

TRADE AND ENVIRONMENT WORKSHOP

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PAPERS AND PROCEEDINGS

**Economic Committee
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FOREWORD

Since its formation at the 1994 APEC Ministerial meeting in Jakarta, the Economic Committee has pursued a work program aimed at fulfilling the three major objectives established for it: namely to serve as a forum for discussion of economic trends and issues in the region; to support the Ministerial and Leaders' meetings and other APEC fora; and to disseminate information on economic issues and linkages in the region.

An important part of the Committee's work in 1997 and 1998 has been the project on *Trade-Related Environment Measures and Environment-Related Trade Measures*. This project involves a review of the various trade-related environment measures and environment-related trade measures adopted within the region to provide a first-ever overview of how APEC member policy regimes in these important inter-linked areas interact. The project addresses the interface between the two high-profile issues of trade and sustainable development, an interface that is as difficult and complex as it is important to success on both fronts. For the Economic Committee, this project is thus a particularly challenging undertaking.

In the past, the Committee has found it useful to involve outside experts in its work and to this end has regularly organized symposia, workshops and public-private sector dialogues. Building on this tradition, a *Workshop on Trade and Environment* was organized under the auspices of the Committee by the Chinese Academy of International Trade and Economic Cooperation (CAITEC) of the Ministry of Foreign Trade and Economic Cooperation in the People's Republic of China to advance this project. The Workshop, which was held in Beijing, 22-24 July 1998, brought together over 60 experts and government officials, representing 15 APEC member economies, to review the conceptual issues, to develop an understanding of how these issues are viewed in the various APEC member economies, and to provide expert commentary and advice to the team developing the draft report and survey on behalf of the Committee.

The Workshop indeed fulfilled these high expectations, providing guidance and inspiration on how to further develop the work in ways that are practical and feasible and that will make a real contribution to understanding of this key policy interface. The papers and proceedings that emerged from this event constitute a rich body of material. The Committee hopes, through publication of this material, to deepen the understanding of this key nexus of issues within the APEC community and beyond.

I should like to express my deep appreciation to CAITEC and its staff for organizing this important event. Particular thanks are due to Mr. Chen Wenjing, Vice President and Senior Economist, who was the team leader for this project and the inspiration behind the organization of the Workshop. Thanks are also due to Dan Ciuriak for compiling and editing the proceedings and to the APEC Secretariat for seeing this volume of proceedings through to publication.

John M. Curtis

Chair
APEC Economic Committee
Ottawa, November 1998

SUMMARY OF THE PROCEEDINGS

Summary Report

The APEC Workshop on Trade and Environment was held July 22-24, 1998 in Beijing, China, under the auspices of the APEC Economic Committee and the Chinese Academy of International Trade and Economic Cooperation (CAITEC). Delegates, experts and scholars from the following member economies participated: Australia; Canada; People's Republic of China; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; New Zealand; Papua New Guinea; Philippines; Singapore; Chinese Taipei; and the United States of America (see the appendix for the list of participants). A representative from Peru also attended the Workshop, as did a representative from UNESCAP.

This volume provides a summary of the discussions that took place at Beijing and makes available to a wider audience the papers and contributions made by the expert speakers who gathered there.

Opening Statements

The opening ceremony was chaired by **Mr Chen Wenjing, Vice President of the Chinese Academy of International Trade Economic Cooperation (CAITEC)**. He welcomed the participants, introduced the distinguished guests, and expressed his gratitude to the APEC Secretariat for its financial support.

Dr Zhang Xiang, Vice Minister of Foreign Trade and Economic Cooperation, in his opening speech, pointed out that, with the deepening of trade and investment liberalization, the relationship between trade and environment has become an issue of global concern. The international community, including APEC member economies, has made great efforts to reconcile trade liberalization and environmental protection so as to achieve sustainable development. He noted that the government of China has always attached great importance to environmental protection while pursuing economic growth, and that a complete legal system for environmental protection has been formulated. He expressed his belief that the Workshop would greatly enhance cooperation on trade and environment between APEC member economies and he wished the participants complete success in their deliberations.

Dr John M. Curtis, Chair of APEC Economic Committee, although unable to personally attend the Workshop, provided an opening statement. Dr Curtis pointed out that, as the financial and economic crisis that has hit the APEC region is overcome and regional stability is progressively restored, attention would return to two factors that determine long-term growth in the region. The first is continued progress toward achieving the Bogor goal of free and open trade and investment in the Asia Pacific region by 2010/2020. The second is coming to grips with the issue of "sustainability" in its broadest sense. He observed that the *Survey on Trade-related Environment Measures and Environment-related Trade Measures* that is being developed within the Economic Committee addresses the intersection between these two prime policy concerns. At the same time, he emphasized that trade and environment is a crosscutting type of issue, the

boundaries of which are not well defined. Accordingly, he expressed his hope that the Workshop would provide guidance and inspiration to the Economic Committee on how to develop the survey in ways that are practical and feasible and that would make a real contribution to a better understanding of this key policy interface.

Opening remarks by **Ms Julie Gould, Director (Program) of APEC Secretariat**, were also announced. She noted that the work being carried out under the survey on trade-related environmental measures and environment-related trade measures is an excellent example of APEC's work in information gathering and analysis to facilitate trade in an area of growing importance for all APEC economies. She also emphasized that it provided an example of APEC's unique way of carrying out its business, with the work being undertaken on a voluntary basis by member economies; to be successful, it depended therefore on the willing participation of APEC members. She concluded by congratulating China for having put together such a detailed and interesting program for the three-day Workshop.

The Workshop discussions that followed these remarks included sessions on:

- *Information Gathering and Analysis on Trade and Investment Measures in APEC Member Economies*, chaired by Mr Chen Wenjing of China;
- *The Relationship between Trade and Investment*, chaired by Mr Aaron Cosbey of Canada; and
- *Economic Report on Trade and Environment*, which was conducted in two sessions chaired respectively by Dr Huang Chung-Huang, of Chinese Taipei and Dr Kog Yue-Choong, Singapore.

Session 1: Information Gathering and Analysis on Trade and Investment Measures in APEC Member Economies

Chair: Mr Chen Wenjing, China

The chair opened the discussion with a brief introduction to the project. He noted that, as this was the first attempt to set up a database on trade and environmental measures in multiple languages, the project was breaking new ground and would pave the way for further and more extensive work within APEC or in other international organizations. He noted that a preliminary report had been prepared and invited project team members to present the results for discussion and comment.

Mr Kong Fanchang of China defined and categorized trade-related environmental measures (TREM) and environment-related trade measures (ERTM) and reviewed efforts within APEC and other fora to develop some coordination in this area:

- 1) Multilateral environmental agreements (MEAs) and related trade measures: Of the 180 existing MEAs, about 20 contain trade provisions, several of which are significant, in particular *The Montreal Protocol on Substances that Deplete the Ozone Layer*, *The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)*, and *The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal*. Most APEC member economies are signatories of these agreements.

- 2) Trade measures taken by APEC member economies for the purpose of environmental protection: APEC member economies have implemented numerous trade measures for the purpose of environmental protection, some adopted pursuant to MEAs and others implemented on an individual basis. Some of the latter have in particular cases led to trade disputes, raising issues concerning the appropriate formulation of such measures.
- 3) Environmental measures with significant trade effects: These include administrative and regulatory measures (e.g., emission standards that can impact on imports); product-related environmental measures (eco-labeling, packaging and recycling), environmental management system (ISO 14000 series); and economic instruments (e.g., environmental taxes, tradable permits, deposit/refund systems and financial incentives). As the survey documents, APEC member economies are highly diverse with respect to many aspects of this issue, including: the formulation and implementation of environmental laws and regulations; environmental standards; testing protocols; data requirements; and so forth.
- 4) Efforts made by APEC member economies and sub-regional groups in coordinating trade and environment: Significant work is underway internationally to coordinate work on trade and environment, with the active involvement of many APEC member economies. Of note in this regard is the APEC Environment Ministers' *APEC Environment Statement* and *A Framework of Principles for Integrating Economy and Environment in APEC* which includes an article on trade and environment. Also of note is APEC's work on sustainable development, including the Leaders' initiative on the *Impact of Expanding Population and Economic Growth on Food, Energy and the Environment (FEEEP)* which integrates broad economic and environment considerations. Almost all APEC economies are WTO members and participate in the WTO Committee on Trade and Environment (CTE), which has brought environmental and sustainable development issues into the mainstream of WTO work. Finally, major sub-regional trade groups such as the North American Free Trade Agreement (NAFTA) and the Association of South East Asian Nations (ASEAN) have sought to establish a harmonious relationship between free trade and environmental protection, although with differing approaches and methods.

In concluding, he suggested that, while all APEC member economies seek to coordinate trade and environmental policies to promote sustainable development, their differing stages of development have led to differences in their environmental measures and standards. Accordingly, he argued that attempts to create uniform standards and/or individual implementation of measures would inevitably be problematic. Noting the importance of transparency, he also requested all member economies to report revisions and implementation of environment-related trade measures and trade-related environmental measures on a timely basis in order to maintain the APEC database as up to date as possible.

Ms. Zhao Yuming reviewed growth and environmental trends in the APEC region and addressed the issue of the relationship between trade liberalization and environmental performance. She noted that Asia Pacific economies have experienced impressive economic growth in recent decades largely due to the improved market access achieved through the GATT and unilateral economic opening. However, they also have paid a high environmental cost for their economic success. She noted that, despite some improvement of environmental indicators for individual members, the state of the environment in the

APEC region was far from being satisfactory, with the main environmental problems being resource depletion and degradation (including land degradation, deforestation, loss of biodiversity and depletion of fisheries) and heavy pollution (mainly air and water pollution) in a number of member economies. She noted that, while there is a growing apprehension that free and open trade and investment will induce accelerated environmental degradation, the root of environmental problems lies in market failure and policy failure and not in economic growth itself. Population dynamics (growth, urbanization/industrialization and poverty) also contribute very significantly to the environmental problems.

In addressing the interrelationship between trade and environment, she approached the issue from two dimensions – the environmental consequences of trade liberalization and the impact of trade-related environmental measures on trade. Whether trade liberalization has positive or negative environmental effects depends in most cases on whether the complementary environmental policies are in place. On the other hand, trade protectionism can also be costly in ecological as well as economic terms. For example, by creating market distortions, protectionism can encourage excessive use of resources and foil the efforts of developing economies to move from primary resource-based exports to higher-value-added manufactured products.

As regards the impact on trade of various TREMs and ERTMs, she noted that, while a common understanding has been reached that trade liberalization and environmental protection should develop hand in hand under the general guideline of sustainable development, discussions have chiefly focused on differences between developed and developing economies. These differences derive from the general divergence in economic development, varied environmental consciousness and preferences, and distinct technological levels and environmental regulations among the economies.

Further, while concerns center on possible competitiveness and market access impacts of TREMs, and there is some evidence that exporters (especially SMEs in developing economies) have been affected adversely by stringent environmental measures, the analytical results are not conclusive. Environmental measures are one of many factors affecting competitiveness and it has not been firmly established whether there is a systematic relationship between environmental measures and competitiveness. In addition, it is to be noted that well-designed environmental policies create some positive gains. In light of these points, she argued that, with more and more environmental measures being introduced and the process of APEC trade and liberalization gaining momentum, trade-related environmental measures will likely have long-term, indirect and mixed effects on the competitiveness.

In concluding, she emphasized the importance of APEC:

- upholding sustainable development as its paramount goal and guiding trade and investment liberalization plans accordingly;
- promoting the internalization of environmental costs as the most effective means to ameliorate the negative environmental impacts of trade liberalization;
- encouraging adoption and implementation of internationally recognized environmental and quality management standards such as ISO 14000;

- promoting regional cooperation in environmental protection, including institution building, technological transfer, and information exchange; and
- improving consultation to facilitate consensus-building on trade-environment issues

Mr Shao Honghua considered the relationship between competitiveness and internalization of environmental costs, which is generally agreed to be the fundamental way to coordinate the relationship between trade and environment. He noted that, to internalize environmental costs effectively, it is important to define “ownership” of environmental assets, and secondly to “price” them appropriately. He reviewed the range of economic instruments that have been devised to promote internalization of costs, including the important “polluter pays” principle, and considered their impact on competitiveness both in theoretical terms and on the basis of a review of existing empirical work and several case studies. He concluded that, while there is a broad consensus about the utility of internalization of environmental costs, this is easier in theory than in practice. Moreover, the evidence is inconclusive as to the possible effects of environmental cost internalization on competitiveness. He suggested that, nonetheless, APEC could help strengthen cooperation in the field of cost internalization by, *inter alia*, promoting enforcement of measures and helping developing economies to cope with any competitiveness impacts which they might suffer.

Mr Jiang Hao concluded the review of the report with an appeal for improvement of the transparency of trade and environment measures in APEC, which, he believed, would help APEC members gain a better knowledge of regional trade and environmental measures and promote trade liberalization and environmental protection. He noted the role of international treaties and WTO agreements in the establishment of standards and cited a number of APEC accomplishments in promoting acceptance of and adherence to international standards. He also noted the importance of incorporating standards in laws, of publicizing them to promote widespread adherence, and of including public participation in the policy-making process to ensure public support for measures.

He concluded that transparency is a prerequisite for effectiveness of measures to protect the environment and noted some salient differences faced by developing versus developed economies in promoting transparency. For example, in the developed economies, people can keep abreast of new information from the Internet, while in the developing economies recourse is still usually required to written materials. He also suggested that APEC might contribute to raising transparency by, *inter alia*, supporting:

- sharing of experience, including by developing individual Economy Reports on trade and environment, to be available in English to facilitate mutual understanding
- environmental research and development work;
- economic and technical cooperation, including training for officials dealing with trade/environment issues, to promote widespread progress;
- establishment of one or more information centers to cope with the questions raised by governments, businesses or individuals in other member economies; and
- translation of important measures related to environmental protection into the main international languages to overcome language barriers.

During the open discussion that followed, a number of updates and clarifications were provided, and suggestions made, to improve the report. A number of substantive comments and suggestions were also made.

- As the WTO legal framework for trade-environment issues is still incomplete and procedural laws for the settlement of disputes in this area are still lacking, it is legitimate for individual economies to adopt measures in this area.
- A uniform natural resources accounting and evaluation system should be established (however, it was further noted in this connection that trade and environment disputes in the past have hinged on highly subjective evaluations of environmental resources, such as the value to consumers of a dolphin, which are difficult to capture in such accounting systems).
- Developing economies need to develop the necessary infrastructure to support measures aimed at internalizing environmental costs.
- In considering internalization of environmental costs, it is important to bear in mind a basic distinction between manufactured or final-use goods and commodities versus intermediate-use goods. The former are sold directly to consumers which can result in their benefiting from the “greening” of consumer demand; indeed, they may become more competitive in becoming more environmentally friendly. By contrast, intermediate-use goods are sold to manufacturers who may be expected to be more concerned about price, which would tend to make them less competitive as a result of internalizing external environmental costs.

To improve the report it was suggested that:

- The quantitative analyses and theoretical models underlying the case studies should be included in the report.
- Institutional and management response systems should be added to the categories of trade-related environment measures.
- Since environmental technology is indispensable for an economy to reach international environmental standards, successful experiences on trade and environment measures should be included in the survey to assist member economies to find suitable environment technologies.

Session 2: The Relationship between Trade and Environment

Chair: Mr Aaron Cosbey, Canada.

Mr Xinpeng Xu of Australia presented a paper entitled *International Trade and Environmental Policy: How Effective is 'Eco-Dumping'*, which examines the significance of environmental policy for trade. He proposed a basic hypothesis that technology, rather than the environmental factor, is the significant determinant of the international competitiveness of environmentally sensitive industries. He outlined the mathematical analysis in his paper which covered: technology, increasing returns to scale and generalized GNP function; approximation of the generalized GNP function using a

flexible function form; and data and measurement. He noted that the results supported the hypothesis that so-called eco-dumping is not an effective strategy.

Dr Khalid Abdul Rahim of Malaysia presented a synthesis of some studies on trade and environment linkages carried out in Malaysia. He then drew on several cases, including palm oil, timber and electronic industries, to elaborate on the impact of environmental measures on trade and the impact of trade liberalization on the environment. He also touched upon Malaysia's participation in international environment agreements and the possible effects of meeting international standards. He concluded his report by stressing that, to reconcile trade and environment conflicts and to promote sustainable development, priority should be given to the coordination of international trade and environmental protection policies in public policy decision-making.

Dr Kog Yue-Choong from Singapore spoke on the impact that Singapore's environmental measures had exerted on its trade and environmental performance. He first briefed on Singapore's environmental performance in the context of its rapid economic growth since 1960s, and then reviewed the broad strategies that have been introduced to cope with environmental impact of the trade-related development plans which accounted for the success achieved by the Singapore economy. He attributed Singapore's robust economic growth and steady elevation of environmental standards to the strength of legislative support.

During the open discussion that followed, a number of questions were raised and comments offered.

- In response to a question, it was suggested that the empirical evidence on the impact of environment measures showed that export performance of environmentally sensitive industries remained unchanged for the majority of economies investigated. However, it was also suggested that the environmental factor can be a significant determinant of international competitiveness – in particular, this would reflect different environmental standards in developing versus developed economies, which in turn stem from their different levels of economic development. Moreover, there have been cases where pollution-intensive industries migrated from developed economies to developing economies.
- It was suggested that developing economies could not always afford stringent environmental policies while trying to maintain a relatively high efficiency in environmentally sensitive industries, which resulted in a low environmental stringency index.
- It was suggested that results of environmental studies should be interpreted cautiously, because such elements as government subsidies, environmental policies, the adoption of different methodologies and models can influence the results attained.

Session 3: Economic Report on Trade and Environment

Chair: Dr Huang Chung-Huang, Chinese Taipei

Mr Shinya Murase from Japan presented a brief description of Japan's basic policy approach on trade and environment issues by referring to the relevant international agreements concluded by Japan and their implementing legislation. With a particular focus on trade-related environmental measures, he touched on the implications of governmental subsidies, the use of economic instruments, and the legal aspects of trade-related environmental measures adopted by Japan. He stressed that it is crucial to establish compatibility between trade liberalization provisions and the measures taken under multilateral environmental agreements. He concluded by suggesting that APEC might consider how to support working out substantive rules on trade and environment to establishing viable dispute settlement mechanisms so as to harmonize the relationship between trade and environment.

Mr Aaron Cosbey from Canada reviewed the background to Canada's trade and environment regime, noting that a key feature of Canadian policy, both at the international level and the national level, is an emphasis on the principle of openness. He briefly summarized Canada's laws, regulations and administrative regulations pertaining to trade-related environment measures and environment-related trade measures at the national level and noted the bilateral and multilateral agreements on trade and environment-related matters signed by Canada. In his report, he touched on the issues of transparency, the impact on environment of trade liberalization, and the impact on competitiveness of internalization of external environmental costs. Mr Cosbey recommended some of the principles and practices of NAFTA (e.g., the commitment of NAFTA parties not to lower environmental standards to attract investment). He added that NAFTA had incorporated the WTO's general environmental measure and included an explicit reference to the three major Multilateral Environmental Agreements – CITES, the Montreal Protocol and the Basel Convention. He also introduced some of the specific practices in Canada, noting in particular a mechanism that had been established to respond to complaints concerning environment (which provides for establishment of an ad hoc joint group comprised of government officials in charge of environment and trade and experts in relevant fields to tackle trade and environment-related matters).

Dr Lepi T. Tarmidi from Indonesia described the worsening environmental situation in Indonesia due to the excessive exploitation of natural resources and elaborated on the trade-and-investment-related environmental measures and environment-related trade and investment measures adopted by the Indonesian government. He offered the view that environmental measures should be confined to environmental protection alone and not linked with trade sanctions, and that environmental degradation and carelessness in developing economies are mainly because of ignorance and of backwardness in environment technology, and in this field industrialized economies can assist with technical assistance.

During the open discussion that followed these three presentations, a number of issues were raised and comments offered.

- The concern was raised that perhaps the developed economies may tend to advocate more stringent environmental policy for developing economies than they had followed themselves. In this regard, it was suggested that the present project should be linked with similar projects conducted by other international organizations so as to establish a more comprehensive and hence more authoritative information collecting system.
- The issue of transfer of pollution-intensive industries from developed to developing economies in APEC was also raised and some examples were cited.
- In the case of deforestation in some parts of Asia, it was noted that economies that import timber from these sources could also be considered as sharing the responsibility for the environmental damage.

In the afternoon continuation of this session, several more speakers presented papers.

Mr Xia Youfu from China reported on the development of FDI in China; the positive and negative impacts of FDI on China's sustainable development; and China's laws, regulations and policies related to FDI and environmental protection. Among the positive impacts of FDI on the environment were: the transfer of advanced pollution-controlling technologies and equipment; the introduction of advanced environmental management practices; and the impetus provided to the development of eco-farming and cleaner production in China. The negative impacts mainly derived from transfer of pollution-intensive industries to China; the transfer of ODS production and consumption to China; and the transfer of hazardous wastes and technology to China.

Dr Corazon P. B. Claudio from the Philippines briefed on the trade and environment regime in the Philippines and the international environment agreements to which the Philippines was a party. She shared the concern about the transfer of pollution-intensive industries to developing economies and suggested that the Philippines actually imported more pollution than it exported. She reiterated the statement of the Philippines' government that the pace of economic growth must be calibrated with the environment's carrying capacity. At the end of her report she put forward some suggestions for the project:

- the project team should be fully aware who would be the user of the information collected – government, the business community or civil society – and should shape the information to provide substantive support to public policy decision-making;
- the project should establish some criteria for the selection of information for the database, which might include feasibility of collection, cost-effectiveness of collection and analysis, accuracy, reliability, timeliness and validity of the expected data;
- the database should serve as a trade and environment monitoring mechanism with an early warning system on trends and developments in primary markets for APEC member economies; and
- a Best Practices Program for Trade and Environment could be a good component to include in the project.

Dr Sang-Hee Yoo from Korea noted in his presentation that environment-related trade measures have been increasingly adopted due to public needs for higher environmental quality. However, he expressed concerns about the impact that individual economy

environmental measures with extraterritorial effects might have on the international trade system in general and on Korean exports in particular. Indeed, in his view Korea's had in fact become hindered by environment-related measures taken abroad. He stressed that although the dominant view in the developed economies seemed to be that stringent environmental policies do not have serious adverse effects on trade and competitiveness, there are still great concerns in this regard.

In the open discussion that followed these presentations, several observations and comments were made:

- It was argued that the internalization of environmental costs is a decisive factor in improving environment quality and is preferable to measures such as restrictions on exports.
- In response to a question concerning the differences between the OECD's and Mr Yoo's estimates of GDP loss due to CO₂ emission restraint, Mr Yoo responded that the differences were due to the different models the two organizations adopted in their estimation.

Mr Ye Ruqiu from China briefed on the background of environmental protection and foreign trade in China, touching on: the legal framework of environmental protection and foreign trade, international aspects of environment and trade, some of the problems of trade and environment facing China, and policy options and measures to address international trade and environment issues. He stated that, in the early 1980s, China adopted environmental protection as a basic state policy in conjunction with economic growth and urban development. He suggested that significant achievements have been made in the field of environmental protection as a result of strengthened environmental management.

