, the author will use the permissible standard level which was issued through Minister Decree of the Minister of Environment (Keputusan Menteri Negara Lingkungan Hidup): Kepmen LH No. Kep-02/MENKLJ/I/1988. The Decree regulates standards of seawater quality for Indonesian mariculture, as it has been used as a standard value or guidelines on environmental study of the port of Tanjung Priok.

2.4.2. Location of observations

In order to achieve a comprehensive result; observations for measuring water quality were made covering all the key areas within the port. Several key observation sites were selected so as to get a clear picture and to understand the influence of the rivers that flow into the port, the industrial activities within the port and also the influence of the port activities themselves such as ship and cargo handling operations.
Those all locations of observations (stations) were as follows:

S-1 = The mouth of River Sunter Baru
S-2 = The mouth of Koja Canal
S-3 = The Mouth of River Japat
S-4 = Near the eastern breakwater
S-5 = The Oil Terminal
S-6 = The west entrance to the port
S-7 = Near Basin I
S-8 = Near Basin III
S-9 = Near the liquid chemical terminal

(See appendix 2)

2.4.3. The quality parameters

There are several parameters or indicators, which can be used for examining the quality of water. Some major parameters that will be discussed in this section are as follow:

1. Physical elements:
   - Temperature
   - Turbidity
   - Suspended Solid

2. Chemical elements:
   - pH
   - BOD
   - COD
   - Heavy metal
   - Ammonia, Nitric, Cyanide, Phenol

3. Biological elements:
   - Phytoplanton
2.4.4. Physical elements

2.4.4.1. Temperature

Temperature plays an important role in the marine environment relating to the life of marine organisms (Breman 1998). Based on the monitoring, the temperature of seawater in the port of Tanjung Priok ranges from 30.1°C to 32.2°C at the surface water and from 27.3°C to 31.1°C at the bottom. Temperatures within the rivers showed little variation between surface and bottom. Temperatures ranged from 27.4°C to 33.7°C in the surface water and 27.8°C to 33.2°C at the bottom during low tide, while during high tide the temperatures showed the interval between 27.4°C to 30.5°C at the surface and 27.8°C to 29.8°C at the bottom. The interval of the temperatures above still remain within the limit set by Indonesian Mariculture Standard as natural.

2.4.4.2. Turbidity

Turbidity is an indicator of the amount of sunlight arriving at the sea surface and penetrating into the water depth, and may vary with time of day, season and weather. The depth to which any wavelength penetrates depends partly on the amount of suspended particles and chlorophyll in the water (Berman, 1998). In addition, turbidity is essential for plant reproduction, the growth of plants and photosynthesis.

The turbidity in the port of Tanjung Priok varies from one observation point to another, ranging from 2.1 to 91.5 Nephelometric Turbidity Unit (NTU). The highest values were measured at the mouth of River Japat, River Sunter Baru and Koja Canal respectively 36.9; 34.6 and 91.5 NTU. These highest values exceed the permissible level of Indonesian mariculture standard, which is equal or less than 30. These bad values indicate that the rivers have been heavily polluted by many substances discharged from many activities located along the rivers. Table below shows the turbidity at all monitoring system:
### Table 4: The turbidity level (NTU) in the port of Tanjung Priok 1993/1994

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<td></td>
<td>34.6</td>
<td>91.5</td>
<td>36.9</td>
<td>9.1</td>
<td>28.5</td>
<td>3.2</td>
<td>3.52</td>
<td>10.3</td>
<td>2.1</td>
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</table>

*Source:* Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok
PT. Pelabuhan II, Jakarta, 1994

#### 2.4.4.3. Suspended Solid

Other physical indicators of water quality are suspended solids. This parameter is closely related to turbidity because suspended solid also influence the turbidity. Suspended solid in the water may consist of organic and inorganic particles. The source of the particles could be from urban run-off and/or from industrial discharge. Based on the laboratory analysis, the value of suspended solid in the port of Tanjung Priok is varies from 34 mg/l to 119.5 mg/l. The lowest value was measured at the eastern part of the port, while the highest value was at the mouth of Koja canal. This high value indicates that the river has been heavily polluted. The Indonesian permissible standard value for suspended solid is equal or less than 80 mg/l. All results of observations are displayed in the table below:

### Table 5: The Suspended Solid concentration (Mg/l) in the port of Tanjung Priok 1993/1994

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<tr>
<td></td>
<td>43.8</td>
<td>119.5</td>
<td>56</td>
<td>30.3</td>
<td>34.0</td>
<td>22.9</td>
<td>26</td>
<td>30.4</td>
<td>18.4</td>
</tr>
</tbody>
</table>

*Source:* Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok
PT. Pelabuhan II, Jakarta, 1994

#### 2.4.5. Chemical elements

##### 2.4.5.1. pH

pH is a measure of acidity of a wastewater sample. If water has pH level of less than 7 it means that the water is acid. If it is greater than 7, then the water is alkaline. Because ocean and sea water are naturally slightly alkaline, the acid is neutralized and no harm
should occur. However, if in particular sheltered or limited areas the concentration of acid is very high then a treat to marine life can occur. Measuring of pH level in the port of Tanjung Priok water showed the slightly neutral level as it present in the table below:

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Because the Indonesian permissible standard value for pH is 6 to 9 and the desirable level is 6.5 to 8.5, so it may be concluded that the pH levels still remain at acceptable levels.

### 2.4.5.2. BOD and COD

We use the data on Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), the most commonly used indicators for organic waste in industrial effluent, as the indicator of pollution intensity. The BOD is the amount of oxygen used over a five-day period by microorganisms as they decompose organic matter at a temperature of 20' C (68' F). The COD is the amount of oxygen required to oxidize the organic matter by use of dichromate in acid solution (Encarta 1998).

The Indonesia permissible standard value for BOD is equal or smaller than 45 mg/l, while for COD is equal or smaller than 80 mg/l. Based on laboratory analysis the concentration of BOD was higher in the mouth of River Japat and Koja canal (49.2 mg/l and 55.7 mg/l respectively). The same situation with respect to COD concentration was 106.1 mg/l in the mouth of river Japat and 113.1 in the mouth of Koja canal. The high level of the BOD and COD level in these two locations should be interpreted as a broad indicator of overall deterioration of pollution in these two outflows, which have many sources of industrial discharge and sewage from population areas. Sewage has a high oxygen demand and
many inland waters have experienced serious harmful effect from oxygen depletion and excessive nutrient concentration (Preston, 1998, 15).

The table below shows the result of measuring the BOD and COD level in all observation stations:

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<tbody>
<tr>
<td>BOD</td>
<td>38.2</td>
<td>55.7</td>
<td>49.2</td>
<td>20.4</td>
<td>20.4</td>
<td>25.5</td>
<td>20.4</td>
<td>19.2</td>
<td>18.0</td>
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<tr>
<td>COD</td>
<td>77.8</td>
<td>113.1</td>
<td>106.1</td>
<td>55.6</td>
<td>74.3</td>
<td>38.9</td>
<td>70.7</td>
<td>56.6</td>
<td>42.4</td>
</tr>
</tbody>
</table>

Source: Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok PT. Pelabuhan II, Jakarta, 1994

### 2.4.5.3. Heavy metal

All natural metals occur in seawater in greater or lesser amounts. Some, such as iron, copper, cobalt, and zinc are essential in small quantities for the healthy growth of marine organism. All metals are toxic if present in excess, but the most important marine contaminants are generally considered to be among the nonessential elements (Preston(2), 1998, 130).

Naturally, various metal elements exist in the marine environment, which might come from sediments carried by rivers or channel water because of erosion or dust absorption from the atmosphere. Other sources could come from human activities onshore or offshore such as industrial activities, agriculture, mining, and sea transportation activities (Nahdudin, 1998, 16).

To get a comprehensive picture of metal levels in the port, both heavy metal concentration in water samples and sediments are presented. Table 8 below show the metal elements concentration (Hg, Cr, Cu, and Zn) in the port of Tanjung Priok, of which only Cr (hexavalen) exceed the Indonesian permissible standard value, especially at the mouth of River Sunter Baru and River Japat. This element could be come from industrial discharge
either from industrial activities located within the port or along the rivers. The Indonesian standard value are equal or <0.003, equal or <0.01, equal or <0.06, equal or <0.1 mg/l respectively for Hg, Cr, Cu and Zn.

Table 8: The Heavy Metal concentration (mg/l) of water sample in the port of Tanjung Priok 1993/1994

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<th>S-5</th>
<th>S-6</th>
<th>S-7</th>
<th>S-8</th>
<th>S-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.0006</td>
<td>0.006</td>
<td>0.0019</td>
<td>0.0010</td>
<td>0.0010</td>
<td>0.0010</td>
</tr>
<tr>
<td>Cr.</td>
<td>0.0863</td>
<td>0.0017</td>
<td>0.0350</td>
<td>0.0350</td>
<td>0.1017</td>
<td>0.0063</td>
<td>0.0081</td>
<td>0.0063</td>
<td>0.0054</td>
</tr>
<tr>
<td>Cu</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.0072</td>
<td>0.0098</td>
<td>0.0017</td>
<td>0.0350</td>
<td>0.0683</td>
<td>0.0350</td>
</tr>
<tr>
<td>Zn</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.0090</td>
<td>0.0175</td>
<td>0.0066</td>
<td>0.0022</td>
<td>0.0086</td>
<td>0.0250</td>
</tr>
</tbody>
</table>

Note: *-) = not available
Source: Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok PT. Pelabuhan II, Jakarta, 1994

**Heavy metal in sediments:**
Measurement of heavy metal concentration in sediments were made at three locations, namely, at the mouth of River Japat, River Sunter and Koja canal. The resulting observations indicate the high level for all elements, with the average highest level occurring at the mouths of the Rivers. This condition indicates that the sediment at those places have been heavily contaminated by pollutant that could be come from the industrial discharge. The result of laboratory tests is shown in table 9 below:

Table 9: The Heavy Metal concentration (mg/l) of sediment in the port of Tanjung Priok in 1993/1994

<table>
<thead>
<tr>
<th></th>
<th>S-1</th>
<th>S-2</th>
<th>S-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg</td>
<td>0.0412</td>
<td>0.0601</td>
<td>0.4530</td>
</tr>
<tr>
<td>Cr.</td>
<td>37.7461</td>
<td>32.4186</td>
<td>22.1041</td>
</tr>
<tr>
<td>Cu</td>
<td>10.2591</td>
<td>12.9739</td>
<td>48.3206</td>
</tr>
<tr>
<td>Zn</td>
<td>79.0431</td>
<td>84.3107</td>
<td>107.0602</td>
</tr>
</tbody>
</table>

Source: Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok PT. Pelabuhan II, Jakarta, 1994

2.4.5.4. Ammonia, Nitrite, Cyanide, and Phenol
These elements are some of a number of important poisonous chemical substances that are very harmful to marine life. Concentrations of these substances in the water reflect the condition of the water, which has been polluted by various sources. Concentrations of this substances in the port of Tanjung Priok water could come from industrial discharge mainly through outflow of the rivers. Based on laboratory analysis of all samples, it may be seen that the concentration of the 4 chemical substances exceed the Indonesian permissible standard values which are equal or < 1 mg/l for ammonia, Zero (0) for Nitrite, 0.20 mg/l for cyanide and equal or less than 0.002 mg/l for phenol (except for sample of nitrite taken at the mouth of River Japat which is undetectable).

