



Sustainable Use of Natural Resources in the Context of Trade Liberalization and Export Growth in Indonesia

*A Study on the Use of Economic Instruments
in the Pulp and Paper Industry*

Foreword

During Indonesia's economic growth oriented paradigm of the 1980s – 1990s, natural resources and the environment were regarded as free goods (or factors of production) and the costs of using natural resources were not internalized into production costs. This approach has led to a negative situation in which natural resources are over used and environmental services are under valued, which disturbs the natural balance. The perception that environmental resources are free should be discontinued because this approach creates high environmental costs and social inequities, in particular for the people who are not using those natural resources directly. For these reasons and to achieve sustainable development, the Indonesian Government needs to design development policies, including trade-related policies, that will internalize the costs of pollution and environmental damage into an activity's production costs.

Current environmental policies and the institutional framework of Indonesia's industrial sector do not adequately address the negative impacts of export growth resulting from trade liberalization. Environmental management in Indonesia has relied on command and control approaches, which have many limitations in addressing adverse impacts, especially in the industrial sector. The use of economic instruments in environmental management is fast becoming an alternative approach, particularly for pollution control and damage to the environment. This study proposes the use of economic instruments to address and mitigate the negative impacts of pollution caused by the pulp and paper industry.

However, environmental policies are part of a complex system of existing and proposed government actions. In competition with other government actions and objectives, economic instruments for environmental protection must be able to operate effectively with other policies already in place, and the responsible institution will need adequate capacity to carry out an additional set of highly sophisticated activities. In other words, any proposed economic instruments must be compatible with national regulatory objectives and existing legislation. The National Effluent Charge for the pulp and paper industry proposed in this report should meet these criteria.

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Executive summary

In the trade liberalization era, Indonesia has the opportunity to improve the economy through fostering export growth in the industrial sector. Consequently, Indonesia needs to anticipate the potential risks of negative impacts to the environment and natural resources. To achieve sustainable development and at the same time improve environmental quality in Indonesia, a range of tools are needed such as environmental policies and market-based incentives (economic instruments), which have already been successfully applied in many countries.

This report provides a general review of environmental policy in Indonesia and assesses the utilization of economic instruments to encourage the sustainable use of natural resources and the internalization of environmental costs in the industrial sector. The industrial sector in Indonesia was selected for project implementation because it is the most important and growing source of foreign income and because it relies heavily on the use of natural and environmental resources. Indonesia's recent development has been led by rapid growth in manufacturing output, especially in the pulp and paper industry. In 1997, Indonesia ranked 12th and 13th amongst the world's largest pulp and paper producing countries respectively.

However, much of the industrial expansion has taken place without due regard to the environment, and has led to serious environmental degradation, particularly in Java where 75 per cent of industry is located. The major negative impacts of Indonesia's industrialization are: increasing dependence on Indonesia's stock of key natural resources (land, forest, water and energy); an immediate and significant threat to health and human welfare caused by industrial pollution combined with urban pollution; and increased conflicts over use of land and other natural resources.

Pulp and paper production in particular can be highly degrading to the environment. The production process employs significant quantities of chemicals in pulping and bleaching as well as large amounts of fossil fuel, energy and fresh water. For example, it has been estimated that pulping and bleaching processes put approximately 950,000 tons of effluent into rivers, including toxic organochlorine compounds as well as pumping approximately 100,000 tons of acid rain, including sulphur dioxide into the air (Thompson, 1996).

According to the Indonesian Pulp and Paper Association (2003), the total installed capacity of pulp production in 2002 was about 6.08 million tons of pulp annually and real production was about 4.97 million tons. There are 77 paper production mills (10 are integrated pulp and paper mills), with total installed capacity of about 10.06 million tons of paper annually and in 2002 real paper production was about 7.21 million tons. Environmental impacts from the pulp and paper industry activities include deterioration of forest resources and loss of biodiversity, water, land and air pollution and heavy consumption of surface and ground water resources. Reforms that promote trade will raise the overall level of pulp and paper industry activities, prompting even higher rates of consumption of natural and environmental resources.

If the Indonesian economy grows as expected (GNP reaches 4-5 per cent growth per year), then domestic paper consumption can be expected to increase to 30 kg/capita/year in 2008. It will need additional paper supplies of around 7.9 kg/capita x 200 million people = 15,800 million kg or 15.8 million tons per year.

Therefore, domestic market conditions still provide good prospects for the industry to grow (CIFOR, 2002). In addition, from the economic point of view, foreign exchange revenue from the industry was US\$ 3 billion, equal to about 4.4 per cent of total GDP in the year 2000, but it declined slightly to about US\$ 2.54 billion in 2001. The expected revenue for 2002 was US\$ 3.5 billion (APKI, 2001). Based on the projected increases in production, if appropriate environmental policies are not well established, negative environmental impacts will continue.

Indonesia's first environmental policy was promulgated in 1982, and was revised in 1997 to introduce a new paradigm in environmental management, replacing the earlier law. The new Act pays more attention to promoting policies that use market based instruments (economic instruments) together with the command and control (CAC) approach. To achieve better synergy between CAC policy and economic instruments, partnerships among stakeholders and increased public involvement is being encouraged.

A number of market-based policies have already been adopted in several sectors with some positive indirect impacts. However, market based approaches have made only modest inroad into national environmental policies. The complementary nature of command and control and market-based approaches or economic instruments needs to be better understood and then turned into better policy-making. Policy approaches are rarely comprised of only a single tool.

In the pulp and paper industry there is currently no specific use of economic instruments, although they have been used in the upstream activities that supply raw materials for the industry. For example, a forest taxation system has been in use for many years. Other economic instruments that can be applied to the main cycle of the pulp and paper production process include environmental soft loans, import duty exemptions on environmentally sound technology, user fees and user charges. In order to identify an appropriate type of economic instrument for specific use in a specific sector, it is necessary to determine whether it is possible to design a measure that will also meet all the other relevant criteria. For example, a tax must meet the criteria set out in the Statement of Intent and similar criteria will apply to other economic instrument schemes. However, while the ideal economic instrument will tackle the environmental problem identified, this is often not possible to achieve directly and proxies may need to be used.

In contrast to economic instruments, regulation often takes the form of uniform emission standards across industry. This is because regulators lack the necessary information about firm-specific pollution abatement costs to design a pattern of regulation whereby the marginal abatement costs between firms are equalized. However, a well-designed economic instrument can equalize the marginal abatement costs between polluters.

This report summarizes a number of economic instruments that have been implemented in the industrial sector with relevance to the pulp and paper industry. Findings indicate that economic instruments do tend to have specific purposes and have a strong potential to reduce the environmental impact identified. The report then proposes a framework for implementing a national effluent charge in the pulp and paper industry and presents a preliminary work plan for achieving this. An effluent charge is a viable option to implement in Indonesia since many of the conditions required to implement such an economic instrument programme are already in place. However, the proposal will have broad implications for the institutions responsible for implementing and enforcing it.

Finally, the report clearly indicates that further research on environmental management strategies is needed to provide sound guidance to decision makers and industry stakeholders to establish new policies and select appropriate instruments for environmental protection and sustainable development of the pulp and paper industry. It is hoped that this report will provide a useful basis from which to continue the research and develop in-depth studies in the future.

Abbreviations and acronyms

ADB	Asian Development Bank
AFTA	Asean Free Trade Area
APKI	Asosiasi Pulp & Kertas Indonesia (Indonesian Pulp & Paper Association)
ASEAN	Association of South East Asian Nations
BAPEDAL	Badan Pengendalian Dampak Lingkungan (Environmental Management Impact Agency)
BBS	Balai Besar Selulosa (Cellulose Research Institute, current name is Pulp and Paper Research Institute)
BOD	Biochemical oxygen demand
CAC	Command and Control
CIFOR	Centre for International Forestry Research
COD	Chemical oxygen demand
DR	Dana Reboisasi (Reforestation Fund)
EIs	Economic Instruments
EMS	Environmental Management Systems
GOI	Government of Indonesia
HTI	Hutan Tanaman Industri (Industrial Forestry or Plantation Forest)
IDR	Indonesia dollar Rupiahs*
IEPC-KfW	Industrial Efficiency and Pollution Control-Kreditanstalt fur Wiederaufbau (for small and medium enterprises)
IHPHP	Forest Concession License Fee
IMF	International Monetary Fund
LEI	Lembaga Ecolabel Indonesia (Indonesia Eco-labelling Institute)
MBI	Market Based Instrument
MOE	Ministry of Environment
MOF	Ministry of Forestry
PAE-JBIC	Pollution Abatement Equipment-Japan Bank for International Cooperation (for large scale enterprises)
PBB	Pajak Bumi dan Bangunan (Land and Building Tax)
PROKASIH	Program Kali Bersih (Clean Rivers Programme)
PROPER	Program Peringkat (Business Environmental Performance Rating Programme)
UGM	Universitas Gadjah Mada
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNSOED	Universitas Jenderal Soedirman
USAID	United States of America Aid programme
WALHI	Wahana Lingkungan Hidup Indonesia (Indonesia Environmental Forum)
WTO	World Trade Organization

*1.00 IDR = 0.0001 USD

1. Introduction and background

After three decades of continuous growth fostered by political, social, and macroeconomic stability, the Asian economic crisis of 1997 catalyzed a major change in Indonesia's economic and political system. The crisis and the subsequent fall in GDP, the largest among ASEAN (Association of South East Asian Nations) countries, exposed the underlying weaknesses in Indonesia's economic and financial structures, prompting calls for reform. Subsequently, Indonesia developed a programme aimed at stabilizing the economy, restructuring its ailing banking system, and creating the conditions conducive to a more efficient, market-based allocation of resources in several key sectors.

These reforms have so far been positive, as Indonesia's economy began to stabilize in 1999, following the sharp economic contraction and high inflation of 1998. By following a tight monetary policy, the Government reduced inflation from over 70 per cent in 1998 to 2 per cent in 1999. Although interest rates spiked as high as 70 per cent in response to the monetary contraction, they fell rapidly to the 10 to 15 per cent range. The free-fall of the economy stopped in the second half of 1999 as GDP showed some growth, although GDP for the year as a whole showed no growth.

The Indonesian economy grew at an average rate of 7.1 per cent annually over the past decade (1990-2000), and in 1996 attained a GDP of approximately US\$ 157 billion (at 1993 prices). However, the monetary crisis in mid-1997 led to a 75 per cent devaluation of the rupiah (IDR) relative to the US dollar. The prolonged crisis weakened nearly every sector of economic activity so that economic growth was only 2 per cent in 1997 and shrank by 17 per cent in 1998. However, the World Bank and the Asian Development Bank (ADB) expressed satisfaction with the Government of Indonesia's efforts to implement a wide range of economic reforms. Considering the 3.6 per cent growth of GDP in 2002, some economists are optimistic that monetary stability will be restored and the Indonesian economy will regain its growth momentum, starting with 3.8 per cent in 2003 (Basri, 2003).¹

Indonesia's growing industrial sector in particular was severely affected by the economic crisis. Having previously grown at rate of 11-14 per cent annually for more than a decade, it shrank by 12 per cent in 1998. For almost five years (1997-2002), the government has had to face political, moral, social and economic crises influencing every aspect of human life.

1.1 Indonesia's industrial sector

Indonesia, as a developing country, has focused its recent economic development on the industrial sector. As the government gradually simplified administrative procedures and offered a more attractive investment policy to domestic and foreign private investors in the 1980s and early 1990s, significant growth of industrial activities at all levels occurred.

¹ As of publication, the Indonesian Research Bank predicted a 4.5-5 per cent growth of GDP in 2004 and reported that GDP reached 4.9 per cent in the third quarter of 2004.

In the first semester of 2003 the industrial sector contributed significant output to national income: 24.54 per cent of GDP, compared to 17.85 per cent for agriculture (Biro Pusat Statistik, 2003). In the same period, the industrial sector grew by 3.67 per cent while the agricultural sector grew only 3.43 per cent (ibid.). In addition, Basri (2003) predicts that the industrial sector will grow by 4.5 per cent in 2004, whereas agriculture will grow by only 2.2 per cent.

In Indonesia's economic growth oriented paradigm of the 1980s - 1990s, natural resources and the environment were treated as free goods. This approach has led to a negative situation in which natural resources are over used and environmental services under valued, and the environmental and social costs are not internalized into production costs.

Expansion of industrial activity also increased the amount of industrial waste generated. Consequently, environmental management measures must now be put in place to solve the environmental problems associated with growth of industrial activities, including waste treatment techniques.

The perception that natural resources are free also creates high social costs, as well as inequities for the people who are not directly benefiting from use of those natural resources. For these reasons and to produce development that can be sustained for the long run, the government therefore needs to design sustainable development policies and policies that internalize the costs of pollution and environmental damage into production costs.

1.2 Environmental issues in Indonesia

Issues of environmental quality and sustainability are recent additions to government development concerns. Development policies tended formerly to be based on economic growth rather than on sustainable development. It is now widely recognized that much pollution and environmental damage has been caused by the failure to include and integrate environmental wisdom into development plans and processes. Over the last five years, there have been many changes in development policy.

The pursuit of this goal of environmental sustainability will need to be shaped by a future fundamentally different from the past. The story of the past is one of oil, rural development and the reduction of poverty based primarily on a natural resource intensive growth strategy. The story of the future is one of transition, already well under way: from a dependence on oil and agriculture to reliance on rapid industrialization; from a largely rural society to a predominantly urban one; and from a low-income to solidly middle-income country. This is based on a development strategy that emphasizes increasing efficiency and competitiveness of domestic production, higher productivity and greater value-added goods. The private sector, with support from the government, is expected to be the main engine of growth.

These transitions will have major implications for the environment. The analysis of current environmental conditions and trends, and the likely impact of future growth and development under existing policies and practices, leads to three main conclusions.

First, future growth and development, including the process of industrialization, will depend increasingly on Indonesia's stock of key natural resources (land, forest, water, and energy) and the sustainability of critical ecosystems (including groundwater aquifers in urban areas, and watersheds and coastal and marine ecosystems throughout Indonesia). Current inefficiencies in the allocation and use of natural resources however, and the prospects for continued degradation of critical ecosystems, call into question the sustainability of even current levels of economic activity in a number of key sectors.

Second, industrial sector growth will continue to be concentrated in urban areas, especially on Java. Industrial pollution, combined with pollution from urban sources (human waste, solid waste and vehicle

emissions), poses an immediate and significant threat to health and human welfare. Growing congestion and pollution in Indonesia's main urban centres will erode the efficiency of public and private sector investment, reduce Indonesia's ability to attract foreign investment, and eventually lead to strong community resistance to industrial expansion, particularly in urban areas, with serious implications for growth of the economy as a whole.

Third, as a result of rapid economic growth, conflicts over the use of land (i.e., forests, since it directly relates to the present study) and access to other natural resources are increasing. Growing numbers of people are being exposed to environmental pollution, threatening their health and livelihoods and jeopardizing their prospects for a higher quality of life in the future.

The emergence of these issues has led to a growing awareness in Indonesia of the need to improve the management of natural resources, reduce the level of urban and industrial pollution, and enhance equity in future growth and development. To deal with these issues will not be easy. The main challenge will be to integrate environmental issues and concerns into the development process, to take maximum advantage of the positive linkages, and deal effectively with the tradeoffs. This will require continued improvement in development policies and creating incentives for environmentally responsible behaviour. Substantial increase in investments for environmental protection by both the Government and the private sector, and sustained efforts to strengthen the institutions responsible for environmental planning and management will also be required.

In order to support the sustainable use of natural resources, the Government of Indonesia has developed policies and laws that promote the use of economic instruments. Once implemented, most sectors will be required to use economic instruments as a tool to internalize environmental and social externalities.

1.3 Project rationale

The industrial sector in Indonesia has been selected for project implementation because it is the most important and growing source of foreign income in Indonesia and because it relies heavily on the use of natural resources and environmental services. However, much of the industrial expansion has taken place without due regard to the environment, and this has led to serious environmental degradation, particularly in Java where 75 per cent of industry is located.