Dr Agogo Mawuli from Papua New Guinea in his presentation described the beautiful scenery and abundant natural resources that Papua New Guinea enjoyed. He noted that, since the economy was heavily resource-based, the government paid special attention to the rational exploitation of natural resources when making environment and trade policies. A series of pieces of domestic legislation (e.g., the Mining and Petroleum Act, the Water Resources Act and the Environmental Contaminants Act) had been passed with the aim of environmental protection and conservation. He noted as well that some international agreements and conventions to which PNG was a party have effectively regulated its exports.

Dr Eden Sui-Hung Yu from Hong Kong, China elaborated on the trade-related environmental measures enacted by the Hong Kong, China government pursuant to its policy objective of fostering economic development in a manner that sustained trade and preserved environment. He noted in particular the adoption by Hong Kong, China of the "polluter pays" principle in dealing with waste disposal and treatment, i.e., the costs of waste disposal and treatment are recovered at various levels from waste generators.

In the open discussion that followed, several clarifications of measures in some member economies were made and some more general comments and suggestions were made. In particular, it was noted that considerable material compiled for the presentations had been sourced from various Internet sites and that it was highly advisable for the project to make good use of Internet sources in setting up their database.

Session 3 (continued): Economic Report on Trade and Environment

Chair: Dr Kog Yue-Choong, Singapore

Mr Yee Che Fong, representative from UNESCAP presented a paper entitled *Trade, Environment and Sustainable Development*. He noted that the Ministers of ESCAP economies at the Third Ministerial Conference on Environment and Development in Asia and the Pacific held in Bangkok in 1995 had emphasized that trade and environment policies should be mutually supportive in a manner that contributed to sustained economic growth and that policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. He observed that a key to sustainable development lies in pricing environmental resources to reflect their real value. Mr Yee concluded by offering several suggestions to the project team: there should be more transparency in their work, and more channels of information gathering should be opened; the consensus reached at such Workshops should be included in the project report; and the project team should try to put forward proposals that might be of help to APEC member economies in their implementation of TREMs and ERTMs.

Dr Huang Chung-Huang from Chinese Taipei discussed the motivations for Chinese Taipei's concern about the linkage between trade and environment, which included the importance of environmental quality for sustainable development, the increasing cases of disputes over trade and environment worldwide, and the potential impacts of trade-related environmental measures and environment-related trade measures. In his report he touched upon the following topics: background on Chinese Taipei's trade and environment regime and regulatory framework, transparency, and the impact of environment and trade measures on trade and the environment. He concluded that while the body of research on this nexus of issues is growing, much of it remains theoretical and empirical assessments are still generally lacking.

In the open discussion that followed, a number of issues were raised concerning environmental subsidies, the practice of recycling, and the potential pressures on enterprises in developing economies from implementation of the multilateral environmental agreements.

- In response to a question concerning whether account had been taken of the fact that the public sector is also a source of pollution, it was noted that one clear example was Canada where all government departments were required to submit a sustainable development plan as part of a "greening government" initiative.
- The importance of strong support from the general public and a sound legal system to ensure the timely redress of environmental offenses in leading to favorable environmental outcomes was noted.
- It was suggested that the report could be made more "user-friendly" by, for example, providing a clearer classification of trade and environmental measures (domestic, unilateral, bilateral and multilateral) and presenting this in a consistent format; and by including more detail as to what trade effects might be entailed by the implementation of TREMs.

Conclusion of the Workshop

At the close of the Workshop, Dr Kog Yue-Choong, on behalf of all the participants, expressed sincere thanks to the organizers of the Workshop for the excellent work they had done. Mr Chen Wenjing of CAITEC, in his closing remarks, showed his appreciation to the expert speakers and all the participants for their cooperation and contribution in making the Workshop a complete success.

OPENING STATEMENTS

Opening Statements

Opening Remarks by Dr Zhang Xiang Vice Minister of Foreign Trade and Economic Cooperation People's Republic of China

Distinguished Delegates, Ladies and Gentlemen,

On the opening of the *APEC Workshop on Trade and Environment*, please allow me, on behalf of the Ministry of Foreign Trade and Economic Cooperation of the People's Republic of China, first of all to extend our warmest welcome to all the honorable delegates and guests.

With the deepening of APEC trade and investment liberalization, the linkages between trade and environment as well as their interactions have aroused more and more attention. How to reconcile the trade-environment relations and attain the objectives of sustainable development has become a major problem facing the international community, including the APEC region. The deteriorating global environment as exemplified by the depletion of the ozone layer, desertification, the diminishing of tropical forests and the extinction of a wide range of wild flora and fauna not only leads to an ascending voice for environmental protection, but also a continuous increase in agreements and regulations on environmental protection, both multilaterally and unilaterally. Some of them comprise certain trade provisions, which impose restrictions on products, and even production processes that are not up to the environmental protection standard.

Within the context of the rapid advancement of APEC trade and investment liberalization, it will be a challenge for all the APEC member economies to explore ways and means to ensure the smooth progress of liberalization on one hand while improving the regional environment on the other. Since the formation of APEC, its officials have attached great importance to environmental protection. It is explicitly pointed out in the *Osaka Action Agenda* that environmental protection should be reflected in every aspect of trade and investment liberalization and economic cooperation. This issue has also been discussed at a series of APEC ministerial and expert meetings and by a number of working groups engaged in particular fields such as energy, transportation, tourism and industrial technology, among others.

Trade and environment issues are also included in the work agenda of the APEC Economic Committee which has launched a project of great significance, entitled *Information Gathering and Analysis on Trade-Related Environmental Measures and Environment-Related Trade Measures in APEC*, with a view to offering information for the study of trade and environment issues, contributing to the framework for sustainable development and safeguarding the achievement of the long-term objectives of APEC. The Workshop opening today is an important element of this project and is surely conducive to its completion.

China's foreign trade has been mushrooming in recent years. China's absorption of foreign investment has exceeded all the other developing economies in the past few years. Along with the rapid growth of its foreign trade volume and foreign investment absorption, China has been actively pursuing the goal of environmental protection as a fundamental state policy, which by no means is an easy task for a developing economy with a relatively low level of economic development. This shows how seriously the Chinese government takes this issue.

Over the last few years, a large number of laws and regulations on environmental protection have been formulated in China, leading to the formation of a comparatively complete system of environmental protection legislation as well as a system of environment management with Chinese characteristics, which are helpful to the improvement of China's environment. Soon the *Environmental Protection Law*, the *Water Law*, the *Marine Environment Protection Law*, and the *Law on Land Administration* will be revised. Besides, a number of new laws will be drafted regarding pollution prevention and control in Bohai Bay, pollution prevention and control of chemical substances, and pollution prevention and control of soil and rivers.

In order to reconcile the relationship between environment and trade and to attain sustainable development, China will expand "green food" production, promote cleaner production, implement eco-labeling and ISO 14000, develop environmentally sound industries and accelerate the phase-out of chlorofluorocarbons (CFCs).

Through experience, we have come to the conclusion that environment and trade are mutually supportive and that this mutual support can be realized under the objectives of sustainable development. For this reason, we maintain that, when working out trade policies, due consideration should be given to environment and that trade promotion must not be scored at the cost of environment. On the other hand, significant attention should be directed to trade liberalization when introducing environment policies, so as to avoid the creation of new trade barriers.

The convening of the *APEC Workshop on Trade and Environment* provides a good opportunity for all the APEC member economies to exchange their views and practices on the reconciliation of trade and environment issues and to study and discuss in depth certain issues such as trade liberalization and environmental protection.

I am convinced that, through the concerted efforts of all the delegates present, the Workshop will surely achieve fruitful results. It will further enhance the cooperation among the member economies in the fields of trade and environment; facilitate the smooth progress of trade and investment liberalization; and finally help to realize sustainable development in the APEC region.

In closing, I wish the Workshop a great success.

Opening Statement by Dr John M. Curtis
Chair
APEC Economic Committee

When APEC Ministers and Economic Leaders meet in Kuala Lumpur in November 1998, first and foremost on their agenda will be to ensure that the region has been put back on a path of growth and stability. While much of the attention at the current time is still focussed on the issue of stabilization, particularly within the APEC Finance Ministers process and elsewhere in the inter-governmental world, it is to be expected that, as stability is progressively restored, the longer-term factors that determine growth will again move to the front and centre stage.

One of these longer-term factors is, of course, to continue progress towards achieving the Bogor goal of free and open trade and investment in the Asia Pacific region by 2010/2020. The strong result from the meeting of APEC Trade Ministers in Kuching, Malaysia, in June 1998, sent an important message to markets that the region remains committed to open markets and that initiatives such as the Early Voluntary Sectoral liberalization (EVSL) will be resolutely implemented on a concerted, yet voluntary basis. Notably, the EVSL initiative includes environmental goods and services as one of the sectors for early liberalization.

The second longer-term factor is addressing the issue of sustainability in its broadest sense. Here too, APEC continues its work to address the very complex issues posed by, and the many repercussions of, population expansion and economic growth in the region over the longer term. In particular, the Economic Committee, working collegially with a number of other APEC fora, is advancing the initiative to address *The Impact of Expanding Population and Economic Growth on Food, Energy and the Environment (FEEEP)* which was put on APEC's agenda by leaders at their meeting in Osaka in November 1995. This initiative is moving into a policy phase this year and options for possible joint actions to address these longer-term issues will be put to Leaders for discussion at Kuala Lumpur.

The Survey on Trade-Related Environment Measures and Environment-Related Trade Measures that is being developed within the Economic Committee under the leadership of the People's Republic of China by the project team sponsoring this Workshop addresses the interface between these two high-profile issues of trade and sustainable development. This interface is as difficult and complex as it is important to success on both fronts. For the Economic Committee, this project is thus a particularly challenging undertaking and we look to this Workshop to help us make a credible and useful contribution to APEC's work in this area.

What is it that we are looking for from the Workshop? There are a number of general benefits and some more specific contributions that we are seeking.

First, I should like to note that trade and environment is a crosscutting type of issue. It is broad and the boundaries are not well defined. It involves disciplines such as economics, trade policy and law, the environment-related sciences, industrial practices and so forth –

and yet it is central to none of these. In its work on crosscutting issues, the Economic Committee has found it most useful to bring together experts from the different disciplines since it is from the synergy or “chemistry” of the interactions that some of the most profitable results are achieved. This is one outcome from this Workshop of which we are most hopeful.

Second, as you may know, APEC functions without a large Secretariat with extensive professional resources. Accordingly, APEC’s work is carried out largely in capitals by economies that volunteer to carry the burden for particular projects. While significant progress can be made via electronic exchanges – and this will become more and more the case as Internet policy dialogue tools become more refined and, equally importantly, better understood by the policy community – at some point projects do require concentrated input from a critical mass of experts both in the formal proceedings of a colloquium such as this and in the corridor and dinner conversations that go with it.

More specifically, we look for guidance and inspiration on how to develop the survey in ways that are practical and feasible and that will make a real contribution to understanding of this key policy interface. This is in some ways a “reality check” on our ambitions and, if necessary, a point to make course corrections, to identify gaps and to avoid pitfalls.

Secondly, the papers and proceedings that flow from this event will constitute a rich body of materials on which to draw in developing the final results. Indeed, it is our intention to publish the papers and proceedings of the Workshop as a separate contribution to APEC’s work in this field.

I wish you good luck and inspiration in your discussions and convey my sincere and deep regret for not being able personally to join you.

**Opening Statement by Ms Julie Gould
Director (Program)
APEC Secretariat**

Economic experts have observed that it is by facilitating trade that APEC is making its most immediate contribution to the regional economy. The work being carried out under *The Survey on Trade-Related Environment Measures and Environment-Related Trade Measures* in an excellent example of APEC's work in information gathering and analysis to facilitate trade in an area of growing importance for all APEC member economies. The information that has been collected by the project team provides, for the first time, APEC-wide data on the relationship between trade and environment measures. The conclusions of this Workshop will be studied with interest by policy-makers, academics and also by the business community, as accurate information on regulations is vital for companies trying to expand into new markets.

The Survey on Trade-Related Environment Measures and Environment-Related Trade Measures is also an example of APEC's unique way of carrying out its business. The key for APEC has been to concentrate on practical "value added" input, building on, rather than duplicating, the work of the many multilateral institutions. All APEC activities are undertaken on a voluntary basis and, to be successful, they depend on the willing participation of APEC member economies. This project was initiated by China to expand the information available in this area, but the data on the trade and environment measures, which will be discussed in the Workshop over the next three days, have been obtained through the assistance and cooperation of all APEC member economies.

The Workshop has been partly funded by a special APEC account established by a generous donation from the Government of Japan to assist projects that advance APEC's trade and investment liberalization and facilitation objectives. Projects which are funded under this scheme will support APEC member economies in reaching their goal of free and open trade and investment in the Asia-Pacific region by 2010 for developed member economies and 2020 for developing members.

The APEC Secretariat appreciates China's foresight in proposing that APEC undertake work in this important area, its dedication in pursuing the collection of the data from many different sources and, in particular, the hard work and determination of the Chinese project team to ensure the success of this Workshop. The Secretariat congratulates China for having put together such a detailed and interesting program for the next three days, and looks forward to receiving the results of the discussion that will take place and passing them on to the wider APEC community.

**PAPERS DELIVERED
AT THE WORKSHOP ON
TRADE AND ENVIRONMENT**

International Trade and Environmental Policy: How Effective is ‘Eco-Dumping’?

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Abstract

The effects of environmental regulations on the international competitiveness of domestic industries have become an increasing concern in the trade liberalisation process in the 1990s. This paper examines the significance of environmental policy for trade. A generalised GNP function, which incorporates both technology changes and increasing returns to scale, is set up and a flexible translog function form is used to approximate this generalised GNP function. A seemingly unrelated regression estimation technique is employed to estimate a system of sectoral share equations derived from the generalised GNP function. The basic hypothesis is that while the environmental factor is not a significant determinant of the international competitiveness of environmentally sensitive industries, technology is. The result supports this hypothesis and suggests that so-called eco-dumping is not an effective strategy in this context.

JEL classification: Q28 L50

Keywords: Trade and Environment; Eco-dumping; International Competitiveness

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International Trade and Environmental Policy: How Effective is ‘Eco-Dumping’?

1. Introduction

An economy is regarded as engaging in ‘ecological-dumping’,¹ or ‘eco-dumping’ when it gains international competitiveness in environmentally sensitive industries by imposing relatively lax environmental standards on the production of a good. More precisely, ‘eco-dumping’ can be defined as a policy which ‘prices environmentally harmful activities at less than the marginal cost of environmental degradations, i.e., a policy which does not internalize all environmental externalities’ (Rauscher 1994).

‘Eco-dumping’ and its counterpart, anti-dumping, have emerged as new issues threatening the trade liberalisation agenda of APEC and the WTO. As trade and environment concerns have become increasingly evident, there has been a resurgence of calls for a ‘level playing field’, ‘harmonisation of environmental standards’ and ‘fair trade’, and fears of loss of international competitiveness in environmentally sensitive industries on the part of developed economies. Developing economies, on the other hand, have seen these calls as new protectionism, in the form of hidden non-tariff barriers and problems of market access (Dua and Esty 1997).

An even more important issue facing developing economies is that of development strategy. Is there a conflict between environmental standards and international competitiveness? Do developing economies need to sacrifice their hopes for economic development, or, more narrowly, international competitiveness in the interests of higher environmental standards?² Is it a question of economic development (or the international competitiveness of ESG industries) versus environmental standards or is it rather a question of economic development taking environmental standards into account?

The literature features a number of normative analyses (Bhagwati and Hudec 1996; Chichilnisky 1994; Brander and Taylor 1997; Anderson and Blackhurst 1992; Esty 1994; Dua and Esty 1997; Porter and van der Linde 1995; Markusen 1997; Oates, Palmer et al. 1993; Barrett 1994, among others).³ However there is a lack of further empirical analysis, as pointed out in a 1995 report to the OECD Council at the ministerial level: “the next stage of the OECD’s work programme should include empirical analysis of selected policy areas and economic sectors” (OECD 1995).

This paper ties in with the literature on trade liberalisation and environmental policy from

¹ When a firm sells products in another economy at prices below average cost or below the price in the home economy, it is called dumping. Dumping sometimes can be beneficial to importing economies if the reason for selling products at lower prices is that the foreign demand curve is more elastic and the firm just wants to price discriminate (Viner 1923). In practice, however, dumping is illegal in the United States and some other economies because dumping is regarded as a form of predatory pricing (Davies and McGuinness 1982; Ethier 1982) used by foreign firms to gain market share and market power. The penalty is a high tariff or non-tariff barrier, the so-called anti-dumping duty.

² For an interesting analysis on global change and developing economies, see Schelling (1992).

³ See Dean (1992) for a survey of this literature.

an empirical perspective. It aims to investigate the effectiveness, if any, of ‘eco-dumping’ on the international competitiveness of environmentally sensitive industries. It seeks to examine whether the introduction of stringent environmental policies will lead to the decline of ESG industries. To this end, a generalised GNP function, which incorporates both technology change and increasing returns to scale, is set up and a flexible translog function form is used to approximate this generalised GNP function. A seemingly unrelated regression estimation (SURE) technique is used to estimate a system of sectoral share equations derived from the generalised GNP function. Environmental stringency is treated as a factor of production together with capital, labour, land, mineral, oil and coal endowments. The technology level is regarded as an important determinant in sectoral share production. The basic hypothesis is that while the environmental factor is not a significant determinant of international competitiveness of environmentally sensitive industries, technology is.

This paper is organised as follows. The generalised GNP function is derived in the next section. A flexible translog function form is set up to approximate the generalised GNP function in section III. Section IV discusses data and measurement issues. Section V reports the econometric results and the robustness of the test. The final section presents some conclusions.

2. Technology, increasing returns to scale and the generalised GNP function

Following Samuelson (1953), Dixit and Norman (1980), Woodland (1982), Kohli (1993) and Harrigan (1997), we consider a small open economy characterised by fixed aggregate factor supplies, constant returns to scale, and competitive market clearing. It can be shown that the equilibrium for the production sector can be obtained using the following maximisation problem:⁴

$$\begin{aligned} \text{Max } \mathbf{p} \cdot \mathbf{y} \quad \text{subject to } \mathbf{y} \in \mathbf{Y}(\mathbf{v}) \\ \mathbf{p}, \mathbf{y} \in \mathbb{R}^N, \mathbf{v} \in \mathbb{R}^M, \end{aligned} \quad (1)$$

where \mathbf{y} is the N -dimensional output vector, \mathbf{p} is the price vector for output, \mathbf{v} is the M -dimensional factor endowment vector, and $\mathbf{Y}(\mathbf{v})$ is the set of all output vectors which can be produced given the technology and the factor endowment. Its boundary is called the production possibility frontier. This is essentially the problem that a central planner would attempt to solve given the price vector \mathbf{p} and the factor endowment vector \mathbf{v} . The optimum \mathbf{y} is clearly a function of \mathbf{p} and \mathbf{v} : $\mathbf{y}^* = \mathbf{f}(\mathbf{p}, \mathbf{v})$. Substituting this optimum output vector \mathbf{y}^* into the objective function $\mathbf{p} \cdot \mathbf{y}$ gives the GNP function, which is a function of \mathbf{p} and \mathbf{v} as well. The GNP function can be written as

$$G = G(\mathbf{p}, \mathbf{v}) \quad (2)$$

$G(\mathbf{p}, \mathbf{v})$ is non-decreasing, linearly homogenous, and concave in \mathbf{v} , and non-decreasing, linearly homogenous, and convex in \mathbf{p} .

⁴ Woodland (1982) shows that the maximum GNP function $G(\mathbf{p}, \mathbf{v})$ is essentially the same as the minimum factor payment function $m(\mathbf{p}, \mathbf{v})$. They are dual. The term GNP function is sometimes called the revenue function (Dixit and Norman 1980), or the restricted profit function (Diewert 1974).

This optimisation problem may also be illustrated diagrammatically in Figure 1 for the 2×2 case. In Figure 1, the area OAB is the production possibility set given the economy's factor endowment. The optimum output vector \mathbf{y}^0 can be solved given the price vector, \mathbf{p} . This gives the point y^0 where the highest iso-GNP line is tangential to the production possibility curve given the factor endowment vector \mathbf{v} . The price vector \mathbf{p} , drawn starting from any point y^1 (not shown on the graph) on the iso-GNP line, must be orthogonal to any vector starting at y^1 and lying on the iso-GNP line. This is so because for any y^2 that itself lies on iso-GNP line, we have

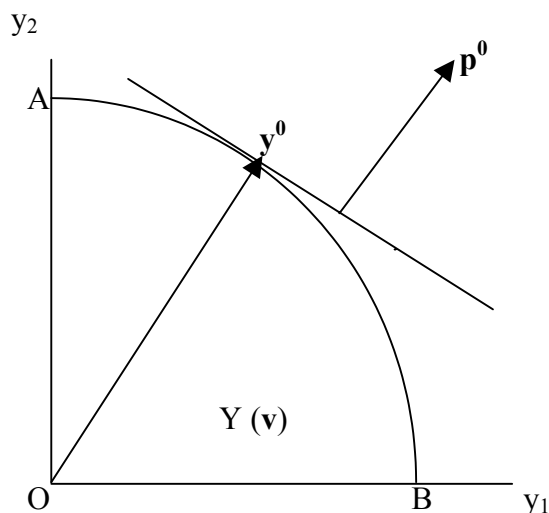
$$\mathbf{p} \mathbf{y}^1 = \mathbf{p} \mathbf{y}^2 = \text{GNP}.$$

Hence

$$\mathbf{p} \Delta \mathbf{y} = 0 \text{ for } \Delta \mathbf{y} = \mathbf{y}^2 - \mathbf{y}^1.$$

Since the inner product of two vectors is equal to zero, vector \mathbf{p} is orthogonal to vector $\Delta \mathbf{y}$. Note that when we draw the price vector in the diagram, we use the 'units' on the axes to represent units of prices rather than goods.

Figure 1



The GNP function approach has proved very useful tool of analysis in international trade theory and empirical trade studies. As long as the GNP function is twice continuously differentiable, applying Hotelling's lemma gives the gradients (derivative) of $G(\mathbf{p}, \mathbf{v})$ with respect to \mathbf{p} and \mathbf{v} , which are the vectors of output supplies and factor price, respectively.

$$\mathbf{y} = G_{\mathbf{p}}(\mathbf{p}, \mathbf{v}) \quad \text{and} \quad \mathbf{w} = G_{\mathbf{v}}(\mathbf{p}, \mathbf{v}) \quad (3)$$

Constant returns to scale and no technology change are two of the several basic assumptions underlying the Heckscher–Ohlin theorem. It has been argued by 'new trade theorists' that increasing returns to scale are among the most important factors that explain trade patterns, especially the large volume of intra-industry trade. We can demonstrate that the assumption of constant returns to scale can easily be relaxed in the generalised GNP function framework.