**Table 10**: The Concentration of Ammonia, Nitrite, Cyanide and Phenol (mg/l) of water sample in the port of Tanjung Priok 1993/1994

<table>
<thead>
<tr>
<th></th>
<th>S-1</th>
<th>S-2</th>
<th>S-3</th>
<th>S-4</th>
<th>S-5</th>
<th>S-6</th>
<th>S-7</th>
<th>S-8</th>
<th>S-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>6.40</td>
<td>1.15</td>
<td>2.05</td>
<td>2.58</td>
<td>16.40</td>
<td>1.10</td>
<td>4.41</td>
<td>1.96</td>
<td>2.44</td>
</tr>
<tr>
<td>Nitrite</td>
<td>0.751</td>
<td>0.751</td>
<td>X*</td>
<td>13.544</td>
<td>1.345</td>
<td>6.106</td>
<td>4.023</td>
<td>X*</td>
<td>6.404</td>
</tr>
<tr>
<td>Cyanide</td>
<td>3.6301</td>
<td>4.2140</td>
<td>2.2413</td>
<td>6.5700</td>
<td>3.9212</td>
<td>2.3045</td>
<td>7.3430</td>
<td>2.8679</td>
<td>3.8210</td>
</tr>
<tr>
<td>Phenol</td>
<td>0.09</td>
<td>0.47</td>
<td>0.08</td>
<td>0.64</td>
<td>0.06</td>
<td>0.07</td>
<td>0.83</td>
<td>0.05</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*Note: *) undetectable
*Source: Rencana Pengelolaan Lingkungan, Pelabuhan Tanjung Priok
PT. Pelabuhan II, Jakarta, 1994

2.4.6. Biological elements

Biological elements usually taken for water quality measurement are plankton, which consist of phytoplankton and zooplankton. Phytoplankton are single-celled, floating plants from which the vast majority of the oceans primary production is based. Phytoplankton are composed of several diverse groups of algae that carry out autotrophic production and begin the pelagic marine food chain (Berman 1998, 5). The marine zooplankton community includes many different species of animal, ranging in size from microscopic protozoan to animals of several meters in dimension (Berman 1998, 7).

In measuring the biological elements in the port of Tanjung Priok water, only 2 - 4 species of phytoplankton were found at the time of high tide with diversity around 0.68 to 1.38. At
the time of low tide, the amount of phytoplankton in the sample was 2 - 3 species with diversity of about 0.24 to 0.92 (SEL Tanjung Priok, 1994).

The situation with regard to quantity of zooplankton was similar, where only 1-7 species with diversity of about 0 – 1.56 in a high tide, and 3 – 7 species with diversity of 0.80 to 1.71 at low tide (SEL Tanjung Priok, 1994).

The limited population of the plankton gives a strong indication that the water condition of the port of Tanjung Priok is bad. Plankton are very vulnerable and the life of these benthic flora and fauna is totally depend on the good quality of water in terms of freedom from pollutant and low turbidity.

2.4.7. Air Quality

As the port located in the city and very close to residential areas and business centers, the source of air pollution is difficult to identify, because of wind, the gas emissions affecting the port could be coming from outside the port. In fact, in general, the air quality in the city of Jakarta is bad due to the high level of motorized vehicles, especially various kind of public transportation, which produce relatively high concentrations of gas emissions such SO$_x$, NO$_x$, CO, Pb. Nevertheless, the port of Tanjung Priok has tried to reduce the air pollution especially pollution by dust from cargo handling processes by implementing good operating procedures.
CHAPTER 3

THE ENVIRONMENTAL PROTECTION PROGRAM IN THE PORT OF TANJUNG PRIOK AND THE OBSTACLES TO ITS IMPLEMENTATION

This chapter will discuss the environmental protection program that is applied to the port of Tanjung Priok and the obstacles to its implementation. The shortcomings that are inherent in the program will also be explained. Before addressing this topic, the legislative framework on environment policy in Indonesia, especially in sea transportation and the port sector, together with the role of the Indonesian Maritime Administration in environmental policy will be discussed, to give a brief description of their role in environment policy in the maritime and port sectors. Finally, the utilization of reception facilities, a key element in implementing environmental program in the ports, will be discussed.

3.1. Legislative framework on environmental policies

Indonesia is an archipelagic state consisting of approximately 17,000 Islands. Because it is an archipelago, Indonesian domestic and export commerce is highly dependent on shipping, and thus on port operations. Also Indonesia is located on the main shipping routes between Asia (or east bound) and Europe (or westbound). A major portion of the traffic via these shipping routes are tankers providing oil or oil products to industrial countries such as Japan and countries in Europe or the United States.

Since the length of coastline reaches about 80,800 km, sea transport plays vital role in transporting people and distributing goods, both for domestic and international destinations.
Currently, there are 1889 ports in Indonesia which consist of 656 public ports and 1,233 special ports. 112 of the public ports are commercial ports, which are managed and operated by the Indonesian Port Corporation Ltd. (PT. Pelabuhan Indonesia), while the remaining are non-commercial ports which are managed by the government i.e. Directorate General of Sea Communication. Special ports are mainly operated by private companies (industries), and managed by them for loading or discharging their own products. The port of Tanjung Priok is a commercial port, the biggest in the country, and is operated and managed by the Indonesian Port Corporation.

Based on the above facts, shipping and port operations can be a major contribution of pollution and degradation of the marine and coastal environment, including for the port area itself. To prevent or eliminate the threat of these activities to the environment, the government has given serious attention to the handling of marine and coastal environmental impacts resulting from the operation of the ports, and the operation of shipping or sea transportation in general.

3.1.1. Ratification of international legislation

As a country which has a great concern for the environment, Indonesia has been very active in participating in the signing and implementing of international agreements and conventions to limit and manage pollution from shipping and ports. As a maritime country, Indonesia has been very much aware of the threat to the marine and port ecosystems caused by shipping activities and port operations. Therefore, over the course of many years, several international treaties have been signed.

Up to now, Indonesia has ratified the International Convention on Civil Liability for Oil Pollution Damage (CLC-69), the International Convention for The Prevention of Pollution from Ships (MARPOL 73/78; Annex 1 and 2 only), the International Oil Pollution Convention of 1971 (Fund-71) and the Basel Convention on Hazardous Cargoes of 1992. The DGSC has recommended to the Minister of Communication, the ratification, within the near future, of the Oil Pollution Preparedness, Response and Co-operation Convention of 1990 (OPRC-
90), and Annexes 3, 4, and 5 of MARPOL. Also the Ministry of State for the Environment is considering ratification of the London Dumping Convention of 1972.

The MARPOL Convention 1973/78 is the most important international convention related to prevention of pollution from ships. There are six separate Annexes to the convention of which Annex I and II are compulsory for all contracting parties while Annex III, IV, V and VI are optional. As a contracting party, Indonesia ratified the convention in October 1989, but only for Annex I and Annex II. Up to now, Indonesia has not signed any of Annexes III, IV, V, and VI of the convention.

As far as a ship entering port is concerned, application of the convention is very important, especially related to the provision of reception facilities in port.

3.1.2. National legislation and regulation related to environment protection

To implement the convention so as to meet national environment obligations in ports, the government of Indonesia has issued certain legislation and regulations. The legislation and regulations are consists of Act, Presidential decree and Ministerial decree. In this subchapter several legislative provisions and/or regulations related to prevention of pollution at sea and in port will be discussed.

3.1.2.1 Shipping Act, Environment Act and supporting regulations

The new Shipping Act was promulgated in 1992 and replaces the first Act. This Act is more comprehensive than the previous one, and provides for a much broader and more encompassing set of regulations and guidelines with respect to the management of pollution from shipping and ports. So, this Act not only addresses shipping in general, but also port problems related to the environment.

Many of these regulations and guidelines will be implemented and managed through a Sub-Directorate of the Directorate of DGSC. Besides that, the Ministry of Communication will
also be implementing various decrees related to the requirement of ports to manage and reduce pollution from port activities, and related to the general environmental condition within the port. This also will include providing facilities to collect and properly dispose of wastes related to the handling of cargo.

Under the previous shipping legislation, the government had already issued a number of regulations and decrees. The government had issued the President Decree “KEPRES No. 46 of May 1986” to make the MARPOL 73/78 become law, and its application mandatory for Indonesia. This decree is further implemented in the new Shipping Act 1992.

To meet its responsibilities under MARPOL Annex I, the Minister of Communications has issued Ministerial Degree 167 of 1986 on International Oil Pollution Prevention Certificates. As regard Port State responsibilities, the Minister of Communications issued Decree 215 in 1987 instructing the gateway commercial ports (Tanjung Priok, Belawan, Tanjung Perak and Makassar) as well as special ports and ship repair ports, to install ship waste reception facilities by April 1, 1988 at the latest. Furthermore, Port Administration was instructed to employ Port State Control to inspect ships to ensure compliance with specific MARPOL requirements.

With regard to the environmental protection policies in Indonesia, a number of regulations have been issued in order to manage the living environment in all sectors of activities or industries.

The basis of regulation related to environment management in Indonesia is contained in Act No. 23 of 1997 concerning the Management of the Living Environment which is issued by the Office of the Ministry of State for Development Supervision and the Environment (Ministry for Environment). This Act is a new version of a previous Act, the Act No. 4 of 1982 concerning the Basic Provision for the Management of the Living Environment.

The Act introduces the Environmental Impact Analysis study (ANDAL) and also establishes the right of Minister for Environment to issue further regulations and to coordinate environmental management across different sectors of activity.
This Act, supported by Government Regulation “Peraturan Pemerintah” PP No. 51 of 1983, addresses the overall Environmental Impact Assessment approach (AMDAL). The Minister of Communication has also issued decree KEPMENHUB No. I of 1992 stating that development planning and other operational activities in ports must take into account the ANDAL procedure. Furthermore, by decree KEPMENHUB No. 75 of 1994, the Minister of Communication issued the Technical Guidelines for ANDAL in ports and ports activities.

In summary, existing Indonesia legislation has been adequate enough to cope with the requirements of environmental policy, especially in the sea transportation sector, including in the port sectors.

3.1.3. Institutions dealing with environmental policies

Management of the living environment in Indonesia involves different levels of institution depending on the region in which the environmental aspect is to be managed. According to the Living Environment Act, the management of the living environment at the National Level is the responsibility of the Minister for the Environment, through an integrated approach using institutional mechanisms.

The management of the living environment, in relation to the integrated implementation of the national policy, is assigned to the sector with responsibility for departmental and non-departmental institutions. At the regional level, the management of the living environment is the responsibility of regional government in accordance with the existing legislation.