This degradation has become increasingly evident in the form of deforestation, adverse health impacts, increased pressure on air, land and water resources, and damage to downstream activities and coastal and marine ecosystems. In broad terms, these impacts can be traced to industrial pollutants of three major types: water pollutants (e.g., biochemical oxygen demand (BOD) and suspended solids), air pollutants (e.g., particulates, sulphur and nitrogen oxides, carbon dioxide and carbon monoxide), and toxic and hazardous waste (e.g., bio-accumulative metals).

The six major industries that support the developing Indonesian economy are chemical fertilizers, pulp and paper, cement, textiles, leather and plywood. This study will focus on the pulp and paper industry. This sector was chosen according to the following criteria: contribution to gross domestic product (GDP); volume of exports; number of workers; environmental impacts; and use of natural resources (for details, see Appendix 1).

It is hoped that this report will produce a comprehensive overview of the utilization of economic instruments to encourage the sustainable use of natural resources and internalize environmental impacts resulting from trade liberalization and export growth in the industrial sector.

1.4 Overview of the pulp and paper industry

Pulp and paper production can be highly degrading to the environment. The production process employs significant quantities of chemicals in pulping and bleaching as well as large amounts of fossil fuel energy and fresh water. It has been estimated that pulping and bleaching processes put approximately 950,000 tons of effluent into rivers, including toxic organochlorine compounds as well as pumping approximately 100,000 tons of acid rain, including sulphur dioxide into the air (Thompson, 1996).

Prior to the economic crisis, Indonesia's pulp and paper industry was characterized by rapid growth and strong performance, at approximately 24 per cent per annum. Foreign investment has played a significant part in increasing production capacity. Joint ventures between domestic and foreign companies have allowed for larger investments and the establishment of greater production capacities than domestically supported plants. By 1997, the industry employed over 75,000 workers nationwide.

In 1997, of the world's 30 largest paper and pulp producing countries, Indonesia ranked 12th and 13th respectively. In the past five years, the country's pulp production went up by an average annual rate of 28.1 per cent, from 1.3 million tons in 1993 to 3.05 million tons in 1997. The paper industry continued to expand by 17.5 per cent on average per year, yielding 2.5 million tons of paper in 1993 and 4.8 million tons in 1997. Until the end of 1997, the paper and pulp industry was not significantly affected by the economic crisis. In fact, the industry continued to grow since the domestic market for the first nine months of 1997 remained strong.

In 1998, however, the continued heavy devaluation of the Indonesian dollar rupiah (IDR) against the US dollar caused the prices of most paper types to soar by more than 100 per cent, making them unaffordable to most domestic users. To cope with this situation, many pulp and paper manufactures intensified exports. This has not been difficult in view of the devaluation of the IDR, making the manufacturing costs among the lowest in the world, and creating a price advantage for Indonesian pulp and paper. As a result, Indonesia's export volume of pulp and paper in the first eight months of 1998 jumped by 63.4 per cent and 60.1 per cent respectively. According to Indonesia's Pulp and Paper Association (APKI, 2000), the value of exports of pulp and paper products in 1998 was US\$ 3.5 billion.

1.5 Project objectives and scope

Based on the considerations above, this report aims to reach the following objectives:

- to assess the environmental implications of trade liberalization and export growth of the industrial sector, focusing on the pulp and paper industry.
- to stimulate decision makers to take a proactive role in formulating country and sector-specific economic policy instruments to achieve sustainable use of natural resources.
- to institute a multi-stakeholder process in identifying and implementing effective economic instruments to address the issue of industrial pollution in Indonesia.
- to enhance cooperation between national and international institutions and experts in the use of economic instruments.
- to identify economic instruments to use in environmental and natural resource management in the pulp and paper industry.
- to develop and recommend a policy proposal to use economic instruments to support the sustainable use of natural resources in the pulp and paper industry.
- to develop capacity in policy research in Indonesia.

1.6 Methodology

With the support of UNEP, the project was implemented by the Ministry for Environment in cooperation with the Ministry of Forestry, the Ministry of Industry and Trade, the National Agency for Export Development (NAFED), the Ministry of Finance, and was supported by the Natural Resources Management (NRM) and other stakeholders.

Team members and UNEP

A multidisciplinary team was established by the Minister for the Environment through Ministerial Decree No. 30, dated 12 June 2002 comprising a Steering Committee and an Organizing Committee. The Steering Committee was chaired by Mr. Hoetomo, Deputy Minister for Environmental Policy and Institution (MOE). The main task of the Steering Committee was to guide the study by defining strategy and policy. The Steering Committee was composed of members of the Ministry of Environment, the Ministry of Finance, the Ministry of Industry and Trade, the Ministry of Forestry, and the National Agency for Export Development.

The Organizing Committee was established to direct the project and was led by Mrs. Laksmi Dhewanthi (MOE). Team members included staff from the Ministry of Environment and resource personnel. In addition, two consultants, Mr. Denny Indradjaja and Mr. Arief Budi Purwanto were responsible for conducting the study. The team was also supported by experts in the use of economics instruments, forestry management and industrial issues. The consultants, experts and resources personnel were appointed by the Deputy Minister for Environmental Policy and Institution.²

A Launching Workshop took place on 21 February 2002 and included representatives from agencies and relevant stakeholders related to the pulp and paper industry as well as several independent experts. A further series of consultative meetings and discussions were also convened to develop the study. The first Organizing Committee meeting was conducted on 26 April 2002 and the Steering Committee first met on 10 May 2002. These meetings were organized to obtain more information and suggestions for achieving the objectives and producing the outputs of the report. Participants included representatives from the Ministry of Industry and Trade, the Ministry of Finance, the Ministry of Forestry, the Ministry of Environment, the National Agency for Export Development (BPFN), the Ministry of Foreign Affairs, the Chamber of Commerce (KADIN), the Indonesian Anti Dumping Committee (KADI), the Cellulose Research Institute (BBS), the Indonesian Pulp and Paper Association (APKI), professional experts from well-known universities (UGM, UNSOED), local authorities, environmental organizations and representatives of the pulp and paper industry.

UNEP provided financial and technical support, attended the Launching Workshop and the National Closing Workshop, and invited experts and consultants to review and make comments and suggestions on the draft reports.

Data collection

Primary and secondary data were collected from a variety of different sources:

- Literature review
Analysis of relevant information and data from a range of research literature and previous studies conducted by governmental agencies, UNEP, UNDP, USAID, NGOs, the Indonesian Pulp and Paper Association (APKI), and other research organizations.

² Letter No. B -1816/Dep.I/06/2002 dated 24 June 2002.

- Consultative meetings and discussions

Several meetings were convened for specific designated purposes, such as for examining national policy and international norms relevant to the pulp and paper industry, discussing the use of economic instruments, and develop the final objectives of the study to map a project proposal.

- Survey

A survey was conducted to gather detailed information and primary data directly from the pulp and paper industries as well as through interviews with key persons from relevant agencies/institutions. (A summary of the survey results is provided in Appendix 2).

- Independent experts and stakeholders

Discussions with a variety of stakeholders were convened as required. Participants included environmental economic researchers (UGM, UNSOED), forestry researchers (technology research centre), a Base and Cellulose Industry researcher, and a Finance researcher.

The private sector such as Hutan Tanaman Industri, private organizations such as Jasa Tirta, Co, as well as the Indonesian Pulp and Paper Association and key representatives from pulp and paper industries also took part.

2. Impacts of trade liberalization in Indonesia

Trade liberalization can have both positive and negative impacts on the environment and the economy. On the one hand, increased trade can lead to expansion of production, employment, and consumption, which is associated with a rise in living standards and a reduction of poverty. Trade liberalization can promote the efficient allocation of resources worldwide and therefore reduce pressure caused by over-exploitation of global natural resources. On the other hand, without appropriate environmental policies and regulations in place, increase in production and consumption as a result of trade can also increase demand for natural resources and increased generation of waste and emissions. Degradation of the environment and increased pollution will likely be hastened and can also have major implications on poverty and economic development.

As a member of WTO (since 1947 as a colony of the Netherlands), Indonesia has had to adjust its trade-related policies in the era of trade liberalization. The Government significantly liberalized both import and export markets after the economic crisis of 1998, under supervision and with the support of the International Monetary Fund (IMF) and the World Bank. Many policies and regulations have been set up and implemented, including a new tax system, trade liberalization, foreign investment, performance bonds, and restrictions on forest conversion.

2.1 Trade liberalization and economic growth

2.1.1 Economic reform

Trade and foreign investment were at the heart of Indonesia's economic reform policy during the 1990s, but from 1994 – 1996, the pace of trade and investment slowed somewhat, compared with previous years. In the face of the economic crisis, however, the Government undertook to accelerate the pace of reforms and to remove many remaining restrictions on domestic and international trade. These reforms involved a major review of anti-competitive practices, including monopolies, oligopolies and all other restrictive marketing arrangements that had survived Indonesia's trade liberalization process, with a view to "levelling the playing field" across many sectors, and creating a more open, competitive market place.

Government policy makers have reiterated Indonesia's commitment to stable macroeconomic policies, have started to restructure the banking sector, and are addressing long-standing structural impediments to growth. These impediments include the many trade distorting barriers that survived the wave of liberalization in the 1980s and 1990s, and which have, over time, contributed to unduly high costs for the economy as a whole. This issue of Indonesia's competitiveness had in fact already become a concern in 1996, when growth in exports, a main economic strength, started to slow down. Certainly, as Indonesia seeks to improve the performance of its economy and address poverty, the environment will be an important concern.

2.1.2 Transition to an industrial economy and growth of the private sector

Future development of Indonesia's economy will be characterized by efforts to achieve a full economic recovery and enhance free trade. Indonesia is well on its way to making a transition from an agricultural to an industrial economy. Success in making this transition sustainable will be determined by the efforts of both the government and the private sector. However, the government's ability to catalyze economic development is likely to weaken, as its control of overall expenditure and investment is decreasing due to the increasing role of the private sector and regional governments. Also, the government budget for subsidizing state-owned enterprises will most likely decrease. The privatization of state-owned enterprises and the issuance of municipal bonds could be seen as an effort to ease the government budget while attracting foreign investment.

2.2 Environmental impacts of trade liberalization

Rapid growth of Indonesia's industrial sector to support economic and trade activities has serious worldwide environmental implications. Increased exploitation of natural resources including high consumption of water and accelerated forest conversion, increased generation of energy and deterioration of other resources, as well as increased levels of pollution, are examples of environmental problems happening worldwide.

The international community is making efforts to take concrete actions to protect the environment, mitigate the negative impacts of increased trade and promote the positive impacts. One example is by integrating environmental considerations into trade policies and international, regional and bilateral trade agreements. However, it is important to ensure that internalizing environmental costs does not adversely affect market access and it is important that this does not act as unfair obstacles to trade or are protectionist in intent, but also that trade rules do not discourage environmental protection. Indonesia, with an open economic system, is susceptible to international influence.

The present situation in which deterioration and degradation of the environment continues, makes Indonesia vulnerable to such consequences – indeed Indonesia has already experienced some discrimination where export destination countries have refused certain products because of environmental issues such as illegal logging, use of environmentally unfriendly materials, content of hazardous substances in final products, and so on.

There are many ways of assessing environmental and sustainable development effects of trade policies and trade liberalization. One of the most commonly used approaches in Indonesia is based on the environmental assessment methodology of the OECD, which has been further developed by other practitioners of assessment, including UNEP. This methodology qualitatively assesses the impacts of trade on the environment and can be similarly used to assess the social impacts of trade policy. It takes into account the full range of effects that trade reforms may have on the environment and on society (UNEP, 2002).

Ideally, an environmental assessment will consider both direct and indirect effects of trade reforms on the environment and on society. Decision makers are then able to make decisions on trade-offs between economic gains, environmental impacts and social effects, if those impacts can be rationally and exactly identified or measured (UNEP, 2001).

UNEP has provided a reference manual for the integrated assessment of trade-related policies (UNEP, 2001). It outlines five types of effect that will happen directly and/or indirectly to a range of environmental, health, and social issues due to trade reforms. These effects include Product effects, Technology effects, Scale effects, Structural Effects, and Regulatory effects (for details describing the effects, see Appendix 3). Table 1 below summarizes the results of a preliminary assessment relating to the pulp and paper industry.

Table 1: Preliminary assessment of the impacts resulting from trade liberalization and export growth in the pulp and paper industry

Trade-related effects	Impact on forest resources	Impact on bio diversity	Impact on water use	Impact on energy use	Impact on aquatic resources	Impact on surface & ground water	Impact on acid rain	Impact on health & safety
Product effects	(0)	(0)	(0)	(0)	(-)	(-)	(0)	(0)
Technology effects	(++)	(++)	(+++)	(++)	(+++)	(++)	(++)	(+++)
Scale effects	(---)	(---)	(---)	(---)	(---)	(---)	(---)	(---)
Structural effects	(---)	(---)	(---)	(---)	(---)	(---)	(-)	(-)
Regulatory effects	(++)	(++)	(0)	(0)	(++)	(++)	(++)	(++)

Source: Adapted from UNEP, 2001.

Note: (0) = No significant impact

(-) = Light negative impact; (- -) = Moderate; (- - -) = Significant negative impact

(+) = Light positive impact; (+ +) = Moderate; (+ + +) = Significant positive impact

2.2.1 Environmental impacts of trade liberalization in the pulp and paper industry

Reforms that promote trade will raise the overall level of pulp and paper industry activities, causing a higher rate of consumption of natural and environmental resources. Environmental impacts from the pulp and paper industry activities include higher air, water, or land pollution, natural resource effects associated with changes in demand for the use of natural resources, and faster resource depletion or resource degradation. Assessment of the environmental impacts of the pulp and paper industry resulting from trade policies and agreements were based on qualitative exercises carried out by experts and practitioners (so-called 'expert judgment' method) for preliminary identification of impacts and their magnitude. The table in Appendix 3 shows a modification of the matrix developed by UNEP (2001). This preliminary identification needs to be further developed for more quantitative results.

However, these preliminary impacts may be mitigated when efficiency is improved, or when industry growth allows for greater investments in environmental projects. An expansion in the level of economic activities in the pulp and paper industry could have positive impacts on the environment by reduced demand on natural resources through improved efficiency and less generation of polluting waste through improved technology.

Expansion of pulp and paper production could also have negative environmental impacts when the use of natural resources is inefficient and there is minimum investment in environmental management. In this situation, pulp and paper production will be associated with increase in environmental degradation and pollution and severe impacts on health and safety.

The environmental impacts are summarized as follows:

1. Deterioration of forest resources and loss of biodiversity

- increased demand for raw materials
- increased dependency on natural forests due to improper management of industrial forestry
- increase in rate of degradation and deforestation, not only to natural forests but also to cultivated/ industrial forests due to increase in illegal logging when supply of raw materials is low
- deterioration of forest ecosystems, threats to biodiversity and loss of endemic species
- social impacts due to destruction of local communities surrounding and/or within the forest.

2. Water and air pollution

The pulp and paper industry is energy and water intensive. Pulp industry wastewater contains high concentrations of COD and BOD emissions. Transport vehicles, power stations and recovery boilers for chemical pulping all emit sulphur and nitrogen oxides, gases which acidify the atmosphere have regional environmental impacts.

3. Surface and ground water resources

An increase in pulp and paper production will create an increased demand for surface and ground water resources.

2.3 Prospects for economic growth

The Indonesian pulp and paper industry has good prospects due to a high domestic and international demand, and also the abundant availability of resources and raw materials. The Government has stated that pulp and paper are priority export products (APKI, 2003). However, globally, the demand is for wood fibre to be produced from renewable sources and is sustainable in terms of both the environment and the impact on local and wider societies. Moreover, the average paper consumption per capita will possibly increase with population and overall economic development.