In the case of increasing returns to scale (external economies of scale), a firm's output is not only a function of factorial value added $f(\mathbf{v})$, as in the case of constant returns to scale, but also a function of industry output $g(\mathbf{Y})$.

$$\mathbf{y} = g(\mathbf{Y}) f(\mathbf{v}) \quad (4)$$

where $g' > 0$ and $g'' < 0$, suggesting that the larger the industry, the more efficient the firm. $\mathbf{Y} = \sum \mathbf{y} = g(\mathbf{Y}) f(\mathbf{v})$ is the industry output vector. Let the equilibrium industry output vector be $\underline{\mathbf{Y}}$, then the firm will maximise $\{\mathbf{p}g(\underline{\mathbf{Y}})\} \cdot f(\mathbf{v})$, where $g(\underline{\mathbf{Y}})$ can be treated as a scalar of price vector \mathbf{p} . The GNP function then becomes

$$G = G(\mathbf{p}g(\underline{\mathbf{Y}}), \mathbf{v})$$

or

$$G = G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) \quad (5)$$

where $\boldsymbol{\theta} = \text{diag} (\theta_1, \theta_2, \dots, \theta_N) = g(\underline{\mathbf{Y}})$.

Similarly, applying Hotelling's lemma gives the gradients (derivative) of $G(\mathbf{p}g(\underline{\mathbf{Y}}), \mathbf{v})$ with respect to \mathbf{p} and \mathbf{v} , which are the vectors of output supplies and factor prices, respectively.

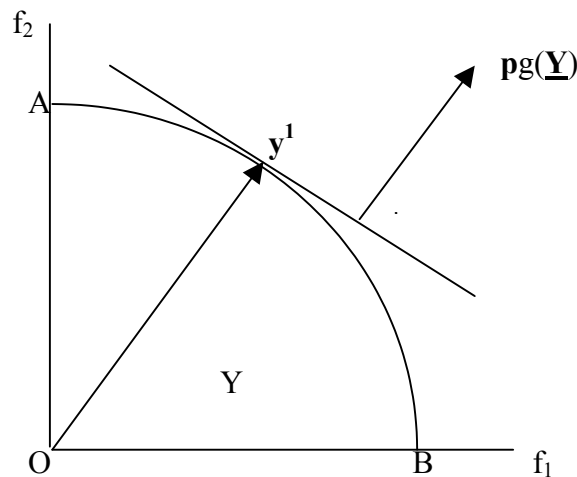
$$\partial G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) / \partial \mathbf{p} = \{\partial G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) / \partial (\boldsymbol{\theta}\mathbf{p})\} \bullet \{\partial (\boldsymbol{\theta}\mathbf{p}) / \partial \mathbf{p}\} = \boldsymbol{\theta}f(\mathbf{v}) = \mathbf{y}$$

and

$$\partial G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) / \partial \mathbf{v} = \mathbf{w} \quad (6)$$

where $\partial G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) / \partial (\boldsymbol{\theta}\mathbf{p}) = f(\mathbf{v})$ and $\partial (\boldsymbol{\theta}\mathbf{p}) / \partial \mathbf{p} = g(\underline{\mathbf{Y}})$. This can be illustrated diagrammatically as in Figure 2. Comparing this to Figure 1, we can see that increasing returns to scale can be modelled as industry-specific price changes and the optimum output vectors are again given by the gradient of the GNP function.

Figure 2



Dixit and Norman (1980) and Harrigan (1997) arrived at similar result by relaxing the assumption of no technology difference across economies and industries. Suppose there exists a production for each good given by

$$\mathbf{y} = \boldsymbol{\phi}f(\mathbf{v}) \quad (7)$$

where φ is a scalar parameter relative to some base economy. The assumption of the existence of distinct production functions implies that joint production is ruled out. The resulting GNP function can be shown to have the form

$$G = G(\varphi\mathbf{p}, \mathbf{v}) \quad (8)$$

where $\varphi = \text{diag} \{\varphi_1, \varphi_2, \dots, \varphi_N\}$. This formulation implies that industry-specific neutral technology change can be modelled in the same way as industry-specific price increases, as in the case of increasing returns to scale.

However, it is now clear that the parameter attached to the price vector stands not only for the effect of industry-specific neutral technology change, as discussed by Harrigan (1997), but also increasing returns to scale, a point that was missed by Harrigan (1997).

3. Approximation of the generalised GNP function using a flexible function form

Having laid out the theoretical background, the next step towards testing the hypothesis is to approximate the GNP function using a flexible function form. Since its introduction by Christensen, Jorgenson and Lau in 1973, the translog function has received considerable attention in the empirical literature. It has several advantages over the Cobb–Douglas and CES functions. Following Woodland (1982), Kohli (1978; 1991; 1993) and Harrigan (1997), translog function is used to approximate the GNP function. The translog GNP function takes the form

$$\begin{aligned} \ln G(\boldsymbol{\theta}\mathbf{p}, \mathbf{v}) = & \ln \alpha_{00} + \sum_j \alpha_{0j} \ln \theta_j p_j + \sum_i \beta_{0i} \ln v_i \\ & + 1/2 \sum_j \sum_k \alpha_{jk} \ln \theta_j p_j \ln \theta_k p_k \\ & + 1/2 \sum_i \sum_m \beta_{im} \ln v_i \ln v_m + \sum_j \sum_i \gamma_{ji} \ln \theta_j p_j \ln v_i \end{aligned} \quad (9)$$

where j and k stand for products that are in 3^N while i and m denote factor supplies that are in 3^M , $\boldsymbol{\theta}$ is a variable capturing the effects of both technology level and increasing returns to scale. We can impose symmetry by requiring that $\alpha_{jk} = \alpha_{kj}$ and $\beta_{im} = \beta_{mi}$ for all j, k, i and m . Since the GNP function is linear in \mathbf{v} and \mathbf{p} , we require

$$\sum_j \alpha_{0j} = 1 \quad \sum_i \beta_{0i} = 1 \quad \sum_j \alpha_{jk} = 0 \quad \sum_i \beta_{im} = 0 \quad \text{and} \quad \sum_i \gamma_{ji} = 0$$

Differentiating $\ln G(\theta \mathbf{p}, \mathbf{v})$ with respect to each $\ln p_j$ and imposing homogeneity restrictions $\sum_j \alpha_{jk} = 0$ and $\sum_i \gamma_{ji} = 0$ and adjusting the terms gives the sectoral share in GNP, $S_j = p_j y_j / G$ as a function of technology parameters, prices and factor supplies:

$$S_j = \alpha_{0j} + \sum_{k=2}^N \alpha_{kj} \ln (p_k / p_1) + \sum_{k=2}^N \alpha_{kj} \ln (\theta_k / \theta_1) + \sum_{i=2}^M \gamma_{ij} \ln (v_i / v_1) \quad (10)$$

$$j = 1, 2, \dots, (N-1)$$

In the case of free trade, each economy faces the same prices but they differ in their factor endowments, technology level and scale of economy. This implies $\sum_k \alpha_{kj} \ln (p_k / p_1)$ is a constant and it can be factored into the constant term. Following Harrigan (1997), if one takes into account the fact that many goods are non-traded, only tradable goods prices will be absorbed into the constant term. The problem is that data for non-tradable goods prices are generally not available. One approach is to treat them as random with some estimable probability distribution that may generate a stochastic process with a constant dummy for each economy and a classic disturbance term. These reformulations are defined by α in (11). Therefore, we have the following estimated equation:

$$S_j = \alpha + \sum_{k=1}^N \alpha_{kj} \ln (\theta_k) + \sum_{i=2}^M \gamma_{ij} \ln (v_i / v_1) + \varepsilon_j \quad (11)$$

$$j = 1, 2, \dots, (N-1)$$

The only sign restriction on this equation by theory is that the own-technology effect, α_{jj} , is positive: holding other factors constant, an increase in the technology level should lead to an increase in its sectoral share. The theory also requires that the cross-technology effects are symmetrical, $\alpha_{kj} = \alpha_{jk}$ for all sectors j and k , $k \neq j$.

Since θ is a variable capturing the effects of both technology levels and increasing returns to scale, we assume the following functional form for the relationship between the effect of technology level θ_t , and increasing returns to scale θ_s

$$\theta = \theta_t^\tau \theta_s^{1-\tau} \quad (12)$$

Substituting equation (12) into (11) gives

$$S_j = \alpha + \sum_{k=1}^N \alpha_{kj} \tau \ln (\theta_{kt}) + \sum_{k=1}^N \alpha_{kj} (1-\tau) \ln (\theta_{ks}) + \sum_{i=2}^M \gamma_{ij} \ln (v_i / v_1) + \varepsilon_j \quad (13)$$

$$j = 1, 2, \dots, (N-1)$$

With data on technology level, increasing returns to scale and factor endowments, equation (13) can be estimated by substituting equation (12). However, data on increasing returns to scale across industries and/or economies are generally not available. The best way to approach this problem may be to treat the increasing returns to scale effect as random with some estimable probability distribution as ζ

$$\zeta_i = \rho_i + e_i \quad (14)$$

where e_i is white noise. Rewriting equation (13) using (14) gives the equation to be estimated

$$S_j = \beta + \sum_{k=1}^N \beta_{kj} \ln(\theta_{kt}) + \sum_{i=2}^M \gamma_{ij} \ln(v_i / v_1) + e_i \quad (15)$$

$$j = 1, 2, \dots, (N-1)$$

where constant term β , which equates to $(\alpha + \sum \alpha_{kj} (1 - \tau) \ln(\theta_{ks}))$ with $k = 1$ to N , combines the effects of all goods prices, non-traded goods technology parameters, increasing returns to scale effect and $\beta_{kj} = \alpha_{kj}\tau$.

4. Data and measurement

To estimate the above model, we need data on sectoral output share, technology level and factor endowment. As to sectoral output share, we choose ISIC 33, 34, 35, 36 and 37, as follows. These five industries are generally regarded to be the environmentally sensitive industries. All data are for 1988.

Table 1
Industry classification code for environmentally sensitive industries

ISIC code	Descriptions
1. 33	Manufacture of wood and wood products
2. 34	Manufacture of paper, paper products and printing
3. 35	Manufacture of chemicals and chemical products
4. 36	Manufacture of non-metal mineral products
5. 37	Manufacture of basic metal products

Source: UNIDO.

Sectoral output share

Data on sectoral output value added and sectoral employment are available from UNIDO (United Nations Industrial Development Organisation) industrial statistics database. GDP in current price data are from the World Bank CD-ROM *World Development Indicator 1997*. Sectoral output value added is divided by GDP to obtain the sectoral output share as the dependent variable.

Technology

Technology is a variable that has no uniform definition, especially in the empirical literature. Total factor productivity is sometimes used to measure the Hicks-neutral technology difference across industries (and/or economies). Since data for sectoral factor supplies are not available, sectoral value added per worker is used instead. This can be justified to some extent for the following two reasons: (1) embodied technology changes (especially labour augmenting) can be regarded as a reasonable approximation of the process of technology progress. As shown by Barro and Sala-i-Martin, the long-term

experience of the United States and some developed economies ‘suggests that a useful theory would predict that per capita growth rates approach constants in the long run; that is, the model would possess a steady state’ (Barro and Sala-i-Martin 1995: 34). Therefore technological progress must take the form of Harrod-neutral (labour augmenting) in order for the model to have a steady state. (2) If the production function takes the Cobb–Douglas form, it is possible for technological progress to be both Hicks-neutral and Harrod-neutral. Suppose production, in the case of two factors, Capital K_t and Labour L_t , is

$$Y_t = f(K_t, A(t)L_t) = \beta K_t^\alpha (A(t) L_t)^{1-\alpha} \quad (16)$$

After arranging the items on the right-hand side, this function becomes

$$Y_t = (A(t))^{1-\alpha} \beta K_t^\alpha L_t^{1-\alpha} = \gamma K_t^\alpha L_t^{1-\alpha} \quad (17)$$

This function satisfies the criteria of both Hicks-neutrality and Harrod-neutrality.

The environmental factor

Data on the environmental factor are generally not available. In light of this, an aggregate index number is often chosen. For example, quoting data from Walter and Ugelow (1979), Tobey (1990) chose an index number to approximate an economy’s environmental stringency, which is measured on a scale from one to seven for a set of 23 economies.

The latest attempt to ‘measure the status of environmental policy and performance’ is a World Bank project by S. Dasgupta, A. Mody, D. Wheeler and S. Roy (Dasgupta, Mody et al. 1995). They undertook a comparative assessment using environmental reports presented to the United Nations Conference on Environment and Development by 145 economies in 1992. The reports are reasonably comparable because the United Nations imposed a standard reporting format. From the information in these reports, they develop a set of indicators to ‘measure the status of environmental policy and performance’. Unfortunately, they only randomly selected 31 UNCED reports from the total of 145 (Table 2). Further, sectoral output value-added and factor endowment data are not available for some of the economies. Due to limitations in degrees of freedom, this data set is not explicitly employed in the econometrics study. However, we do construct our environmental stringency variable based on inferences made from their data.

Table 2
Environmental Stringency and GDP Per Capita for Selected Economies

Economy	Environment Index (1)	ICPGDP	PCGNP	Rank by (1)
Germany	951	16920	22320	1
Switzerland	945	21690	32680	2
Netherlands	900	14600	17320	3
Finland	894	15620	26040	4
Ireland	871	9130	9550	5
Bulgaria	737	7900	2250	6
Korea	686	7190	5400	7
Jamaica	633	3030	1500	8
Czech	622	3470	3470	9

Economy	Environment Index (1)	ICPGDP	PCGNP	Rank by (1)
S. Africa	619	5500	2530	10
Tunisia	589	3979	1440	11
Trinidad	563	8510	3610	12
China	530	1950	370	13
India	507	1150	350	14
Pakistan	506	1770	380	15
Brazil	492	4780	2680	16
Jordan	474	4530	1240	17
Ghana	465	1720	390	18
Kenya	464	1120	370	19
Thailand	448	4610	1420	20
Philippines	447	2320	730	21
Paraguay	443	3120	1110	22
Egypt	441	3100	600	23
Malawi	441	670	200	24
Zambia	437	810	420	25
Nigeria	396	1420	290	26
Mozambique	368	620	80	27
Bangladesh	363	1050	210	28
Tanzania	341	540	110	29
Papua NG	329	1500	860	30
Bhutan	256	510	190	31
Ethiopia	253	310	120	32

Note: PCGNP stands for per capita GNP and ICPGDP for per capita GDP estimates compiled by the UN International Comparisons Program. 'Environment Index' denotes the environmental stringency index compiled by S. Dasgupta et al., World Bank.

Source: S. Dasgupta et al. (1995)

Table 2 shows the environmental stringency index compiled by the World Bank project. One interesting feature of this data set is that the relationship between per capita income and environmental stringency is positive and highly significant. As can be seen in Table 3, the Spearman correlation coefficients between the environmental stringency index and ICPGDP, PCGNP are -0.86987 and -0.8553, respectively. Both are statistically significant at the 0.01 per cent level. This suggests that higher income economies tend to have more stringent environmental policies. On the basis of this result, we use per capita GDP as an 'instrumental variable' to the environmental stringency index: the higher an economy's GDP per capita, the more stringent is its environmental policy.

Table 3
Spearman Correlation Test

	Rank	ICPGDP	PCGNP
ICPGDP	0.8678 (0.0001)		
PCGNP	0.8537 (0.0001)	0.9554 (0.0001)	
Environmental stringency	-0.9999 (0.0001)	-0.8699 (0.0001)	-0.8553 (0.0001)

Note: numbers in parentheses are p-values. See also Table 2 for notations of variables.

Source: Author's calculation.

Other factor endowments

Although data on sectoral factor supplies are difficult to get for the economies of interest, national factor endowment data are used to measure the fixed effect of factor abundance. The national factor endowment can be interpreted as the mean of the sectoral factor input. The justification for proceeding in this way can easily be found in the literature of the production possibility frontier where provincial data is used as the mean of firm-level data. Since the econometric estimated model is a system equation, these factor endowment variables examine whether economies with higher endowments of one factor will tend to be associated with a higher sectoral share for one of the sectors. The measures of factor endowments are provided by Song (1996) and include: (1) capital stock at constant prices assuming a 15-year average life of assets, in US\$ m; (2) labour force; (3) labour 1, the number of workers classified as professional or technical; (4) labour 2, the number of literate non-professional workers; (5) labour 3, the number of illiterate workers; (6) land; (7) oil, crude oil production plus production of natural gas, in \$US '000s; (8) coal, production of primary solid fuels (coal, lignite, and brown coal) plus natural gas, in \$US '000s; (9) minerals, composite of 12 kinds of major mineral. Note that the sum of labour 1 to 3 equals the total labour force in each sector of each economy.

Data summary

The coverage in this data set includes 16 of the 18 APEC economies and most OECD economies. Table 4 gives a summary of how the thirty economies differ in what they produce. The second column gives the percentage share of manufacturing value-added in total GDP. The last column gives the percentage share of the five environmentally sensitive industries' value-added in total manufacturing value-added. An interesting feature is that environmentally sensitive industries account for 40 to 50 per cent of the total manufacturing value added for the majority of the economies. Other columns give the percentage share of each industry's value-added in total manufacturing value-added. We can see that economies vary significantly as to the composition of their environmentally sensitive industries' production.

Table 4
Share of Manufacturing in GDP and Shares of Selected Industries
in Total Manufacturing, 1988

	Manufacturing	Wood Prod.	Paper & Printing	Chemicals	Non-Metal	Metal	ESGs
Australia	15.4	5.7	11.2	13.4	4.8	9.8	44.8
Canada	21.5	6.2	15.2	15.7	3.4	7.8	48.2
Chile	18.1	3.5	9.2	17.1	3.2	26.5	59.4
China	35.7	1.3	3.4	19.5	7.0	9.6	40.8
Denmark	20.7	4.7	10.0	15.4	5.2	1.5	36.8
Finland	28.9	7.0	24.3	10.6	4.5	5.2	51.7
France	21.7	3.0	7.4	19.6	4.3	5.6	39.9
Germany	32.1	2.5	4.2	20.9	3.5	5.4	36.6
Greece	25.8	2.3	5.3	16.8	8.0	8.1	40.6
HK, China	20.5	1.0	7.7	9.7	0.7	0.6	19.7
India	17.8	0.5	3.2	24.0	4.4	13.9	46.0
Indonesia	19.7	13.9	4.7	16.4	3.9	8.3	47.2
Italy	23.5	3.0	6.5	14.0	6.1	7.7	37.4
Japan	28.2	2.7	7.9	15.7	4.6	7.1	37.9
Korea	32.1	1.5	4.5	17.5	4.3	7.2	35.1
Malaysia	21.2	6.9	4.2	26.5	6.1	3.4	47.1
Mexico	26.8	0.5	4.4	23.0	7.7	11.8	47.3
Netherlands	18.8	1.8	10.1	25.9	3.7	5.3	46.7
New Zealand	18.2	6.6	14.1	13.9	3.8	3.8	42.2
Norway	14.0	6.1	14.6	11.8	3.6	12.9	48.9
Philippines	25.6	3.9	4.0	22.8	3.8	6.2	40.7
Portugal	27.9	4.3	11.5	15.6	9.0	3.1	43.3
Singapore	29.9	1.4	5.4	20.7	1.2	1.2	30.0
Spain	24.1	4.0	7.1	17.9	6.7	6.4	42.1
Sri Lanka	15.4	1.2	4.1	9.9	6.1	0.9	22.0
Sweden	25.2	6.1	16.3	12.9	2.9	6.1	44.3
Chinese Taipei	37.2	3.0	4.1	24.0	3.8	6.6	41.4
Thailand	25.8	2.8	18.2	17.0	6.3	2.6	46.9
Britain	25.2	3.3	10.7	17.7	5.4	5.0	42.0
United States	20.0	3.0	11.2	17.0	2.9	4.2	38.3

Notes: The column labeled 'Manufacturing' gives the percentage share of manufacturing value-added in total GDP. The column labeled ESGs gives the percentage share of the five environmentally sensitive industries' value-added in total manufacturing value-added. The remaining columns give the percentage share of each industry's value-added in total manufacturing value-added.

Source: Author's calculation on the basis of UNIDO data, International Economic Data Bank, the Australian National University.

The summary statistics for the dependent variables for each industry are given in Table 5. Environmental stringency is calculated as an index on the basis of an economy's level of development measured by GDP per capita in constant 1987 US dollars. For the thirty economies in the study, the index number runs from one (strict) to thirty (tolerant). The smaller the index number, the more stringent the economy's environmental policy.

Table 5
Summary Statistics of the Sectoral Share for Each Industry across 30 Economies

	Wood Prod.	Paper & Printing	Chemicals	Non-Metal	Metal
Mean	0.0074	0.0183	0.0373	0.0094	0.0142
Standard Deviation	0.0040	0.0116	0.0197	0.0045	0.0135
Sample Variance	0.0000	0.0001	0.0004	0.0000	0.0002
Minimum	0.0004	0.0025	0.0110	0.0014	0.0010
Maximum	0.0153	0.0532	0.0879	0.0228	0.0743

Note: Sectoral share refers to share of GDP (not in percentage terms).

Source: Author's calculation

Table 6
Environmental Stringency Rank Measured by GDP per capita

	GDPPC	Rank		GDPPC	Rank		GDPPC	Rank
Norway	21,615	1	Italy	13,949	11	Korea	3,615	21
Japan	20,954	2	Australia	13,197	12	Malaysia	2,025	22
Denmark	20,158	3	Britain	12,663	13	Mexico	1,775	23
Sweden	19,559	4	New Zealand	11,050	14	Chile	1,742	24
United States	18,973	5	Hong Kong	9,461	15	Thailand	1,050	25
Finland	18,653	6	Singapore	8,656	16	Philippines	603	26
France	16,608	7	Spain	7,956	17	Indonesia	468	27
Canada	16,010	8	Taiwan	5,507	18	Sri Lanka	414	28
Netherlands	15,129	9	Greece	4,829	19	India	346	29
Germany	14,699	10	Portugal	4,438	20	China	272	30

Note: GDPPC stands for GDP per capita in 1988 (constant prices, US\$ 1987). The ranking is calculated on the basis of GDPPC.

Source: *World Development Indicators 1997*, World Bank. International Economic Data Bank, the Australian National University.

5. Empirical results

A seemingly unrelated regression estimation (SURE) technique is used to estimate equation (15) as a system. The estimation result and hypothesis tests are reported in Table 7. Standardised coefficients are reported in Table 9. For each equation, the dependent variable is the sectoral share in GDP in each economy. The definitions of the independent variables in this system equation are given in Table 8. Since the sectoral shares for each economy will sum to one rather than one hundred, and the independent variables are all in logarithms, the interpretation of the coefficient carries the form of semi-elasticity. A parameter of 0.0013 indicates that a 10 percent increase in the independent variable will raise the output share by 0.013 percentage points. Constant terms that absorbed the country fixed effect, the scale effect, the all goods prices effect and the non-tradable goods technology effect are included in the regression but not reported in this table.