In order to perform the technical role and to implement policy, the Minister for the Environment established the Environmental Impact Management Agency (BAPEDAL) in 1990. The BAPEDAL is a non-ministerial government agency subordinated under, and directly responsible to the President. Together with the Ministry for the Environment, the BAPEDAL develops environmental quality standards that are for all areas of pollution control as well as specific industry standards.
The principal task of BAPEDAL is the management of environmental impact studies including prevention and control of pollution and environmental damage and rehabilitation of environmental quality in accordance with prevailing legislation. In order to implement the principal task, BAPEDAL has responsibility for certain functions as follows:

- Stipulating technical policy for the prevention and control of pollution and environmental damage, and rehabilitation of environmental quality.
- Developing institutions and improving environmental impact management capacity.
- Administering technical policy on prevention and control of pollution and environmental damage, and the rehabilitation of environmental quality.
- Implementing the prevention and control of pollution, which may arise from any particular activity plan or implementation thereof, and rehabilitation of the relevant environmental quality.
- Implementing technical guidelines for the prevention and control of pollution and environmental damage, and the rehabilitation of environmental quality.
- Managing Analysis on Environmental Impact (AMDAL) and developing the technical ability to control environmental impact.

(BAPEDAL, 1999, 1)

### 3.2. The role of the Maritime Administration in the documentation of environmental policies for sea transportation sectors

This sub-chapter will discuss briefly the role of the Ministry of Communication particularly the Maritime Safety and Environmental Protection Administration in the Maritime Administration, in adoption and implementation of regulations and legislation especially related to the prevention and minimising pollution in Indonesia seas and ports.

#### 3.2.1. The Indonesian Maritime Administration

Indonesia has a large maritime administration. As a maritime country, the Indonesian Maritime Administration has important functions and a role in regulating, managing and
controlling maritime activities in Indonesia.

The Indonesia Maritime administration is called The Directorate General of Sea Communication (DGSC), which is a part of the Ministry of Communication. As the agency responsible for overall management of the sea transport sector, the DGSC have several functions as stated in Ministerial Degree No.164/ot-02/phb-80 as follow:

- Planning and coordinating the planning process among all units within the DGSC head office and the 27 regions (Provinces) throughout the country;
- Controlling and coordinating sea transport activities;
- Controlling and coordinating port and harbor development projects and acquisition of property;
- Interpreting international conventions and national legislation and preparing/ updating maritime and port rules and regulations for the entire country;
- Enforcing maritime and port rules and regulations;

To perform the management functions, DGSC have six technical directorates as follows:

- Directorate of Sea Traffic
- Directorate of Marine Safety
- Directorate of Port and Dredging
- Directorate of Navigation
- Directorate of Maritime Services
- Directorate of Sea and Coast Guard

3.2.2. The Indonesian Maritime Safety Administration

The Indonesia Maritime Safety Administration is the Directorate of Marine Safety as stated above, which has vital function to ensure the safety of life at sea, the safety of navigation and protection of the marine environment. Its function is also related to seafarers, registration of ships, and joint co-operation with the Directorate of Sea and Coast Guard on maritime casualty investigations. The Directorate of Marine Safety is also responsible
for general superintendence and co-ordination of the work of the Maritime Safety Administration as a whole.

The task of the Directorate of Maritime Safety is to perform a part of the main task of the Directorate General of Sea Communication in shipping and maritime safety by virtue of the policy of the Directorate General. The Directorate of Maritime Safety is responsible for Flag State Control with regard to Indonesian ships and Port State Control for foreign flag ships. In addition, the Directorate of Maritime Safety is also responsible for the setting up of National safety regulations and the implementation of both national regulations and international safety conventions.

To perform its functions, the Directorate of Marine Safety is divided into five Sub-Directorates, namely: Nautical, Technical and Radio; Seaworthiness; Ship Measurement and Registration; Harbour and Ship Crew; Marine Environment Protection.

The Sub-Directorate of Marine Environment Protection is responsible for the prevention of pollution from ships. This Sub-Directorate has three sections, namely Prevention of Pollution section, Combating Pollution section and Documentation section. This Sub-Directorate provides the guidance for the prevention and treatment of pollution from ships, the inspection of ships to confirm international oil pollution prevention certificates, and the removal of floating waste at sea and port. It also records all cases of sea pollution. In addition, the Sub-Directorate is also responsible for implementation of MARPOL 73/78 with regard to oil spill prevention equipment carried on board ships, reception facilities in ports and the development of National and local oil spill contingency plans. Therefore, the Sub-Directorate of Marine Environment Protection also has responsibilities for environmental improvement in ports.

### 3.2.3 Port State Control

To support port control at the regional level, the DGSC has established a regional office in the port called the Port Administration (ADPEL), which is a branch of the DGSC in
commercial ports in each region/province. Each port administration is headed by a Port Administrator. The port administrator has responsibilities for port state control and for government affairs in the port. The Port Administration office consists of a general affairs officer, harbour master, navigation officer and Coast Guard officer.

In fulfilling his responsibilities for port state control, the administrator has the task of inspecting and controlling of ships entering the ports, to ensure enforcement of International standards for shipping safety and pollution prevention. In other words, the administrator is in charge of all regional administration in relation to port state control and the physical security of the port area.

3.2.4. Implementation of regulations or legislation in the port sector

In connection with regulations concerning environmental protection in the sea transportation sector particularly in port sector, the Maritime Administration has certain responsibilities for dealing with the provision and implementation of regulations concerning environmental protection. Because of the centralised bureaucratic system in the Indonesian government system, this task is always directed or co-ordinated from the Ministry of Communication.

One of the most important tasks is dealing with Overall Environmental Impact Assessments (AMDAL), which consist of 3 documents: Environmental Impact Analysis (ANDAL), Environmental management Plan (RKL) and Environmental Monitoring Plan (RPL). The purpose of the AMDAL is to reduce the negative environmental impact caused by any projects or activities.

To perform this task, the Ministry of Communication established the Ministry of Communication Central Commission for AMDAL (Komisi Pusat AMDAL Departemen Perhubungan). The responsibilities of this commission are as follows:

- To develop the technical guidance of AMDAL which covers the terms of reference
of the Environmental Impact Analysis (ANDAL), the Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL).

- To give input or any correction on ANDAL, RKL and RPL documents.
- To assist in the issuing of the Minister of Communication's Decree for the legalisation of ANDAL, RKL and RPL documents.

In order to obtain a comprehensive evaluation of the ANDAL study, a Technical Team of the AMDAL Central Commission was established, headed by the Head of the Planning Bureau. The Technical team members comprise inter-disciplinary staff and officers who have been trained in AMDAL procedures. Some of the members are representatives of related institutions such as the Ministry for Environment, BAPEDAL, and Research Institution. The duties of the Technical Team are as follows:

- To assist the Central Commission in making corrections and commenting on the AMDAL Term of Reference.
- To evaluate the AMDAL documents, technically, before it is sent to the Central Commission for further discussion

Meanwhile, at the Directorate of DGSC level, a technical team has also been established, which has as its aim to assist the AMDAL Central Commission in evaluating and giving direction on the composition of the RKL and RPL documents. The team consists of the representatives of each Sub-Directorate and the State Owned Companies concerned.

3.3. Environment Protection Program in the Port of Tanjung Priok.

As stated in the Indonesian Environment Act that, in principle, all development projects and activities can create impacts on the environment, so that early planning of any development effort or in the running of an activity must include consideration of its major impact on the environment, both physical and non-physical, so that an assessment can be made as to whether an environmental impact analysis should be carried out. This analysis will indicate more precisely the negative impact of a particular activity so that step may be prepared as
early as possible in order to mitigate its negative impact.

The statement above is only formally applicable to new projects, but in Indonesia, an Environment Impact Analysis is carried out not only on new projects, but also on existing activities that have been in existence for some time before the environmental impact analysis or environmental protection policy were introduced at the beginning of eighties. The reason behind this policy is due to the fact that the existing activities are also creating or have created negative impacts on the environment, and those activities have been subjected to an environmental impact assessment before. The port of Tanjung Priok is one example of such activities.

The result of the environmental impact assessment of the port of Tanjung Priok has been discussed in chapter II. The main environmental problem in the port is deterioration of water quality. The three sources have been identified as major concerns. The land-based source (urban and industrial discharge) and effluent from industry within the ports are considered as the main sources. In other words, they are contributing to the pollution. Chemical substances, sewage and garbage are components of pollution generated from these activities. Relatively high level of BOD and COD concentration and heavy metal levels in the port water and sediment indicate that the cause of this condition may be attributed to the effluents.

Because port activities have had a negative impact on the environment, the port of Tanjung Priok conducted an environmental impact assessment entitled Studi Evaluasi Lingkungan (SEL) in 1994. SEL is the old name of ANDAL. As previously mentioned, the AMDAL study consisted of three documents: ANDAL, RKL and RPL. As a result of the study, the port established and ran the Environment Management Plan (RKL) and the Environmental Monitoring Plan (RPL) to follow up on the results of the study. Thus, these plans now constitute the environmental protection program for the port of Tanjung Priok. Through these plans, several policies have been made by the port to try to reduce or eliminate and prevent the negative impact caused by the activities.

3.3.1. Environmental Management Plan (RKL)
The Environmental management Plan (RKL) is a document which sets forth those practices which will be implemented to prevent, control, and mitigate significant negative impacts arising as a consequence of port activities. Therefore, in the RKL the effort required to prevent, control and mitigate the significant impact arising from all activities related to the causes of the pollution may be suggested.

In relation to the requirement, the RKL of the port of Tanjung Priok has covered all of the requirements of the content. The content of the Environment Management Plan consists of a brief but clear description of each type of impact caused by the activities, under the following elements:

- **Significant impact and the sources of the impact.**
  In the RKL all significant impacts arising from port operational activities, industrial activities and land-based sources are explained briefly through environmental components or parameters, such as BOD, COD, turbidity, etc. The sources or the causes of the impact are also stated in order to mitigate the impact, because ideally, if it is possible, the solution to the pollution should be overcome at the source of pollution, so that a total solution can be attained.

- **Impact criteria.**
  Impact criteria are used to measure the environmental component or parameters affected by the activities. These criteria are quality standards that are commonly practised and stipulated by Government Agencies. In the RKL, the standard used for measuring water quality is the Indonesian Standard Quality for Mariculture, which is stipulated through Minister for Environment Decree.

- **Objective of the Environmental Management Plan**
  In the RKL, it is also specified and described that the objective is to manage the significant impact, so that it will be consequentially prevented, mitigated or controlled. For example, the strategic impact to be managed in the paint factory is the quality of waste
water, and the specific objectives of the environmental management practice are: "to control the quality of the wastewater discharge into the port water body, particularly, BOD, COD and heavy metal, so as to ensure that they don’t exceed the wastewater permissible quality standard as stipulated by the Minister for Environment Decree”.

- **Environmental Management**
  This is the action plan at the core of the Environmental Management Plan (RKL). In this section, those environmental management practices for all environmental parameters are described in detail. The plans are carried out through the technological, economic and/or institutional approaches.