2.3.1 Policy issues for future development of the pulp and paper industry

Trade liberalization could lead to further changes in the sectoral composition of Indonesia's economy, as it specializes in production of goods or services where it has comparative advantages. Since the pulp and paper industry has good prospects, this industry could be an important source of Indonesian foreign exchange earnings, leading to changes in policy that will create more incentives to develop the industry.

If the Indonesian economy grows as expected (reaches 3 - 4 per cent), then domestic paper consumption could increase to 30 kg/capita/year by 2008.³ Additional paper supplies of around 7.9 kg/capita x 200 million people = 15.800 million kg or 15.8 million tons per year will be required. Thus, the domestic market still offers a good opportunity for the industry to grow (CIFOR, 2002).

Foreign exchange revenue from the industry was US\$ 3 billion – equal to about 4.4 per cent of total GDP in the year 2000, but it declined slightly to about US\$ 2.54 billion in 2001. The expected revenue for 2002 was US\$ 3.5 billion (APKI, 2001). Consequently, with this potential increase in production, the development of the pulp and paper industry is likely to increase pollution and forest exploitation unless there are appropriate environmental policies in place.

Pulp and paper industries compete continuously between themselves and indirectly through the use of technology. Thus the pulp and paper industry needs to:

- *Encourage innovation of technology to survive and develop.* Innovations can include installation of new equipment, improvement in production efficiency and quality, or importing components in exchange for local ones. Innovation can also be proposed in anticipation of environmental issues. Recently, the industry has said that environmentally friendly technologies are available and being implemented. This technology reduces the impact of environmental pollution and guides the industry to use resources more

³ In the third quarter of 2004 Indonesia's economy was growing at a rate of 4.9 per cent GDP and domestic paper consumption was 24 kg/capita/year in 2002.

efficiently. And more open trade policies will lead to further transfer of production technologies across borders, with a positive effect on the environment.

- *Guarantee availability of basic materials.* Almost all pulp and paper factories use wood-based raw material. Any permit for expansion and new investment should be made only with a guarantee of supply from sustainable plantations. A few producers use bamboo and recycled paper, and the use of non-wood raw material is a challenge to be developed.
- *Strengthen community development* through improved forest management programmes.
- *Reform trade* that may have impacts on environmental regulation and standards. Trade agreements may explicitly include measures to improve environmental standards. This regulatory reform should have positive impacts on forest resources, biodiversity, health and safety, and surface and ground water resources.

2.4 Opportunities and challenges

The positive implication of trade liberalization is the encouragement of rapid growth of commercial and manufacturing sub-sectors in general, and the pulp and paper industry in particular. Trade liberalization drives international trade activities by reducing tariff and non-tariff barriers.

In the ASEAN Free Trade Area (AFTA) in particular, there will be good opportunities for Indonesia's pulp and paper products, because import tariffs will be 0 per cent for pulp, between 0 – 5 per cent for paper and 10 per cent for newspaper. In addition, some final products of paper such as notebooks and shopping bags will be more competitive and have more added value as compared to other forms of exported papers.

The effect of trade liberalization policy on the pulp and paper industry will thus be expansion of the export market because of Indonesia's low production costs for making pulp. However, this raises the major issue of supply of raw material, as discussed in the following.

2.4.1 Comparative advantages

The tropical climate in Indonesia makes it easy for the environment to recover, so the cost for plantation wood is cheap. Meanwhile, in the USA and Europe that have 4 seasons in a year, the growth of wood is slower and the cost of recovery is more expensive also. These factors make the Indonesian pulp and paper industry competitive with the USA, Canada and Scandinavian countries.

Indonesia's comparative advantages are:

- Indonesia still has a considerable area for further development of industrial or plantation forestry (HTI), with over 144 million hectares of forest (70 per cent of Indonesia's landmass). The present allowed exploitation of forests by the pulp and paper industry is only 2.6 million hectares or around 1.8 per cent of Indonesia's forests (APKI, 2003).
- Indonesia's HTI timber can be harvested after 7-8 years, while in 'Norscan' countries timber for pulp needs 30 years before harvesting. With appropriate use of technology and good management systems, these comparative advantages can deliver competitive advantages.

The situation described above shows that Indonesia has a prospective world-class pulp and paper industry. The industry sector has a strong structure in terms of raw material supply, quality, and technology, and the structure of the pulp and paper industry is stronger than the other industries.

These advantages should make penetration of the international market possible. In fact, this industry was able to penetrate the world market from 1994 to 1997, especially to the Scandinavian countries, Europe, the USA and Canada. According to data from the Indonesian Pulp and Paper Industry Association (APKI, 2001), those countries represent around 70 per cent of the world pulp and paper market.

2.4.2 Competition issues

In the trade liberalization era, Indonesia's pulp and paper industry will face competition that could hamper export growth and could cause the industry to reduce its production capacity. The competition issues include:

1. Bilateral and Regional Agreements and the WTO

The temporary exemption of import tariffs on writing paper and printed paper that are exported to Indonesia by several countries could decrease opportunities in the international market, because it could raise the price of Indonesia's paper for export.

2. Imported paper and 'dumping'

With trade liberalization, there will be a lot of imported pulp and paper products entering the Indonesian market, particularly those from Indonesia's main competitors. This market penetration by imported products could hamper growth of the industry and impede the growth of national income from exports.

Data from APKI shows that the price of imported paper products was only US\$ 500 - 550 per ton while the price of Indonesian paper products exported to other countries and price in the international market was US\$ 800 to US\$ 850 per ton. The Indonesian Anti Dumping Committee needs to be more proactive in investigating the dumped paper issue to avoid loss of market momentum.

3. Eco-labelling and EMS ISO-14001 Series

Indonesia is often accused of allowing *environmentally unsound and illegal logging* (CIFOR, 2002). To address this allegation, the Government and the Indonesian Pulp and Paper Industry Association need to encourage voluntary product certification such as the eco-label ISO-14024 (for details of eco-labelling requirements see Appendix IV).

Eco-labelling is a way to motivate the industry to adopt sound environmental management systems. There are basic criteria to follow for achieving eco-certification in terms of life cycle analysis of a product, from raw material procurement, processing, distribution, product utilization, and disposal. The pulp and paper industry needs to accept responsibility for minimizing environmental destruction and degradation, and increase energy and water efficiencies for sustainable use of natural resources in order to avoid criticism in the future.

4. Environmental sustainability

Increased production of pulp and paper will increase pressure on natural resources and the environment, inviting concern from various parties. Since forests are the main source of raw materials for the industry, the concept of sustainable forestry that positions forests as a long-term economic and environmental resource should integrate the concept of environmental sustainability including through internalizing environmental costs. Indonesian forests need to be properly managed to minimize environmental degradation through increased law enforcement, better implementation of existing regulations, including economic instruments, and wider dissemination of voluntary approaches.

3. Indonesia's pulp and paper industry

3.1 Development of the industry

The growth of Indonesia's pulp and paper industry over the past decade has involved an aggregate capital investment of approximately US\$ 15 billion (Barr, C, 2002). According to the Indonesian Pulp and Paper Association (2003), total installed capacity of pulp industries was about 6.08 million tons of pulp annually and in 2002 actual production was about 4.97 million tons. There are 77 paper production mills (10 are integrated pulp and paper mills) with a total installed capacity of about 10.06 million tons of paper annually. In 2002 actual paper production was about 7.21 million tons.

Table 2 shows the increased performance of Indonesia's pulp and paper industry from 1998 to 2002. The table also shows that production was at about 73 per cent of capacity on average. It should be noted that in order to achieve optimum profit and to increase efficiency, production capacity could reach 90 per cent.

Table 2: Performance of the pulp and paper industry, 1998-2002

Commodities	1998	1999	2000	2001	2002
Installed capacity (tons per annum)					
Pulp	4,323,600	4,543,600	5,228,100	5,587,100	6,087,100
Paper	7,479,530	9,097,180	9,116,180	9,904,080	10,065,580
Waste paper (WP)	2,783,430	3,913,560	4,224,420	4,805,945	5,015,935
Production (tons)					
Pulp	3,430,000	3,694,630	4,089,550	4,665,920	4,969,000
Paper	5,487,260	6,720,560	6,849,000	6,951,240	7,212,970
Waste paper recovery	1,355,000	1,917,650	1,679,265	1,740,000	2,215,000
Utilization rate (%)					
Pulp	79.30	81.30	78.20	83.50	81.60
Paper	73.40	73.90	75.10	70.20	71.70
Waste paper	61.80	58.80	60.00	60.70	61.30
Recovery rate of WP	48.70	49.00	39.80	36.20	44.20

Source: Indonesian Pulp and Paper Association, 2003.

Capacity

In relation to capacity development of the pulp and paper industry, the Ministry of Trade and Industry stated that the demand for raw material (wood chips) from the big seven companies in the pulp and paper industry would be 26.4 million metric tons annually. Therefore, the Ministry of Forestry needs to prioritize the development of Industrial or Plantation Forestry (HTI) in order to support the supply of raw material. In addition, research institutions have also encouraged utilization of other fibre sources (rather than

conventional wood), such as woody wastes, non-wood fibres (e.g., abaca,⁴ bamboo, bagasse,⁵ and agricultural residues), estate wastes (e.g., empty oil-palm bunches), and waste paper, which are potentially abundant.

Plantation Forestry (HTI) Investment

The cost of the HTI (Hutan Tanaman Industri) development project is less than 10 per cent of the average pulp factory investment. Some simple calculations pertaining to estimated investment needs in pulp production and HTI are provided below (Haryopuspito, K, 2001):

- A factory with a capacity of 1,500 tons per day needs a minimum investment of around US\$ 1.5 billion
- For continuous wood supply a pulp factory needs around 100,000 hectares (of HTI), so if the HTI operation costs US\$ 1,000/ha, then the investment needed is US\$ 100 million.

Hence, in this simple calculation, investment for HTI is only about 6.6 per cent of total pulp factory investment.

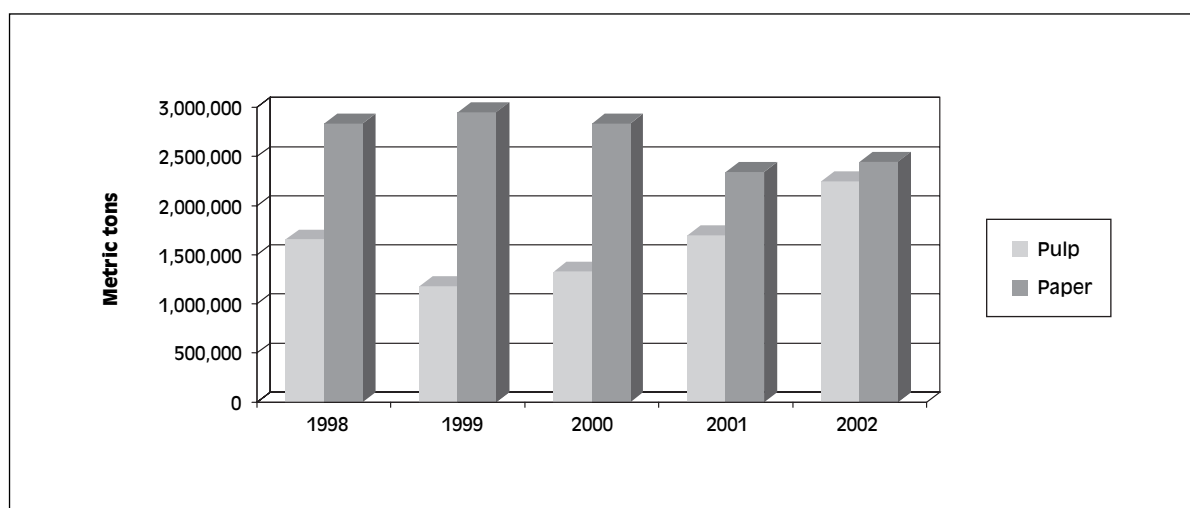
International and domestic markets

Export market

In the early 1990s, the country's pulp industry grew fast. Fast growth was boosted by rising demand in export markets and growing demand from the expanding paper industry in the country. Growth of the pulp and paper industry in 1996-2000 indicated that the industry still had good prospects even though there were some problems in relation to government policies and external competition. The trend of Indonesia's pulp and paper exports in 1998 - 2002 is shown in Figure 3.1.

The price of pulp in the international market in 2001 was high, between US\$ 680-700 per ton. Even though the price of pulp and paper in the international market fluctuates, Indonesia's pulp and paper industry still struggles to compete with other countries. Before the economic crisis in 1998, the cost of pulp production in Indonesia was US\$ 217 per ton and in 2001 about US\$ 250. This is the same as pulp production costs in Asia/Pacific (US\$ 250), and less than in South-America (US\$ 260), North America (US\$ 300), Western Europe (US\$ 420) and Japan (US\$ 590). Brazil and Chile are Indonesia's main competitors with pulp production costs at US\$ 231 and US\$ 241 respectively (APKI, 2002).

Figure 3.1: Export growth of pulp and paper, 1998-2002



Source: Indonesian Pulp and Paper Association Directory (2003)

⁴ Philippine banana tree having leafstalks that yield Manila hemp used for rope and paper etc.

⁵ Sugar cane residue.

With recent world paper consumption at around 400 million tons per year, experts predict that the growth rate of world paper consumption will be 2-3 per cent per year. It is argued, however, that this prediction is too optimistic because of the fluctuating supply and demand of pulp. This is reflected in the wide range of international pulp prices – between US\$ 300 - US\$ 900 per ton (Haryopuspito, K, 2001).

There are only a few countries able to develop a pulp industry successfully. In Asia, Indonesia and China can support a pulp industry due to an abundant supply of raw material from Indonesia's natural and HTI forests. Meanwhile, the current leaders in pulp and paper exports, the 'Norscan' countries (North America and Scandinavia Countries), have limitations in terms of land area and labour. On the other hand, Brazil and its neighbours have an abundant supply of fibre wood as raw material. Indonesia therefore needs to sustainably develop its advantages to fully realize the opportunities.

Income from the pulp and paper industry was US\$ 2.646 billion in 1999 and US\$ 3 billion in 2000. In 2001, however, income dropped to US\$ 2.54 billion with pulp production at 4.9 million tons. Most of this production comes from the companies PT. Riau Andalan Pulp and Paper and PT. Indah Kiat Pulp and Paper, producing about 1.6 million tons each.

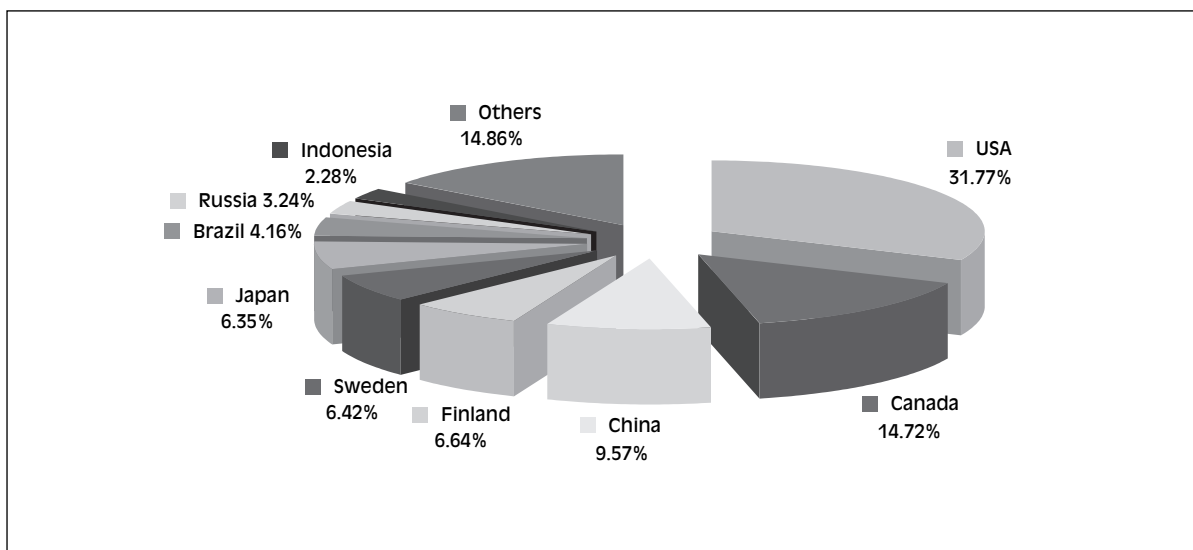
Indonesia's pulp industry is becoming a serious competitor to other producers, especially 'Norscan' countries. Total world pulp production in 2000 was 179.41 million tons (Figure 3.2). The biggest producer was the USA (31.77 per cent), followed by Canada (14.72 per cent), China (9.56 per cent), Finland (6.64 per cent), Sweden (6.42 per cent), Japan (6.35 per cent), Brazil (4.16 per cent), Russia (3.24 per cent), Indonesia (2.28 per cent) and 'others' (14.86 per cent).