Table 7
SURE Estimates of the GDP Share Equations

Variable	Wood Products	Paper & Printing	Chemicals	Non-Metal	Metal
TECH1	0.0013 (0.3786)	0.0007 (0.2867)	-0.0017 (-0.6919)	-0.0010 (-0.4752)	0.0019 (1.1916)
TECH2	0.0007 (0.2867)	0.0140 (4.1391)	-0.0041 (-1.2265)	0.0021 (1.1167)	0.0001 (0.0600)
TECH3	-0.0017 (-0.6919)	-0.0041 (-1.2265)	0.0146 (2.6070)	-0.0035 (-1.7179)	-0.0009 (-0.2885)
TECH4	-0.0010 (-0.4752)	0.0021 (1.1167)	-0.0035 (-1.7179)	0.0042 (1.4858)	-0.0039 (-3.2779)
TECH5	0.0019 (1.1916)	0.0001 (0.0600)	-0.0009 (-0.2885)	-0.0039 (-3.2779)	0.0120 (3.1795)
ENVIR	0.0003 (0.5098)	-0.0015 (-1.3582)	0.0023 (1.1105)	0.0002 (0.4058)	0.0008 (0.4644)
LAND	0.0007 (0.7061)	0.0038 (2.1368)	-0.0112 (-3.2160)	-0.0030 (-3.2098)	-0.0025 (-0.9479)
LABOUR	-0.0016 (-0.5823)	0.0045 (1.3165)	0.0052 (0.8368)	0.0003 (0.1159)	0.0060 (1.3184)
MINERAL	0.0000 (0.12826)	-0.0011 (-1.5911)	0.0016 (1.2273)	0.0010 (2.8046)	0.0009 (0.9389)
OIL	-0.0001 (-0.6518)	-0.0005 (-2.9725)	0.0003 (0.8183)	-0.0001 (-0.5993)	0.0000 (-0.1702)
COAL	0.0001 (0.4227)	0.0000 (0.0563)	0.0011 (2.6937)	0.0002 (2.2264)	0.0004 (1.1547)
CAPITAL	0.0005 (0.1067)	-0.0053 (-0.7237)	0.0007 (0.0498)	0.0013 (0.3011)	-0.0055 (-0.5303)
Hypothesis Tests (p-value)					
Homogeneity	0.860	0.130	0.912	0.582	0.217
Significant tests					
A1: Technology	0.0755	0.00002	0.0135	0.0072	0.00005
A2: Factor Endowments	0.6400	0.055	0.0019	0.0017	0.137
A3: Tech. & Factor end.	0.112	0.0000	0.00005	0.00003	0.00006

Notes: SURE estimation results are listed in the columns, with t-statistics in parentheses. For a detailed definition of the variables, see Table 8. The marginal significance levels of the hypothesis tests are reported under the heading Hypothesis Tests. It is computed using the appropriate Wald statistic with a Chi-square distribution. The hypothesis for the homogeneity test is that the sum of the factor endowment terms is zero. It is tested for each industry separately with χ^2 (1). The hypothesis for A1 to A3 is that the indicated coefficients are all zero. The test statistics for A1 to A3 are χ^2 (5), χ^2 (6), χ^2 (11), respectively.

Source: Author's calculation

As shown in Table 7, the own-technology effects are all positive, as suggested by theory, and statistically significant at the 5 per cent level in most cases. The largest positive effects are in chemicals and paper and printing, with slope coefficients of 0.0146 and 0.0140, respectively. This means that a 10 percent technology improvement in the chemicals sector will lead to a 0.146 percentage point increase in its sectoral share of GDP

and a 0.140 percentage point increase in the paper and printing sector. Technology improvement in the metal products sector has a small positive effect, but is statistically significant only at the 13.96 percent level. The wood products sector shows a positive technology effect but it is not statistically significant.

The cross-technology effects are mixed, as suggested by the theory. In most cases, the cross-technology effects are small and statistically insignificant with the exception of the cross-technology effects between the metal and non-metal sectors where the cross-technology effects are negative and statistically significant. This result is similar to Harrigian’s study using the OECD International Sectoral Data Base (ISDB) although he uses total factor productivity as a measure of technology.

Table 8
Definition of the Variables

Acronym	Definition
(1) TECH1 to TECH5:	Log of the technology level for each industry starting from wood products in the first row in Table 6.
(2) ENVIR:	log of the environmental stringency index. Number one stands for the most stringent environmental policy while number 30 stands for the least stringent.
(3) LAND:	log of the land area.
(4) LABOUR:	log of the total labour force.
(5) OIL:	log of the oil factor endowment as defined in the text.
(6) MINERAL:	log of the mineral factor endowment as defined in the text.
(7) COAL:	log of the coal factor endowment as defined in the text.
(8) CAPITAL:	log of the capital stock as defined in the text.

Turning now to the effects of the environmental factor on sectoral shares, the environmental stringency only has a negligible effect and is shown to be not statistically significant in all sectors. This suggests that economies with less stringent environmental policy are not necessarily associated with a higher sectoral share of ESGs. This finding confirms the recent empirical evidence suggested by Xu (1998) using trade pattern data and Levinson (1996) using firm-level data.

Other resource endowment factors do have statistically significant effects on sectoral shares of GDP. The factor endowment effects underlying the new framework are essentially the same as those of Leamer (1984) and Song (1995) using the Heckscher–Ohlin–Vanek framework. Our findings include: A 10 per cent higher endowment of mineral resources is associated with a 0.01 per cent higher non-metals sectoral share of GDP; economies with a relatively large endowment in coal are generally associated with high sectoral shares of chemicals and non-metals; economies with a larger endowment of oil are associated with a lower sectoral share of paper and printing; economies with a large amount of land (including forest land) are associated with a higher share of the paper and printing industries. An economy’s total labour force is not found to be significantly associated with a high share of any one of the ESG sectors. The effects of capital endowment turn out to be insignificant in all cases. This might reflect the fact that capital is more mobile internationally than other natural resource endowment factors.

Table 9
Estimates of GDP Share Equation: Standardised Coefficients

Variable	Wood Prod.	Paper & Printing	Chemicals	Non-Metal	Metal
TECH1	0.3641	0.0651	-0.0927	-0.2496	0.1518
TECH2	0.1768	1.2666	-0.2163	0.4785	0.0106
TECH3	-0.4122	-0.3541	0.7489	-0.7747	-0.0710
TECH4	-0.2767	0.1953	-0.1931	1.0036	-0.3125
TECH5	0.4355	0.0112	-0.0458	-0.8090	0.8415
ENVIR	0.1581	-0.2424	0.2246	0.0983	0.1065
LAND	0.3949	0.7400	-1.2851	-1.4779	-0.4210
LABOUR	-0.4858	0.4750	0.3210	0.0697	0.5424
MINERAL	0.0751	-0.5597	0.4980	1.3391	0.4199
OIL	-0.1491	-0.4247	0.1336	-0.1130	-0.0312
COAL	0.1087	0.0092	0.5052	0.4759	0.2436
CAPITAL	0.0007	-0.0034	0.0005	0.0012	-0.0042

Source: Author's calculation

To understand the size of the effect of environmental stringency compared to the other factors, especially the technology factor, Table 9 shows the standardised coefficients of the SURE. The standardised coefficients are often known as 'beta' coefficients. They adjust the estimated coefficients by the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable. This makes it possible to compare the size of the effects of each independent variable directly. A standardised coefficient of 1.27 indicates that a one standard-deviation increase in the independent variable will lead to an increase in the dependent variable by 1.27 standard deviations. More interestingly, a normalisation of standardized coefficients gives more intuitive indications as in Table 10. This normalisation is carried out using a standardised coefficient of the technology variable in each column as the base. Comparing the size of the effect of environmental stringency with that of technology, we can see that the average effect of environmental stringency on sectoral share is only 0.23 times the effect of the technology factor.

Table 10
SURE Estimates of GDP Share Equation:
A Normalisation of Standardised Coefficients

Variable	Wood Prod.	Paper & Printing	Chemicals	Non-Metal	Metal
TECH1	1.0	0.1	-0.1	-0.2	0.2
TECH2	0.5	1.0	-0.3	0.5	0.0
TECH3	-1.1	-0.3	1.0	-0.8	-0.1
TECH4	-0.8	0.2	-0.3	1.0	-0.4
TECH5	1.2	0.0	-0.1	-0.8	1.0
ENVIR	0.4	-0.2	0.3	0.1	0.1
LAND	1.1	0.6	-1.7	-1.5	-0.5
LABOUR	-1.3	0.4	0.4	0.1	0.6
MINERAL	0.2	-0.4	0.7	1.3	0.5
OIL	-0.4	-0.3	0.2	-0.1	0.0
COAL	0.3	0.0	0.7	0.5	0.3
CAPITAL	0.0	0.0	0.0	0.0	0.0

Note: Normalisation is carried out on the basis of Table 9. See also discussion above.

Source: Author's calculation

The hypothesis tests are shown in Table 7. The Wald statistics are computed for each hypothesis and the marginal significance levels are reported. The homogeneity restrictions are not rejected for all the five cases. The technology factor and factor endowment are jointly significant (A3) at the one percent level except in the case of the wood sector where the significant level is 11.2 percent. The technology factor and factor endowment are then tested separately (A1 and A2) and are all significant at the 5 per cent level except in the case of the wood sector.

6. Conclusion

There are growing concerns about loss of international competitiveness and impediments to economic development due to environmental regulations from developing economies. Concerns on the part of developed economies about eco-dumping from developing economies with lax environmental policies have also become important in debates on trade and environment. This paper tries to investigate, econometrically, the effectiveness, if any, of 'eco-dumping' on the international competitiveness of environmentally sensitive industries.

A generalised GNP function, which incorporates both technology change and increasing returns to scale, is set up and a flexible translog function form is used to approximate this generalised GNP function. A seemingly unrelated regression estimation (SURE) technique is used to estimate a system of sectoral share equations derived from the generalised GNP function. Environmental stringency is treated as a factor of production together with capital, land, labour, mineral, oil and coal endowments. Technology level is regarded as an

important determinant in the sectoral share production. The basic hypothesis is that while the environmental factor is not a significant determinant of the international competitiveness of environmentally sensitive industries, technology is.

The econometric results suggest that the own-technology effects are all positive, as suggested by theory, and statistically significant at the 5 per cent level in most cases. However, the environmental stringency variable has only a negligible effect and is shown to be not statistically significant in all sectors. This suggests that economies with less stringent environmental policies are not necessarily associated with higher sectoral share of ESGs. While trade is not explicitly addressed, the implications for trade are immediately apparent: to the extent that economies have similar tastes, the inferences about the determinants of production pattern found here will translate into inferences about the economy's trade pattern (Harrigan 1997). This finding confirms the recent empirical evidence suggested by Xu (1998) using data on trade patterns and Levinson (1996) using firm-level data.

The policy implications are clear. On the one hand, these findings suggest that development strategies that rely on lax environmental regulations to achieve economic goals for developing economies may not be appropriate since dynamic comparative advantage may be more relevant in the international trade arena. There may be a compromise between environmental standards and international competitiveness. The appropriate development strategy for a developing economy, therefore, is one of economic development that takes environmental standards into account rather than economic development based on lax environmental standards.

On the other hand, the developed world's fear of eco-dumping by developing economies has little credibility in the light of this test. The call for harmonisation of national environmental standards may not be justified, even from an empirical perspective.

References

- Anderson, K. and R. Blackhurst (1992), *The Greening of World Trade Issues*, Ann Arbor: University of Michigan Press.
- Barrett, S. (1994), "Strategic environmental policy and international trade", *Journal of Public Economics* 54(3): pp. 325–38.
- Barro, R.J. and X. Sala-i-Martin (1995), *Economic growth*, McGraw-Hill, Inc, New York.
- Bhagwati, J. and R.E. Hudec (1996), *Fair Trade and Harmonization: Prerequisites for Free Trade?*, Cambridge and London: MIT Press.
- Brander, J.A. and M.S. Taylor (1997), "International trade between consumer and conservationist countries", *Resource and Energy Economics*, 19: p. 267.
- Chichilnisky, G. (1994), "North–South trade and the global environment", *American Economic Review* 84(4): pp. 851–74.
- Dasgupta, S., A. Mody, *et al.* (1995), "Environmental regulation and development: a cross-country empirical analysis", *World Bank Policy Research Working Paper* No. 1448.
- Davies, S.W. and A.J. McGuinness (1982), "Dumping at less than marginal cost", *Journal of International Economics*, 12(1/2): pp. 169–82.
- Dixit, A. and N. Victor (1980), *The Theory of International Trade*, Cambridge: Cambridge University Press.
- Dua, A. and D.C. Esty (1997), *Sustaining the Asia Pacific Miracle: Environmental Protection and Economic Integration*, Washington DC: Institute for International Economics.
- Esty, D.C. (1994), *Greening the GATT: Trade, Environment, and the Future*, Washington: Institute for International Economics.
- Ethier, W.J. (1982), "Dumping", *Journal of Political Economy* 90(3): pp. 487–506.
- Harrigan, J. (1997), "Technology, factor supplies, and international specialization: estimating the neoclassical model", *American Economic Review* 87(4): pp. 475–94.
- Kohli, U. (1991), "Technology, duality, and foreign trade: the GNP function approach to modeling imports and exports", *Studies in International Trade Policy*, Ann Arbor: University of Michigan Press, pp. 382.
- Kohli, U. (1993), "A Symmetric normalized quadratic GNP function and the U.S. demand for imports and supply of exports", *International Economic Review*, 34(1): pp. 243–55.
- Kohli, U.R. (1978), "A Gross National Product function and the derived demand for imports and supply of exports", *Canadian Journal of Economics*, 11(2): pp. 167–82.
- Leamer, E.E. (1984), *Sources of International Comparative Advantage: Theory and Evidence*, Cambridge Mass.: MIT Press.
- Levinson, A. (1996), "Environmental regulations and industry location: international and domestic evidence", *Fair Trade and Harmonization: Prerequisites for Free Trade?*, J. Bhagwati and H. Robert.

- Markusen, J.R. (1997), "Costly pollution abatement, competitiveness, and plant location decisions", *Resource and Energy Economics*, 19: pp. 299–320.
- Oates, W.E., K. Palmer, *et al.* (1993), *Environmental regulation and international competitiveness*, UMD, Resources for the Future
- OECD (1995), *Report on Trade and Environment to the OECD Council at Ministerial Level*, Paris: Organisation for Economic Cooperation and Development
- Porter, M.E. and C. van der Linde (1995), "Toward a new conception of the environment-competitiveness relationship", *Journal of Economic Perspectives* 9(4): pp. 97–118.
- Rauscher, M. (1994), "On ecological dumping", *Oxford Economic Papers* 46(5): pp. 822–40.
- Samuelson, P.A. (1953), "Prices of factors and goods in general equilibrium", *Review of Economic Studies* 21(1): pp. 1–20.
- Song, L. (1996), *Changing Global Comparative Advantage: Evidence from Asia and Pacific*, Addison-Wesley.
- Tobey, J. A. (1990), "The effects of domestic environmental policies on patterns of World trade: an empirical test", *Kyklos* 43(2): pp. 191–209.
- Viner, J. (1923), *Dumping: A Problem in International Trade*, University of Chicago Press, Chicago.
- Walter, I. and Judtth, U. (1979), "Environmental policies in developing countries", *Ambio* 8(2, 3): pp. 102–9.
- Woodland, A.D. (1982), *International Trade and Resource Allocation*, Amsterdam: North-Holland.
- Xu, X. (1998), "Export performance of environmentally sensitive goods: A global perspective", *Pacific Economic Papers*, No. 278 (April 1998): pp. 1–22.

Economy Report: Canada Trade and Environment Policy and Practice

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1. Background on Canada's Trade and Environmental Regime

The government of Canada's perspectives on the issues of trade and environment need to be understood in the context of the economy's strong dependence on trade as an engine of growth and a backbone of economic activity. Roughly one of every three jobs in Canada depends on exports, and exports of goods and services in 1997 were equivalent to more than 40 percent of GDP – the highest ratio of goods and services exports to economic output among the G-7 nations.

Canada thus has a keen interest in ensuring fair and stable rules of trade, and in working with other economies to dismantle existing, and prevent erection of new, tariff and non-tariff barriers that hamper trade and investment flows. In the early stages of the trade-environment debates, Canada saw the issue of environment as one more in a list of potentially harmful non-tariff barriers, and proceeded cautiously in discussions in the WTO, the OECD and elsewhere on the interface of these two policy spheres. This caution was in no small part due to the predominance of natural-resource-based products in Canada's export trade. A Counsellor in Canada's Mission to the WTO recounts:

“For Canada, the initial approach to the issues was largely defensive but not in a negative sense. Given the importance of our natural resource sector, the focus was on concerns over efforts by other countries to determine Canadian domestic environmental policies through trade measures. The dangers of protectionist abuse of environmental policies were clear. The challenges faced by the forest products sector to adapt to changed market requirements, whether these be with respect to harvesting practices, bleaching processes, or recycled content were the clearest examples. Canada had good reason to approach the discussions with some caution.”¹

However, recent years have brought an evolution of the thinking on these issues. The Canadian government recognizes that there are legitimate policy issues linking trade and environment, and not simply in a negative sense. The North American Commission for Environmental Cooperation, of which Canada is a member along with the USA and Mexico, recently wrote in the context of North America:

“The association of environmental and trade questions is simply the logical consequence of an economic union's evolving dynamics. The further the North

¹ Griffith, Andrew. “Market Access and Environmental Protection: A Negotiator's Point of View”, Department of Foreign Affairs and International Trade Reference Document #3, mimeo, October 1997.

American partners move toward economic integration, the more they will have to deal collectively with a host of matters that are the logical consequences of the development of economic integration (e.g., transportation, agriculture, common economic policies, environmental and labour policies, communications, education and scientific research). In other words, once a decision is taken to move beyond an arm's-length trading relationship – typified by the General Agreement on Tariffs and Trade in the early seventies – it becomes necessary to deal with such new “non-trade” issues.”²

The Honourable Lloyd Axworthy, Minister of Foreign Affairs, repeated the same theme in a recent address:

“If there is one characteristic that defines this new landscape, it is integration. We have realized that the issues we once dealt with separately are in fact interlinked. Out of this realization came a set of new concepts: globalization, human security, sustainable development.”³

Canadian policy now recognizes that the trade and environment linkage can be either positive or negative, and the desire is to exploit the synergies where they exist, while avoiding conflicts where possible. It is true that, without clear and appropriate trade rules, environmental regulations can become unfair barriers to trade; and that, in the absence of appropriate environmental regulations, increased trade can be environmentally detrimental. But it is also true that greater openness in trade and investment regimes can bring greater efficiencies of resource use (through increased competition), and new environmentally preferable technologies (through FDI and joint ventures), as well as bringing to bear on domestic industries the demands of green-minded foreign consumers and retailers. In the sense that the Canadian position on trade and environment has come to appreciate these dynamics, the changes in recent years can be characterized as a “maturing” of policy.

A key feature of the Canadian trade and environment-related policy, both at the international level and the national level, is an emphasis on what has been called the principle of openness.⁴ This principle comprises both civil society’s participation in the process of decision-making, and the transparency necessary to make such participation meaningful. According to Minister Axworthy:

“Political action and expressions of political will at the highest level are vitally important. But governments can not – and should not – act alone on sustainable development. If we are to achieve our goals, it will only be with the active involvement of all sectors of society. That is why we have made inclusion of stakeholders a key feature of the Canadian approach.”⁵

² “Dispute Avoidance: Weighing the Values of Trade and the Environment under NAFTA and the NAAEC. The NACEC’s Environment and Trade Series, No. 3. Ottawa: Prospect Inc., 1996, p. 15.

³ Address by the Honourable Lloyd Axworthy, Minister of Foreign Affairs, on sustainable development in Canadian Foreign Policy. Vancouver, British Columbia April 17, 1997.

⁴ For a full exploration of this principle, see International Institute for Sustainable Development, *Principles for Trade and Sustainable Development*, Winnipeg: IISD, 1994.

⁵ The Honourable Lloyd Axworthy. See *supra* at 3.

This paper describes a number of Canadian instruments for openness in trade and environment-related policy making at the national and international level (see section D below). As well, Canada has been one of the strongest proponents of this principle in discussions in Geneva at the World Trade Organization (WTO).

2. Canada's Regulatory Framework

Trade and Environment-Related Laws and Regulations

Tables 1 and 2 (see pp.51-59) provide a list and summary of Canada's laws, regulations and administrative regulations pertaining to trade-related environmental measures and environment-related trade measures at the national level. Two qualifications should be made regarding this list.

First, the list does not include measures enacted at the sub-national (provincial) level. The level of research necessary to compile such a listing is beyond the scope of this paper. Second, the list does not include taxes, subsidies and other non-regulatory measures that are in force for addressing trade and environment-related concerns, though a number of these exist.

For the reader's sake, it should also be explained how the measures were separated into trade-related environment measures and environment-related trade measures. Any measure which directly banned or restricted the import or export of a good or service was considered a trade measure. Any measures which indirectly affected trade by mandating certain environmental practices (for example, a restriction on the use and sale of certain grades of gasoline) was considered an environmental measure. There are cases where the distinction blurs; a ban on the export of hazardous waste is clearly both an environmental measure and a trade measure. But the distinction is not, in any case, such an important one.

International Agreements and Conventions

Table 3 contains the trade and environment-related international agreements and conventions to which Canada is a party. Following the table is a brief description of each of them, and some explanation of those elements that relate to trade and environment.

TABLE 3
Survey of Bilateral and Multilateral Agreements on Trade and Environment-Related Matters Signed by Canada

Multilateral Agreement	Signature	Ratification/ Accession
CITES	10/04/75	09/07/75
Vienna Convention	22/03/85	04/06/86
Montreal Protocol	04/06/86	05/07/90
London Amendment		16/03/94

Multilateral Agreement	Signature	Ratification/ Accession
Copenhagen Amendment		27/03/98
Convention on Biological Diversity	11/06/92	04/12/92
UN Framework Convention on Climate Change	12/06/92	04/12/92
Kyoto Protocol	29/04/98	Not yet ratified
Rio Declaration	06/92	n/a
Basel Convention	22/03/89	28/08/92
North American Free Trade Agreement	17/12/92	01/01/94
North American Agreement on Environmental Cooperation	13/09/93	01/01/94
WTO Final Act	15/04/94	01/01/95
Prior Informed Consent	*	*
POPs Protocol to the Convention on Long-Range Transboundary Air Pollution	**	**
Bilateral Agreement	Signature	Ratification/ Accession
Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste	28/10/86	1986
Canada-Chile Free Trade Agreement	06/02/97	05/07/97
Canada-Chile Agreement on Environmental Cooperation	06/02/97	05/07/97

Notes:

- * Open for accession September, 1998, at which time Canada is expected to accede.
- ** Open for accession December, 1998, at which time Canada is expected to accede.

Basel Convention: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) was adopted in 1989 and entered into force on 5 May 1992. It strictly regulates the transboundary movements of hazardous wastes (wastes which are hazardous to people or the environment because they are toxic, poisonous, explosive, corrosive, flammable, eco-toxic, or infectious), and provides obligations to its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner. The third Conference of the Parties in 1995 agreed to ban trade in hazardous wastes from OECD to non-OECD member states.

CBD: The Convention on Biological Diversity commits signatories to certain measures for the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. As such, some of its components cover issues of technology transfer and trade-related intellectual property rights.

CCAEC: The Canada-Chile Agreement on Environmental Cooperation is a side agreement to the CCFTA, signed by Canada and Chile. The agreement is identical in many respects to the NAAEC.

CCFTA: The Canada-Chile Free Trade Agreement is a trade agreement between the two signatories designed to lower tariff and non-tariff barriers and promote increased trade and investment flows. Like the NAFTA, it contains a warning (but not an obligation) not to lower environmental standards in order to attract investment. It incorporates the general environmental exceptions from the GATT, with some strengthening language. And it contains an explicit deference to three existing MEAs: CITES, the Montreal Protocol and the Basel Convention.