In this action plan, there is also described the environment management site, the duration of the environmental management, and the cost of running the environmental management. The environment site is the location of any environmental management activities where there are impacts to be managed. The duration of environmental management is the time frame during which the environmental management activities will be carried out. And the cost is related to the funding source necessary for the purchase of environmental management equipment, personnel and operating costs.

- **Environmental Management Institutions.**
  This is related to the institution tasked with, involved in, and related to, that environmental activity pursuant to the prevailing regulation or laws.
  There are three bodies of institutions who may be involved in environmental management plan:

  - **Environmental Management Executing Bodies/Agencies.** They are executing agencies that are responsible for implementing and paying for the environmental management activity. The agencies could be a company that is responsible for the cause of pollution.
  - **Environmental Management Supervisory Bodies/Agencies.** They are agencies that will serve in a supervisory role in the implementation of the RKL. There may be one
or more agencies involved in this supervision, depending on the scope of authority and responsibility, and prevailing laws. They are could be Ministry of Communication, Ministry of Environment, BAPEDAL, the Directorate General Sea Communication, and the Port Administrator.

- **Environmental Management Reporting Bodies/Agencies.** They are agencies that are to be periodically reported to regarding the result of the environmental management activities, in accordance with the scope of the prevailing laws and the responsibility of the agencies concern. They are could be Ministry of Communication, Ministry of Environment, the Directorate General Sea Communication.

### 3.3.2. Environmental Monitoring Plan (RPL)

The Environmental Monitoring Plan (RPL) is a document presenting those efforts that will be made to monitor the environmental parameters which will be subjected to significant impacts arising from the activities. This document should be linked to the RKL so that all aspects to be monitored may be defined with due regard to the significant impact as stated in the RKL.

The objective of the RPL is to monitor the source of impacts and/or the environmental parameters or components affected by the impact. By monitoring both these aspects simultaneously, the effectiveness of environmental management activities (RKL) undertaken may also be evaluated and tested.

The contents of the RPL consist of several elements as follows:

- Significant impacts to be monitored and the sources of these impacts (the impacts are the same as the impacts in RKL).
- Environmental parameters to be monitored. This consists of all parameters having significant impacts on water and air quality such as BOD, COD, dust, SO\(_x\), NO\(_x\).
- Purpose and objective of the Environmental Monitoring Plan.
- Environmental Monitoring Method. This consists of the method for data collection and analysis including the type of equipment or instruments used, and the method used for
analysing the resulting data.

- Environmental monitoring site.
- Monitoring duration and frequency. Describes the duration or length of the monitoring period, as well as the frequency per time unit.
- Environmental Monitoring Institutions. Each environmental monitoring plan should list those institutions dealing with, having an interest in, or related to environmental activities, in accordance with prevailing national regulations. There are also three kinds of institutional bodies who should be involved in Environmental Monitoring Plan (RPL) which are the same as the institutions in the Environmental Management Plan (RKL).

### 3.3.3. Implementation of the program

Despite, the fact that in the RKL of the port of Tanjung Priok, all significant impacts have been covered, all environmental management plans have been described and all institutions concerned have been stated, in its implementation, only a few actions in the environmental management plan have been implemented. Those actions are related to the significant impacts that are related to the ports activities only. In other words, the other significant impacts caused by external factors which are very important factors to be considered (namely those the sources from land-based (urban and industrial effluents) and industry effluent within the ports), have not been touched at all.

So far, the implementation of the Environmental Management Plan has only addressed how to manage or how to carry out cargo handling and cargo storage activities properly through its standard operating procedures so that the negative impact to the water, especially to the air quality can be prevented or minimised. On other hand, to clean the port water body from floating garbage, some garbage catching boats have been operated periodically. This garbage originates mainly from urban areas and from ship discharges. This solid waste is then collected and subsequently separated, sorted outside the gate of the port by private operators and finally dumped in municipal landfill.

To collect oil and other waste from ship, the port has operated reception facilities for several
years now. But so far, based on information from the Port Authority, the ship repair yard, oil terminal and the liquid chemical terminal have not installed any reception facilities.

3.4. The obstacles in its implementation

As a port authority, the port of Tanjung Priok expects that the programs will give a satisfactory result. But, in fact since they were introduced the programs have not given a satisfactory result as expected. Despite the fact that the port of Tanjung Priok has introduced some efforts to reduce the pollution by implementing Standard Operating Procedure (SOP) proposed in cargo handling process and establishing reception facilities for oily waste, the condition of the port environment remains polluted. The bad condition of the water quality can be visually seen directly. The port water still remains dirty and dark, with a lot of solid garbage floating on the water surface and oil slicks in several locations such as the oil terminal. The concentration of other parameters still remains the same.

There is a reason why the condition of water quality still remains bad. It is simply because the effort required to prevent the pollution is only limited to port operations. There are other sources or aspects that must be considered because they make a great contribution to the pollution namely land-based sources and waterfront industries. Chemical substances, sewage and also garbage are components of pollutant generated from these sources. But, unfortunately, those sources were not taken into account in the implementation of the program. The relatively high level of BOD, COD and metal elements in many places within the port are an indication of their contribution to the pollution.

There are several factors behind these situations, which are related to the ineffectiveness, and shortcomings of the environmental program implemented by the port especially the Environmental Management Plan. There are certain factors which are influencing this situation which can be classified into two factors are as follows:

- Internal Factors
• **External Factors**

### 3.4.1. Internal Factors

It has been stated clearly in the Environmental Management Plan (RKL) what steps or actions should be taken at the source of impacts in order to prevent/control/mitigate the significant impact. But, it has not been explained clearly who will be responsible to carrying out the environmental management plan, or who will be as a executing agencies, supervisory bodies, and environmental management reporting bodies.

As a result, the Environmental Management Plan still can not be fully implemented. This is simply because of shortcomings in the program. It is obvious, since the program requires the involvement of external parties, that the arrangement with the parties should be clearly defined and what kind of arrangements should be made. The tasks and responsibilities of the parties should also clearly defined. But, the program or the plan does not define or give direction as to how the arrangement should be made, how co-ordination and co-operation with those external parties as executing bodies should be built, how to force or impose the program on them, and who will act as enforcement body or institution to impose the program on those external parties. These aspects are important since the program has cost consequences in its implementation. Moreover, the difficulties dealing with those external parties may be because they did not participate or were not involved in formulating the management environmental plan, so that there may be some points that are not agreed by them, especially for those private companies which are very sensitive with any kind of non operating cost or expenditures.

So, we can say that the full involvement or participation of all parties concerned in implementing the program is a key factor in order to achieve the successful implementation of the program or plan. For this purpose, clear arrangements, co-ordination and good co-operation are necessary between these parties: private companies, the municipality of Jakarta, the Ministry for Environment, BAPEDAL, the Ministry of Industry, and other bodies or institutions.
Other factors which can be considered as obstacles to the implementation of the program is lack of trained staff at the port of Tanjung Priok to carry out the program. There are some staff who are responsible for carrying out the program, who have not been trained in the environmental field so that they are not ‘environmentally minded’.

In addition, the port of Tanjung Priok also has not had a special division or department dealing with this environmental management plan. All tasks or jobs related to the environmental aspects are carried out by technical division staff. Even, control of the utilisation of reception facilities is carried out by commercial divisions.

3.4.2. External factors

As has been explained in chapter II the cause of the environmental problem in the port is not limited to port activities, but is greatly influenced by external factors. Industrial discharges (both those located within the port and outside the port) and urban discharges are some key factors which play important roles in contributing to pollution of the port water. Therefore, in order to achieve a total solution to the problem, these two external factors must be taken into account.

Because these external sources are an important part of the program, so their full participation are important factors in the successfully implementation of the program. However, since there is no arrangements or co-operation between them and the port; the port of Tanjung Priok will not be able to impose the program on them. The port has no authority or right to force them to participate in, or to carry out the program, even though it has been so stated in the environmental management plan.

Lack of awareness of the public about the importance of the environment is another factor in the problem. It has been recognised that some factories within the port are still discharging their effluent into the port water without prior treatment. Some people who are classified as uneducated, and work within the port in the informal sector are also contributing to the pollution by producing garbage resulting from their ‘business’ while using
bins to dispose of garbage is not a common practice for them. People living in the city of Jakarta, especially those who are poor and uneducated, and living along the rivers have long been recognised as using the river as a 'garbage bin' to dispose of their garbage. Industrial effluents from industry activities located in the river are an old story. All of those actors are uncontrollable elements for the port of Tanjung Priok authority. Indeed, the most difficult task is how to increase the people awareness about the importance of the environment, especially the people who are involved in, or working within the port.

With regard to the implementation of the Environmental Monitoring Plan (RPL), the program is also not properly implemented because its implementation depends on the implementation of RKL. Since there is a link between the RKL and the RPL and since the RKL is not fully implemented, the implementation of its RPL will be meaningless, because the significant impact or the level of environmental parameters to be monitored will still remain unchanged.

3.5. Reception Facilities and its utilisation

Another important factor that should be taken into consideration in relation to the environmental program in the port of Tanjung Priok is the initialisation of reception facilities. Despite the fact that the provision of the reception facilities is mainly related to the prevention of pollution from ships (to prevent discharge of waste at sea), it is an important and integrated part of the environmental program of any port as a whole.

The most important international convention related to control and management of pollution from ships is the MARPOL 73/78. Indonesia is a country who ratified this convention through President Decree No. 46 of 1986, and implemented it in the Shipping Act of 1992.

The port of Tanjung Priok, as a biggest port in Indonesia was equipped with reception facilities in 1988, as the implementation of the Minister of Communication Decree No. 215 of 1987 instructing the four gateway ports (Tanjung Priok, Belawan, Tanjung Perak, Makassar), special ports and ship repair port to install ship waste reception facilities.
As previously mentioned, within the port, there are other companies who operate their own terminal. They are the PERTAMINA oil terminal and a liquid chemical terminal. There are also 5 shipyards and repair facilities within the port. As regulated in MARPOL convention, those three kinds of activities should comply with the requirement for reception facilities. This section only discussed the utilisation of reception facilities which are owned and operated by the port of Tanjung Priok.

However, The management of ship waste is a responsibility of the Port Administration, but the Port Administration delegates the operating and managing of the reception facilities to the port company.

The reception facilities that have been installed by the port of Tanjung Priok so far consist of equipment, as follows:

<table>
<thead>
<tr>
<th>Facilities</th>
<th>Unit</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Barges for collecting oil waste</td>
<td>2</td>
<td>190 m³</td>
</tr>
<tr>
<td>- Oil waste Tank</td>
<td>1</td>
<td>25 m³</td>
</tr>
<tr>
<td>- Oil Separator Machine</td>
<td>1</td>
<td>25 m³ / Hour</td>
</tr>
<tr>
<td>- Tug Boat</td>
<td>1</td>
<td>200 PK</td>
</tr>
</tbody>
</table>

*Source: Port of Tanjung Priok 1998*

Since the reception facilities were installed in 1988, the facilities have been operated on a commercial basis. The users of the reception facilities are charged through an individual tariff (direct charge system), and all costs incurred from utilising the facilities are covered by the tariff. In other worlds, the port users should cover all the costs of services provided, including depreciation, interest, operation and maintenance.