From 1994 to 1996, Indonesia exported pulp and paper to European and American markets with quality products at competitive prices, indicating Indonesia as one of North America and Scandinavian countries' strongest competitors.

Domestic market

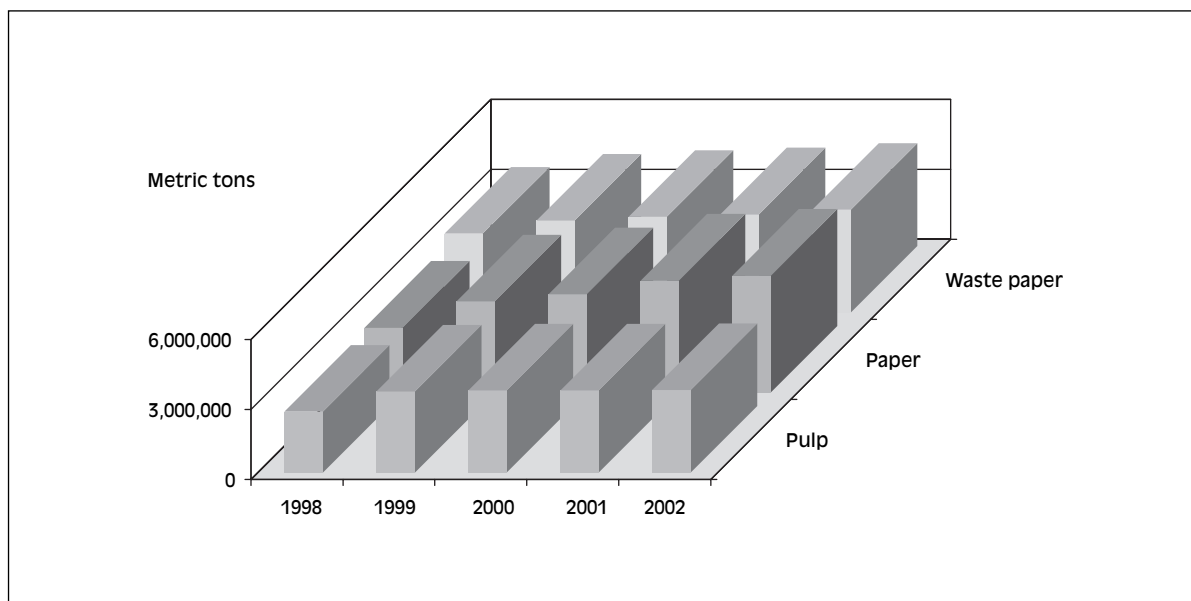
Domestic paper consumption increased from 2.64 million tons in 1995 to 3.28 million tons in 1997. During the economic crisis in 1998, domestic consumption decreased to 2.78 million tons. After the crisis, in 2002, domestic paper consumption increased significantly to 5.02 million tons (see Figure 3.3).

Figure 3.2: World pulp producers, 2000



Source: BBS, 2001.

Figure 3.3: Pulp, paper and waste paper: domestic consumption



Source: Indonesian Pulp and Paper Industry Directory, 2003.

Increase in production capacity has been accompanied by increase in domestic paper consumption per capita. For instance, in 1992, paper consumption per capita was only 10 kg, rising to 15.5 kg in 1996. In 1998 it decreased slightly to 14.41 kg. When economic recovery occurred in 2000, paper consumption per capita rose significantly to 20.8 kg and then 22.1 kg in 2002.⁶ This increase has been triggered by development of the paper and printing industry and development in information technology application that requires various kinds of paper.

3.2 Structure of the pulp and paper industry

3.2.1 Supply of raw materials

Production of 1 ton of pulp requires approximately 4.9 - 5.4 m³ of round wood (CIFOR, 2000). Currently, over 70 per cent of the wood used by the pulp and paper industry in Indonesia comes from natural forests and clearing of natural forest for conversion to another use, such as development of an industrial timber estate or an oil palm plantation (Kartodihardjo, H, 2002).

Ideally, a pulp factory needs to be supported by Industrial Forestry / Plantation Forests such as the Hutan Tanaman Industri (HTI), to guarantee the sustainability of raw materials. But before the plantation (HTI) timber is ready for harvesting, the demand for raw materials is fulfilled using waste wood from logging and land clearing/preparation for HTI development and oil palm plantation development, migration and other development projects. However, acquiring raw materials from land clearing/preparation is clearly not sustainable in the long term (APKI, 2003). In addition, using logging waste is economically feasible only from a relatively close distance and if in sufficient quantities.

⁶ To put things in perspective, in 2002, Malaysia's paper consumption per capita was 116 kg (rising sharply from 87.4 kg in 1998) and in Singapore consumption was 161.2 kg. USA consumption was 334.6 kg (Haryopuspito, K, 2001).

In 1985, the Government of Indonesia launched an ambitious plan to establish vast areas of fast-growing Industrial Forest – the Hutan Tanaman Industry, (HTI) under the Ministry of Forestry, especially in Sumatra and the Kalimantan Islands. The programme accelerated with the issuance of a Government Regulation in 1990. The HTI programme aimed to supplement supplies of timber from the natural forests, rehabilitate degraded lands, and promote environmental conservation (Forest Watch Indonesia, 2002). Every pulp mill would be required to have its own industrial forestry/plantation forest. HTI pulp is composed of *Eucalyptus* spp, *Accacia mangium* and *Gmelina arborea*.

Ideally, HTI pulp production is based on principles of sustainable forest management, improved land productivity, and adds to the overall forested area if developed from secondary degraded land or bushland rather than from converted natural forests.

The Government has also established a regulation specifying that investors in HTI development should also build pulp and paper factories. However, HTI production is incompletely developed and only half have operational pulp and paper factories. The realization of HTI pulp planting until December 2000 was around 23.5 per cent (Forest Watch Indonesia, 2002).

Social equity

One issue that generally occurs in plantation/forestry areas comes from claims from local people that the land that belongs to them. To deal with this, local and central governments often act as mediators in any conflict. Social conflict in forest management is becoming critical due to:

- the weaknesses of Forest Preservation and Conservation legislation
- unprofessional forest management
- unrealistic rules
- lack of understanding of the socio-economic issues and local culture
- a deep economic gap and unfair income distribution between the forestry sector and local communities (Pratomo, H, 2002).

Use of non-wood raw materials

Non-wood fibre for pulp and paper production can come from: stubble, bagasse, bamboo, palm bunches, abaca, and recycled paper. There are some difficulties in efforts to increase the use of alternative raw material coming from non-wood fibres:

1. Alternative raw materials can only be supplied in limited quantities (max. 100 tons/day).
2. Supply of most of the raw materials is seasonal, fluctuates, and is not widely and equally distributed.
3. The machinery and other technical equipment to process raw materials of wood fibre are not always suitable to process raw materials of non-wood fibre.

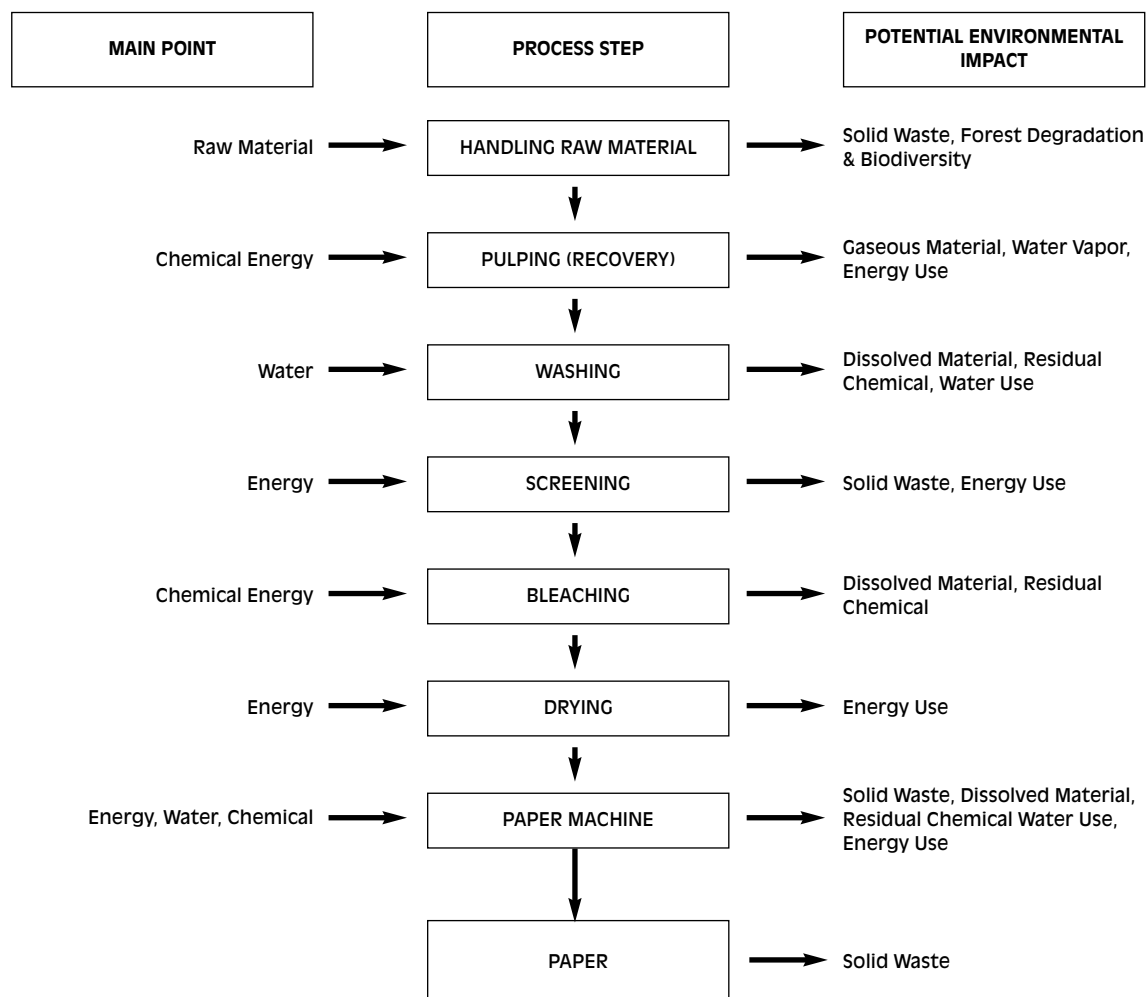
However, there is some opportunity to develop non-wood fibre raw material from oil palm petioles.⁷ The utilization of agricultural residues would make economic as well as environmental sense. The supply of oil palm petioles is abundant, because for each 20 tons of palm oil, 200 tons of palm oil bunches are produced. Preliminary studies on the use of oil palm petioles have been conducted (Joedodibroto, 1982). Good pulping properties and sheets of good strength were obtained and the results compare well with the use of commercial wood pulps. More recently, Santosa, (1998) has conducted experiments using pulp from unbleached oil palm petioles. The handsheets of various grammage were made on a laboratory scale and results showed that oil palm petiole pulp influences significantly the strength, sizing effect, and moisture content of the liner paper, but does not influence the ring crush and bulk properties.

⁷ The stalk that joins the leaf to the stem.

3.2.2 The production process

Generally, the pulp and paper production process, which employs chemical pulping and bleaching, incorporates several steps simplified in Table 3 below.

Table 3: Simplified flow chart showing the major pulp and paper processing steps



Sources: Modified from UNEP, Cleaner Production at Pulp and Paper Mills: A Guidance Manual, 1996.

Pulp

Pulp can be produced using three types of pulping processes – mechanical, semi-mechanical/semi-chemical, and chemical – to convert wood or other cellulosic materials into separated individual fibres, called “pulp”. The processes consume a lot of water, chemicals, and energy. The three different processes of pulp production are shown in Table 4.

In Kraft pulp,⁸ one of the chemical processes, a mixture of sodium hydroxide (NaOH) and sodium sulphide (Na₂S) agents are used to chemically separate lingo-cellulosic fibrous inputs into pulp through dissolution of non-cellulosic compounds (i.e., particularly lignin).

⁸ A chemical pulp also called sulphate pulp, used to create Kraft paper.

Table 4: The three different processes of pulp production

Mechanical	Semi-mechanical/ semi-chemical	Chemical
The fibres are separated mainly by mechanical force in grinders, refiners	The raw material fibre is treated with chemicals at elevated temperature prior to atmospheric refining	The raw material fibre is treated with chemicals at elevated temperature and pressure (cooking) in pressure vessels (digester)
The type of raw material: wooden logs, wood chips (long fibres)	The type of raw material: long or short or mixed fibres	The type of raw material: long or short fibres
Pulp yield is around 90 per cent	Pulp yield is in the range 60-75 per cent	Pulp yield is in the range 45-55 per cent
The resulting pulp has low strength, low quality to be used for non-permanent uses, e.g: newspaper	The resulting pulp strength properties to be used for carton, box	The resulting pulp has the best strength properties, high quality to be used for permanent uses, eg: magazine, printing paper, textbook
No chemical used	Chemical used: sulphite or soda	Chemicals used: soda, sulphate and sulphite

Source: Modified from UNEP (1996) and Roliadi (2003)

Pollution, energy consumption and yield from pulp processing

The load of potential pollutants, energy consumption, and yield of pulp are different according to the pulp production process (see Table 5 below). According to this table, SGW (Stone Ground Wood) and PGW (Pressure Ground Wood) discharge the lowest pollution load (COD & BOD) and also consume the lowest energy compared to the others. SGW and RMP (Refined Mechanical Pulp) processes produce the highest yield of pulp. Meanwhile, Silitonga (1989) stated that water consumption required in pulp processing is about 45 - 60 cubic meters per ton of pulp.

Table 5: Pollution loads, energy consumption and yield in pulp production

Kind of pulp		Pollution (Kg/ton pulp)		Energy consumption (GJ/ton)	Yield (%)
		COD	BOD		
SGW	Unbleached	15-35	8-20	5.3	93-98
	Bleached	20-40	-		
PGW	Unbleached	-	9-16	5.0	85-90
	Bleached	-	14-23		
RMP	Unbleached	23-55	12-25	6.8	93-97
	Bleached				
TMP	Unbleached	40-45	10-30	8.5	85-95
	Bleached	75-80	20-40		
CTMP	Unbleached	70-140	30-60	7.6-10	85-95
	Bleached	80-160	40-85		

Note: SGW: Stone Ground Wood; PGW: Pressure Ground Wood
RMP: Refined Mechanical Pulp; TMP: Thermo Mechanical Pulp
CTMP: Chemi Thermo Mechanical Pulp

Sources: Webb (1991) and Panggabean, 1995.