CITES: The Convention on International Trade in Endangered Species of Wild Fauna and Flora entered into force on 1 July 1975 and now has a membership of 143 countries. These countries act by banning commercial international trade in an agreed list of endangered species and by regulating and monitoring trade in others that might become endangered.

CUATMHW: The Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste sets out specific conditions for the export and import of hazardous wastes between the two countries including prior notification provisions.

Kyoto Protocol: The Kyoto Protocol to the UNFCCC obliges developed and transition country signatories to achieve an overall reduction in greenhouse gas emissions to below 1990 levels by 2008-2012, with different countries meeting various specific targets. Options for flexibility under the Protocol include credits for carbon sinks, a Clean Development Mechanism for joint implementation, and emissions trading between developed countries. While the Protocol does not specifically provide for the use of trade measures, it is likely that some states will use some form of them to help achieve their targets.

Montreal Protocol (and amendments): A protocol to the Vienna Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer was agreed to by Governments in 1987 and has been amended (broadened and accelerated) three times so far, in London in 1990, in Copenhagen in 1992 and recently, in Montreal in 1997. The Protocol sets specific targets to reduce and eventually eliminate the emissions of man-made ozone depleting substances. Trade in such substances and products incorporating them is prohibited with non-parties, and transfer of technology for producing and using the substances to non-parties is to be discouraged.

NAAEC: The North American Agreement on Environmental Cooperation is a side agreement to the NAFTA, signed by Canada, the US and Mexico. The side agreement aims to create collaboration among the three countries on continent-wide environmental improvement through harmonization of efforts, research and procedures, coordination of public input, public education, and by helping to achieve the environmental objectives of the NAFTA. The NAAEC establishes a Secretariat, one of the duties of which is to hear complaints about lack of enforcement of environmental standards.

NAFTA: The North American Free Trade Agreement is a trade agreement among Canada, the US and Mexico, designed to lower tariff and non-tariff barriers and promote increased trade and investment flows. The Parties undertake (non-binding commitment) to not lower environmental standards to attract investment. The Agreement incorporates the general environmental exceptions from the GATT, with some strengthening language. And it

contains an explicit deference to three existing MEAs – CITES, the Montreal Protocol and the Basel Convention – and two bilateral agreements.

PIC: The International Legally Binding Instrument for the Application of the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade: Through this treaty governments honoured their commitment made at the 1992 Rio Earth Summit to negotiate a convention to curb the trade in certain hazardous chemicals and pesticides. PIC replaces two previous voluntary agreements: UNEP's London Guidelines for the Exchange of Information on Chemicals in International Trade, and FAO's International Code of Conduct on the Distribution and Use of Pesticides. It aims to enable importing countries to decide what chemicals they want to receive and to keep out those they cannot manage safely.

Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants (POPs): This is a recently-completed (June 1998) Protocol to the Convention on Long-Range Transboundary Air Pollution, adopted in November 1979. Its objective is to control, reduce or eliminate discharges, emissions and losses of persistent organic pollutants. In restricting the use of the dozen chemicals covered, it is likely that parties will legislate trade restrictions.

Rio Declaration: The Rio Declaration on Environment and Development was signed as part of the results of the United Nations Conference on Environment and Development of 1992. It contains a set of principles to which states agree to comply, but has no binding mechanisms or specific commitments. A number of the principles are trade and environment-related, including a prohibition on unilateral environment-related trade measures, and an assertion that states have the right to set their own appropriate levels of environmental standards. It also calls for observance of the precautionary principle, and re-asserts the sovereign rights of states in environmental matters, where these do not have transboundary effects.

UNFCC: The United Nations Framework Convention on Climate Change provides a framework within which to work toward solving the problems of climate change. Among other things, it commits signatories to providing information about domestic emissions and sinks, and increasing scientific understanding of the problems of climate change. As well, developed countries pledged (without making specific commitments) to reduce greenhouse gas emissions to 1990 levels by 2000, and to assist developing countries through the transfer of technology and financial aid.

Vienna Convention: The Vienna Convention on the Protection of the Ozone Layer entered into force in 1985. Through this Convention, governments committed themselves to protect the ozone layer and to co-operate with each other in scientific research to improve understanding of the atmospheric processes.

WTO Final Act: The Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations was the latest of an ongoing set of rounds of negotiations. It strengthened the existing trade rules, particularly in the area of dispute settlement and subsidies, and broadened the scope of coverage to include, for example, intellectual property rights, investment and services. The rules contain certain environment-related

general exceptions, and the Final Act creates a Committee on Trade and Environment with a mandate to recommend changes to the trade rules to make them consistent with the objectives of sustainable development.

3. Transparency

All of the Government of Canada's trade and environment-related regulations and laws are published in the Canada Gazette, the official news bulletin of the Government of Canada. It consists of three parts:

Part I: Published every Saturday, this contains all formal public notices, official appointments, miscellaneous notices and proposed regulations from the government and private sectors that are required to be published by a federal statute or a regulation. Calls for comment on proposed regulations or amendments can be found here.

Part II: Published every second Wednesday, this contains regulations as defined in the Statutory Instruments Act, and certain other classes of statutory instruments.

Part III: Published as soon as is reasonably practicable after Royal Assent, this contains the most recent Public Acts of Parliament and their enactment proclamations.

As well, a number of the international agreements listed in Table 3 have its own reporting and notification requirements. The WTO, for example, through the Technical Barriers to Trade (TBT) Agreement, has the following requirements for transparency of regulations which may affect Members' trading partners:

“2.9 Whenever a relevant international standard does not exist or the technical content of a proposed technical regulation is not in accordance with the technical content of relevant international standards, and if the technical regulation may have a significant effect on trade of other Members, Members shall:

2.9.1 publish a notice in a publication at an early appropriate stage, in such a manner as to enable interested parties in other Members to become acquainted with it, that they propose to introduce a particular technical regulation;

2.9.2 notify other Members through the WTO Secretariat of the products to be covered by the proposed technical regulation, together with a brief indication of its objective and rationale; such notifications shall take place at an early appropriate stage, when amendments can still be introduced and comments taken into account;

2.9.3 upon request, provide to other Members, particulars or copies of the proposed technical regulation and, whenever possible, identify the parts which in substance deviate from relevant international standards;

2.9.4 without discrimination, allow reasonable time for other Members to make comments in writing, discuss these comments upon request, and take these written comments and the results of these discussions into account.”

4. Impact of Environment and Trade Measures on Trade and Investment Liberalization

Canada maintains a number of import and export prohibitions or restriction measures for the purpose of environmental protection. They are listed and summarized in Table 1. A number of these are measures taken in accordance with Canada's obligations under various bilateral and multilateral agreements, listed in Table 3.

Canada has undertaken a broad range of initiatives in various fora aimed at reconciling the interaction of trade and environmental protection. Some of the best known are listed and summarized below.

Canada provided key funding for two groundbreaking symposia in the WTO. Convened 20-21 May 1997 and 16-17 March 1998, the Symposia brought together NGOs and WTO delegates for the first time to engage in meaningful dialogue on the issues of trade and sustainable development. The funding included resources for a reporting service to cover and the events and broadcast the results in print and via the Internet.

At the national level, Canada's foreign policy is informed by a multi-stakeholder group known as the International Trade Advisory Committee. This mechanism for civil society input has established a Working Group on Trade and Environment, which makes recommendations on Canada's position respecting the issues domestically and at the international level.

Another instrument of openness is the National Round Table on the Environment and the Economy (NRTEE). This is an independent agency of the federal government that reports directly to the Prime Minister's office. Its members are drawn from business, labour, academia, environmental organizations and aboriginal communities, provide policy advice based on commissioned research. While it is not currently working on trade issues, it has been active on them in the past, particularly during the NAFTA negotiations. The NRTEE is a model for multi-stakeholder input to decision-making processes.

Canada has been pushing in international fora for recognition of the need for an integrated perspective on trade and environment issues. For example, in the ongoing negotiations on the Biosafety Protocol to the Convention on Biological Diversity, Canada has consistently raised the issues of implications for the WTO SPS Agreement. Similarly, it has raised the issue of the Biosafety protocol in the Committee on SPS in the WTO.

Also in the WTO, Canada notified its ecolabelling system to the Committee on Technical Barriers to Trade. Although many other countries interpret the obligations of the TBT Agreement such that such notification is unnecessary, Canada did so of its own volition, giving potentially affected exporters the more opportunity to comment on the proposed system.

In concluding the North American Agreement on Environmental Cooperation (NAAEC) Canada, along with the USA and Mexico, broke new ground in recognizing the need for institutional arrangements to reconcile the interaction of environment and trade. It establishes the North American Commission on Environmental Cooperation (CEC), "the

only regional environmental organization that has its roots in expanded economic integration brought about by a trade liberalization agreement.”⁶

Among other institutional arrangements, the CEC collaborates with the NAFTA’s Free Trade Commission to achieve the NAFTA’s environmental objectives. Elements of its mandate in that regard include:

- “(a) acting as a point of inquiry and receipt for comments from NGOs and persons concerning those goals and objectives;
- ...
- (c) contributing to the prevention or resolution of environment-related trade disputes by:
 - (i) seeking to avoid disputes between the Parties,
 - (ii) making recommendations to the Free Trade Commission with respect to the avoidance of such disputes, and
 - (iii) identifying experts able to provide information or technical advice to NAFTA committees, working groups and other NAFTA bodies;
- (d) considering on an ongoing basis the environmental effects of the NAFTA; and
- (e) otherwise assisting the Free Trade Commission in environment-related matters.”⁷

Among other efforts meant to fulfil (d) above, the CEC has been working on a framework for assessing the environmental effects of a trade agreement such as the NAFTA. This is groundbreaking work on a methodologically extremely difficult task.

A unique form of collaboration between the CEC and the FTC will be established in the coming year in the form of an Environment and Trade Officials Working Group, consisting of environment and trade experts from the three parties. This will be a formal linkage between what can roughly be characterized as North America’s trade secretariat and its environment secretariat. The potential for positive interaction is great.

The NAAEC also establishes a Joint Public Advisory Committee (JPAC), made up of appointed members from the three Parties, to provide advice to the CEC on any matter within the scope of the Agreement, and on its implementation and further elaboration. The JPAC may also provide technical, scientific or other information to the Secretariat, including for the purposes of resolving disputes.

5. Environmental Cost Internalization/Effect on Competitiveness

It is difficult to describe Canada’s “approach to implementing environmental cost internalization”, let alone its practice and effect. In fact, all of the measures taken by Environment Canada in its various programs could arguably be characterized as cost internalization measures (with the exception perhaps of outright bans, habitat conservation decrees and strict command and control measures).

⁶ CEC’s Environment, Economy and Trade Program 1998 work plan.

⁷ NAFTA, Article 10 (6).

Such approaches run the gamut from regulations that specify types of equipment to be used, to innovative new negotiated agreements, or “covenants”, between the regulators and specific industries or industry groups. In the regulators’ toolkit can be found any number of specific instruments to be used in different contexts, including:

- Specific regulations (command and control)
 - Product bans, restrictions
 - Specified technologies, process methods
 - Mandated emission/effluent levels
- Taxes, charges, levies or fees
 - Emissions or effluent charges
 - Charges on environmentally damaging products
 - User charges for environmental/resource-based services such as water
- Subsidies, grants and tax allowances for environmentally beneficial activities
- Deposit and take-back schemes
- Tradable permits (not used in Canada)
- Voluntary agreements
- Ecolabelling programs

In many cases, a specific environmental problem (most of which can be thought of as problems of uninternalized environmental costs/benefits) will be approached by using a mixture of different types of instruments, depending on the context. Among the factors used to choose the appropriate instrument or mix of instruments are:⁸

1. **Effectiveness** – how well does it protect the environment?
2. **Motivation** – does it provide business with incentives to innovate?
3. **Administrative cost** – how costly is it to implement, monitor and enforce?
4. **Efficiency** – how costly is it to the firms involved, per unit of improvement?
5. **Political acceptability** – will it have broad public support?

In any given context the answers to the above questions are likely to be different. The diversity of resulting approaches makes it almost impossible to characterize “the approach” taken by the Canadian economy to environmental cost internalization.

As a general trend, there has over the past two decades been a movement away from prescriptive instruments toward more flexible market-based incentives. But a detailed description of this dynamic and its effects on competitiveness is a major research project in its own right, and is beyond the scope of this paper.

⁸ This list is based on the discussion in Jacobs, Michael. *The Green Economy: Environment, Sustainable Development and the Politics of the Future*, Vancouver: UBC Press, 1993, pp. 149 – 162.

TABLE 1
Environment-Related Trade Measures

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Chlorobiphenyls Regulations (SOR/91-152 & CEPA)	Prohibition on import other than for specified uses. This includes a prohibition on their import as a constituent of products, other than specified electrical equipment.	Federal	02/1991	Environment Canada	Full – TBT	No
Chlorofluorocarbon Regulations, 1989 (SOR/90-127 & CEPA)	Prohibition on import of chlorofluorocarbon for use as a propellant in hair sprays, deodorants and antiperspirants.	Federal	02/1990	Environment Canada	Full – TBT	No
Contaminated Fuel Regulations (SOR/91-486 & CEPA)	Prohibition on import and export of contaminated fuel as defined by the Regulations. Exceptions for import if intent is to legally destroy, dispose of, or recycle. In such cases, certain records must be maintained. Exceptions for export if importing country grants ascent.	Federal	08/1991	Environment Canada	Full – TBT	No
Diesel Fuel Regulations (SOR/97-110 & CEPA)	Importers of diesel fuel are required to report quarterly, and keep 5 years' records of: volume of fuel imported and the concentration of sulphur by weight in said fuel.	Federal	02/1997	Environment Canada	Full – TBT	No
Export and Import of Hazardous Wastes Regulations (SOR/92-637 & CEPA)	A hazardous waste may be exported for purposes of disposal only if it complies with the provisions of Section 6 of the Regulations. The conditions include: <ol style="list-style-type: none"> 1) the countries of import or transit must not have notified Environment Canada that the importation of that hazardous waste into that country is prohibited; 2) the country of import must be a party to the Basel Convention or the Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste; 3) the importing and exporting entities must have a written contract with certain specified characteristics and undertakings; 4) the goods to be exported must be properly packaged and labelled; 5) the country of disposal is not south of 60° south latitude. 	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Export and Import of Hazardous Wastes Regulations (SOR/92-637 & CEPA)	<p>A hazardous waste may be imported for purposes of recycling only if it complies with the provisions of Section 12 of the Regulations, including:</p> <ol style="list-style-type: none"> 1) the province of import must notify Environment Canada that the importation of that hazardous waste into that province is allowed under its laws, and consent of the competent authority in any country of transit has been successfully solicited; 2) the country of export must be a party to the Basel Convention, the 1992 OECD decision concerning control of transfrontier movements of wastes destined for recovery operations or the Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste; 3) the importing and exporting entities must have a written contract with certain specified characteristics and undertakings; 4) the goods to be exported must be properly packaged and labelled. <p>If Canada is a transit country, packaging and labelling requirements must be met, and the countries of export, import, & subsequent transit must have notified Environment Canada of their consent to the shipment.</p>	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention
Export and Import of Hazardous Wastes Regulations (SOR/92-637 & CEPA)	<p>Importers or exporters of hazardous wastes must give notice within 1 year of their intent to do so. Importers must notify Environment Canada; exporters must notify the official point of notification in the country of export.</p>	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Export and Import of Hazardous Wastes Regulations(SOR/92-637 & CEPA)	<p>A hazardous waste may be imported for purposes of disposal only if it complies with the provisions of Section 7 of the Regulations, including:</p> <ol style="list-style-type: none"> 1) the province of import must notify Environment Canada that the importation of that hazardous waste into that province is allowed under its laws, and consent of the competent authority in any country of transit has been successfully solicited; 2) the country of export must be a party to the Basel Convention or the Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste; 3) the importing and exporting entities must have a written contract with certain specified characteristics and undertakings; 4) the goods to be exported must be properly packaged and labelled. <p>If Canada is a transit country, packaging and labelling requirements must be met, and the countries of export, import & subsequent transit must have notified Environment Canada of their consent to the shipment.</p>	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention
Export and Import of Hazardous Wastes Regulations(SOR/92-637 & CEPA)	<p>A hazardous waste may be exported for purposes of recycling only if it complies with the provisions of Section 11 of the Regulations, including:</p> <ol style="list-style-type: none"> 1) the countries of import or transit must not have notified Environment Canada that the importation of that hazardous waste into that country is prohibited; 2) the country of import must be a party to the Basel Convention, the 1992 OECD decision concerning the control of transfrontier movements of wastes destined for recovery operations or the Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste; 3) the importing and exporting entities must have a written contract with certain specified characteristics and undertakings; 4) the goods to be exported must be properly packaged and labelled; 5) the country of disposal is not south of 60° south latitude. 	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Export and Import of Hazardous Wastes Regulations (SOR/92-637 & CEPA)	All importers, exporters and carriers of hazardous waste must have adequate insurance as specified in the regulations. Exporters must arrange to take back exports of hazardous waste that cannot be delivered to, or will not be accepted by, the destination facility.	Federal	11/1992	Environment Canada	Full – TBT	Full – Basel Convention
Export of Logs Permit (C.R.C., c. 612 & Export and Import Permits Act)	Permits are needed to export logs of all kinds of wood. Permits will only be granted for peeled logs of less than 11 inches top diameter.	Federal	05/1989		Full – TBT	No
Fish Health Protection Regulations (C.R.C., c. 812 & Fisheries Act)	Permit required for the importation of wild fish, live cultured fish or eggs of wild fish. The regulations presently apply only to salmonid species. To obtain such a permit, the importer must be granted a certificate, based on an inspection, which lists any diseases or disease agents found. The permit is granted if none of these is thought to be harmful to the conservation and protection of fish in the province of importation.	Federal/ Provincial	08/1997	Fisheries and Oceans/Provincial Fish Health Officers	Full – SPS	No
Fresh Fruit and Vegetable Regulations (C.R.C., c. 285 & Canada Agricultural Products Act)	No person may import fresh fruits and vegetables as food if they are “contaminated”, meaning: containing a chemical, drug, food additive, heavy metal, industrial pollutant, ingredient, medicine, microbe, pesticide, poison, toxin or any other substance not permitted by, or in an amount in excess of limits prescribed under the Canadian Environmental Protection Act, the Food and Drugs Act or the Pest Control Products Act	Federal	08/1997	Canadian Food Inspection Agency	Full – SPS	No
Gasoline Regulations (SOR/90-247 & CEPA)	The maximum concentration of lead in imported gasoline is 5 mg/L, other than for prescribed speciality uses. The maximum concentration of phosphorus in unleaded imported gasoline is 1.3 mg/L. Importers of leaded gasoline must submit quarterly information sheets to the Minister, and maintain records for two years, regarding the quantities and composition of the gasoline in question.	Federal	04/1990	Environment Canada	Full – TBT	No

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
New Substances Notification Regulations (SOR/94-260 & CEPA)	<p>Importers of new substances not covered by other statutes, including organisms and polymers, and where the imports exceed a certain amount, must provide specified information including extensive test data. Those found on the NDSL (the Non-domestic Substances List compiled by Environment Canada) have less onerous reporting requirements, as do product development substances. Certain products of biotechnology have more onerous reporting requirements.</p> <p>Importers of micro-organisms to be introduced to non-indigenous ecozones must also provide data from tests conducted to determine the effects of the micro-organism on plant, invertebrate and vertebrate species likely to be exposed.</p> <p>There is a specified assessment period in which the Minister will consider the information provided.</p>	Federal	03/1997	Environment Canada	Full – TBT	No
PCB Waste Export Regulations, 1996 (SOR/97-109 & CEPA)	<p>The export of PCB waste, as defined in the Regulations, is banned for any other purpose than disposal. Export to the U.S.A. is permitted under conditions which include:</p> <ol style="list-style-type: none"> 1) the U.S.A. authorities must not have notified Environment Canada that the importation of that hazardous waste into that country is prohibited; 2) the Canada-U.S.A. Agreement on the Transboundary Movement of Hazardous Waste must be in effect; 3) the importing and exporting entities must have a written contract with certain specified characteristics and undertakings; 4) the exporter must receive licence, permit or other written authorization for the export from the U.S.A. authorities; 5) exporters must arrange to take back exports that cannot be delivered to, or will not be accepted by, the destination facility; 6) within 12 months before the intended export, the exporter must submit to Environment Canada a PCB Waste Notice, as described in Regs. 	Federal	02/1997	Environment Canada	Full – TBT	No

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Ozone-depleting Substances Products Regulations (SOR/95-584 & CEPA)	<p>Prohibits the import of 10 kg of any chlorofluorocarbon in a pressurized container. Exceptions apply for specialty uses, and for essential uses established under the Montreal Protocol. Also exempted are chlorofluorocarbons in certain azeotropic mixtures, used as refrigerants. Prohibits the import of any container or packaging material for food or beverages that is made of plastic foam in which any chlorofluorocarbon has been used as a foaming agent.</p> <p>Prohibits the import from non-parties to the Protocol of certain products, where they contain any chlorofluorocarbons or bromofluorocarbons.</p>	Federal	12/1995	Environment Canada	Full – TBT	Full – Montreal Protocol
Ozone-depleting Substances Regulations (SOR/95-576 & CEPA)	<p>Prohibits export to or import from non-parties to the Montreal Protocol of certain controlled ozone-depleting substances. Certain exceptions apply, as for essential uses as established under the Protocol. As well, transferable consumption allowances are established for those current users of controlled substances. Prohibitions for each substance are applicable only over specified timetables.</p> <p>Imports or exports of recovered, recycled, reclaimed or already used controlled substances are allowed by the granting of a permit, where the proposed import or export does not contravene the terms of the Montreal Protocol, or other laws of Canada.</p> <p>Any importer or exporter of controlled substances must annually report to Environment Canada. Those using consumption allowances must also report quarterly.</p>	Federal	12/1995	Environment Canada	Full – TBT	Full – Montreal Protocol

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Pest Control Products Regulations (C.R.C., c. 1253 & Pest Control Products Act)	<p>Certain types of control products (including 2, 4-D; organisms; and those control products not registered as of January 1, 1984) must apply for registration with Environment Canada before being imported. The Minister may refuse to register those control products that may lead to an unacceptable risk of harm to public health, plants, animals or the environment.</p> <p>The packaging and labelling of registered imported control products must conform to the conditions set out in the Regulations.</p> <p>Certain chemical combinations are prohibited in control products, as elaborated in Section 47.</p>	Federal	12/1997	Agriculture Canada	Full – SPS	No
Plant Protection Regulations (SOR/95-218 & Plant Protection Act)	<p>The import of any thing that is a pest, that is or could be infested with a pest or that constitutes or could constitute a biological obstacle to the control of a pest, is banned unless the importer has obtained a valid permit number and, as applicable, a foreign Phytosanitary Certificate or foreign Phytosanitary Certificate for Re-export. The pest risk assessment takes into account, inter alia, whether the import has a significant adverse effect on the environment, and has the objective of minimizing the degradation of environmental quality with respect to Canadian flora.</p>	Federal	04/1995	Agriculture Canada	Full – SPS	No
Prohibition of Certain Toxic Substances Regulations (SOR/96-237 & CEPA)	<p>Imports of prohibited toxic substances are banned. Schedule I of the CEPA, periodically amended, constitutes the List of Toxic Substances which are prohibited.</p>	Federal	04/1996	Environment Canada	Full – TBT	No
Toxic Substances Export Notification Regulations (SOR/92-634 & CEPA)	<p>These regulations cover exports of substances on the List of Toxic Substances Requiring Export Notification (periodically amended) in Part II of Schedule II of the CEPA. Before export, exporters must notify Environment Canada as required in UNEP's London Guidelines for the Exchange of Information on Chemicals in International Trade.</p>	Federal	11/1992	Environment Canada	Full – TBT	Full – London Guidelines