### 3.5.1. Utilisation of the reception facilities
It has long been recognised that the availability and utilisation of reception facilities are common problems world wide. There are still a lot of vessels reported to be discharging oily waste at sea illegally. As was reported by Henk Langerberg from Ministry of Transport, Public Works and Water Management, Netherlands as an example, it is estimated that on yearly basis about 40,000 tons of oil is discharged into the North Sea. The greater part of this 40,000 tons is discharged illegally, and only about 1,500 tons of oil waste is discharged legally (Henk L, 1994, 3). This practice will affect directly the utilization of reception facilities in any particular port, if one vessel calling at the port, has discharged its oily waste illegally at sea before arriving in the port.

With regard to the utilization of reception facilities in the port of Tanjung Priok, the amount of waste discharged into the reception facilities has fluctuated in the three first years of operations. But, since it was operated, its utilization has been very low, comparing with the number of vessels visiting the port.

In 1989, the total number of ships calling at the port was 10,124. Of these ships only 0.5% discharged oily waste into reception facilities. Total volume of oily discharges in the year was 1,890 cubic meters, therefore the average amount of oily discharges was about 37.1 cubic meters per ship. Because the maximum capacity of the reception facilities is 18,400 cubic meters per year so the utilization of the facilities in the year was only 10.27%.

In 1990, the situation was more or less the same as the situation in 1989 in terms of the amount of ships visiting the port, which was 11,130 unit. Total % number of ships discharging oily waste was only 0.37%, while the total amount of oily waste discharged was 1,017 cubic meters so that the utilization of the reception facilities in that year was only 5.53%.

In 1991, the situation was a slight increase in terms of ship calls, the number of vessels discharging waste, the amount of oil discharged and the utilization of the reception facilities. But the situation is still remains below 1989 figures.

From 1992 to 1997 there was a rapid increase in the total number of ships calling at the
port due to the increase in economic activities. In 1997, total ships visiting the port were 15,141, and there was 243 vessels discharging waste into the reception facilities, or the number of vessels utilising the facilities was 1.6%. Meanwhile the amount of oily discharge was 7,491 cubic meter, therefore the utilisation of the reception facilities was 40.71%. Hence, we can say that even though the utilisation was still relatively small, there has been a significant progress since 1989. The complete figures for utilisation of the facilities are shown in table 13 below:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>SHIP CALL (UNIT)</th>
<th>MAX. CAPACITY (M3)</th>
<th>No.of SHIP DISCHARGE (UNIT)</th>
<th>No.of SHIP DISCHARGE (%)</th>
<th>The AMOUNT of OIL DISCHARGED (M3)</th>
<th>UTILIZATION OF RF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>10,124</td>
<td>18,400</td>
<td>51</td>
<td>0.5</td>
<td>1,890</td>
<td>10.27</td>
</tr>
<tr>
<td>1990</td>
<td>11,130</td>
<td>18,400</td>
<td>41</td>
<td>0.4</td>
<td>1,017</td>
<td>5.53</td>
</tr>
<tr>
<td>1991</td>
<td>12,106</td>
<td>18,400</td>
<td>43</td>
<td>0.4</td>
<td>1,805</td>
<td>9.81</td>
</tr>
<tr>
<td>1992</td>
<td>12,359</td>
<td>18,400</td>
<td>56</td>
<td>0.5</td>
<td>2,019</td>
<td>10.97</td>
</tr>
<tr>
<td>1993</td>
<td>13,525</td>
<td>18,400</td>
<td>79</td>
<td>0.6</td>
<td>2,203</td>
<td>11.97</td>
</tr>
<tr>
<td>1994</td>
<td>12,733</td>
<td>18,400</td>
<td>150</td>
<td>1.2</td>
<td>4,974</td>
<td>27.03</td>
</tr>
<tr>
<td>1995</td>
<td>13,109</td>
<td>18,400</td>
<td>226</td>
<td>1.7</td>
<td>6,215</td>
<td>33.78</td>
</tr>
<tr>
<td>1996</td>
<td>14,288</td>
<td>18,400</td>
<td>237</td>
<td>1.6</td>
<td>7,085</td>
<td>38.51</td>
</tr>
<tr>
<td>1997</td>
<td>15,141</td>
<td>18,400</td>
<td>243</td>
<td>1.6</td>
<td>7,491</td>
<td>40.71</td>
</tr>
</tbody>
</table>

*Source: Port of Tanjung Priok 1998*

Based on the data above, the number of ships visiting the port year by year from 1989 to 1997 has increased on average. Despite the fact that the number of vessels visiting the port has increased, the average oily waste discharged per year was very low. However, experience from reception facilities in other ports of the world shows an average delivery of up to 5 cubic meters oily waste per ship call. As the port of Tanjung Priok is called at by more than 12,000 ships per year, the quantity of oily waste to be received by the reception facilities should be in the vicinity of 60,000 cubic meters per tonnes per year (Ostergaard, 1993, 115).
The low utilization of the reception facilities is caused by several reasons, as identified by the port administration as follows:

- It was assumed that the use of reception facilities is not attractive from a shipping company point of view because they are imposed or charged by individual tariff for using the facilities so that they are reluctant to discharge their waste into the facilities. This situation is a reflection of the lack of awareness of the shipping company, especially those under national flag.
- On the other hand, there are some private collectors who have received permission from the port corporation operating in the port to receive the oil waste from the ship. The oil waste will be recycled and used as fuel oil in brick manufacturing. In this case, the private collectors even pay a small fee to receive the waste from the shipping company.
- The control effort of the Port Administration as a Port State Control is weak, so that it has been confirmed that several vessels have discharged her oily waste into the sea illegally before calling the port.
- The port of Tanjung Priok itself is not too active in encouraging the shipping company to use the reception facilities. As a result, a lot of oily waste is collected by the private companies, and then there is no guarantee that the oily waste will be recycled or treated properly in an environmentally sound way. The lack of willingness could be a reflection of a lack of awareness of some port staff toward environmental considerations.
- The procedure for using the reception facilities might be rather complicated, which results in undue delay of the ship in port, and consequently increasing its operating cost.
- Law enforcement is currently weak in Indonesia, so that it encourages illegal discharge of oily waste at sea.
CHAPTER 4
THE NEED FOR INSTITUTIONAL APPROACH

4.1. Introduction

In Chapter II, the current environmental condition in the port of Tanjung Priok has been described and in Chapter III the environmental program of the port and the obstacles in its implementation together with the role of Indonesia Maritime Administration in maritime environment policy and the legislation frame work have been discussed. In this chapter some solutions related to the problems will be suggested which are mainly focused on institutional and management approaches in general.

As previously stated, the main environmental problem in the port of Tanjung Priok is deterioration of water quality. Therefore the description and explanation that have been made in the Chapter II only addressed this issue. This is not meant to say that other aspects or other environment components such as soil and air quality are not important. There are two reasons why water quality has become the main problem, firstly, the level of deterioration for almost of all key environmental parameter measured are bad. Secondly, the causes of the deterioration involve many aspects or types of activities and from different sources which mainly involve external sources.

In this section the author will briefly review the typical situations and conditions of the land base sources, especially the current situation related to industrial discharges and the urban facilities concerning sewage and garbage disposal in the city of Jakarta.
4.1.1. **Brief review of land-based sources**

It has been recognized that most of the pollutants of the marine and coastal ecosystem come from land-based sources that consist of effluent from various industrial discharges; run-off from agricultural and chemical products; sewage discharges and garbage from population centers. As has been reported by GESAM, land-based sources have contributed 44% of total pollutants discharged into seawater or the marine environment, as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterborne land-based sources</td>
<td>44%</td>
</tr>
<tr>
<td>Airborne land-sources pollution</td>
<td>33%</td>
</tr>
<tr>
<td>Marine transportation</td>
<td>12%</td>
</tr>
<tr>
<td>Marine dumping (mainly land-source waste)</td>
<td>10%</td>
</tr>
<tr>
<td>Off-shore oil production</td>
<td>1%</td>
</tr>
</tbody>
</table>

(GESAM, 1990, p.18)

Based on the fact that land-based sources makes the biggest contribution to pollution of the marine ecosystem, we should take into consideration this factor in formulating solutions to the environmental problem caused by this factor as it is being faced by the port of Tanjung Priok at the present. However, even though the biggest contribution of the pollution comes from land-based sources, a significant amount also comes from marine and port activities themselves. Oil spills, either small or large scale, accidental or deliberate arising from the activities including exploration activities, are several of these sources.

4.1.2. **Urban discharges.**

Water pollution is most commonly associated with the discharge of effluents from several sources as mentioned above. Organic matter is the major type of effluent. The discharge of excessive quantities of the organic matter is undoubtedly the oldest and even today, the most widespread form of water pollution. The major sources of organic pollution are from sewage and domestic garbage, especially from urban areas or population centers (besides from agricultural run-off and industrial activities). The pollution not only affects the aquatic
ecosystem but also has a significant impact on human health.

### 4.1.2.1 Sewage

The city of Jakarta where the port of Tanjung Priok is located, is now facing a serious problem concerning sewage (especially sanitary sewage) disposal. The sewage disposal arrangements are still inadequate. As a result, as with many coastal cities all over the world, sewage is discharged, often completely untreated, into the sea through rivers.

A typical problem regarding sewage disposal especially sanitary and domestic sewage is that the system is inadequate. The city has a population of 11 million inhabitants, where only 52% of them use a sewerage system. Only 9% of the people who use the sewerage system for the sanitary sewage have direct access to the city sewer system. So, the remainder (48%) use a river as the method for disposal of this sewage, or build their own sewage system by using a septic tank.

This situation gives rise to two different negative impacts respectively, namely pollution of the rivers by organic sewage, and pollution of ground water which has further impacts on the health problem such as dysentery because the ground water, which is used by majority of the people in the city has been contaminated by colliform bacteria from the septic tanks which have been built too close to the ground water source or ground water well.

Based on the study carried out by BAPEDAL in 1997, the contribution of this organic sewage to the organic pollution of rivers in Jakarta was estimated at about 50 to 70% (Republika, 1999, 06/21). As a consequence, these pollutants finally reach the port, and coasts of Jakarta Bay where the rivers have their end-flows.

### 4.1.2.2 Garbage

Garbage disposal is also a great problem for the local government of Jakarta. Even though
the garbage collection system has been established especially for collection of garbage from household and traditional markets, the pollution of garbage still occurs in many places. The garbage is not only organic garbage but also inorganic garbage such as plastic bags and plastic containers. Mineral water bottles are very common inorganic garbage that can be found easily in many ditches or drainage, which can block the water flow, so it is not surprising that flooding is a routine problem in the rainy season.