Processing technology

Depending on the desired products, the resulting pulp can be further processed. For example, it may not be necessary to bleach the pulp, resulting in unbleached pulp and paper products. Furthermore, after or without the bleaching, some additive agents can be added to impart pulp/paper products with certain characteristics and properties. For example, additives such as resin, size or wax emulsion are added to increase water repellency of the pulp/paper product; additives such as binding/gluing agents (e.g., starch, latex emulsion, and asphalt emulsions) are added to increase the bonding and felting network among the fibres in the pulp/paper sheets, thereby improving their physical/mechanical strengths; and colouring can be added.

Additives can be added internally or externally during the processing. Internal additives are added to the pulp furnaces before being converted to paper sheets. Meanwhile, external additives are added to the surface of the paper products after the sheet formation. In particular cases, pulp/paper processing can proceed without any or with only a little additive treatment, for instance in the production of tissues, napkins, and sanitary or toilet paper.

In all, the pulp/paper processing, from preparation of raw material (e.g., wood logging, chipping, debarking), to pulping, bleaching, treating with internal additives, to the finished product (paper sheet), besides consuming a lot of energy, water, and chemicals, can generate a substantial amount of waste that is potentially polluting the environment.

Pollution from paper production

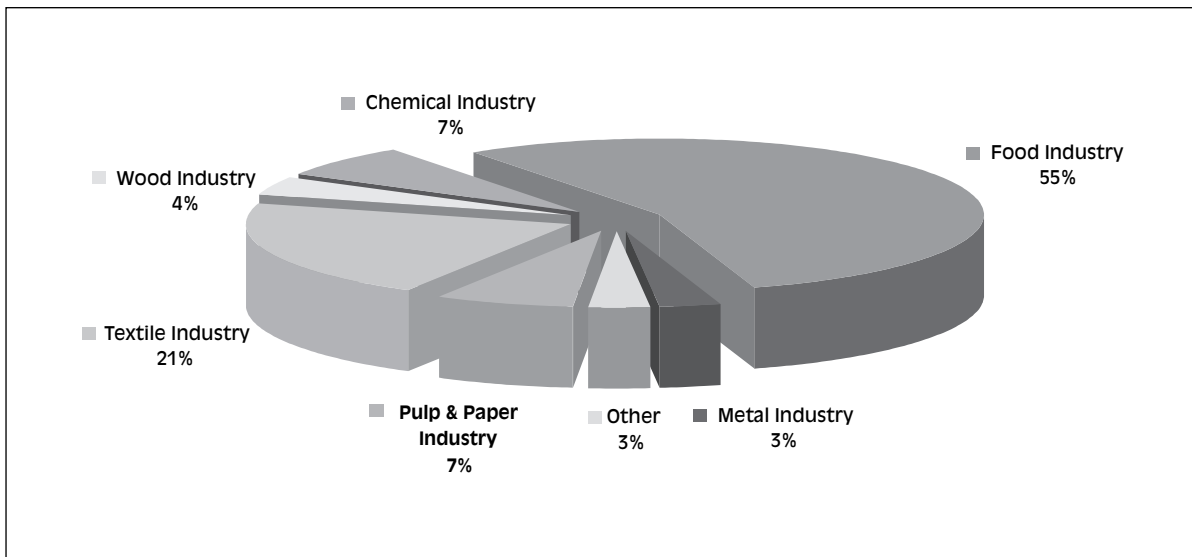
Pollution loads from the paper industry vary from between 1 to 5 kg/tons of BOD and 2-25 kg/tons of SS (suspended solid), depending on the kind of paper produced. Water consumption of the paper industry is between 10-30 m³/ton of paper (Table 6).

In 1998, BOD emissions of the pulp and paper industry contributed 7 per cent to the national total of BOD emissions, about the same as the emissions generated by the chemical industry (see Figure 3.4). Any increase in production and development of the pulp and paper industry should raise concern for generating further environmental problems.

Table 6: Water consumption and pollution loads from the paper industry

Kind of paper	Water consumption (M ³ /tons)	BOD ₅ (Kg/tons)	SS (Kg/tons)
Newsprint	20-30	2-4	8-20
Magazine paper	20-30	2-4	10-20
Wood-free printing paper	10-20	3-6	12-25
Kraft paper	10-20	1-3	8-15
Folding boxboard	20-30	2-5	2-8
Food board	20-40	2-5	2-8
Corrugating medium	10-20	1-3	10-25

Source: Eddy H., 1984.

Figure 3.4: Industry share of BOD emissions, 1998

Source: Indonesia Environment Monitor, World Bank, 2001.

There are three groups of pollutant materials generated from the pulp and paper production process, particularly the one employing chemical (Kraft) pulping and incorporating bleaching with chlorine-containing agents,⁹ as follows: liquid waste effluent, solid waste and particulates, and gas.

Pollutants contained in industrial effluent will cause a level of pollution depending upon the characteristics and the nature of the water recipients – which can be rivers, lakes, estuaries or oceans. The water current and the location of the mill discharge point in particular determine the pollution level: in general, the pollution level will be adversely proportional to the linear distance of the current from the point of discharge.

The concentration of pollutants in the effluents (which can be organochlorines, including the chlorophenolics and chlorinated resin acids) will decrease rapidly upon contact with water due to dilution and the effect of hydrodynamics. The reduction of pollutant concentration is also due to the formation of the colloids and particles of organic substances of high molecular weight settling as sediment on the bottom of recipients.

3.2.3 Environmental impacts

Without regulatory controls, counter-pollution measures or adequate use of cleaner production methods, the production process potentially causes several environmental impacts:

- 1. Non-sustainable use of natural resources: forest degradation, biodiversity deterioration, and inefficient use of energy and water.** Friends of the Earth (2002) stated that clearing a good quality natural forest to replace it with a tree plantation cannot be regarded as ecologically sustainable and causes the irreversible loss of the natural forest habitat and the vast majority of its associated biodiversity. On the assumption that, on average, producers are able to obtain 110 m³ of pulp or wood from each hectare they clear, the pulp and paper industry in Indonesia would seem to be responsible for the destruction of over 900,000 ha of highly biologically diverse rainforest since the late 1980s (CIFOR-WWF, 2001).

⁹ Technical guidance on Technology of Pollution Control for The Indonesia Pulp and Paper Industry, MoE, (2002).

2. **Solid waste that could pollute soil, water bodies and surface and ground water.** Waste is formed at all stages of pulp and paper production. Waste from forestry consists mainly of degradable material. Organic waste formed in production processes, such as sludge from external treatment, may cause environmental impacts at disposal. Ashes, slag and other inorganic process waste usually goes to landfill.
3. **Liquid waste that could cause dysfunction of photosynthesis of aquatic flora and interference with benthos life.** Discharge of organic matter will result in oxygen consumption in the receiving water. The environmental impacts of this will vary with the characteristics of such water bodies.
4. **Gas that could poison living creatures, release particular substances carcinogenic to human and aquatic organisms, and induce acid rain which in all are harmful to human health through inhalation.** Emissions to air from the pulp and paper industry to a large extent originate from the incineration of fuels. Volatile Organic Compounds (VOCs) are emitted from the processing, storage and handling of raw material fibre and from all combustion processes, including transportation. VOCs consist of various substances which can contribute to the formation of tropospheric or low-level ozone which has a direct environmental impact on vegetation and crops. The level of air emissions is not well documented.

3.2.4 Development of improved technology and cleaner production

The pulping and bleaching processing technologies are changing and the trend of the industry to apply closed loop operations¹⁰ will help to significantly reduce the amount of pollutants emitted to the environment. The hydrophilic properties of the pollutants and the prospect of making them biodegradable is being investigated (UNEP, 1996).

Changes in technology to reduce the use of chlorine in the bleaching process include pressure cooking and oxygen delignification to reduce significant amounts of pollutant in the effluent. Bleaching process applying ECF (Elemental Chlorine Free) technology will reduce AOX (Adsorbable Organic Halides) up to 90 per cent. Beside ETC, TCF (Total Chlorine Free) bleaching has already been applied commercially in some Scandinavian Countries, despite not currently being very economically feasible (Sudirjo, S.T, 1998).

3.3 Future prospects for the pulp and paper industry

It is hoped that the pulp and paper industry will help to ensure sustainability in Indonesia and improve the national economy, which has been weak for several years. In the long term, the pulp industry will be supplied with raw materials from industrial forestry (HTI), but in the meantime, most of the raw material is supplied from natural forests, land clearing and unused chips from the plywood and sawmill industries, currently available in huge amounts.

Indonesia's Government encourages the industry to use logs from land clearing for land preparation to reduce or avoid forest fires and optimize government expenditures (such as the Reforestation Fund and the Forest Resource Fee). Ultimately the pulp industry will use logs from 100 per cent HTI – both to produce a better product and to reduce dependency on the available mixed woods.

In the future, the pulp and paper industry will be developed as a priority sub-sector of the forestry sector and development of the pulp and paper industry will be encouraged. Three key aspects of development will need to be considered: expansion, equitable distribution, and environmental sustainability.

¹⁰ The concept of a closed loop mill aims to eliminate discharges to the aquatic environment, recycle and reuse all possible solid and liquid process wastes, and reduce air emissions to the lowest possible quantity and toxicity.

4. Review of Indonesia's current environmental policies

There are three main approaches that can be used to manage environmental problems: 1) command and control policies (CACs), 2) voluntary approaches and 3) economic instruments (EIs). These approaches attempt to shift the costs and responsibilities associated with pollution or use of natural resources back onto the polluter or the user (*the polluter pays principle*). However, in practice, no single approach is implemented, a combination of the approaches is generally applied.

Command and control

Command and control (CAC) policies rely on regulation and law with a set of explicit requirements for resource users and polluters to comply with. Common performance standards are applied to a large group of firms, individuals or pollution sources (the target will depend on the exact nature of the problem). These standards will drive needed modification either by installing new control equipment or by reducing emissions or resource use.

Voluntary approaches

The use of voluntary approaches has increased recently due to market pressure and internal requirements for efficiency. Most of the major pulp and paper companies have been certified to Environmental Management System (EMS) ISO 14001 standards and are implementing cleaner production technology.

Economic instruments

The use of economic instruments in environmental management is becoming an alternative approach, particularly for pollution control and mitigation of damage to the environment. This approach is used because of the failure of conventional methods that tend to focus on the waste treatment process – known as the *end-of-pipe approach*. Economic instruments encourage financial incentive and disincentive mechanisms to drive effective environmental management (UNEP, 2002).

The promotion of economic instruments seems to be a good strategy for controlling pollution in many developing countries. Although not yet fully implemented, many studies, seminars and workshops have taken place and draft policies have been proposed. In accordance with Agenda 21, all developing countries (including Indonesia) have considered implementing environmental economics instruments, but implementation is difficult, especially since the Asian economic crisis.

It is known, however, that selection of the most appropriate instrument requires careful consideration in terms of environmental, social and economic conditions. Consequently, an instrument that is successfully implemented in one country or area will not necessarily deliver the same results in other countries or areas. Each country needs to analyse and select the most appropriate instrument according to its specific conditions. For example, some instruments such as transferable emissions permits are especially difficult

to apply in developing countries because they require good infrastructure and control systems. They also require strong law enforcement systems to enforce penalties. Effective implementation of economic instruments in environmental management can therefore only be achieved by improving other approaches concurrently.

4.1 National environmental policies in the industrial sector

The first set of environmental policies was promulgated in 1982 with Act Number 4 regarding Provisions of Environmental Management. In 1997, Act Number 23 regarding Environmental Management introduced a new paradigm in environmental management and replaced the earlier law. This new Act gives more attention to policies that use Market Based Instruments (MBIs) rather than Command and Control (CAC) only. To achieve better synergies between CAC policy and MBIs, partnerships among stakeholders and greater public involvement is being encouraged.

A provision in the Act relevant to economic instruments is highlighted in Article 10e. The article encourages efforts to prevent decrease in environmental supportive and carrying capacity by developing and applying various schemes of environmental management, including pre-emptive, preventive and proactive instruments.

Pre-emptive instruments include actions undertaken at the decision-making and planning level, such as spatial use planning and environmental impact analysis. Preventive action takes place at the level of implementation through compliance with waste quality standards and/or economic instruments. Proactive action is at the level of production with application of environmental management systems such as EMS ISO 14001.

The provisions in the Environmental Management Act are general and flexible and outline basic principles for the management of Indonesia's environmental and natural resources. They are also adaptable in the context of the trade liberalization era.

4.1.1 Policies relevant to the pulp and paper sector

Some of Indonesia's national environmental policies and regulations that are relevant to pulp and paper production are summarized in Tables 7 and 8. Some of these policies are in the process of being implemented.

4.2 Use of economic instruments in environmental policy

When environmental costs are fully internalized into the price of a product or activity, a reallocation of resources in the economy occurs because price signals for both producers and consumers will reflect the environmental costs of goods and services. Consumers will be encouraged to substitute higher priced goods or services in favour of lower priced alternatives that are less environmentally damaging. Likewise, businesses are encouraged to move away from using environmentally damaging production methods and resources.

Using the tax system to address environmental externalities can also lead to an efficient level of pollution abatement and can be an effective way of achieving behavioural change in a number of ways by creating dynamic incentives to reduce pollution. As polluters are required to pay tax for residual emissions as well as abatement costs, this can encourage technological developments and new processes offering greater environmental protection. This contrasts with regulation, where there is usually no incentive to do better

Table 7: Command and control approach to environmental protection

No. regulations	Substantial issues
1. Act No. 41 of 1999 (Forestry Management)	Act aims to increase the welfare of the people by paying more attention to equity and sustainability in terms of: <ul style="list-style-type: none"> • maintaining the area of forest sufficiently and proportionally • optimize the multifunctionality of forests, including: conservation, reservation and production to attain sustainability of environmental, social, cultural and economic benefits • increase carrying capacity of forest as a water catchment area • increase capacity development and people empowerment through participatory and environmentally sustainable management in order to create social and economic resilience and resistance from external uncertainties • To guarantee equity and sustainability in benefit distribution.
2. Government Regulation No. 18/1999 (Hazardous Waste Management)	The regulation on hazardous waste management basically contains the following: <ul style="list-style-type: none"> • requirements for companies or activities to treat their hazardous waste • provisions in determining hazardous waste • Technical and administrative requirements that are applicable in hazardous waste collection, treatment, disposal, reuse and transportation • Supervision and control of hazardous waste management activities • Penalty for non-compliance.
3. Government Regulation No. 74/2001 (Hazardous Material Management)	This regulation includes provision in the use of a Material Safety Data Sheet (MSDS) by anyone who deals with hazardous material and requirements to carry out certain actions for Environmental Health and Safety.
4. Government Regulation No. 82/2001 (Water Quality Management and Water Pollution Control)	The regulation on water management basically contains: <ul style="list-style-type: none"> • requirements for water management • provisions on the supervision and control of activities involving water resources • provisions in determining water pollutants • requirements that companies or activities must pay retribution for water discharge.
6. Minister's Decree No. 13/1995 (Emission Standard for Stationary Sources)	The minister's decree contains: <ul style="list-style-type: none"> • requirements for emission standards for industrial activities • requirements for monitoring activity of environment quality.
7. Minister's decree No. 51/1995 (Effluent Standard for Industries)	The minister's decree contains: <ul style="list-style-type: none"> • requirements for effluent standards for industrial activities • requirements for monitoring activity of effluent quality.
8. Minister's Decree No. 17/2001 (Business and/or Activity with obligation to conduct Environmental Impact Assessment includes pulp and paper industries owning at least 5,000 hectares of industrial forestry)	The minister's decree contains: <ul style="list-style-type: none"> • list of businesses or activities with an obligation to conduct Environmental Impact Assessment
9. Hindrance Ordinance (HO) Stbl.1926 , revised by HO Stbl. 1940, No:14 & 450	The Act (adopted from Dutch regulation) contains: <ul style="list-style-type: none"> • requirements for new activities/industries to have permission or approval to disturb its surroundings in a proposed site • the disturbance includes noise and vibration as well as other emissions. Level of disturbance should meet an existing ambient standard.

Source: Authors' elaboration, 2003.