Short Title, Associated Statute	Description	Enacted by	Date last Enacted/ amended	Implementing Dep't	Align with WTO	Align with MEAs
Transport Packaging of Radioactive Materials Regulations (SOR/83-740 & Atomic Energy Control Act)	All fissile material, or devices or packaging of a certain level of radioactivity, that is imported or exported must be packaged and labelled as specified in the Regulations. The importer or exporter must obtain a certificate from the Atomic Energy Control Board before transporting such material, devices or packaging.	Federal	03/1992	Atomic Energy Control Board	Full – TBT	No
Wild Animal and Plant Trade Regulations (SOR/96-263 & Wild Animal & Plant Protection and Regulation of International & Interprovincial Trade Act)	Species of plant or animal, or derivatives thereof, listed under Appendices I - III of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) require either an import permit, or a permit or certificate that satisfies the requirements of the Convention and is granted by a competent authority in the exporting country.	Federal	05/1996	Canadian Wildlife Service, Environment Canada	Full – TBT	Full – CITES

TABLE 2: Trade-Related Environmental Measures

Short Title, Associated Statute	Description	Enacted by	Date Enacted/ last amended	Implementing Dep't	Align with WTO	Align with MEAs
Benzene in Gasoline Regulations: SOR/97-493 & CEPA	Sale of gasoline with benzene concentrations exceeding 1.5% by volume is prohibited. Effective July 1, 1999, this figure is 1.0%. Importers must keep certain records of all batches imported.	Federal	11/1997	Environment Canada	Full – TBT	No
Energy Efficiency Regulations: SOR/94-651 & Energy Efficiency Act	All energy-using products as defined in the regulations (mostly household appliances) are assigned a minimum standard for energy efficiency. All such products when imported must bear a label which describes their efficiency of energy use, as specified in Schedule II of the Regulations.	Federal	10/1994	Energy, Mines and Resources Canada	Full – TBT	No
Environmental Choice Program	An ecolabelling program which grants the right to use its EcoLogo™ to products and services which comply with its criteria. Criteria are based on environmental impact, such as improved energy efficiency, reduced hazardous by-products, use of recycled materials or reusability of the product itself	Federal/ Private	1988	TerraChoice Environmental Services Inc.; Environment Canada	Full – TBT, Code of Good Practice	No
Fishery (General) Regulations (SOR/93-53) (Fisheries Act)	A license is needed for the transfer of live fish into a fish rearing facility, or the release of live fish into a fish habitat. The license, which carries no fee, is issued if, inter alia, the release or transfer of the fish will not have an adverse effect on the stock size of fish or the genetic characteristics of Canadian fish or fish stocks.	Federal	02/1993	Fisheries and Oceans	Full – SPS	Full – Bio-diversity Convention
Fuels Information Regulations, No. 1 (C.R.C., c. 407) (CEPA)	Importers of certain types of fuels (primarily vehicle fuels) are required to keep quarterly records and submit them annually to Environment Canada. Records specify the volumes imported, and their sulphur content.	Federal	02/1980	Environment Canada	Full – TBT	No
Motor Vehicle Safety Regulations (C.R.C., c. 1038) (Motor Vehicle Safety Act)	Imports of light-duty vehicles, light-duty trucks, heavy-duty vehicles, heavy-duty engines and motorcycles must conform to the emissions standards set for the vehicle's model year. This part of the Regulations (Schedule V) in effect harmonizes Canada's standards and test procedures for those vehicles with those of the United States Environmental Protection Agency.	Federal	12/1997	Transport Canada	Full – TBT	No

Environmental Protection and Foreign Trade in China

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1. Background

China's social and economic development has witnessed great achievements since the policy of reform and opening-up was adopted in 1979. During the period of the Eighth Five-year Plan, China's GDP increased at the average rate of 12 percent per year, to reach 5,760 billion yuan (US\$ 694 billion) in 1995, fulfilling five years ahead of time the original target of quadrupling 1980 GDP by the year 2000. In 1997, China's GDP reached 7,477 billion yuan (approximately US\$ 900 billion), 8.8 percent higher than that of the previous year.

Over this period, and particularly since 1992, an economic structure based on opening up has become well established; China's foreign trade has developed rapidly, the scale of utilization of foreign investment has expanded substantially, and the overall situation is now one of openness from coastal regions to the interior and from the common processing sectors to the industrial infrastructure and capital construction.

In 1997, total imports and exports reached US\$ 325 billion in 1997, tenth highest in the world. As well, since 1993, China has become the second largest recipient of FDI next to the United States.¹ The inflow of foreign capital has helped to make up for the insufficiency of construction capital and served to introduce advanced technologies and management experience.

With regard to environmental protection, a broadly complete set of environmental laws and management systems suitable for the Chinese situation has been established. In the early 1980s, China adopted environmental protection as a basic state policy and pursued a strategy of integrating economic, social and environmental goals. Significant achievements have been made in the field of environmental protection as a result of strengthened environmental management and, over the past 20 years, China's environmental quality has been relatively stable even while the national economy was developing rapidly.

2. The Legal Framework of Environmental Protection and Foreign Trade

The Chinese government attaches great importance to the legislation in the field of environmental protection and foreign trade. After more than 20 years of endeavor, a

¹ In 1996, China accounted for 12 percent of total FDI world-wide, and 32 percent of the total flowing to developing economies. By the end of 1997, the total number of approved projects of FDI reached 304,821, contracted foreign capital was US\$ 520 billion and the actual foreign capital was US\$ 222 billion

relatively comprehensive legal system, with the Constitution of the People's Republic of China as its basis and suitable for the national conditions, has been established. The Environmental Laws of the People's Republic of China and the Law on Foreign Trade of the People's Republic of China are the main laws governing environmental protection and foreign trade respectively.

Article 26 of the Constitution of the People's Republic of China stipulates: "The state protects and improves the living environment and ecological environment, and prevents and controls pollution and other public hazards; the state organizes and encourages afforestation, and protects forests and trees" and "the state ensures the rational utilization of natural resources, protects rare fauna and flora, and prohibits any organization or individual from invading and occupying the natural resources by any means". As a fundamental national law, the Constitution lays a foundation for the formulation of laws on environmental protection and foreign trade.

The Environmental Protection Law of China was promulgated in 1989 after 10 years of tentative implementation and is the basic law of environmental protection. It takes into account the specific conditions of economic development and environmental protection of the country and sets up basic guiding principles for economic and social development and environmental protection, and stipulates the rights and responsibilities of governments at all levels, all organizations and individuals in the protection of the environment.

The Foreign Trade Law of People's Republic of China was promulgated in 1994. It is based on the specific conditions of the country and in accordance with international conventions and agreements concluded and joined by China. It stipulates the principles, procedures and subject bodies of trade. It is the basic law on foreign trade and lays a foundation for the formulation of other laws and regulations related to foreign trade.

Specific Laws and Regulations for Environmental Protection and Foreign Trade

There are a number of specific laws and regulations for environmental protection and foreign trade. In the field of environmental protection they are:

- Law on the Prevention and Control of Water Pollution,
- Law on the Prevention and Control of Air Pollution,
- Law on the Prevention and Control of Environmental Pollution by Solid Wastes,
- Marine Environment Protection Law and
- Law on the Prevention and Control of Noise Pollution.

With regards to foreign trade, they include:

- Contract Law governing Business Relations with Foreigners,
- Law on Chinese-foreign Joint Venture Enterprises,
- Law on Foreign Funded Enterprises and
- Law on Chinese-foreign Cooperative Enterprises.

Environment- and Trade-Related Laws and Regulations

There are a number of laws on natural resources related to the environment which mainly include the following

- Forest Law,
- Grassland Law,
- Fishery Law,
- Mineral Resources Law,
- Land Administration Law,
- Water Resources Law,
- Law on Water and Soil Conservation,
- Law on the Protection of Wild Animals, and
- Agriculture Law.

There are also other related laws and regulations. They are:

- Health Quarantine Law,
- Civil Suit Law,
- Law on the Protection of Military Installations,
- City Planning Law,
- Administrative Suit Law,
- Customs Law,
- Statistics Law,
- Criminal Law,
- Law on Preservation of Cultural Relics,
- Law on Management of Medicines and Chemical Reagents,
- Law on the Quarantine of Imported and Exported Animals and Plants etc.

Importance is attached to environmental protection in laws and regulations concerning FDI. For example:

- According to the Rules for the Implementation of the Law on Chinese-foreign Joint Venture Enterprises (1983), the Rules for the Implementation of the Law on Foreign Funded Enterprises (1990) and the Rules for the Implementation of Law on Chinese-foreign Cooperative Enterprises (1995), no approval will be granted to the joint ventures, foreign funded enterprises and Chinese-foreign cooperative enterprises that cause significant environmental pollution.
- The Rules on Chinese-foreign Cooperative Exploitation of Oil Resources stipulate that operators and contractors of oil exploitation shall abide by the relevant environmental protection and safety laws to protect fishery and other natural resources and to prevent pollution and damage to the air, oceans, rivers, lakes and the land.
- According to the Interim Provisions on Directions for Foreign Investment approved by the State Council in June 1995, foreign investment projects are divided into four categories – encouraged, permitted, restricted and prohibited. Investment projects that endanger national security, damage social and public interests, cause environmental damages, destroy natural resources and impair public health are prohibited.
- In 1998, amendments were made to the Catalogue of Industrial Directions for Foreign Investment, which concerns businesses of five industrial sectors. These rules will minimize negative impacts by FDI projects, while actively attracting FDI.

Standards for Environmental Protection and Foreign Trade

For the improvement of the legal framework of environmental protection, the Chinese government has formulated and promulgated a series of environmental protection standards as an important component of the environmental protection legal system. These include:

- environmental quality standards,
- pollutants discharge standards,
- environmental criteria, and
- sample standards and method standards.

By the end of 1995, more than 360 national environmental standards were promulgated. In respect of foreign trade, more than 1,140 standards for commodity inspection and related sanitary and other standards were promulgated. These contribute to ensuring the quality of import and export commodities and to protecting the environment and human health.

Related National and Local Regulations and Rules

Up to now, The Chinese government has enacted more than 30 administrative decrees regarding environmental protection. In addition, departments concerned have also issued a number of administrative rules and decrees on environmental protection. To implement the state's environmental protection laws and regulations, people's congress and people's governments at local levels, proceeding from specific conditions in their own areas, have enacted and promulgated more than 600 local laws on environmental protection.

International Treaties

The Chinese government has always actively participated in the negotiations on global environmental problems and has signed a series of international conventions and protocols (see Appendix), including among others:

- the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),
- the Basel Convention on Control of Transboundary Movements of Hazardous Wastes and Their Disposal,
- the Vienna Convention for the Protection of the Ozone Layer and the London Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer,
- the United Nations Framework Convention on Climate Change,
- the Convention on Biological Diversity,
- the Convention on Prevention and Control of Desertification

China has always seriously implemented its international obligations under the agreements, which constitute the indispensable part of the system of China's environmental protection laws and regulations. In the field of international trade, the agreements that China has signed or acceded to include, among others:

- Agreement on Trade in Textiles,
- International Agreement on the Protection of Property Rights,
- International Tropical Timber Agreement,
- International Agreement on Natural Rubber, and
- Agreement on Whaling on the High Seas.

System of Environmental Management Policies and Measures

The Chinese government has formulated three major environmental policies: (i) prevention as first priority and control measures combined with prevention; (ii) the polluter takes the responsibility for pollution control; and (iii) strengthening environmental management. Moreover, a series of effective environmental protection management systems have been formulated and implemented.

Environmental impact assessment: For all new construction projects or ecological development projects, it is required that an assessment be made of the impacts on the environment and that measures be taken to control pollution caused by the project. Only after evaluation and approval of the environmental impact assessment report by the environmental authority can construction of the project be started. Through this measure the rational allocation of productivity and financial input in environmental protection can be ensured.

“Three synchronizations”: This refers to the fact that, in undertaking new, renovation and expansion projects as well as regional development projects, the pollution prevention and control facilities of these projects shall be designed, constructed and put into operation at the same time as the main part of the projects.

Pollution levy: This environmental rule was gradually established by using legal, economic and administrative instruments based on the principle that polluters control pollution. This rule requires that levies be made on the discharge of pollutants from all the pollutant dischargers, according to the amount and concentration of the pollutants discharged, whether they exceed the standard or not. An additional levy, according to this rule, is made if the emission exceeds the standard. About 80 percent of the collected charges are to be used for pollution control, the remainder can be used for enhancing the capacity of environmental management. Enterprises are allowed to include the fees for pollution discharge in the cost of production. Pollution charges have some implications in terms of internalization of environmental costs. This measure will encourage enterprises to adopt cleaner production techniques, improve production efficiency and prevent and control pollution.

Environmental target and responsibility: This measure makes leaders of governments at all local levels responsible for the environmental quality in the area of their administration and makes managers of enterprises responsible for the environmental performance of their enterprise. Tasks and targets will be determined and checked as the performance of the work of the government leaders and enterprise managers during their term of office.

Quantitative examination of comprehensive urban environmental performance: This is an examination, based on a system of parameters that have been worked out, for the comprehensive quantitative evaluation of environmental performance of a city, including the urban environmental quality and environmental management. The examination is carried out once a year and the results are published.

Pollutant discharge license: This is a way to exercise direct control over the pollution sources according to the standard of total amount and the standard of combined total

amount and concentration. The government's environmental authority defines the maximum allowed discharge amount of pollutants based on the carrying capacity of the environment in a region and gives licenses to enterprises that allocate permitted amounts of pollution discharge. It encourages polluters to assess their pollution discharge, to apply the best technology and to make best use of financial resources to meet the pollution emission standard.

Pollution control within a deadline: A deadline is given to an enterprise for pollution control if (i) it seriously damages the environment or gives rise to a strong public complaint, or (ii) a compulsory measure taken by the local government under the guidance of the master plan specifies the time, content, target and effect of pollution control. The deadline control also applies to the movement of those factories unsuitable for the overall layout of a given area as well as to the phase-out of heavily polluting industrial products.

Centralized pollution control: In order to enhance the efficiency of pollution control, measures combining centralized and scattered pollution control, with centralized pollution control put first, should be adopted. For the new development zones, there should be centralized pollution control facilities. At the same time, centralized pollution control can facilitate the development of township industries, getting enterprises to concentrate in the town and preventing the dispersion of pollution to the countryside.

The experience over many years has proved that these rules of environmental management are effective in China. In the years ahead, more efforts will be made to enforce them in a wider range of areas. The formulation and implementation of environmental policies makes a great contribution to improving the policy framework of China's environmental protection laws and regulations and to strengthening environmental protection in China.

International Aspects of Environment and Trade

After the end of World War II, the General Agreement on Trade and Tariffs was concluded to promote free trade on a global scale. In the past 50 years, the world economy and trade have undergone tremendous development, with the rate of growth of trade substantially outpacing that of real GDP. However, the rapid post-war development also brought about many problems of environment protection and ecological damage, such as ozone depletion by CFCs, climate change, biodiversity decrease, trans-boundary movement of hazardous chemicals and waste, etc.

It became increasingly recognized that economic and trade activities may pose a severe threat to, and have great impact on, the stability of the global ecosystem, and that economic development and environment protection must be coordinated properly. In order to protect the global ecological environment, a series of environmental agreements and conventions were concluded after years of numerous and tough negotiations. Some of the conventions were aimed at using trade measures as an instrument to protect the environment and included some trade-related provisions. For example:

- In the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the Convention on International Trade in Endangered Species of Wild Fauna and Flora, there are provisions banning international trade of the protected and controlled targets as well as relevant control measures and penalties for violations.

- In the Montreal Protocol on Substances That Deplete Ozone Layer, in addition to trade measures to control the products which contain ODS, there are also provisions on the products of which in the process of production ODS are used.

These environmental conventions address trade issues from the environmental perspectives while GATT approaches environmental issues in terms of the principle of free trade, so it is inevitable that they sometimes clash with each other. One example of this is that provisions in GATT are applied only to products themselves rather than to production process, which is obviously inconsistent the provision in the Montreal Protocol related to the production process. How to narrow the differences and to resolve contradictions between multilateral trade agreements and international environmental conventions is the subject area of trade and the environment.

The relationship between trade expansion and environmental protection is complicated in that they can be mutually enhancing as well as constraining. For example, global trade liberalization enhances the development of the world economy and raises incomes world wide. On the one hand, this stimulates the exploitation of resources, which leads to damage to the environment and ecosystems. On the other hand, higher incomes increase demand for a clean environment and generate the means to adopt cleaner technology and so forth.

Historically, the exports of developing economies have mainly consisted of raw materials and primary products shipped to developed economies.² The exploitation of these resources in the developing economies has led to at times severe environmental damage. The secular decline in the prices of raw materials and primary products has added to the difficulties of developing economies in checking the worsening trend of environmental pollution, resource damages and ecological degradation.

Due to differences in development levels and environmental situations, disparities exist between industrialized and developing economies in their environmental legislation and standards. In general, the environmental standards of most of the developing economies are lower than those of industrialized economies. The consequence of these differences have been reflected in many aspects of the world economy and environmental protection.

At present, some economies have adopted unilateral trade measures based on environmental protection. One example is the U.S. ban on the import of wild shrimp caught without the use of turtle-exclusion devices. The recent WTO decision on this case ruled that the U.S. ban violated international trade rules as it attempted to impose U.S. environmental rules on other economies. This decision may have profound implications for the environmental community. It should be noted that overemphasis on environmental protection may pose limits on trade liberalization, or even become a new trade barrier. This results in new unequal economic relations between nations, which severely impacts

² According to UNCTAD (1991), 67 percent of Latin American exports are raw materials or primary products. For West Asia, the figure is 84 percent; for developing economies in Oceania, 76 percent; and for sub-Saharan African economies, as high as 92 percent. Developing economies in Southeast Asia also have a high export rate of primary products. According to 1992 figures, the share of primary products in Indonesia's exports was 48 percent; for the Philippines 73 percent; for Thailand 67 percent and for Malaysia 61 percent.

the economic development and foreign trade of developing economies. In addition, many such unilateral measures are rather arbitrary in their formation and implementation. They are often used as excuses for “green protectionism”. They exercise a negative impact on international economic cooperation and the economic development of developing economies, and do not do much to promote global environmental protection. Therefore, these environmental trade measures should not be advocated. The issues of trade and the environment should instead be resolved through multilateral and bilateral negotiations and consultation.

Differences in environmental standards between developed and developing economies may lead to a shift of pollution from one economy to another. The environmental laws and standards in some developed economies do not allow for some products to be manufactured or sold domestically. However, companies can take advantage of the relatively less stringent environmental regulations and standards in developing economies to either market such products there or to manufacture the products there for local sale or export. For example, certain developed economies export to developing economies large quantities of air-conditioners with CFCs that are prohibited from use within their own borders.

Eco-labeling schemes are now implemented in many developed economies and in some developing economies. An eco-labeling program usually identifies products that have less environmental impact than other similar products, sets up non-binding environmental requirements for these products, and awards a special label to producers who meet these standards. Such labels are increasingly seen as important market instruments, used to complement mandatory laws and regulations for environmental protection.

However, the proliferation of eco-labeling programs has raised a number of trade concerns. Economies, especially developing economies, feel that eco-labels could be used as a disguised form of trade barrier and thus affect their exports. Major concerns related to potential trade barriers include:

- Many eco-labeling schemes lack transparency. In particular, they are poor at informing foreign producers of existing and emerging eco-labeling programs, and giving them opportunity to comment.
- Eco-labels are being increasingly developed in sectors of export interest to the developing economies.
- Criteria based on life-cycle analysis cannot reflect different environmental and developmental conditions, but only reflect those of the labelling economies. Thus they are not as effective in terms of environmental protection in the exporting economies as in the importing economies.
- Developing economies may lose international competitiveness due to the high cost of complying with eco-labeling criteria.

Despite the fact that the primary goal of eco-labeling programs is to protect the environment, they can at times discriminate against foreign producers in the way that they operate. Although eco-labeling so far has not caused significant trade effects in general, it has created difficulties for some exports from developing economies – in particular, paper and pulp, footwear, and textiles – due to differences in standards. Over the long run, when

eco-labeling programs increase their product coverage to include more and more products of export importance to developing economies, the impact of eco-labeling could potentially become more significant.

Recently some developed economies have introduced the concept of "ecological dumping" to limit imports of some products on the grounds that environmental costs are not reflected in their price. A tax on ecological dumping, which is in essence a unilateral environmental trade measure, tends to target developing economies since their exports are dominated by raw materials (which tend to be the focus of these measures), their environmental management tends to be weak, and the price of their exported products usually do not reflect environmental costs. Not only does this place the developing economies at a further competitive disadvantage, the proceeds from the tax will not help recover the resources or restore the environment since they do not flow to the exporting economies.

To fully coordinate environment and development, Agenda 21 adopted by Rio Conference made it clear that the world economy shall provide a supportive international environment for achieving the objectives of the environment and development by adopting the following approaches:

- Promoting sustainable development through trade liberalization;
- Making trade and the environment mutually supportive;
- Offering adequate financial resources to developing economies and addressing international debts;
- Encouraging macro-economic policies favorable for the environment and development.

This agenda also points out that governments shall share common understanding of the intersection of trade and the environment and development within the framework of existing international forums and domestic policies of each nation. An open, just, safe, non-discriminating, and predictable multilateral trade system which is aimed at sustainable development and leads to an optimal global distribution of comparative advantage shall be beneficial to all trade partners. In addition, improving the market entry opportunity of exports from developing economies and adopting sound macroeconomic and environmental policies will have a positive influence on the environment and make significant contributions to sustainable development. These should serve as the guiding principles for coordinating global issue of trade and the environment in the future.

Some of the Problems of Trade and Environmental Facing China

Problems in the Utilization of FDI

FDI plays a great role in the development of China's economy. However, in some areas the existing strategies for introducing FDI emphasize quantity and speed, while neglecting efficiency, quality, and management of FDI projects. This has provided opportunities for foreign companies to transfer pollution-intensive operations to China. According to the statistics provided by the third national industrial census conducted in 1995, there are 16,998 foreign-funded enterprises (including equity joint ventures, contractual joint ventures and wholly owned foreign enterprises) that involved in pollution-intensive

operations, approximately 30 percent of total foreign-funded enterprises in China. Among them, about 40 percent engaged in highly pollution-intensive operations.

There are also cases indicating that undesirable materials or technology sometimes were shifted to China through FDI. These include shifting ozone-depleting substances (ODS) production and consumption, importing foreign hazardous wastes, transferring technologies and facilities that have been phased out by exporting economies, and introducing main technologies and facilities without necessary pollution control facilities.