In practice, the garbage collected is sent to the final dumping site at Bantar Gebang outside the city. In this site, some valuable components like plastic and metal are recovered by poor and unemployed people who are scavengers as their profession. The recovered valuable material is then sold to intermediaries for the final recycling process.

However, the garbage collection system in Jakarta has not been effective in its implementation, because this practice has not included all regions in the city and not involved all levels of the community. The ‘bad’ areas where the poor and uneducated people were not reached or covered by the system at all. As a result, the waste or garbage is dumped in all sorts of places, which can cause pollution, especially visual pollution. Moreover, in the areas along the river where the these kinds of people are concentrated, garbage can be easily dumped into the rivers.

Due to the above facts, it is not surprising that in many big cities in Indonesia like Jakarta, a large volume of waste or garbage enters the river system due to ineffective waste collection systems and the carelessness of people with regard to waste disposal. Subsequently, rivers discharge the debris via the port basin into the sea. In cases of low current velocities, debris or garbage may accumulate in the basin and can cause a significant nuisance. As was reported by ‘Republika’, a daily newspaper on June 21, 1999, thousands of people of the Taman Sari Mangga Besar district (western Jakarta) complained to the municipal government because the River Anak Ciliwung have been fully covered by various kinds of garbage. The condition has been made worse since a lot of people dump debris from demolished buildings into the river, while on other hand the government was not too responsive about this problem.
**4.1.3. Industrial effluents**

Indonesia’s recent developments in rapid economic growth have led the development in industrial sector. This rapidly expanding industrial sector has begun to cause a number of environmental problems because these industries were established without due regard to the environment. Factories are usually built next to rivers so that industrial waste may be disposed of easily into the river without prior treatment.

As with most industrial effluents, the waste discharged into the river can be assumed to be hazardous and toxic waste. Toxic wastes no doubt cause poisoning of humans and environment, leading to death or serious illness. It has been recognized that many rivers in Indonesia have an 'acute' pollution problem. River Cipinang near Jakarta for example, it has been reported that the river receives tens of tons of chemical waste per day. In addition, the World Bank has reported that there is evidence that some quantities of toxic and hazardous waste are now being deposited in uncontrolled landfills, dumped in rivers along with other industrial wastes, and in some cases, spread to agricultural areas by irrigation water and wind (http://www.worldbank.org, 1999).

Statistically, 75% of industry in Indonesia is located On Java Island, and most of them are located in West Java and Jabotabek (Jakarta-Bogor-Tanggerang-Bekasi) regions. A recent study of hazardous wastes (Dames & More. Inc.1993) estimated that about 2.2 million tons per year was currently being generated in West Java and the Jabotabek region (http://www.worldbank.org, 1999). Since the most of industrial effluent discharges into the rivers, it is clear that the pollutant, finally flows to the sea. That is the situation that is being faced by the port of Tanjung Priok due to the various kinds of pollutants generated from the industrial activities flow into the port basin.

Pollutants from industrial discharges accumulate in the port basin and become bigger in terms of quantity and type because of the contribution of another industrial discharge: waterfront industries effluent. Some industries, such as those located in the west complex and east complex tend to discharge their waste into the sea (port water) without prior
treatment. In Chapter II, some environmental parameters such as BOD, COD, heavy metal components and others that exceed the standard value can provide a good indication how bad the port water quality is. Because the port is protected by a breakwater, the pollutants remain collected in the port basin, which only serves to increase their concentration.

4.1.4. The typical causes of the problems

The bad ‘habit’ of discharging effluents to the water body or rivers could be due to various reasons. In general, attitudes toward environmental protection in society and industrial communities have not adjusted, even though the environmental policy and regulation were introduced some 20 years ago. Some reasons behind this situation may be:

1. Lack of awareness of society and decision-makers, especially in the industrial communities.
2. Lack of control, sanction or law enforcement.
3. Lack of budget and technical ability

It is typical of developing countries like Indonesia, that the attention of majority of people toward environmental protection is still low, event though, in the last several years there is an increasing awareness about this matter in many groups of people or organizations. But, in general the awareness of society and decision-makers of most industrial communities is still weak, especially, regarding pollution and environmental problems, particularly over the long term.

On the other hand, the control regarding implementation of existing regulations towards protection of the environmental is also weak. Therefore, there is a tendency for them to ignore related environmental rules. In addition, enforcement also has been extremely weak and inconsistent. BAPEDAL as an Environmental Impact Management Agency have no legal power to conduct site inspections, and also has no jurisdiction to issue recommendations to send the polluters to the court. Even when the polluters are finally brought to court, their cases may be thrown out due to corrupt practices in the judicial
Another aspect related to the causes of the problem could be financial and technical constraint of the industries, especially for small-scale industries (home industries). As we know, providing or installing waste (water) treatment facilities is generally expensive, so that most industries have no financial ability to build such facilities. The existence of most small Industries that are concentrated in population areas also creates another problem in relation to controlling and implementing permissible standard value in their waste produced. These kinds of industries tend to have no technical ability to design waste water treatment installations.

4.2. The need for an institutional approach

As has been explained in previous chapters that the environmental problem in the port of Tanjung Priok is relatively complex, because of the external parties involved or contributing to the pollution. Those external parties are not within the control of the port. In other words, the management of the port has no right or authority to impose or charge them for any responsibility in order to minimize the pollution in the port. This is because, in the Environmental Impact Management provision, there is no solution or suggestions as to how arrangements with these external parties should be made.

It is obvious, since the program requires the involvement of external parties, that the arrangement with the parties should be clearly defined, and arrangements should be made. The tasks and responsibilities of the parties should also clearly defined. But, the program or the plan does not define or give direction as to how the arrangement should be made, how co-ordination and cooperation with those external parties as executing bodies should be built up, how to force or impose the program upon them, and who should act as the enforcement body or institution to impose the program on those external parties. These aspects are important since the program has cost consequence in its implementation. At the present time, this shortcoming limits the effectiveness of the program to a less than optimal degree.
4.2.1. Co-operation and coordination between parties/bodies or institutions

It should be realized that probably no port can solve this problem on its own. That means that co-operation and coordination is necessary with institutions or parties both inside and outside the port and the necessary arrangements also have to be set up. Moreover, in the case of the pollution of the port which is generated from activities outside the port, the involvement of the external parties or institutions is necessary to attain a real and comprehensive solution.

With regard to the institutions concerned with the causes of the pollution in the port of Tanjung Priok, and other related institutions which deal with the environmental management in general, they are as follows:

- **Ministry of Communication.**
  The Ministry responsible for managing transportation sectors, and also for dealing with environmental policies in these transportation sectors.

- **Directorate General of Sea Communication (DGSC) and other institutions under it.**
  The DGSC is a directorate under the Ministry of Communication, which is responsible for controlling sea transportation sectors including port business. Its responsibilities also include implementation of environmental policies in the sea transport sectors.

- **Ministry of Industry**
  The Ministry of Industry is responsible for managing and controlling all industrial sectors in the country, both state-owned companies and private companies.

- **The Municipality of Jakarta**
  This government body is responsible for managing the city of Jakarta, and is thus the body which deals with urban discharge.

- **Ministry of Environment**
  The Ministry of Environment is responsible for setting up all environmental policies and environmental regulations or legislation.

- **BAPEDAL**
BAPEDAL is the Environmental Impact Management Agency, which was established by Minister of Environment to perform the technical role and to implement environmental policies.

Based on the above, the solution to the problem, obviously requires an institutional approach in terms of cooperation and coordination between the port and the external parties. In order to ensure effectiveness in co-operation and coordination, special arrangements clearly need to be made.

4.2.1.1 Task and responsibility.

To achieve successful implementation of the Environmental Management Plan (RPL) and Environmental Monitoring Plan (RPL) of the port of Tanjung Priok, co-operation and coordination between the port authority and the external parties involved is required. This co-operation and coordination should be carried out in the form of an arrangement, so that tasks and responsibilities of every party or institution in the arrangement can be made clear for all involved.

It has been agreed that in all co-operation and co-ordination arrangements with external parties, defining the task and responsibility of each is a crucial element and primary task to be done, so that each party involved in the arrangement will know exactly what its task and responsibility will be. If the task and responsibility are not defined clearly, then it is likely that these will be overlapping of tasks and responsibilities, which can lead to conflicts between parties. As a result, the objective of the arrangement can not be achieved.

With regard to shortcomings in the port’s existing environmental management and monitoring program, these shortcomings are related to institutional arrangements, such as:

- There is no clear task and responsibility defined for each party.
- There is no explanation or suggestion as to what form the co-operation and coordination between parties should take.
• There is no control and enforcement, or enforcement regulation.

With regard to the implementation of the Environmental Management Plan, each party or institution will perform their task and responsibility in accordance with their role or position in the program. As has been discussed earlier, the bodies or institutions involved in the program are classified into three kinds of institution, namely:

• Executing bodies
• Supervisory bodies
• Reporting bodies

4.2.1.2. Executing bodies

To determine, who should be in the executing bodies of the Environmental Management Plan, we should refer to the "at source" of the pollution, because the executing bodies are responsible for managing and controlling their activities, and therefore they should also be responsible for pollution that is generated from their activities or from activities under their responsibility.

As executing bodies, they should be fully responsible for any expenses or costs arising from efforts in managing and controlling the pollution generated from their activities, because all tasks and responsibilities conducted by them which are related to managing the pollution will require investment of facilities or equipment including, of course, operation cost.

With regard to these executing bodies associated with the source of pollution, it can be easily determined which bodies should be responsible for managing and controlling the pollution. Concerning the industrial discharge, for instance, both discharges from factories outside the port and inside the port, the executing bodies will be responsible for dealing with the pollution they generate are the industries themselves. In this case, they could be the owners of the industry concerned, or they could be a manager or the stockholders of the industries/factories. In relation to urban discharge, this is the responsibility of the
municipality of the city of Jakarta, because all aspects associated with managing the city is under the responsibility of the municipality. Therefore, it is logical that the municipality is the first and foremost party that should be responsible for controlling and managing pollution generated from their people.

As previously mentioned, in the port area there are a number of companies/activities being operated beside the port company itself, such as various industries, oil terminal, chemical terminal, stevedoring companies and office activities. In relation to the executing bodies, all companies within the port should be seen as executing bodies, and should be responsible for any pollutant generated by their activities. The port of Tanjung Priok is also an executing body, for any pollution directly generated by the port business activities in general.

**Polluter Pay Principle**

With regard to the “who should responsible” for particular pollution damage, we can say that this should follow the *polluter pay principle* concept. This is a logical and plausible approach which imposes on the polluters responsibility for all pollution that they create. In other words, it is widely accepted that those who are responsible for pollution should contribute toward the cost of controlling and monitoring the adverse effects of pollution. Hence, establishment of the executing bodies should be guided by this principle.

Concerning the tasks and responsibilities of executing bodies in relation to the pollution that they create, their primary task is to conduct all efforts in order to control and minimize the pollution generated from their activities or from activities under their responsibility, by creating, establishing and implementing any necessary systems, methods, or procedures; and/or by investing in any equipment required.