Table 8: Voluntary approaches to environmental protection

No. voluntary	Substantial issues
1. Eco-labelling	<ul style="list-style-type: none"> • The Eco-labelling Institute (Lembaga Ekolabel Indonesia or LEI) is carrying out eco-labelling to anticipate the rising demand for environmentally friendly products. However, implementation of an eco-labelling system is not yet in place, due to incomplete product-related standards, incomplete testing facilities and institutional settings. • Indonesia's Eco-label programme was launched on 6 June 2004. Under the programme, requirements related to the pulp and paper industry is limited to uncoated printing paper. (for details see Appendix 4.) • For printing paper, there has been a national consensus to fulfil eco-label criteria for an Indonesian National Standard.
2. Environmental Management System (EMS), ISO-14001 certification	<ul style="list-style-type: none"> • Indonesia has been implementing the EMS ISO 14001 standard to cope with the impact from environmental issues. The system includes several principles: a) to follow a commitment to environmental management standards and compliance with environmental regulations; b) environmental management planning; c) implementing EMS; d) evaluation; e) analysing and improving continuously on environmental management systems with the ultimate goal of increasing environmental performance. • Implementation of EMS ISO 14001 is also seen as an entry to the Zero Emission Concept. • Promotion of EMS is achieved through: spreading information on EMS ISO 14001 and the most efficient waste treatment technology; and intensifying the consultation services for companies that have environmental problems. • However, in general, implementation of EMS ISO 14001 has not been effective yet and Indonesia needs to encourage more effective implementation.
3. Cleaner production (CP)	<ul style="list-style-type: none"> • The government launched the National Centre for Cleaner Production on 13 May 2004 to serve as a legal basis for implementing CP in various sectors. • CP aims at preventing and reducing waste generation or the production of other polluting factors throughout all processing stages. • CP attempts to increase the more efficient use of raw material, supporting material and energy throughout the life cycle of the product. • CP has two advantages: 1) it minimizes waste generation, which implies a greater benefit for the environment; 2) it results in increased efficiency in the production process, which ultimately translates into a reduction of production costs. • The application of cleaner production is supported by an environmental soft loan programme.

Source: Authors' elaboration, 2003.

than the regulatory standard which has been set. Regulations often raise costs for polluters, by requiring them to take action to reduce the level of pollution. However, there is no additional cost beyond this, and consequently regulations give less of a dynamic incentive to reduce emissions further.

Taxes and tradable permit schemes raise revenue that can be used to offset other taxes. However, given the uncertainties about some long-term environmental issues and the difficulties in predicting the behavioural response to particular measures, environmental taxes can sometimes give the appearance of being a 'back door' route for government to raise revenue or to achieve other objectives. This makes it important that there is widespread understanding of the reasons for a measure and the considerations that inform design, as well as regular reporting on progress following implementation.

4.2.1 Use of EIs in Indonesia

The use of economic instruments (EIs) or market based instruments (MBIs) is not entirely new in Indonesia. In 1997, UNDP completed a National Strategy for Sustainable Development that contains many references to the use of economic instruments in Indonesia (ADB, 1997).

A number of market-based policies have been adopted in several sectors with some positive indirect impacts. For example, a forest taxation system has been in use for many years. Additionally, by implementing a user fee in the water sector, consumption tends to decrease. Another example is the application by local authorities of charges for urban solid waste (garbage) produced by households. There are no specific EIs directly used in the pulp and paper industry.

In general, however, market based approaches have made only modest inroads into national environmental policies and many MBI-type approaches are adopted outside the official environmental framework. 'Institutional complexity' is usually cited as the major obstacle to introducing market-based approaches, especially those that are tax based. Simplification of administrative systems or jurisdictional realignment could create the conditions more conducive to expanding MBI use (ADB, 1997). The complementary potential of market-based and command and control approaches needs to be better understood and then turned into better policy making. Policy approaches are rarely comprised of only a single tool.

4.2.2 Use of EIs in the forestry sector

Although command and control (CAC) instruments such as maximum allowable harvest, prescribed practices, and different forms of licensing have dominated the approach in protecting Indonesia's forests, a number of economic instruments have been used in forest management. Forestry taxes, part of the prevailing system of forest management and long regarded as only a revenue tool, were later recognized to affect the forest concessionaires' behaviour as well. The level and structure of forest charges and their possible effect on forest management have since been the object of extensive examination. There is a prevailing view that forest charges in Indonesia have been too low, making logging too profitable, and that there has not been sufficient incentive to use the 'standing volume' more efficiently (ADB, 1997).

According to Indonesia's Environmental Forum (Walhi, 1991), Indonesia's Government gained only 17 per cent of logging rent compared to the Sabah East Malaysia Government whose revenues through aggressive taxation was about 81.3 per cent (Repetto, 1988). This would indicate that the Government has earned only a small proportion of the potential rent from its seven forms of forest taxation.

Forestry taxes

The total burden of forest taxation is as follows:

1. **Forest Concession License Fee (IHPHP)** is paid once at the issuance of the 20 year forest concession license. Its level reflects differences in the average quality of standing forest and local factors (US\$ 4/ha in Irian Jaya and Nusa Tenggara, US\$ 7.50/ha, in Sumatra and Sulawesi, US\$ 10/ha in Kalimantan and Maluku). Since 1993, IHPHP became payable, at a somewhat lower rate, also on loggedover areas within the concessions coming up for renewal.
2. **Land and building tax (PBB)**, payable on the area of concession occupied by facilities and housing. Its application is similar to that prevailing outside the forestry sector.
3. **Reforestation Fund (Dana Reboisasi or DR)**, perhaps the most controversial component of the current forest taxation regime for two reasons. First: the stated purpose of the tax is either to induce environmentally desirable behaviour (reforestation) or to generate funds needed to deter any damage that concessionaries are believed to cause. Second, the principle of earmarking the tax is considered by many to be weak. The tariff paid at US\$ 10.50 – 16.00/m³ according to province of origin and species group on wood chips and sawn logs, and at US\$ 2/m³ for pulpwood. In 1993, DR was estimated to account for almost two thirds of the total forest taxation income. Its proceeds are to be used mainly to provide soft loan financing for industrial forestry plantations. However, the fund has proven a relatively

easy target for «raiding» by non-forestry interests and there has been a misuse of funds to finance activities such as establishment of banks and investment in manufacturing by the forestry plantation concessionaries.

4. **Royalty** (IHH), levied at 6 per cent of the reference price of logs,¹¹ differentiated by species and province of origin. Following a log export ban, the royalty is collected at factory exit based on predetermined conversion coefficients. In the early 1990s, it fluctuated between US\$ 2.50 and US\$ 8/m³ according to the species and grade. Royalty is theoretically payable also on charcoal and fuel wood.
5. **Scaling and grading fee** (BPHH), a volume or weightbased fee that is in the nature of a payment for a service.
6. **Sawn timber export tax**, based on sawn timber export price.
7. **Other forest or forestrelated levies**: several other minor taxes exist (training fund, timber estate license fees, etc.) that do not substantially affect the performance of forest users and their environmental impact.

Depending on the source of estimates, the combined forest taxation (about US\$ 20-25/m³ in the early 1990s, yielding an annual total of more than US\$ 400 million, distributed among various tiers of Government) is reckoned to be well below the amount of shortterm profit realized by concession holders, variously estimated to be up to US\$ 6570/m³ (Reid Collin,1992).

Other EIs used in the forestry sector

The use of other EIs implemented in the forestry sector, are summarized in Table 9 below.

Table 9: Other EIs used in the forestry sector

Economic instrument	Institution	Instrument analysis	
		Strengths	Weaknesses
Interest free loan	Ministry of Forestry	To encourage P&P industry to develop HTI to fulfil raw material supply that is not from natural forest	The procedure for disbursement is not timely
Reforestation Fund/ Performance Bond	Ministry of Forestry	There is a guarantee on reforestation to promote sustainability Long experience with its use; effective use requires close field monitoring to make sure that the forest rehabilitated	Complicated bureaucracy & fund administration Not all of the fund is used for correct allocation, which cause the rate of reforestation to be low
Tax exemption on wood from land clearing	Ministry of Forestry	To push P&P industries to utilize waste from IPK (land clearing) to prevent the degradation of natural forests	Low enforcement on applying HTI that can create pressure for wood from natural forests

Source: Authors' elaboration, 2003.

¹¹ FOBlined.

The extent of the effectiveness of existing EIs for sustainable management of forest resources is not clear due to a lack of valid data to support analysis. However, in 2000, forest degradation took place at a rate of 2 million ha/year and was caused mainly by illegal logging (Pratomo, 2002). Some researchers believe that this is because the forest charge is too low, while others claim that raising the forest charges alone would not be sufficient to reduce the rate of deforestation in Indonesia.

Reforestation Fund

The Reforestation Fund of the Ministry of Forestry and Estate Crops was originally meant to operate as a type of performance bond that was refundable if concessions were managed sustainably. Unfortunately, 'administrative difficulties' made it next to impossible for concessions to get their bond back. Ultimately, this scheme was replaced by a set of command and control regulations governing allowable cut, the harvesting system (the selective cutting system), and other aspects of concession management.

Performance Bond

The Performance Bond has the purpose of ensuring a company's performance related to its sustainable management of forest resources. It is regarded as more effective in comparison to the Reforestation Fund, which is not earmarked toward repairing environmental damage. APPHI-IPB (2003) also states that the risk to forestry ecosystem quality (the sustainability of goods and service for long term) should be incorporated into government forestry management requirements. The requirements encompass rehabilitation and forest protection (forest culture). The private sector has to guarantee performance to recover the Performance Bond. The Performance Bond is not a governmental tax income, but must be refunded to the private sector if it has good performance. However, the Performance Bond will require several performance standards (criteria and indicators).

There is also a deposit scheme for pulp and paper that suggests that performance bonds could successfully reduce pollution and materials recovery. Performance bonds involve an upfront financial guarantee by developers, pulp and paper companies or other users to ensure that, should they go bankrupt or otherwise neglect their environmental responsibilities, there will be funding available to cover the cost of rehabilitation. Riau province and East Java will be imposing an innovative Performance Bond system for its pulp and paper sector. The plan contains economic incentives designed to encourage companies to implement best practice forest management and rehabilitation processes.

4.2.3 Use of EIs for pollution control: Environmental soft loan programme for pollution control equipment

For controlling pollution in the production process, one of the biggest problems facing enterprises in environmental compliance is a lack of finance for investment in pollution prevention and control equipment. To address this problem, the Government (Ministry of Environment, Ministry of Finance and the Central Bank of Indonesia) together with state/private banks provide environmental soft loans for the following purposes:

- Investment in pollution prevention and pollution control equipment
- Improvement of production efficiency
- Technical advisory services (for small and medium enterprises)

The objective of the environmental soft loan programme is thus to improve environmental quality by reducing pollution loads through investment in technology.

This programme includes two credit schemes. Firstly, Industrial Efficiency and Pollution Control (IEPC) for small and medium enterprises is funded by Kreditanstalt für Wiederaufbau (IEPC-KfW). Secondly, Pollution Abatement Equipment (PAE) for large scale enterprises is funded by the Japan Bank for International Cooperation (PAE-JBIC). This soft loan is managed as a revolving fund, as others can use the repayments from one end user for similar purposes. Any kind of industry with a potential to pollute the environment can apply for this soft loan.

IEPC-KfW and PAE-JBIC are only available for these types of investments:

- Civil works and equipment for pollution prevention, pollution control (wastewater, emission and solid waste) and recycling plants.
- Consultancy fees for designing pollution prevention and pollution control system and construction fees.

Pollution prevention equipment for the pulp and paper industry includes fibre recovery technology for recovering fibre (sludge) from the wastewater and returning it to the production process and de-inking plants for processing recycled waste paper.

PAE-JBIC provided 111.013 billion Indonesian rupiah (33.64 per cent of the total loan) to 7 pulp and paper industries. This loan helped to reduce 79.52 per cent of BOD loads in 1997 (year 4 of the project), and accounted for 12 per cent of national pollution reduction. The IEPC-KfW soft loan financed 3 small recycling paper plants (1.6 per cent of the total loan).

Box 4.1: Environmental soft loan on pollution control equipment

PT Riau Andalan Pulp and Paper Co.

The PT Riau Andalan Pulp and Paper was granted a PAE-JBIC soft loan in June 1995 for the following equipment:

1. Primary Clarifier
2. Bar Screen
3. Surface Aerators
4. Secondary Clarifiers
5. Screw Press and Sludge dewatering

Source: Ministry of Environment, 1995.

The IEPC-KfW and PAE-JBIC programmes are categorized as financial instruments. Although a lot of industries are satisfied with this instrument, there are some complaints about the application procedure being too complicated. All loan applications have to be processed by the Ministry of Environment, handling banks and the Ministry of Finance/Central Bank of Indonesia. There are only a few banks involved in handling the loan – 2 state banks, 4 private banks and 5 regional development banks out of a total 138 banks operating in Indonesia. (For details of the lending mechanism see Appendix 5).

The strength of this scheme is that funding is made available to promote environmentally friendly technologies. However, the weaknesses include limited fund availability, limited number of handling banks, and complex bureaucracy making some industries hesitate to apply (see Table 10).

Table 10: Summary of financial instruments used for pollution control

Financial instrument	Institution	Instrument analysis	
		Strengths	Weaknesses
1. Soft loan for CP technology and waste water treatment (IEPC-KfW and JBIC-PAE)	Ministry of Environment	<p>to promote best practice in environmental management for industries</p> <p>to fund environmentally friendly technologies</p> <p>to give incentive to boost efficiency and to apply water treatment that prevents further pollution</p>	<p>limited fund</p> <p>few handling banks</p> <p>bureaucracy is not as simple as commercial loan, therefore industries hesitate to apply</p>

Source: Authors' elaboration, 2003.

4.2.4 Use of EIs for improved technology: Import duty exemption to encourage technology import

The import duty exemption for pollution control equipment is a fiscal instrument (see Table 11). The Ministry of Finance declared Ministerial Decree no: 36/KMK/05/1997 for free import duty on equipment and materials that are used for preventing environmental pollution. This instrument has been applied not only for the pulp and paper industry, but also for other industries. A case study for PT. Kertas Leces is provided in Box 4.2.

Box 4.2: Import duty exemption on pollution control and cleaner production equipment

PT Kertas Leces Integrated Pulp and Paper Mill

PT Kertas Leces attempted to prevent possible harmful environmental impacts and yield products that are environmentally friendly by assuring consistent improvement and perfection on its equipment, tools and technology as well as raw materials. PT Kertas Leces applied to the Ministry of Environment to get a tax exemption for importing a de-inking plant (in 1996) and in for a belt filtre and incinerator (in 1997). These technologies are to minimize polluted waste in the industry. The Ministry of Environment issued a letter of recommendation to the Ministry of Finance to approve the free Import Duty for PT Kertas Leces.

Source: PT Kertas Leces, 2003.

Until 1997, free import duty was granted to only 3 pulp and paper industries, and was worth US\$ 2,796,597 for the following equipment: Belt Filter, Aqua Jet Aerator, and the Omega High Pressure Belt Filter Press. Compared to hundreds of other industries there were very few pulp and paper industries that applied for the free import duty facility. This fiscal instrument can encourage the pulp and paper industry to install waste treatment technology which forms a high proportion of the operation and maintenance costs. The fiscal instrument for technology import is shown in Table 11.

Table 11: Fiscal instrument for technology import

Existing fiscal instrument	Institution	Instruments analysis	
		Strengths	Weaknesses
Free import duty on waste treatment equipment	Ministry of Finance Decree No: 136/KMK/.05/1997 on Free Import Duty on Equipment & Material that is used for preventing environmental pollution	To encourage pulp industry to install waste treatment that prevents further pollution	Not guarantee to operate waste treatment equipment Operation and maintenance cost is expensive that makes the industries hesitate to operate it
	Ministry of Environment		

Source: Authors' elaboration, 2003.