Contamination in Food Harms Exports

Many economies, especially developed nations like the USA, Japan and the European Union, have set more rigorous food standards and harsh terms on pesticides residues and harmful chemicals on food imports. Under these circumstances, the Chinese government has since 1983 imposed a ban on the production and use of some widely used farm chemicals such as BHC and DDT. However, problems remain. The residues of these chemicals have persisted in the soil, fertilizers have been used irrationally and contamination has occurred in processing and transportation. As a result, there have been many entry rejections registered as a result of Chinese exporters' failure to meet the hygienic or safety standards of the importing economies.³

The Impact of Eco-labeling on China's Trade

As eco-labeling programs world-wide have developed rapidly, China's exports have been affected on a few occasions. For example, eco-labeling criteria established for refrigerators and other cooling systems in some European economies have made China's exported refrigerators less competitive in these markets. In order to get easy access to the European market, manufacturers have to obtain a European eco-label. Wallpaper produced by Maoxiang Wall Paper Ltd. in Tonghua, Jilin Province was not allowed to be exported to one European economy due to a problem related to an environmental label. The German eco-labels for textiles and the new law in 1994 banning textiles dyed with dyes affect the export of silk products of the Xiamen Silk Import and Export Corporation and the export of textile products of a Shanghai company.

Cases of Illegal Import of Hazardous Waste in China

In the field of trade of waste materials, companies of some economies and regions, including even signatories of the Basel Convention, sought dumping sites for garbage in China under the name of import of waste material for use in manufacturing. For years, a number of incidents of illegal import of garbage and hazardous waste occurred in the ports in Guangdong, Fujian, Jiangsu and Jiangxi provinces, including the cases of import of hazardous chemical waste in Nanjing, municipal waste plastics in Jiangxi, and municipal garbage in Beijing and Shanghai. While these cases of illegal imports of hazardous wastes

³ For example, as residues of dichloro-dimethylpyridinol were found in frozen chicken exported to Japan, almost three tonnes of frozen chicken had to return to China. As well, the discovery in 1988 of contamination by staphylococcus toxins in canned mushrooms triggered a series of import bans by the USA, Canada, the European Community, Australia and some others.

caused serious environmental problems in these areas, they were all eventually handled in accordance with the laws.

Consideration of Policy Options and Measures for International Trade and the Environment

As China continues to integrate into the world economy, it needs to monitor the direction of the future trade, environment, and development agendas and possible approaches to trade and environmental issues. At the same time, it needs to address the adverse impacts of rapid economic and trade growth on the domestic environment; to avoid the possible negative effects of stringent foreign environmental standards on its export products; to explore opportunities arising from the greening of major developed economy markets; to make use of foreign investment to support its sustainable development efforts; as well as to fulfill its obligations under international environmental agreements.

In promoting the strategy of sustainable development, it is very important to deal properly with the relationship between trade and the environment. At present, all the nations of the world approach the issues of trade and the environment and formulate their policies from the perspective of their own national interests. In this situation, the following policy options are considered.

Following Closely New Developments in International Policies of Trade and the Environment

The WTO and conferences related to international environmental conventions are important forums for discussion of issues of trade and the environment. China has made, and will continue to make, great efforts to resume its status as GATT contracting party. China has been active in discussions organized by the WTO Committee on Trade and Environment and those in relevant international conferences. In addition, studies have been organized on the policies of trade and the environment of some important economies, which can be used as reference for formulating China's policies of trade and the environment.

Formulating China's Policy of Trade and the Environment with Reference to the International Regulations and Standards

The policies of trade and the environment vary greatly from nation to nation due to differences in the development levels of various nations. In dealing with international issues of trade and the environment, proper attention should be given to the fact that there are great differences between developed and developing economies in the levels of technology and economic development. Though China relies on its own resources to develop its economy, it must formulate the policies of economic development, trade and the environment with consideration of compatibility with international regulations and standards. The internalization of environmental cost should be promoted gradually and the principle of the polluter and user pay applied in formulating environmental policy. While improving product quality, companies should also improve their environmental behaviour as well as their production process so that the environmental requirements for products and for production process in international trade can be met. In formulating China's environmental standards, attention should be paid to compatibility with international

environmental standards and the promotion of the formation of a mechanism of mutual recognition.

Enhancing the Competitiveness of Exported Products

The competitiveness of exported products depends on their quality and prices. In addition, the products should be oriented to meet the demand in export markets. This requires that China's enterprises reflect progress in science and technology and change traditional modes of production, which is characterized by high input costs, and low efficiency of energy and resource utilization. Many industrial enterprises have indeed recognized the importance of changing the traditional economic system and have started to adopt cleaner production technologies and methods. Doing so will not only reduce consumption of energy and resources and decrease production cost, thus enhancing the competitiveness of exported products, but it will also serve to protect the environment and conserve resources.

Improving the Export Structure

China has gradually moved away from exporting mainly primary products and raw materials. This should be continued by shrinking highly energy- and resource-intensive industries and expanding tertiary industries and production of products with technological value added. At the same time, traditional handicrafts should be further developed to take advantage of China's rich human resources while protecting her limited resources and the environment.

Strengthening the Environmental Management of Export Products

The environmental requirements for production process, technology and raw materials are increasing constantly with growing international environmental concern and awareness. In order to avoid environment-related difficulties in entering international markets, the environmental and foreign trade authorities should make efforts to encourage exporting enterprises to improve environmental management and to participate in cleaner production and eco-labeling programs. It is important that China's enterprises follow closely the development trend of foreign environmental management and legislation and the environmental requirement for products. The information should be passed to foreign trade and industrial departments and enterprises on a timely basis in order for them to adopt adaptation measures.

Incorporation of Environmental Consideration in Foreign Investment Policy

The foreign trade and environmental authorities have promulgated regulations on the management of foreign investment. For the effective enforcement of these regulations, there is a need to establish a coordination mechanism for the approval of the establishment of foreign-invested enterprises. The Ministry of Foreign Trade and Economic Cooperation and the State Environmental Protection Administration should work together more closely in implementing investment and environmental policies, laws and regulations. SEPA and MOFTEC should work together to define a detailed inventory listing environmental projects that are encouraged and projects that may cause serious environmental consequence and thus should be limited or prohibited. This will help to prevent the transfer of polluting technologies and products to China.

Policy Coordination in Multilateral Environmental and Trade Forums

At the present, a number of multilateral environmental agreements contain trade provisions and multilateral trade agreements contain environmental provisions. As their starting points are different, it is unavoidable that some lack of harmony will occur. This needs to be solved through consultation and negotiation. There should also be coordination of policies among foreign trade and environment departments in the country when taking part in international negotiations.

Taking Advantage of the China Council for International Cooperation on Environment and Development

The China Council for International Cooperation on Environment and Development (CCICED) is a high-level advisory body for environment and development, which was founded in 1992. Its main task is to address the environment and development issues faced by China by providing the Chinese government with a comprehensive and long-term strategy and policy recommendations for sustainable development. One of the eight working groups under the Council is the Working Group on Trade and Environment. Established in 1995, the Working Group consists of 12 members, 6 Chinese and 6 international members. Its mandate is to assist China in developing and implementing long-term, comprehensive and integrated trade and environmental policies and measures that are supportive of sustainable development. It carries out policy-related research leading to practical recommendations for consideration by the Government of China in addressing the aforementioned needs. Up to now, this Working Group has completed a series of studies on environment and trade issues such as environmental labeling and its implications for China, China's green food development and environmental protection, pollution haven and ODS in China and analysis on strategy, advantages and disadvantages for China's implementation of AIJ and others.

Raising Awareness of the Importance of Trade and Environment Issues

Training should be provided to the decision makers and managers in the trade and environment departments in order to increase their awareness of environment and trade issues; and to provide them with knowledge related to the international environmental agreements, the trade-related environmental regulations and the multilateral trade agreements related to the environment so that they will take into full consideration the coordination between environment and trade while formulating relevant policies. The information should also be provided to managers of enterprises and researchers in this field.

Training should also undertaken to provide enterprise managers and technicians with the knowledge related to cleaner production, environmental labeling, PPM, ISO 14000 and advanced production technologies. This will increase their understanding of the importance of the above environmental measures, help them to actively participate in the accreditation of environmental label and ISO 14000, and to adopt international practice so as to avoid the impact of the market access and green barriers.

At the same time, full use should be made of the news media, television, radio, seminars and workshops as an important means of education to raise the awareness of the public of trade and environment issues and sustainable development strategy.

Implementation of ISO 14000 Standard Series

To promote economic modernization and to improve the environmental management of enterprises, the Chinese government has started to implement the ISO 14000 environmental management system. In 1996, a Center for Environmental Management System was established by NEPA. Pilot work on environmental management system certification has been conducted in about one hundred enterprises and 13 cities identified as pilot cities for the implementation of ISO 14000 standard series. Up to now, 38 enterprises of different industrial sectors have passed certification under ISO 14000. In May 1997, for the guidance of the implementation of ISO 14000 standard series, the State Council approved the establishment of the Steering Committee on Certification of Environmental Management System with NEPA as the head unit and representatives from relevant ministries.

The procedures for the certification of environmental management systems of enterprises and for the qualification of certifiers and certifying institutions for environmental management systems will be conducted in accordance with international practices. This will ensure the fairness and effectiveness of the certification of the environmental management systems of the enterprises.

Promotion of Cleaner Production

The cleaner production essentially means preventing pollution and minimizing waste and pollutants in the whole process of production and reducing to a great extent the negative environmental impacts of products in their life circle. To promote cleaner production means improving product design, selecting carefully raw materials, tightening management of production processes and improving technological process and waste disposal. Adopting cleaner production will facilitate the improvement of enterprise management, increase economic efficiency and help protect the environment and resources.

The promotion of cleaner production in China in an organized and systematic way was started in the early 1990s. The National Center for Cleaner Production was established with the assistance of UNEP and UNIDO, which is specialized in assessing and popularizing cleaner production technologies and approaches, providing consulting service for the enterprises to undertake cleaner production auditing and setting up and promoting cleaner production demonstration projects. At present, programs of cleaner production are carried out in many provinces and cities.

Promotion of Environmental Labelling Program

Environmental labels are awarded to those products that are environmentally friendly, or pose least harms to the environment in comparison with similar products. Enterprises can apply for environmental labels on a voluntary basis. The purpose of issuing environmental labels is to help consumers make environmentally friendly choices when they are

shopping and stimulate environmental protection by enterprises. It has been proven that implementing environmental labeling programs is beneficial to environmental protection and economic development and is a good way for the public to participate in the environmental protection.

In China, the environmental labeling program began in 1993. By the end of 1997, technical requirements for 22 categories of products had been issued, and 219 products from 55 enterprises have been awarded the environmental label.

Because certification mechanisms and standards for environmental labels differ from nation to nation, it is necessary for the international community to coordinate indicators and standards for environmental label and eventually to establish a mechanism of mutual recognition so as to avoid barriers to market access.

Gradual Internalization of Environmental Cost

To internalize environmental costs is an important step that needs to be taken to deal effectively with the emerging trade and environment issues. Factually, charges for pollutant discharge and charges to compensate for use of environmental resources already have some implications for internalization of environmental costs. However, to more fully realize the goal of environmental cost internalization, more work should be done in the field of environmental economics, including studies on the calculation of losses caused by environmental pollution, environmental and resources accounting and pricing policy. Change of economic growth mode, relying on technical progress and raising production efficiency are the prerequisites for China's enterprises to internalize environmental costs. Otherwise, the competitiveness of their products in international market will decrease as the result of increase of prices of the products.

References

- Environmental Protection in China*, Information Office of the State Council, June 1996.
- Statistics Bulletin of the National Economic and Social Development*, State Statistic Bureau, Economic Reference, March 1998.
- White Paper on China's Foreign Trade 1997*, China Foreign Trade Press, 1997.
- Agenda 21 for Environmental Protection in China*, the State Environmental Protection Administration, China Environmental Science Press, 1995.
- Agenda 21*, in the Report of the UN Conference on Environment and Development, 3-4 June 1992, Rio de Janeiro, Volume 1, United Nations.
- Case Studies on Environment and Trade in China*, Working Group on Trade and Environment, Report prepared for ESCAP, December 1996.
- "Sustainable Development in China and International Trade", Ye Ruqiu, *International Environmental Affairs*, Vol. 8, No. 1, Winter 1996, 16-31.
- World Trade Growth Slowed in 1993*, GATT Newsletter, June 1994.
- "The Change in the Third World and North-South Relations", Zhu Chonggui, Ding Kaisong and Zhang Xinsheng, *Modern International Relations*, Vol. 3, 1995.
- Study on the Problems of China's Utilization of Foreign Investment*, Zhang Shangtang and Su Ning, ed., China International Culture Press, 1996.
- "China Green Food Development and Environmental Protection", in *Trade and Environment*, China Environmental Science Press, 1997.
- "Eco-labelling: Its Implication for China", International Institute for Sustainable Development and Information Institute of the State Environmental Protection Administration, in *Trade and Environment*, China Environmental Science Press, 1997.
- "Implementation of ISO Standards for Environmental Management and Promotion of Sustainable Development in China", Ye Ruqiu, in the *Proceedings of the International Conference on ISO 14000 – Environmental Management and Sustainable Development*, November 1996, Beijing.

Appendix

TABLE 1: Survey of Trade-Related Environmental Measures in China

	Name of Measures	Enacted by		Date of Enact. (M/Y)	Implementing Department	Alignment with GATT/WTO Agreement			Alignment with Multilateral Agreements			
		Full	Part			Full	Part	No	Full	Part	No	
Trade-related Environmental Measures	Environmental Protection Law of P.R.C. Art. 30. Technology and equipment harmful to the environment are restricted for import to China. Art. 33. Producing, restoring, transferring, selling and using toxic and radioactive materials must comply with the state's relevant requirements in order to prevent and control pollution.	√		12/1989	SEPA		√			√		
	Marine Environment Protection Law Chapter 6 Prevention of dumping solid waste into China's marine area that pollute the marine environment	√		3/1983	SEPA		√			√		
	Law on the Prevention and Control of Water Pollution of P.R.C.	√		5/1996	SEPA		√			√		
	Law on the Prevention and Control of Air Pollution of P.R.C.	√		8/1995	SEPA		√			√		
	Law on the Prevention and Control of Environmental Pollution by Solid Wastes of P.R.C.	√		10/1995	SEPA			√			√	
	Law on the Prevention and Control of Noise Pollution of P.R.C.	√		10/1996	SEPA		√			√		
	Forest Law of P.R.C.	√		10/1994	MF		√					
	Grassland Law of P.R.C.	√		6/1985	MA		√					
	Fishery Law of P.R.C.	√		1/1986	MA		√					
	Mineral resources Law of P.R.C.	√		3/1986	MGAR		√					
	Land Management Law of P.R.C.	√		6/1986	SAL		√					
	Water Law of P.R.C.	√		1/1998	MWR							
	Water and Land Conservation Law of P.R.C.	√		6/1991	MWR							

Name of Measures	Enacted by		Date of Enact. (M/Y)	Implementing Department	Alignment with GATT/WTO Agreement			Alignment with Multilateral Agreements		
	Full	Part			Full	Part	No	Full	Part	No
Wild Fauna Protection Law of P.R.C.	√		11/1988	MF						
Wild Flora Protection Law of P.R.C.	√			MF						
Coal Law of P.R.C.	√			MCI						
Rules for the Implementation of Law on the Prevention and Control of Water Pollution of P.R.C.	√		9/1989	SEPA			√			√
Rules for the Implementation of Law on the Prevention and Control of Air Pollution of P.R.C.	√		7/1991	SEPA			√			√
Management Regulations for the Prevention of Marine Pollution and Damages Caused by Land Based Pollution Sources	√		8/1990	SEPA				√		√
Management Regulations for the Prevention of Marine Pollution and Damages Caused by Coastal Engineering Construction Projects	√		8/1990	SEPA						
Regulations for the Environmental Management of Offshore Oil Exploration and Exploitation	√		12/1983	SOB						
Administrative Regulation for the Prevention of Pollution from Ships	√		12/1983	MA						
Regulations for the Management of Waste Dumping to the Sea	√		3/1985	SOB						
Interim Rules for the Environmental Management of Opening Economic Zones	√		3/1986	SEPA				√		√
Urgent Notification of the State Council of Strict Control of Movements of Wastes to China from Abroad	√		11/1995	SEPA, MOFTEC, GAC			√			√
Decisions of the State Council on Some Issues of Environmental Protection	√		8/1996	SEPA			√			√
Environmental Management Procedure of Construction Projects	√		3/1986	SEPA						
Notification of Strengthening Environmental Management of Foreign Invested Construction Projects	√		3/1992	SEPA						

Name of Measures	Enacted by		Date of Enact. M/Y)	Implementing Department	Alignment with GATT/WTO Agreement			Alignment with Multilateral Agreements		
	Full	Part			Full	Part	No	Full	Part	No
Regulations for the Environmental Protection of the People's Liberation Army	√		7/1994	MD						
Regulations for the Environmental Management of the First Import of Chemicals and the Export of Toxic Chemicals	√		5/1994	SEPA,SETC, MOFTEC			√			√
Criteria of Charge for the Environmental Registration of Import and Export of Chemicals	√		5/1994	SEPA,SETC, MOFTEC						
Interim Rules for the Environmental Management of Waste Import	√		4/1996	SEPA, MOFTEC SETC, SAIC SACI						
Management Procedures for the Certification of Environmental Products	√		7/1994	SEPA						
Notification of Implementation of Environmental Labelling Programme in China	√		3/1993	SEPA						
Supplementary Rules for the Interim Rules on Environmental Management of Waste Import	√		8/1996	SEPA, MOFTEC, SETC, SAIC, SACI						
Announcement on Additional List of Waste Material of Restricted Import	√		10/1996	SEPA, MOFTEC, SETC, SAIC, SACI						

State Administration for the Inspection of Import and Export Commodities (SACI), State Economic and Trade Commission (SETC), Ministry of Foreign Trade and Economic Cooperation (MOFTEC), General Administration of Customs (GAC), State Planning Commission (SPC) [now State Development and Planning Commission (SDPC)], National Environmental Protection Agency (NEPA) [now State Environmental Protection Administration (SEPA)], Ministry of Forestry (MF), Ministry of Agriculture (MA), Ministry of Geology and Mineral Resources (MGMR), State Administration of Land (SAL), Ministry of Water Resources (MWR), Ministry of Coal Industry (MCI), State Oceanographic Bureau (SOB).

TABLE 2: Survey of Environment-Related Trade Measures in China

	Name of Measures	Enacted by		Date of Enactment(M/Y)	Implementing Department	Alignment with GATT/WTO Agreement			Alignment With Multilateral Agreements			
		F	P			Full	Part	No	Full	Part	No	
Environment-related Trade Measures	Rules for entry quarantine inspection	√		9/1996□ Art.13 till 11/1996	SACI	√				√		
	Interim Rules for the Import of Electromechanical Products	√		10/1987	SACI and MOFTEC		√			√		
	Rules for the Implementation of Quality License System for Import Commodities	√		8/1992	SACI, SETC MOFTEC and GCA		√			√		
	Implementation Rules for the Inspection and Supervision of Imported Complete Set of Equipment	√		4/1993	SACI		√			√		
	Interim Rules of Limitation for the Import of Ordinary Goods	√		1/1994	SDPC and MOFTEC		√			√		
	Supplementary Provisions to the “Interim Provisions for the Administration of Wastes Import and Environmental Protection	√		8/1996	SACI, GAC and SEPA		√			√		
	Rules for Foreign Investment in Sichuan Province		√	12/1992	Economic and Trade Commission of Sichuan Province		√			√		

Table 3: Bilateral and Multilateral Agreement on Trade- and Environment-Related Matters Signed by China

Name of the Multilateral Agreement Signed by China	Date
International Convention for the Regulation of Whaling	1946
Convention on the Continental Shelf	1958
The Antarctic Treaty	1959
Convention on the Prevention of Marine Pollution by Dumping of Waste and Their Matters	1967
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and the Other Celestial Bodies	1967
International Convention on Civil Liability for Oil Pollution Damage	1969
Convention on Wetlands of International Importance Especially as Water Habitat	1971
Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships	1972
Convention on the Prohibition of the Development and Stockpiling of Bacteriological (Biological) and Toxic Weapons and on Their Destruction	1972
Convention on International Trade in Endangered Species of Wild Fauna and Flora	1973
Convention on the Physical Protection of Nuclear Materials	1979
United Nations Convention on the Law of the Sea	1982
International Tropical Timber Agreement	1983
Vienna Convention for the Protection of Ozone Layer	1985
Convention Concerning the Protection of the World Culture and Natural Heritage	1986
Convention on Early Notification of a Nuclear Accident	1986
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1986
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
Basel Convention on Control of Trans-Boundary Movement of Hazardous Wastes and Their Disposal	1989
United Nations Framework Convention on Climate Change	1992
The Convention on Biological Diversity	1992
International Convention Relating to Intervention on the High Seas in Case of Oil Pollution Casualties	

Foreign Direct Investment and China's Sustainable Development

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1. Introduction

FDI has played a very important role in China's national economic development. It is estimated that foreign-invested enterprises contributed 2.8 percentage points towards China's 10 percent average annual economic growth rate. In 1996, foreign-invested enterprises accounted for the following shares of key economic indices:

Foreign-Invested Enterprises' Share of Economic Activity, China, 1996	Percent
Gross Industrial Output	19.1
Value Added Of Industry	15.8
Sales Revenue	18.7
Total Profits	27.4
Total Pre-Tax Profits	16.0
Total Investment In Fixed Assets	15.1
Total Employment	11.8
Total Taxes	12.3
Exports	40.7
Imports	54.4

Foreign-invested enterprises have also been an important factor in regional economic development, in speeding up the transformation of China's economic regime from a planned economy to a market economy, in strengthening the development of China's legal system, and in further promoting reform and opening to the outside world. FDI has been particularly important in revitalizing state-owned enterprises and in helping develop many excellent entrepreneurs in China.

2. Impacts of FDI on China's Sustainable Development

From the perspective of sustainability, FDI has had both positive and negative impacts on China's development.

On the positive side of the ledger, FDI has had the following impacts in terms of sustainable development:

- Many foreign investors have transferred advanced technologies and equipment to China, including for the prevention and control of pollution.
- Some foreign investors, especially the major transnational corporations, have introduced advanced environmental management systems and awareness. Many foreign-invested enterprises provide good examples of how to approach environmental protection. Of the 36 enterprises that had obtained certification of ISO 14000 since its implementation in China in 1996, 70 percent are foreign-invested enterprises. Similarly, in respect of certification under China's Environmental Labeling program, which has been in operation since 1994, a total of 86 enterprises (and about 340 products) have obtained certification, about 50 of which are foreign-invested enterprises.
- Some foreign-invested enterprises are actively involved in cleaner production and some foreign investors have invested in China's eco-farming, environmental protection industry, and ODS substitutes.
- The inflow of FDI has served not only to increase environmental awareness and management expertise of Chinese partners, but also to promote the adoption of sustainable development strategies in FDI-receiving regions: for example, Xiamen in Fujian Province, Shenzhen and Zhuhai in Guangdong Province, Dalian in Liaoning Province, Weihai in Shandong Province, and Zhangjiagang in Jiangsu Province have been chosen as model cities of environmental protection. Xiamen, Shanghai, Beijing, Tianjin, Zhongqing, Dalian, Suzhou, Shenzhen, Chengdu, Benxi and Qingdao have been regarded as the trial cities of applying ISO 14000.