To perform this task, every factory should be responsible for ensuring adequate waste water treatment, so that the waste discharged into the water body is safe to the environment without creating any harm to the marine life. Similarly, the municipality of
Jakarta, as the body responsible for managing the city, should establish a good sewage and garbage handling system. The municipality should be responsible for ensuring that the domestic waste or sewage and garbage is collected, transported away, recycled and disposed in such a manner as may be necessary from the viewpoint of health and environmentally acceptable waste handling. It is important to note, that primary attention should be addressed to the 'low level' class of people who are uneducated, live in 'dirty' areas along the rivers and usually use the rivers for disposal of any sewage and garbage. By nature, they do not understand, and have no awareness of environment, so that the municipality needs to apply a special strategy for dealing with these people in order to build their awareness about this matter. So, developing their awareness is a key requirement, and sewage and garbage collection system needs to be provided in these areas.

For the companies/activities within the port, based on the polluters pay principle, each company should be responsible for managing and controlling the pollution generated by their operations. For example, each office should provide a garbage bin, or pay a fee for a garbage collection service to be provided. The stevedoring company should carried out cargo handling activities by using special equipment or method and procedures to prevent or minimize dust generated from their activities. Furthermore, the oil and chemical terminal must carry out or apply special precautions to prevent any accidents or spills from their activities by implementing system and procedures, and/or by using special equipment. In addition, as has explained earlier, the industries or factories within the port should provide the waste treatment facilities.

The responsibilities of executing parties are not limited to providing the necessary systems for managing or controlling the pollution. There are other important aspect related to the total efforts of the environmental management and monitoring program. Monitoring the result of environmental management program, providing the trained staff required, fixing salary of staff, managing the cost of staff education and training, and other operational costs are all that responsibility of the executing bodies. In other word, all cost consequences arising from these programs are their responsibility. It is widely accepted that environmental protection means, in most case, spending money. To the degree that
it comes under their competency and obligation, those responsible have to be prepared and the necessary budget has to be made available.

4.2.1.3. Supervisory bodies

The supervisory bodies are those institutions that will serve a supervising role in the implementation of the environmental management and monitoring program. There may be one or more institutions involved in the supervision, depending on their scope of authority and responsibility. So, the main task and responsibility of the supervisory bodies is to do direct supervision of the actions taken by executing bodies in conducting the program.

Concerning the implementation of the tasks and responsibilities of the industrial communities or factories in managing, controlling and monitoring their waste water in environmentally sound ways, the appropriate supervisory institutions should be the Ministry of Industry, because all industrial sectors or activities are under the authority and responsibility of the Ministry, so that it will be easier for the Ministry of Industry to supervise whether or not the industries or factories carrying out the programs have applied the environmental management and monitoring program consistently.

Likewise, with regard to the task and responsibility of the municipality of Jakarta in managing urban discharges, the supervision task should be carried out by the Ministry of Environment and/or BAPEDAL, because the municipality of Jakarta is a provincial level government, and therefore the appropriate institution acting as the supervisory body should be the national level institutions, in this case the Ministry of Environment and/or BAPEDAL.

For all activities within the port, the supervisory bodies should be carried out by the Directorate General of Sea Communication (DGSC) together with the Port Administrator as the representative of DGSC in port, because the Port Administrator has a control power in all administrative affairs and has authority and responsibility for all activities within the jurisdiction of the port area.
4.2.1.4. Reporting Bodies or Reporting Institutions

The reporting bodies or reporting institutions are other important elements of the institutional approach of the program, because the program conducted by the executing bodies should be periodically reported to the reporting institutions regarding the result of the environmental management and monitoring program they have carried out. Other important requirement for the program to be reported to the reporting institutions is in order to obtain an evaluation of the effectiveness of the program and to get feedback from the institutions so that any necessary modification of the program can be made in order to achieve an optimal or effective result for the program.

The reporting institutions for implementation of the programs which are conducted by industry, the municipality of Jakarta and companies or activities within the port should be the Ministry of Environment and the Ministry of Communication. The Ministry of Environment is an appropriate institution to be reported because it has the highest authority and responsibility dealing with the environmental policy, while the Ministry of Communication is responsible for, and concerned with all policies and programs conducted in the maritime and port sectors, including the environmental management and monitoring program of the port. In other word, the environmental program as a whole is under the control and direction of the Ministry, despite the facts that some aspects of its implementation, are delegated to the DGSC.

4.2.2. The Environmental Monitoring Program (RPL)

In Chapter III, it has been explained that Environmental Monitoring Plan (RPL) is linked to the Environmental Management Plan (RKL). In the Environmental Monitoring Program, all parties concerned are also listed. These include the sponsor of the monitoring program, monitoring operators, users of monitoring results and supervisors of the monitoring carried out. It is important, that inter institutional co-operation and coordination are built in, in order that data or information obtained and subsequently distributed to the various users, will be effective, efficient and reliable.
In the Environmental Monitoring Program, the institutional approach should also be applied, which is the same as the institutions involved in the Environmental Management Program. So, the executing bodies in the RKL are also executing bodies in the RPL. Similarly, for supervisory and reporting bodies. The executing bodies in RPL are the sponsors of the monitoring program, and the reporting bodies are the users of the monitoring result, of the program. But, the result of the monitoring is also needed and used by the executing bodies or companies and the port of Tanjung Priok itself as an input for evaluation of the program.

The relation between the executing bodies, supervisory bodies and reporting bodies can be seen in chart below:

Figure 2. Institutional arrangement proposed for the Environmental Management and Monitoring Plan in the port of Tanjung Priok
4.2.3. Establishment the enforcement regulations

It is desirable to establish enforcement regulations for implementation of the program that will be carried out by the institutions. The objective of the establishment of the regulations is to ensure that the objectives of the programs are achieved through the institutional approach, are made clear to all concerned, and that they are implemented. In the enforcement regulations, the co-operation and co-ordination arrangements among the parties should be included.

So, the enforcement regulation is a ‘tool’ to enforce policies designed in the environmental management and monitoring program so that the program or the arrangement becomes ‘legally’ binding on all parties and therefore the successful implementation of the program can be attained.

The enforcement regulation could be in the form of a Ministerial Decree of the Ministry of Environment, which has a statutory power to make sure that the regulations are enforced effectively by all parties concerned.

4.2.4. Control and enforcement body

Experience has shown that a port not only needs regulations to implement any arrangement or program, but control and enforcement are necessary as well to ensure that the arrangements for the programs are properly and consistently implemented by all parties.

It has been recognized that enforcement is an important element of regulatory policy designed. To enforce the policies set in the program, a government body dealing with the environmental policies is better placed to control or monitor and enforce the rule adopted in the Ministerial Decree. In the case, it should be the Ministry of Environment and the BAPEDAL. The Ministry of Environment is an appropriate institution to carry out this task, because the Ministry of Environment has the highest authority concerning environmental policy in Indonesia, meanwhile the BAPEDAL, as Environmental Impact Management
Agency, is a special agency dealing with control and implementation of the Environmental Impact Assessment, and Environmental Management and Monitoring Program. In addition, the BAPEDAL also has the power or duty to enforce any regulations related to environmental policies.

4.2.5. Public awareness and participation

The public could play important rule in the successful implementation of any environmental protection program because if they are made aware of the importance of the environment, then their participation in the implementation of the program can be obtained. The means of increasing public awareness and participation should be addressed, not only for the people of the city, but also for the industrial and port communities. This should be the task of the executing bodies of each activity, but BAPEDAL should also be involved to ensure that the effort can be guided properly, especially for municipalities and industrial communities.

With regard to the people in the city, the municipality of Jakarta need take an interest in educating the people concerning environmental protection, especially those less educated people who live in marginal areas along the rivers, where most of them do not understand the need for protection of environment. Campaigns or periodical briefings should be organized by applying an appropriate method which aligns with their education and understanding level. Media tools such as brochures can also be used to communicate the environmental issues to the public. For this purpose, the non-government organization (NGO) also needs to be involved. To guarantee that the result of all the efforts can be achieved, the municipality must provide adequate waste collection facilities.

4.2.6. Training of staff

Training of staff is a very important aspect to be considered in implementing the Environmental Management and Monitoring Plan. The most detailed rule and the best arrangement for co-operation can not function effectively if staff training is not taken into
consideration. Staffs have an important role to play in carrying out any policies or programs and bear the responsibility for all that happens in the implementation of the program. Hence, they need to be educated and trained so as to give them the basis for their skills. The staff involved in the implementation of the environmental program should be trained in the environmental field, so that they have necessary skill and knowledge to conduct the program. This training is more important for the staff of the port of Tanjung Priok, because the port has made the success of the program a key priority. In addition, the necessary number of qualified staff to supervise all activities related to reception and handling of ship-generated wastes has to be available as well. Indeed, ideally, medium size and larger ports should have a full time environmental staff member to handle environmental matters on a continuous basis (IAPH, 1991, 2).

4.3. Optimizing the Utilization of Reception Facilities

The provision of reception facilities is an important part of any environmental protection policy in many ports in order to collect wastes from ships, as is required by the MARPOL 73/78 convention.

Indonesia, as a country that has ratified the convention, has taken certain actions to comply with the MARPOL regulations. Throughout the Ministerial Decree No. 215/1987, the Minister of Communication instructed the four gateway ports to install the reception facilities by April 1, 1988, at least.

To comply with the regulation, The port of Tanjung Priok, as one of the four gateway port had installed the reception facilities in 1988 for the collection of oily wastes from ships. The reception facilities consisted of 2 barges, 1 oil waste tank, 1 oil separator machine and 1 tug boat. However, only reception facilities for oily waste were provided, while facilities for other waste were not made available. This was simply because of the lack of a budget of the port to install complete facilities for all kind of wastes, and so far it is not been necessary to do so since Indonesia only ratified Annex I (oily waste) and Annex II (chemical waste) of the MARPOL 73/78 convention.
With regard to the reception facilities for chemical wastes (Annex II wastes) from noxious liquid substances carried out by bulk carrier or chemical tanker, the facilities are generally used to receive prewash tank residues of tankers having unloaded any or all their tanks. In relation to this kind of cargo, in the port of Tanjung Priok, there is one terminal for the discharge of liquid chemical cargo, which is handled and operated by a private company. Because of the nature of the cargo discharged which is light and easy to evaporate, the tank cleaning after discharge of such cargoes is achieved using a ventilation procedure. As a consequence, there are no residues needed to be received at the terminal, and therefore there is no requirement for the reception facilities.

As mentioned in Chapter II, there is also an oil terminal in the port, which is owned and operated by PERTAMINA, a national oil company. At present, there are no reception facilities for the reception of oily waste from a calling tanker. All tankers coming into the terminal depart with oil products so that there is no dirty ballast water to be discharged at the terminal. Meanwhile, slop from cargo tanks is always discharged in the refinery ports.

The most important reception facilities for the port of Tanjung Priok are the reception facilities for oily waste. Since there is no chemical waste to be discharged from chemical tankers, the reception facilities for that type of waste is not required, at least at the present time. However, it may be necessary to have reception facilities for chemical waste if in the future chemical tankers loading a particular chemical cargo coming into the port need to be prewash and in so done generate some chemical wastes.