4.2.5 Use of EIs in the water sector

User fees for sustainable management of surface are imposed by by the Perum Jasa Tirta (Water Service Company) (see Box 4.3) and deep well water tax for ground water resources by Ministry of Energy and Minerals Resources. The main weakness of the instrument is that the tariff is too low, so it is not an effective control over the efficient use of resources. In addition, there is no guarantee that the revenue from the tariffs will be reinvested (no earmarked system) in managing water resources (see Table 12).

Box 4.3: User fees in the water sector

River Basin Management

River Basin authorities in a few regions charge a wide range of tariffs for the extraction of water from surface sources. The table below shows the charge rates for the two main River Basin authorities on Java : Perum Jasa Tirta I in East Java, and Perum Jasa Tirta II in West Java. In both cases, all institutional users are currently charged except for irrigation schemes, and charge rates have risen over time. Despite these increases, charges are not sufficiently high to cover the full costs of river basin management.

User/Purchaser	River Basin Authority				
	Perum Jasa Tirta II			Perum Jasa Tirta I	
Water supply: PDAM	–	–		1991	16 rupiah/m ³
	1997-1999	PAM Jaya: 35 Other PDAM: 23	rupiah/m ³	1998	35 rupiah/m ³
	2000-2003	PAM Jaya: 65 Other PDAM: 48	rupiah/m ³	–	–
Water supply : Industry	1997-1999	23	rupiah/m ³	1998	52 rupiah/m ³
	2000-2003	48	rupiah/m ³	–	–
Irrigation	Current ^a	0	rupiah/m ³	Current ^b	0 rupiah/m ³
Hydropower	1991	2.6	rupiah/kwh	1991	6.0 rupiah/kwh
	1994	3.3	rupiah/kwh	–	–
	1997	7.0	rupiah/kwh	1998	12.4 rupiah/kwh
	1999	8.6	rupiah/kwh	–	–
	2000	11.9	rupiah/kwh	–	–

^a Charge likely to be introduced in 4-6 years

^b Charge likely to be introduced in 3-4 years

Irrigation schemes

User fees cover less than 10 per cent of the O&M costs of the irrigation system in Indonesia (1998 Public Expenditure Review). Recommendations included in the Water Sector Adjustment Loan (WATSAL) include the creation of private water user associations (WUAs), with mandatory annual payments by irrigators into audited WUA bank accounts, and payment rates approved by a scheme-level management committee. For schemes remaining under government responsibility, it recommended greater retention and control of user fee revenues by provincial and district irrigation agencies.

Urban water supply services

Water supply services are not fully self-financing and government funds mainly subsidize capital costs. PDAMs do not receive grants for routine expenditures and are sometimes compelled to pay advance "dividends" that local governments have budgeted, even if they are losing money. This practice is gradually being stopped following concerns raised by donors.

Source: Yearly Publication Book of Perum Jasa Tirta, 2001.

Table 12: Summary of user fees / taxes

Existing user fees	Institution	Instruments analysis	
		Strengths	Weaknesses
1. User fee (Surface water)	Perum Jasa Tirta (Water Service Company)	raises revenue from water resource use	tariff is too low
	Dispenda,(Regional Income Agency)	discourages overuse of water	does not yet consider sustainability of water supply
2. Deep well tax	Ministry of Energy and Minerals Resources (Mining Agency)		no guarantee of reinvestment in managing water resources

Source: Authors' elaboration, 2003.

Effluent/emissions charges

Effluent or emissions charges have a revenue raising function related to the costs of treatment, collection and disposal, and the recovery of administrative costs depending on the situation in which they are applied. They are not directly related to damage costs in the environment (Turner *et al.*, 1994).

Indonesia has plenty of experience with effluent charges for municipal services (drinking water, wastewater treatment, solid waste collection and disposal) and for roads (transportation) (see Table 13). However, there appears to be limited use of environmental charge systems in industrial estates and there is now discussion of implementing them as a matter of national policy. Indeed there is active consideration of implementing them in East Java (Binnie & Partners LTD., 1999 and Alaerets, 1999). Prior to the economic crisis, the Environmental Management Impact Agency BAPEDAL operated several innovative water pollution control programmes – a Clean Rivers Programme (PROKASIH) and an Environmental Rating Programme (PROPER), (Office of the State Minister for Population and Environment, 1990 and Wheeler and Afsah, 1996). The future of these programmes is linked to attempts to introduce wastewater effluent charges as a matter of national policy (Ruzicka, 1997: 17). Indeed, prior to the economic crisis, this was already under active consideration.

There are however, several legal and institutional impediments that appear to undermine effective implementation of emissions charges along with these programmes. Since PROKASIH and PROPER are managed jointly by BADEPAL, government provinces and regional districts, linking wastewater emissions fees to them raises important jurisdictional problems regarding how to disperse the revenue.

In addition, some of the 20 or so industrial estates, encouraged by the Government, own and operate centralized wastewater treatment facilities. These estates aim for full cost recovery, including the cost of wastewater treatment. Prior to the economic crisis, water emissions charges were set by each estate and charges averaged 3,000 IDR per m³ in 1996 (Ruzicka, 1997: 18). However, there is at least one reputed instance of an industrial estate owner who is unwilling to install and operate a centralized waste-water treatment facility because there is no law in Indonesia requiring tenants in the estate to use the facility.

Finally, the Ministry of Finance is apparently unwilling to view water effluent charges as fees for service, preferring to regard them as general revenues. Under these circumstances, local governments may have little interest in implementing water charges. Riau Province has implemented these instruments since 2000. Details of their policy are summarized in Box 4.4.

Box 4.4: Application of an effluent charge in Riau Province

Discharge permit for the pulp and paper industry in Riau Province

Riau Province established Regulation No. 7/2000 on a waste water discharge fee. This policy is categorized as a discharge fee instrument. This instrument aims to manage waste water exuded from industry activity. Riau Andalan Pulp and Paper is one of the companies that must comply with this regulation. The discharge permit for pulp and paper industry is rupiah 10,000,000 per location for each new application, whereas for re-application the discharge permit is rupiah 5,000,000 per each location.

Besides paying a discharge fee, the industry must also fulfill its effluent standard and pay a Waste Water Effluent Charge, as below:

- Rp 25.00/m³ for waste water volume \geq 751 m³ per month
- Rp 20.00/m³ for waste water volume 501-750 m³ per month
- Rp 15.00/m³ for waste water volume 201-500 m³ per month
- Rp 10.00/m³ for waste water volume 0-200 m³ per month

Source: Riau Province, 2000.

There are many charges systems that have been well implemented, but the major weaknesses are:

- Authorities do not use the revenue to manage the environment, but to fund other services;
- The tariff is still too low because charges are not calculated based on proper formula;
- These charges seemingly legitimize the right to pollute the environment, and may lead to more pollution discharge because the system and the level of charge is not set up according to proper standards.

Table 13: Summary of effluent charges

Existing user charges	Institution	Instruments analysis	
		Strengths	Weaknesses
1. Wastewater Retribution Charge	Dispenda,(Regional Income Agency)	raises revenue from pollution discharge	revenue is not used to manage the environment
2. Wastewater Discharge Fee: Riau Province Regulation No. 7/2000	Bapedalda (Regional Environmental Impact Management Agency)	discourages environmental pollution	tariff is still too low
		provides incentive to boost water efficiency	possibly legitimizes the right to pollute that may lead to more pollution discharge
			revenue is not used to manage the environment
			the price of charge is not yet calculated based on proper formula and standard

4.4 Summary

Table 14 below summarizes some of the EIs that have been implemented in the industrial sector in terms of the three main environmental impacts identified in pulp and paper production – forest degradation, air and water pollution and demand for water resources.

From the review above, there is a range of economic incentive instruments (EIs) that are suitable to be deployed in order to encourage environmentally positive behaviour and investments in the pulp and paper industry. The incentives that such instruments provide can take the following forms: a) direct alteration of price or cost levels; b) indirect alteration of prices or costs via financial or fiscal means; c) market creation and market support (Turner *et al.*, 1994).

The regulatory and economic instrument selected to achieve environmental objectives has broad implications for the institutions responsible for implementing and enforcing them. The weaknesses that can occur, such as misuse of funds, need to be addressed. Generally, the institutions that are responsible for pollution control, waste management, and natural resources management, include: national sector agencies, such as the Ministry of Health, the Ministry of Public Works, the Ministry of Forestry, the Ministry of Environment; provincial agencies authorities and county or municipal agencies. In addition, the courts and non-governmental organizations (NGOs) also play roles in the development and enforcement of environmental regulations (Bernstein, 1991).

Table 14: Economic instruments applicable to the pulp and paper industry

Economic instrument	Environmental impact			Purposes	Advantages	Disadvantages
	forest degradation	air & water pollution	surface & ground water resources			
Charge Systems						
Effluent charges		XX	X	used on production processes, waste treatment	raises revenue, encourages polluters to reduce discharge, encourages innovation in clean technology, promotes cost saving strategies	involves complex implementation & high monitoring costs encourages illegal disposal without effective enforcement, over use of water
User charges		X	XX	used according to value & quantity of resources, (surface & ground water)	raises revenue, encourages efficient use of resources	involves high enforcement cost
Fiscal Instruments						
Import tariffs exemption		XX	X	free import tariff/duty on waste treatment equipment, waste paper imported pulp.	provides incentive to control pollution & manage waste, low monitoring costs, promotes innovation in control technology	imposes management costs on private sectors, may create incentive for counterfeiting
Reforestation fund				to encourage reforestation and generate funds for environmental loans (for HTI forestry)	raises revenue (In 1993 accounted for almost two thirds of total forest tax)	easy target for raiding by non-forestry interests
Financial Instruments						
Soft loans & grants		XX	X	to encourage clean production	provides incentive for implementation of CP system & pollution control technology	
Performance bond/		XX		used on HTI operations to maintain forest sustainability	encourages environmental restoration	has limited application & experience
Reforestation fund		X				

Note: X = suitably applied XX= most suitably applied
Source: Author's elaboration, 2003.

5. Policy proposal

5.1 Basic considerations

Based on the identification of existing policies shown in Chapter 4, it can be concluded that while the CAC concept has been used to regulate pollution and environmental damage for industrial activities in general, these can have major weaknesses. Furthermore, there are only a limited number of regulations applicable specifically for the pulp and paper industry (i.e., regulations on effluent and air emission standards). With regard to economic instruments, there are currently no specific instruments used at any stage of pulp and paper processing, although some instruments have been implemented for industry in general (such as soft loans and free import duty on waste treatment equipment).

While there are no specific EIs used directly in the pulp and paper industry, in the upstream activities that supply raw materials for the industry, such as the forestry sector, a forest taxation system has been in use for many years. In addition, Indonesia has extensive experience with user charges, particularly for municipal services (drinking water, waste-water treatment, solid waste collection and disposal) and for transportation (vehicle emissions). There are also a number of environmental charge systems (effluent charges) either under discussion or already in use in Indonesia for controlling water and air pollution.

In order to identify a preferred type of economic instrument for use in the pulp and paper industry, it is necessary to determine whether it is possible to design a measure that will also meet other relevant criteria, such as:

- ability to intervene directly to tackle the cause of an environmental problem – e.g., ability to tackle pollution or emissions rather than using proxies such as inputs to a process or activity;
- ability to intervene at the most appropriate geographical/regional level, whether local or national;
- effects of a policy on the international competitiveness of the pulp and paper industry which are subject to international competition;
- effects on competition within industry sectors;
- distributional effects of a policy on different groups within the population as a whole; and
- compliance costs of implementing and administering a measure, including cost to government, to business and other groups.

5.2 Targeting pollution: Proposal for a National Effluent Charge

Industrial pollution in Indonesia, under the paradigm of trade liberalization and export growth, has been identified as a pressing concern. The pulp and paper industry is already a major polluter, and as the industry grows and develops under Indonesia's policy for economic growth, unless environmental issues are integrated into further development policies, this situation will only get worse.

The economic instrument approach has several advantages for pollution control because, when properly implemented, it can:

- promote a cost-effective means for achieving acceptable levels of pollution;
- stimulate development of pollution control technology and expertise in the private sector;
- provide government with a source of revenue to support pollution control programs;
- provide flexibility in pollution control technologies; and
- eliminate a government's requirement for large amounts of detailed information to determine the feasible and appropriate level of control for each plant or product (Bernstein, 1991).

However, EIs also have some disadvantages. One significant problem is that the effects of EIs on environmental quality are not as predictable as those under the traditional regulatory approach, since polluters may choose their own solutions.

Effluent charges have been well studied in Indonesia. Before the economic crisis, there was some discussion of implementing them as a matter of national policy, and there is currently active consideration of them in East Java (Binnie & Partners LTD., 1999 and Alaerets, 1999). Prior to the economic crisis, BAPEDAL operated several innovative water pollution control programmes – a Clean Rivers Programme (PROKASIH) and a Business Environmental Performance Rating Programme (PROPER). The future of these programmes is closely tied with raising revenue from an effluent charge.

An effluent charge is a viable option for the pulp and paper industry since many of the conditions required to implement such a programme are already in place. These include the necessary legal framework to develop a wastewater charge system and the associated permit requirements, existing programmes such as PROKASIH and PROPER which provide waste water loading data, and a real need to improve the water quality of Indonesia's rivers.

However, it should be noted that the policy approach for each step of the process will need a close assessment of existing information and baseline conditions, and also working closely with stakeholders to ensure support for particular approaches.

5.2.1 Creating a framework for a National Effluent Charge Programme

There are three basic components that are needed to build an economic instruments programme for wastewater management: the data provided in the permits issued, monitoring of pollutant loadings, and application of the charge. These three components provide the framework for a system where:

1. information is first obtained from permits such as the Hindrance Ordinance (HO).
2. monitoring is conducted through self-monitoring requirements and from routine wastewater sampling conducted by the provincial wastewater monitoring agency.
3. a fee is applied to the industry based on total pollution loading (flow and concentration) as determined by the sampling and self-monitoring requirements (Sawyer, 1994).

Presented in Table 15 is an outline of what needs to be addressed in the development of an effluent charge programme. Since this type of system is broad-based and as such will involve multiple government and private sector stakeholders, the institutional arrangements will need to be determined at the beginning of the development process. The legal basis for the charge system will also be of great importance and as such will require attention early in the development process.

The environment charge system comprises seven programme components: 1) identify governmental stakeholders; 2) identify scope of programme (ecosystem or sectoral); 3) gather information about location/industry/loading; 4) establish waste water standard; 5) develop discharge permits; 6) establish/clarify legal basis; 7) determine calculation to be used.

Table 15: Work Plan for development of a National Effluent Charge

Task	Programme component	Comment
1.	Governmental stakeholder	<ul style="list-style-type: none"> Identify potential departments and agencies involved in the development of an environment charge system where government revenue is collected. Develop technical team responsible for the overall direction of the programme. Assign institutional responsibilities and job descriptions for the programme.
2.	Identification of scope of programme (ecosystem or sectoral)	<ul style="list-style-type: none"> Determine priority polluting industry or priority river/section. Identify scale of industry-small, medium, large.
3.	Gather information about location/industry/loading	<ul style="list-style-type: none"> Pollutant loading information for waste water parameters (BOD, COD,TSS). Type, if any, of waste water treatment facilities. Type and volume of production, water needs for production.
4.	Waste water standard	<ul style="list-style-type: none"> Compare industry loading relative to standard or assumed acceptable level of pollutant loading (i.e., average 200 mg/l BOD).
5.	Discharge Permit	<ul style="list-style-type: none"> Identify type of permit being used in region. Determine if information requirements are already included in permit. Determine if an addition to the permit is needed to gain information about industry or make them subject to self-monitoring requirements.
6.	Legal basis	<ul style="list-style-type: none"> Investigate the legal basis for the programme and identify potential threats to the application of charge. Identify areas that must be addressed for the implementation of an emission charge.
7.	Determine calculation to be used	<ul style="list-style-type: none"> Compare models of charge calculation. Determine what waste water parameter is to be used in the calculation. Select model to apply charge.
8.	Link to pollution control programmes	<ul style="list-style-type: none"> Clean Rivers Programme (PROKASIH) and Business Environmental Performance Rating Programme (PROPER)
9.	Monitor funds	<ul style="list-style-type: none"> Arrange the institutions who will manage/monitor the funds (eg. Badan Pengawasan Daerah (Regional Audit Body) Identify the use of funds and its mechanism

Source: Authors' elaboration, 2003.

6. Summary and conclusions

This report has provided a general overview of the implications of trade liberalization and export growth in Indonesia, a review of Indonesia's current environment policies relevant to the industrial sector, and offered a preliminary assessment of the environmental implications of export growth in the pulp and paper industry. Report findings indicate that environmental issues are a relatively new concern in Indonesia, and there is much scope for further research and analysis.

Environmental management in Indonesia is currently based predominantly on command and control regulation, with the use of economic instruments for sustainable development only minimally employed in some sectors. The complementary potential of both approaches needs to be better understood so that environmental policies can operate effectively within the existing system of current and proposed Government actions. One of the most difficult challenges facing policy makers is choosing an effective policy package that will both address the environmental problem they are facing and fit in with the existing institutional capabilities and environmental policies already in place.

However, many supporting factors can help to address the problem. Among others are a high level of awareness and participation of the community, effective law enforcement, and fund availability. Environmental management in developed countries is considerably more successful because of integration of all components into one synergistic system. In Indonesia, there are plenty of informal processes, whereas the formal process is under discussion among stakeholders.

6.1 Key findings

A number of key issues have been raised by the report. Firstly, Indonesia's policy of industrialization and future growth depends heavily on exploitation of natural resources and environmental services (land, forest, water, energy). In particular, the demand for raw materials from the pulp and paper industry urgently needs to be addressed. The policy of sustainably managed plantation or industrial forestry (HTI) must become operational as a matter of high priority. Opportunities for using non-wood raw materials should also be investigated further.

Secondly, current environment policies based on the CAC and voluntary approach are generally weak, poorly enforced and susceptible to misuse. The Government needs to continue improving its policies and incentives for encouraging environmentally responsible behaviour as well as sustain efforts to strengthen the institutions responsible for environmental planning and management. Substantial increase in investment in environmental protection will also be required by both the Government and the private sector.

Thirdly, as a result of economic growth, industrial pollution poses an immediate and significant threat to health and human welfare, creating a major problem that requires urgent attention. Cleaner production processes such as 'closed loop production' should be taken up as a matter of priority, and technological innovation, particularly environmentally friendly technology should be further encouraged.

Finally, for economic growth to be sustainable, the costs of pollution and environmental damage must be internalized into the costs of production and consumption as a matter of national policy, and decision makers need to take a proactive role in formulating a wide range of economic policy instruments to achieve the sustainable use of natural resources. This report will hopefully provide a basis on which to move forward. The National Effluent Charge as proposed in this report is a good first step but it requires further development, a detailed action plan for implementation and suggestions for follow-up.

6.2 Need for further research

Further research on environmental management strategies is clearly needed to build capacity and provide sound guidance in the process of establishing new policies and selecting policy instruments aimed at pollution control and sustainable use of natural resources and raw materials in the pulp and paper industry. The research could include:

- In-depth studies on the effectiveness of various regulatory and economic instruments in developing countries
- Practical aspects of implementing and operating economic instruments and circumstances under which they can be successfully applied
- The combination of regulatory and economic instruments that are most appropriate for developing countries
- Setting appropriate standards for developing countries
- Identifying means for building appropriate monitoring and enforcement capabilities in the pulp and paper industry, and
- Cross-sectoral issues (for example energy consumption).

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Appendices

Appendix I

Industry selection process

1. Criteria

The experts agreed that the weighting factors are varied, from 10 for number of workers, 15 for contribution to GDP, 20 for the use of natural resources, 25 for volume of export to 30 for environmental impacts. This means that the number of workers absorbed is 10 per cent contribution to the weight of degree of importance, contribution to GDP is 15 per cent, 20 per cent for the use of natural resources, 25 per cent for contribution in volume of export, and 30 per cent for environmental impact.

2. Selection process

Data is a key factor in the selection process. However, there are number of difficulties in compiling a complete and comprehensive set of data and not all data are available. Since the quantitative data was

Table A1: Criteria, weighting factors and level of degree

No.	Criteria	Weighting factor	Level of degree	Remarks
1.	Contribution to GDP	15	1	Very low
			2	Low
			3	Medium
			4	High
			5	Very high
2.	Volume of export	25	1	Very low
			2	Low
			3	Medium
			4	High
			5	Very high
3.	Number of workers	10	1	Very low
			2	Low
			3	Medium
			4	High
			5	Very high
4.	Environmental impact	30	1	Very low
			2	Low
			3	Medium
			4	High
			5	Very high
5.	Use of natural resources	20	1	Very low
			2	Low
			3	Medium
			4	High
			5	Very high

Source: Inception Report, 2002.

insufficient for the selection process, it was not easy to make an appropriate decision. Nevertheless, the selection process was tried, using professional judgement (stakeholders) to weight the level of degrees for each industry. The results for the six industry sectors is shown in Table A2 below.

Table A2: Results of selection process

Criteria (weight)	Contribution To GDP (15)		Volume of export (25)		Number of workers (10)		Environmental impact (30)		Use of Natural resources (20)		Total score
Sector											
Fertilizer	3	45	2	50	3	30	3	90	3	60	275
Pulp & paper	4	60	4	100	3	30	5	150	5	100	440
Cement	3	45	3	75	3	30	3	90	5	100	340
Textile	3	45	5	125	5	50	4	120	3	60	400
Leather	2	30	1	25	4	40	4	120	2	40	255
Plywood	5	75	4	100	5	50	3	90	4	80	395

The two industry sectors with the highest score were the pulp and paper industry and textiles, as proposed in the Inception Report. In order to achieve a better focus, **the pulp and paper industry was** selected for the study because this sector is also related to other activities such as forest management, air and water pollution, use of energy, and has many linkages to upstream and downstream industry. In addition, the Indonesian pulp and paper industry is highly competitive in the world market, ranking 9 for pulp and 12 for paper production in 2002.

Appendix II

Summary of survey results

A survey was conducted to gather detailed input from representatives of the pulp and paper industry. The survey aimed to identify the pulp and paper production process and also to gather information about the implications of using economic instruments.

Results:

- Simplified flow chart showing the major pulp and paper process steps which employs chemical pulping and bleaching as shown in Table 3, page 43.
- **Development of industrial forestry (HTI):**
 - Industrial forestry is still underdeveloped with consideration to conservation area
 - Harvesting of HTI can be done after 7-8 years
 - A claim from local people surrounding HTI areas about property rights of the area is argued because of low law enforcement
 - Source of bridging of raw material are chips from plywood industry, waste logging wood form land clearing for HTI development, oil palm development, transmigration and other project
- **Raw material diversification:**
 - A reliable long term supply of diversified raw material (such as oil palm bunches, bagasse) is fluctuated and scattered in many regions
 - Technology equipment and machinery is not always suitable for non wood materials. It requires other investment needs
 - Pulp yield of non-wood material generally is lower than wood fibres
 - There is still questionable economics for non-wood materials
 - There is research on use of non-wood materials for small scale capacity only
- **Research institution for pulp and paper:**
 - The pulp and paper industry usually has communicated with research institutions both in Indonesia and at international level (UNEP, CIDA) and disseminates the research results well
 - Introduction of applicable and appropriate technology is expected to be wider
 - Research institutions help pulp and paper industries in dealing with pollution control (such as a Zero Discharge Mean), production efficiency (such as through cleaner production), applying environmentally friendly technology, efficient use of natural resources
- **Trade liberalization:**
 - The pulp and paper industry is motivated to be environmentally concerned since its products are exported
 - Optimistic the industry will react properly to non-tariff barriers to trade
 - In relation to dumping issue, the pulp and paper industry encourages the Indonesian Pulp and Paper Association to cooperate closely with the Indonesian Anti Dumping Committee
- **Environmental regulations:**
 - Need strong commitment on law enforcement

- Motivate the pulp and paper industry to perform environmental management better
- Need incentives and/or disincentives as well as reward or punishment
- **Economics instruments:**
 - Implemented economic instruments are: waste water discharge fee, waste water effluent charge, waste water retribution, environmental soft loan programme, user fees in water sector, import tariff exemption for technology import.
 - There is a good impact of the implemented economic instruments. The pulp and paper industry intends to reduce its effluents in order to pay lower charges.

Appendix III

Preliminary identification of environmental impacts in the pulp and paper industry resulting from trade policies and agreements

Product effects

These are effects related to the flow of products (or services) between countries. As trade liberalization will likely increase the flow of products between countries, an increase in imported pulp and paper products would have a negative impact on pollution to the aquatic, surface and ground water; primarily caused by increasing the use of pulp and paper products in the importing country. There are no significant direct impacts of product effect (0) on forest resource, biodiversity, water use, energy use, and health and safety, whereas the light negative impacts (-) would occur to the groundwater and aquatic due to the used paper that is not recycled.

Technology effects

More open trade policies may lead to the transfer of production technology across borders. There is a positive technology effect when trade policy allows the flow of environmentally friendly technologies. Pulp and paper production is applying cleaner production technologies. This technology tends to reduce impact on environmental pollution and guides the industry to use resources more efficiently. The technology effects will influence a change in the quality of the environment. For instance, improvement in technology will have very significant impacts (+++) on health and safety, water use, and aquatic, and some moderate impacts (++) to forest resource, energy use, and acid rain.

Scale effects

Reforms that promote trade will often raise the overall level of pulp and paper industry activities, demanding the industry to use a higher consumption rate of natural and environmental resources. However, this may be compensated when efficiency is improved, or when industry growth makes greater investments in environmental projects possible. An expansion in the level of economic activities in the pulp and paper industry can have positive impacts on the environment by improving efficiency, showed by reduced demand on natural resources and less generation of polluting waste.

However, expansion in pulp and paper production can also have negative environmental impacts when there is no efficiency in use of natural resources and the investment in environmental management is minimum. A higher output increases the demand for natural and environmental resources. In this situation, pulp and paper production tends to be associated with an increase in environmental pollution, and severe impacts on health and safety. The pulp and paper industry is complex and highly energy-and-water intensive. In relation to forest resources, the growth of pulp and paper industry possibly causes:

- a higher pressure on natural forest sustainability
- increase in degradation and deforestation rate, not only to natural forest but also to cultivated/industrial forest;
- increase in illegal logging and illegal supply when raw materials availability is lacking
- dependency on supply from natural forest due to improper management of industrial forestry (HTI)

- Deforestation of natural forest causes poor forest ecosystem, with threats to biodiversity, the population of endemic or threatened species, and the wilderness. Besides, deforestation may then influence social impacts due to decreased ability of the community surrounding and/or within the forest to gain benefits from the forest.

Structural effects

Trade liberalization could lead changes in sectoral composition of a country's economy, as it specializes in production of goods or services where it has comparative advantages. If the prospects for developing the pulp and paper industry are good, this industry could be the main source of Indonesia's income. This potential could change the existing policy and then lead to more incentives to development of this industry. Consequently, the development of the pulp and paper industry could increase pollution and uncontrollable forest exploitation to fulfil raw material needs. Without appropriate environmental policies in place, negative environmental effects may occur. Development of the pulp and paper industry will cause moderate negative impacts (—) on forest resources, biodiversity, water use and energy use. Structural effects will affect health and safety, and acid rain also with light negative impact (-).

Regulatory effects

Trade reforms may have impacts on environmental regulation and standards. Trade agreements may explicitly include measures to improve environmental standards. If there are several trade-related policies implemented to best policy and second best policy, there is a tendency for the pulp and paper industry to produce lower impacts on pollution, consume natural resources more efficiently and adopt environmentally friendly practices. Regulatory effects will have moderate positive impacts (++) on forest resources, biodiversity, health and safety, and surface and ground water.

Appendix IV

Eco-Labeling requirements for uncoated printing paper

No	Environmental aspects	Requirements
1	Raw material	Consists of virgin pulp or recycled waste paper or its mixture. Virgin wood pulp should not come from illegal logging or from natural forest. The forests should be managed to keep them sustainable.
2	Paper additive	1. The paper additives used should have a minimum biodegradability of 90% 2. The bleaching agent permitted in de-inking process is Hydrogen Peroxide
3	White water recovery system	Suspended solids of white water should be not more than 8 kg/ton of paper
4	Water and energy consumption	Water and energy consumption should be: 1. Water: not more than 20 m ³ /ton of paper 2. Electricity: not more than 800 KWH/ton of paper 3. Steam: not more than 3 ton/ton of paper
5	Wastewater (as an additional requirement beside the existing environmental regulations)	AOX (Adsorbable Organic Halides) not more than 0.5 kg/ton of 90% pulp

Other requirements:

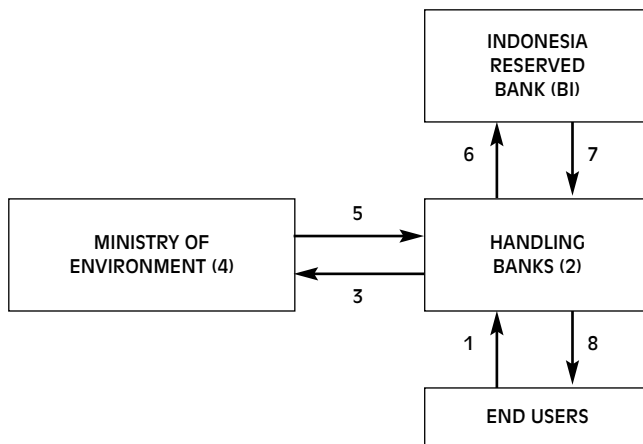
No	Environmental aspects	Requirements
1	Compliance with environmental management regulations	Paper industries should commit to compliance with the relevant laws and regulations
2	Environmental Management System	Paper industries should apply an EMS to ensure fulfilment of requirements for eco-label certification criteria, controlling environmental impacts, and compliance with environmental management regulations
3	Product quality	Product should meet the quality standards specified and/or apply quality management
4	Packaging	Product packaging materials should not consist of PVC or PVDC Information to be provided on the packaging: – Producer's name, address and telephone/fax – % of waste paper or non wood/wood waste (if relevant) in paper product

Source: Ministry of Environment, 2004.

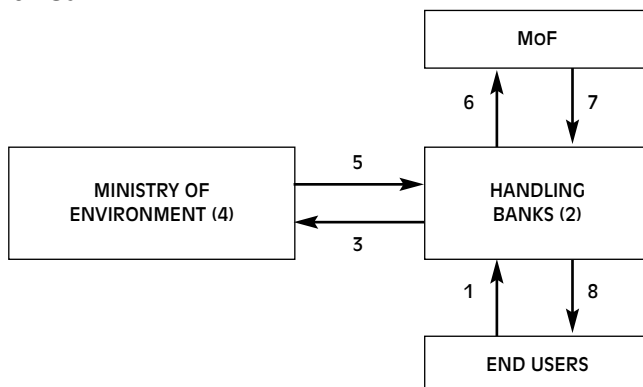
Appendix V

Lending mechanism of the environmental credit line

1. IEPC-KfW Soft Loan



2. JBIC-PAE Soft Loan



Notes:

1. Application from end users to handling banks
2. Financial appraisal by handling banks
3. Submission of official letters and application by handling bank to MoE
4. Technical assessment by MoE [In this regard IEPC KfW supported by Technical Assistance Unit (TAU)]
5. Technical recommendation sent to handling banks
6. Disbursement request to MoF
7. Disbursement to handling banks
8. Disbursement to end users

Source: Ministry of Environment, 1998.