As previously discussed in Chapter III, the reception facilities used are only those which are owned and operated by the port of Tanjung Priok. Therefore, the explanation with regard to the optimization of the facilities will also be addressed to this facilities.

Concerning the problem of reception facilities in general, it is very common in many ports world wide, that the main problems of the facilities are “adequacy” and “undue delay”. Adequacy is closely related to undue delay, because any undue delay of any ship in the port related to the inadequacy of the reception facilities, mean that the ship needs to wait...
longer to be served. In relation to the problem of the reception facilities for Annex 1 class of waste in the port of Tanjung Priok, the problem is not related to those kind of problems, but more to under utilization of the facilities.

As it described in Chapter III, the utilization of the reception facilities is very low (below 50%), although in the last several years its utilization has slightly increased. Compared with the number of ships calling at the port, the number of ships discharging their oily waste at the port is very low (ranging from 0.4% to 1.7%). This is because of several factors which are mainly related to the procedure for using the facilities. These include direct charges that could make using the facilities unattractive to the users, and lack of control of Port State Control, associated with a lack of awareness in some shipping companies which tend to discharge illegally at sea.

Based on the facts above, to increase the utilization and attract the use of the reception facilities, several policies should be developed and applied, as follows:

- An indirect tariff system for using the reception facilities should be introduced
- Simple procedures for using the reception facilities should be applied.
- Control and enforcement should be carried out

### 4.3.1. Indirect tariff system

One the most important issues involved in establishing reception facilities is cost recovery—how the port can recover the cost of installation and operation of the facilities. Cost recovery, of course, can be attained through a tariff imposed on the users of the facilities. However, the port should apply an appropriate tariff system so as to encourage ship operators to dispose their wastes in the reception facilities.

Basically, there are two kind of tariff system for the reception facilities, firstly a direct or individual tariff system, and secondly an indirect tariff system. The direct tariff system, or service charges, is a tariff applied when the customers or users actually use the service of the reception facilities and the amount paid is related to the extent of its use. The indirect
tariff system is tariff applied indirectly to the users of reception facilities through the port dues whether or not a ship actually uses the reception facilities. So, the use of reception facilities will be charged for as an integral part of the port dues.

The direct system is currently used by the port of Tanjung Priok, as it operates on a commercial basis in order to recover all cost components of its establishment and operation. However, experience shows that the system tends to discourage ship operators from using the reception facilities and lead them to dispose of their waste in the open sea, in order to reduce their port cost, although the service charge may be relatively small. This fact has to be faced by the port of Tanjung Priok where only 2% of ship calling to the port use the reception facilities to discharge their waste. There is an indication that the reluctance of ship operators to use the reception facilities for disposal of their waste is because of the tariff imposed on them. Generally, all ships seek to reduce their cost in port.

To increase the utilization of reception facilities, the port of Tanjung Priok should make the reception facilities more attractive, so that the ship will be encouraged to use the reception facilities and the risk of discharging of waste at sea could be reduced.

To attain this objective, the port should apply an indirect tariff system (indirect charge) so that use of the reception facilities will be charged for as an integral part of port dues.

By applying this indirect tariff system, the use of reception facilities will appear to the ship operators as a free service. By financing of reception facilities through the port dues, all ship calling at the port of Tanjung Priok will take part in financing of the reception facilities, whether or not they use the facilities, and thus the problem of cost recovery could be solved.

4.3.2. Introducing simple procedures

The procedure of using the reception facilities is also an important aspect of reception facilities, because a too complicated and bureaucratic procedure will cause an undue delay to ship. This is not popular with ship operators because an undue delay exceeds their
normal stay in port, and increases their port costs.

To encourage ship operators to use the reception facilities, the port of Tanjung Priok should apply a simple procedure. The port must ensure that the formalities for the use of the reception facilities are as simple as possible in order to avoid undue delay to the ship. Good arrangement in the procedure should commence right at the beginning of the process for use of the reception facilities, such as prior notification of waste and quantities expected for discharged, all equipment for discharge, and documentation, are made between the ship and the reception facilities operators.

4.3.3. Control and enforcement

It is important for control and enforcement to be carried out to ensure that the utilization of the reception facilities can achieve its expected level. With regard to the waste from ships, the adequate control of a ship should be exercised to ensure that its compliance with the regulations for discharge as required by MARPOL 73/78. The control of a ship calling of the port is the task of the Port State Control (PSC), in this case the Port Administrator. Since the control effort of the PSC in the port of Tanjung Priok is currently weak, the strengthening of the function of the PSC is very important to ensure that every ship calling at the port had complied with the MARPOL 73/78 regulation.

The objective of this control is to determine whether the ship calling at the port poses a threat of harm to the environment. For instance, such a threat could arise if a ship were leave the port with filled slop tank. In this case, the ship should be required to discharge the waste from its slop tank to the reception facilities. If the captain of the ship is not willing to do so, the PSC should inform to the next calling port for the ship of this situation.

Monitoring of waste aboard ship, other necessary compliance and enforcement should be made based on the available national role and regulation. However, enforcement of MARPOL 73/78 is very difficult, because the convention does not oblige a ship to discharge its waste in a particular port. Hence, co-operation between PSC in regional in control of
ship as it regulate in Tokyo MOU should be strengthened. This co-ordination could be an effective way to ensure that the control of the ship and its discharge will be carried out properly.
CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

Based on preceding chapter, it can be concluded that the environmental pollution problem of the port of Tanjung Priok demands a very complex solution because the sources of the pollution come from various origins or activities, which can not be easily, controlled. The main sources of pollution are from land based sources, both from industrial effluent and urban discharge. However, the activities inside the port such as industrial activities, office activities and the port activities themselves (such as ship operation and cargo handling and storage operations) are also considered to make a significant contribution to the pollution.

The main issue relating to the environmental deterioration of the port is deterioration of water quality, where the value of some key environmental parameters presently exceed the permissible standard value of Indonesian mariculture standard value, as has been described in Chapter II. While the port of Tanjung Priok has been conducting environmental protection program through Environmental Management and Monitoring Plan, there has been no involvement of the other parties, both inside and outside the port, and hence, the program has not been carried out optimally. These shortcomings limit the effectiveness of the program to a significant degree.

In order to achieve a comprehensive solution for the environmental problem of the port of Tanjung Priok and to achieve sustainable development in the port, all parties, both inside and outside the port must take part in mitigating and controlling the pollution generated from their activities, so that the objective of implementation of the Environmental Management and Monitoring Plan can be attained. In other words, it cannot be solved by the port itself.
The participation and awareness of all parties concerned are critically important to the solution of the problem.

In addition, the problem cannot be solved in ad-hoc manner. It requires a carefully managed process based on a well-defined policy with full involvement of the parties. For this purpose co-operation and coordination between parties involved are required through institutional approaches, so that all parties can participate directly in the Environmental Management and Monitoring Plan.

To obtain effective results from implementation of the program, the institutional approach, in which co-operation and coordination exists between the parties, is a key feature of the program. All these aspects need to be taken into account when formulating the new Environmental Management and Monitoring Plan or reformulating the existing one.

Another aspect in relation to the problem of the environmental policy of the port is the utilization of reception facilities, which is presently very low. Of course, the utilization of reception facilities in the port is related to the pollution at sea by ships, but as far as the ships that come into port are concerned, the utilization of the facilities or the discharge ship-related wastes into the facilities is very important. It must be an integral part of environmental protection policy of the ports.

The low of the utilization of the facilities is the product of the current tariff system and procedures applied to the service of the reception facilities. The low of utilization of the reception facilities has two implications. Firstly cost recovery of its provision and installation will not be attained easily; and secondly, it indicates the illegal discharge of wastes at sea.

In relation to the utilization of the reception facilities, it can be said that to gain maximum benefit from the MARPOL 73/78 convention, or to solve the problem of illegal discharge at sea, the reception facilities in the port should appear to the vessel operators as a free service, and use of the reception facilities should be made more attractive. One alternative is to introduce a system of financing the cost of discharge indirectly. The charge for use
of the reception facilities will be as an integral part of port dues and the charge can be said to be an ‘environmental fee’ imposed on the port users. By applying this tariff system, all ship operators will take part in financing the reception facilities, whether or not they use the facilities. In this way port users, in particular ship operators will feel that they have a moral obligation to use this service, in order to prevent damage to the marine environment.

To follow up all aspects discussed, and to highlight some suggestions discussed in previous chapters; and in order to achieve a comprehensive solution to the environmental problem of the port of Tanjung Priok, the following recommendation are made in the hope that it will be taken into consideration by management of the port in solving the problem:

1. To attain the objectives of the Environmental Management and Monitoring, inter-sectoral/inter-departmental or institutional approaches are necessary, so that all parties who have contributed to the pollution of the port take part in managing and controlling/monitoring the pollution. These parties are called as executing bodies.

2. The implementation of the institutional approach should be carried out using a co-operation and coordination mechanism, established through special arrangements so as to ensure that all duties of each party will be carried out consistently and smoothly. Through this arrangement, tasks and responsibilities of all parties should be clear defined, so that they all know what their tasks and responsibilities will be. This will also avoid any overlapping of the tasks and responsibilities.

3. All duties conducted by all parties in implementation of the program should be supervised by appropriate bodies so as to ensure that the program is carried out in proper way, and in accordance with the tasks and responsibilities reflected in the arrangement. Then, these duties should be reported to the reporting bodies in order to receive evaluation and feedback regarding the implementation of the program. The supervisory and reporting bodies should be appropriate institutions, as it discussed in Chapter IV.
4. To have a ‘legal’ basis for the institutional arrangement, the implementation of the arrangement should be carried out through enforcement regulations in the form of a Ministerial Decree of the Minister of Environment, to ensure that the co-operation and coordination arrangements will be carried out by parties. This enforcement regulation will provide a ‘tool’ to enforce the program that is to be carried out by the parties. All aspects of the implementation of the arrangement should then be controlled by the Ministry of Environment and BAPEDAL as control and enforcement bodies.

5. A special program to increase public awareness should also be undertaken by executing bodies to the people under their responsibility, in order to change current public attitudes and consciousness towards environmental protection. In addition, staff training, particularly those staff who are directly responsible for implementing the Environmental Management and Monitoring Plan, should also be provided so as to increase their knowledge, skill and technical ability concerning their duties.

6. For the cost of recovery of reception facilities, an indirect charge is recommended, where all costs related to the provision and installation of the reception facilities are included in port dues. This indirect charge should be seen as ‘environmental fee’ from port users and. In addition, simple procedures for using the facilities should also be introduced in order to encourage ship operators to use it, so that its utilization will increase. Finally, the function of Port State Control should be strengthened so as to control ships onboard and in this way prevent illegal discharge of wastes at sea.
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APPENDIX 1. LOCATION OF THE PORT OF TANJUNG PRIOK
APPENDIX 2. LOCATION OF OBSERVATION SITES