On the negative side of the ledger, FDI has had the following impacts in terms of sustainable development:

- Some foreign-invested enterprises do not pay much attention to China's environmental protection and indeed, some have transferred pollution-intensive industries (PII) or even high pollution-intensive industries (HPII) to China. Foreign-invested enterprises involved in PII-class activities accounted for about 30 percent of output and employment of foreign-invested enterprises as a whole. Foreign-invested enterprises involved in HP II-class activities accounted for about 13 percent of output and employment of foreign-invested enterprises as a whole, but over 40 percent of the foreign-invested enterprises in PII.

	Number of Enterprises	Gross Industrial Output		Number of Employees	
	Number	US\$ billions	% of total	Millions	% of total
PII	16,998	50	5.05	3.0	2.0
HP II	7,487	24	2.4	1.2	0.8

Source: Third National Industrial Census of the People's Republic of China in 1995

- As regards, ODS production and consumption to China, based on incomplete data covering the period 1985-1994, some 957 foreign-invested enterprises may have been involved in ODS production and consumption, accounting for contractual foreign investment of US\$ 1.45 billion. In 1996, the importation of CFC-11 and CFC-12 reached 1800 tons in Guangdong Province, with foreign-invested enterprises being the important users.

- Some foreign-invested enterprises are involved in the importation of hazardous wastes, including some that engage in this illegally. The storage, processing and disposal of hazardous wastes seriously pollutes air, water, and land resources in many regions and poses threats to public health.¹ In 1991, it was estimated that there were 69 foreign-invested enterprises involved in importation of hazardous wastes, with a total investment amounting to US\$ 54 million; in 1992, the number of such enterprises increased to 195 and the investment rose to US\$ 150 million. Based on incomplete data, the quantity and value of imported wastes by all enterprises has evolved as follows since 1990. The value of imported wastes compared with the value of total imports increased from 0.5 percent in 1990 to 1.5 percent in 1993 before falling back to 1.2 percent in 1995 (see Annex 1 for more detail on the classification of China's hazardous waste imports).

	1990	1993	1994	1995
Imported Wastes (Millions of tons)	1.00	8.26	6.67	6.52
Imported Wastes (US\$ billions)	0.26	1.58	1.36	1.73

- Some foreign investors transferred hazardous technology, equipment (including second-hand equipment), products and production processes which may seriously pollute China's environment and which may even be banned in the home jurisdiction of these enterprises.
- Some foreign-invested enterprises have seriously polluted China's environment in the production process.²
- Some foreign-invested enterprises failed to introduce facilities for pollution prevention and control simultaneously; some have not introduced facilities for protection of the safety and health of workers.

3. A Review of China's Laws, Regulations and Policies

China has issued many laws, regulations and policies related to FDI and environmental protection.

Laws, regulations and policies governing FDI

- 1) Detailed implementation of regulations of related laws: "Law on Sino-joint ventures" (1983), "Law on foreign enterprises" (1990), and "Law on contractual joint ventures" (1995) all prohibit the approval of foreign-invested projects that will or may result in environmental pollution.
- 2) Regulation on joint exploitation in marine petroleum resources (1982), Article 24.

¹ For example, 30,000 tons of hazardous wastes imported by Hualong Chemical Co. seriously contaminate 20 hectares of cultivated land. Contact with hazardous wastes caused many workers and peasants to suffer from serious illness.

² In March 1996, 407 people suffered from arsenic poison discharged illegally by a foreign-invested enterprise in Guizhou Province (1,358 times higher than China's national standard), 1 person died in the accident.

- 3) Interim provisions on guiding foreign investment direction (1995).
- 4) Catalogue for the guidance of foreign investment industries (revised edition of 1997, coming into force on Jan. 1, 1998).
- 5) Regulations on labor management in foreign-invested enterprises (1994), Article 31: safety and health of workers and legal obligations.
- 6) Regulations on contract management in respect of technology transfer (1985) Article 3: The transferred technology must be advanced and appropriate, provide for environmental protection and safe production, and be energy- and material-saving.
- 7) Bilateral treaties of investment protection: so far, 87 treaties have been concluded, but environmental protection cannot be found in the treaties.

Laws, regulations and policies for protection of environment and natural resources

- 1) Circular on improving environmental planning in coastal open cities and their economic and technological zones (1984)
- 2) Interim provisions on environmental management to open economic areas (1986)
- 3) Administration rules on environmental protection in construction projects (1986): Articles 3 and 9
- 4) Circular on actively developing the environmental protection industry (1990)
- 5) Circular on strengthening environmental protection in construction projects with foreign investment (1992)
- 6) Provisions on further improvement of environmental management in construction projects (1993)
- 7) China's Agenda 21 (1994)
- 8) Administration provisions on environmental protection to the imported wastes
 - a) Circular of strictly control to the transfer of foreign hazardous wastes (1991)
 - b) Interim provisions on strictly control to the importation of wastes from EU (1994)
 - c) Interim provisions on environmental protection to the importation of wastes (1996)
 - d) Supplementary provisions to the provisional regulations on environmental protection control over import wastes (1996)
 - e) Regulations on strengthening control over shipment of import wastes (1996)
 - f) Measures governing the management of pre-shipment inspection on imported waste materials (for trial implementation) (1996)
 - g) Notice for the supplementary to the list of wastes used as raw materials and restricted to import by the State (1996)
- 9) Law on Air Pollution Prevention and Control (1995), Law on Solid Wastes Pollution Prevention and Control (1995), Law on Water Pollution Prevention and Control (1996)
- 10) Administration rules on environmental standards (1983), Article 8.
- 11) Regulations for environmental protection in the building materials industry (1986)

- 12) Administration provisions on environmental protection in the chemical industry (1990)
- 13) 41 technological policies of chemical industry (1986)
- 14) Administrative provisions on prevention and control in respect of coastal zone construction projects' pollution into the ocean environment (1990)
- 15) Administrative rules on the certification of environmental labeling products (1994)
- 16) Interim administrative provisions on environmental management system certification (trial basis) (1996)

In summary, environmental protection has been integrated into China's policies, laws and regulations governing FDI. The focus is generally on the pre-establishment and application period and based on the catalogue for guidance of foreign investment industries which classifies projects into four categories: encouraged, permitted, restricted and prohibited projects. The environmental laws, regulations and policies are beginning to contain the environmental problems in foreign-invested projects. But the many problems existed not only in the laws, regulations and policies themselves, but also in their enforcement.

4. Recommendations

International cooperation in this field should be strengthened. The following are some suggestions as to how this might be

- 1) Existing theories of international trade, investment and transfer of technology must be amended in order to incorporate sustainable development concepts.
- 2) Future negotiations of multilateral agreements on investment must aim at promoting global sustainable development. In this regard, the WTO faces a number of challenges.
 - a) As regards the WTO's basic principles:
 - PPMs challenge the non-discrimination principle.
 - The double environmental standards challenge the national treatment principle.
 - In many multilateral environmental agreements, such as conventions of protection of ozone layer, the contracting parties have different position compared with the non-contracting parties.
 - b) While international rules for commodity trade (GATT) and services trade (GATS) have been established under the WTO, there is no comparable set of international rules on investment nor an agreement on investment and sustainable development. Moreover, while the WTO continues to make great efforts to speed up liberalization of trade and investment to keep in line with economic globalization and integration; it has not amended its basic principles in consideration of global sustainable development. Thus, there are no limitations on transfer of pollution-intensive industries, hazardous technology, or products and equipment (some of which are eliminated or even prohibited in the developed countries) to developing economies.

- c) In the near future, the WTO should begin negotiations towards a new General Agreement on Investment. This Agreement would have the following features:
- It would include special provisions concerning investment and sustainable development. The principle of non-discrimination, especially the national treatment should be redefined in consideration of sustainable development. On one hand, host economies cannot lower their environmental standards to encourage FDI; on the other hand, investors must adopt higher environmental standards to promote global sustainable development.
 - It would allow the provision of favourable policies to foreign investors who make investment in green industries, products, clean technology and production process.
 - Industries, technologies, production processes, products, hazardous wastes, equipment, etc. that are restricted or prohibited domestically should also be rigidly restricted or prohibited in terms of international transfer, such as through FDI – investors should not have the right to regard developing economies as pollution havens.
 - Investors, especially transnational corporations, must bear some responsibility for sustainable development of both the host economy and the globe. The Conduct Code of TNCs must be reconsidered and perfected, and restrictive business practices and measures detrimental to sustainable development should be rejected.
- 3) Further amendments should be made to some multilateral environmental agreements:
- a) Further amendments to the Basel Convention should be made to include provisions covering transfer of pollution through foreign direct investment:
- Developed economies and newly industrializing economies and regions should be required to adopt effective measures to enforce the Convention.
 - Domestically prohibited and strictly restricted products should not be exported to other economies.
 - Exporting economies should be responsible for punishing illegal exports of hazardous wastes; the approach of sending back illegally transferred wastes does not punish the exporter.
 - A fund to compensate economies that suffer damages from illegal export of hazardous wastes should be established.
- b) The conventions for the protection of the ozone layer should strictly prohibit the transfer of ODS production and consumption in any way, such as through FDI.
- 4) The members of APEC should strengthen cooperation in this field, e.g., through a special agreement on FDI and sustainable development, giving special attention given to the problem of pollution havens. Channels should be established for exchange of information, such as on the transfer of PII and HPII through FDI, experiences, and lessons concerning the control of such transfers.
- 5) China should strengthen the control and management of FDI related to environmental protection:
- a) The existing strategy of utilizing FDI should be amended to incorporate sustainable development principles. Laws, regulations and policies should integrate

FDI into sustainable development. Special regulations on FDI and sustainable development should be established.

- b) The following zones must be transformed into demonstration areas of sustainable development: the 5 special economic zones, Shanghai's New District of Pudong, the 32 state-level economic and technological development zones, the 13 bonded zones, the 35 high-tech industrial parks, the 14 frontal economic cooperation zones, and other open areas.
 - c) TNCs should be guided to serve for China's sustainable development.
 - d) Increased efforts should be made to raise environmental awareness, especially among the businessmen and officials involving in foreign trade and investment.
- 6) Environmental management could be strengthened in the following ways:
- a) An administrative mechanism should be set up to organize and co-ordinate all related governmental organizations.
 - b) A nation-wide survey should be made to determine the situation of transfer of pollution-intensive industries through FDI and their impacts on China's environment.
 - c) Foreign-invested enterprises that seriously pollute the environment should be given a deadline of treatment. At the same time, the names of the 1,000 worst polluters should be published. Conversely, 10 foreign-invested enterprises with excellent records in environmental protection should be chosen and their names published annually.
 - d) An annual environmental report system should be established for foreign-invested enterprises.
 - e) An environmental information centre and accident-prevention and treatment centre for foreign-invested enterprises should be established.
 - f) Foreign-invested enterprises should be encouraged to apply for certification in respect of ISO 14000, China Environmental Labeling, and cleaner production.
- 7) Environmental laws, regulations and their enforcement should be revised:
- a) The legal obligations of environmental criminals should be more severe than the smuggling of drugs. Those who break the related laws and pollute the environment should be severely punished.
 - b) Enterprises that break the laws should be closed down or be given deadlines for treatment of pollution, and those in charge should be considered responsible for environmental crime.
 - c) The maximum economic penalty should be abolished; however, in principle, the penalty should be severe.

Annex 1

FDI and China's Economic Development

In 1997, 21,001 FDI projects were approved, the contractual amount of foreign capital reached US\$ 51 billion, and utilized foreign capital US\$ 45 billion. Up to the end of May 1998, the foreign-invested enterprises approved have increased to 312,129, the contractual amount of foreign capital to US\$ 537.9 billion, and utilized foreign capital to US\$ 370.8 billion (see Table 1). Since 1993, China has been the second largest destination of actual FDI for four years.

Table 1
FDI in China, 1979-1997
Amount Unit: US\$ millions

Year	Number of Approved Agreements	Contractual Amount of FDI	Utilized Amount of FDI	Average Amount of Contractual FDI
Total	312,129	537,903	370,800	1.72
1979-86	8,295	19,180	6,590	2.31
1987	2,33	3,710	2,314	1.66
1988	5,45	5,297	3,194	.89
1989	5,79	5,600	3,393	.97
1990	7,73	6,596	3,487	.91
1991	12,978	11,977	4,366	.92
1992	48,764	58,124	11,008	1.19
1993	83,437	111,436	27,515	1.34
1994	47,549	82,680	33,767	1.74
1995	37,011	91,282	37,521	2.47
1996	24,556	73,276	4,172,552	2.98
1997	21,001	51,004	45,257	2.43
1998**	7,308	17,511	14,885	2.40

Note: ** data up to the end of May 1998.

Sources: Almanac of China's contractual foreign capital.

FDI came from over 150 economies and regions, but the main part was sourced from 10 economies and regions. The Asia and Pacific region accounted for over 91% of projects, 92% of contractual amount of foreign investment, and 89% of actual amount of foreign investment (see table 2).

Table 2
FDI from 10 Economies and Regions, 1979-96

Unit: US\$ millions

	Number of Projects	Percent of total	Contractual FDI	Percent of total	Actual FDI	Percent of total
Hong Kong, China*	168,382	59.33	270,009	61.16	101,806	57.65
Chinese Taipei	35,033	12.34	34,603	7.84	15,060	8.53
United States	22,248	7.84	35,174	7.97	14,295	8.10
Japan	15,002	5.29	26,393	5.98	14,185	8.03
Singapore	6,697	2.36	23,620	5.35	6,167	3.49
South Korea	8,117	2.86	11,014	2.49	3,617	2.05
United Kingdom	1,800	0.63	11,928	2.70	3,507	1.99
Germany	1,503	0.53	5,409	1.23	1,708	0.97
France	1,128	0.40	3,072	0.70	1,509	0.85
Thailand	2,337	0.90				

Notes: * including Macao;

Sources: FDI in China, 1997, MOFTEC, Page 10.

Annex 2

China's Importation of Wastes

Until 1996, China divided wastes into five groups, based on the waste classification system used in the European Union:

- 1) normal green wastes (NGW) which can be imported without limitation;
- 2) restricted green wastes (RGW) which can be imported only with the approval of certain government authorities;
- 3) prohibited green wastes (PGW) which cannot be imported;
- 4) amber wastes (AW); and
- 5) red wastes (RW) which are not allowed to be imported.

Between 1990 and 1995, the percentage of NGW decreased from 77 to 49 percent while the percentage of RGW increased from 8 to 40.

Meanwhile, the quantity and value of PGW increased rapidly, from 11,33 tons in 1990 to 108,213 tons and from US\$ 0.69 million to US\$ 1.82 million. The quantity and value of AW rose from 137,239 tons to 669,155 tons and from US\$ 12.23 million to US\$ 84.49 million.

In 1996, China issued the Interim Regulation on the Environmental Management of Importation of Wastes and Catalogue of Wastes (which can be used as raw materials) with Import Restriction. Wastes not listed in the Catalogue are not allowed to be imported. In the Catalogue, the wastes that can be imported are divided into the following types:

- animal wastes;
- dross,
- scaling and other wastes;
- wood waste and scrap;
- waste and scrap of paper and paperboard;
- textile wastes;
- wastes and scraps of inexpensive metals and their products;
- electrical and electronic scrap;
- waste transportation equipment; and
- special wastes.

Based on this new classification, the quantity and value of restricted wastes imported in 1994 reached 4,920,000 tons and US\$ 830 million, accounting for 73.7 percent and 61.1 percent of the total imported wastes, respectively. At the same time, the quantity and value of prohibited wastes imported reached 1 million tons and US\$ 240 million, accounting for 15.0 percent and 17.4 percent of the total imported wastes, respectively. Compared with the old classification, the quantity of restricted and prohibited wastes increased by 113 percent and 79 percent, respectively.

In 1995, the quantity and value of restricted wastes imported reached 4,300,000 tons and US\$ 1.06 billion, accounting for 66 per cent and 61.4 percent of the total imported wastes, respectively. The quantity and value of prohibited wastes imported reached 1.44 million tons and US\$ 329 million, accounted for 22.1 percent and 19.0 percent of the total imported wastes, respectively. The quantity of restricted and prohibited wastes increased by 66.5 percent and 85.2 percent, respectively, compared with the old classification.

Trade-Related Environmental Issues: The Case of Hong Kong, China¹

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1. The Background of the Trade and Environmental Regime

The Hong Kong, China Government's policy objective for the environment in relation to trade is to foster economic development in a manner that sustains trade and preserves the environment. Government policy proposals are carried out with respect to the protection of the environment and natural resources, and the need for sustainable growth. This paper takes a brief look at the historical development of environmental protection in Hong Kong, China and her position in the international arena to meet this end.

Institutional Development

The Establishment of the Environmental Pollution Advisory Committees

In the late 1960s, at the beginning of the worldwide environmental movement, Hong Kong experienced a surge in its manufacturing sector. As a result, the Governor appointed an Environmental Pollution Advisory Committee known as EPCOM. This committee found it difficult to make progress because it lacked expertise in this newly developing field. In 1974, a team of consultants was commissioned to review the Territory's pollution problems and to make recommendations on how they should be tackled.

The consultants published a review in 1977 that carefully examined all aspects of the local environment and detailed the likely consequences if no government action was taken. The review stressed the need for developing a framework flexible enough to accommodate rapid growth and thriving economy as well as to implement environmental planning and management. To do so, the Government needed to set priorities and introduce the necessary controls.

The review noted specific problems at the time, including: the polluting of coastal waters such as the Tolo Harbour, northwest Kowloon, Victoria Harbour and the Territory's beaches; pollution in the New Territories particularly from agricultural wastes and industrial discharges; and the increasing effects of industrial sulphur dioxide emissions in urban areas.

¹ References: WTO, APEC, ISO 14000 and various official Internet websites, including the Trade Department and the Environmental Protection Department of the Hong Kong SAR Government.

The Environmental Protection Unit Formed in 1977

During the 1970s, pollution control work was managed by at least eight executive departments within the Government. In order to increase central authority, the consultants proposed two options. They are either to establish a new department responsible for the executive functions of the other departments, or to establish a policy unit that would facilitate communication and co-operation between departments without monitoring or enforcement officers. The second option was chosen mainly because of the opposition from existing environmental control departments that did not want to have a new Environment Protection Department.

Thus, the Environmental Protection Unit (EPU) was established in 1977 to introduce policies aimed at curbing pollution in the Territory and to coordinate the activities of the departments involved in pollution control. The creation of the EPU did not, however, provide for such things as conservation and other aspects of the natural environment. Instead, the EPU was lead by the Environmental Protection Advisor, who was later joined by four environment protection officers covering air, water, noise and waste. Since it was difficult to obtain the necessary information on the local environment so as to provide a basis for developing new legislation, and often it was impossible to change some long established practices, the Unit made only limited progress.

The Environmental Protection Agency Formed in 1981

The EPU was replaced in 1981 by the more extensive Environmental Protection Agency (EPA) responsible for developing a comprehensive program of measures to protect the environment from excessive pollution. The agency's role was largely advisory and it focused on monitoring new measures developed for protecting the environment so as to ensure that they were tailored to her particular conditions.

The Environmental Protection Department Formed in 1986

As a response to the growing concern about the environment, the Government established a separate and more powerful department with executive powers to control pollution and to address future environmental management concerns.

The Environmental Protection Department (EPD) was established in 1986 and it remains today with staff and resources from six governmental departments.

Led by the Director of Environmental Protection, the Department was made responsible for all pollution prevention and control measures such as planning the Territory's sewage and waste management programs with the exception of conservation and natural environmental concerns which remains a responsibility with the Agriculture & Fisheries Department.

While EPD and its predecessors, the EPA and EPU, have worked to serve the territory's need for environmental protection work, other contributors have also played an important role. At the policy-making level, the Secretary for Planning, Environment and Lands is chiefly responsible for environmental protection policy making and receives advice from EPCOM's successor and the Advisory Council on the Environment, which consists entirely of non-government people. Assistance from EPD in formulating new policies and programs is also available. For major policy making and new legislation, the Secretary must obtain approval from the Executive Council and the Legislative Council (Legco) that passes laws, controls public expenditure, and monitors Government policies. In order to monitor policies, Legco has set up a Panel system to examine specific policy issues. To address environmental concerns, the Legco Panel on Environmental Affairs provides a forum for the exchange of views on environmental and conservation issues.

In addition to offering advice on policy proposals to the Secretary for Planning, Environment and Lands, EPD is also responsible for enforcing environmental legislation, monitoring environmental quality and drawing up plans for the treatment and disposal of all types of wastes. They offer advice on town planning, large new industrial plants and any other development or new policies that may have a significant adverse effect on the environment. The Department also deals with complaints and inquiries.

Trade and Environmental Concerns in the World Trade Organization

The Background to the WTO's Work on Trade and Environment

In April 1994, Trade Ministers completed the Uruguay Round negotiations in Marrakech and launched an extensive work program within the WTO to cover trade and the environment. Their decision has ensured a high profile for the environmental and trade concerns on the WTO agenda.

During the Uruguay Round, issues of trade and environment were not addressed directly in the negotiations, but certain environmental concerns were nevertheless included in the results of the negotiations. The preamble of the WTO Agreement directly refers to the objective of a sustainable development while preserving the environment. In order to protect human, animal and plant life, governments have made new policies under the agreements of the Technical Barriers to Trade and Sanitary and Phytosanitary Measures. The agreement on agriculture exempts WTO Members from pledging direct payments to environmental programs in order to reduce domestic support to agricultural production. This, however, is subject to certain conditions.

The WTO Committee on Trade and Environment has consistently raised environmental and development issues on the WTO agenda. The Committee's first report was submitted to the WTO Ministerial Conference in Singapore. It highlighted the WTO's interest in building a constructive relationship between trade and the environment. In order to promote sustainable

development, the government should consider the effects of trade on the environment during policy-making.

The Marrakech Ministerial Decision on Trade and Environment

Trade Ministers in Marrakech agreed to establish a WTO Committee on Trade and Environment (CTE) with responsibilities covering an extensive scope of multilateral trading systems from goods and services to intellectual property. CTE serves both analytical and prescriptive functions. It identifies the relationships between trade and environmental measures in order to promote sustainable development, and makes recommendations on whether any modification of the multilateral trading system is needed.

The Relationship between the Provisions of the Multilateral Trading System and Trade Measures for Environmental Purposes

The WTO provides accommodations to meet a range of trade-related measures drawn up for environmental purposes. These include measures constructed under the multilateral environmental agreements (MEAs). Exception clauses contained in Article XX of the GATT legitimately allow a WTO Member to place public health, safety and national environmental goals ahead of its obligation not to raise trade restrictions or to apply discriminatory trade measures. These provisions are a major focus of CTE and are kept for future review.

2. Regulatory Framework

The International Obligations and Rights Sub-group of the Sino-British Joint Liaison Group has agreed that the following shall remain applicable to Hong Kong, China after the 30th of June 1997:

- The 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora has also been extended to the Hong Kong Special Administrative Region. Table 1 below lists some trade-related environmental measures in APEC economies of which Hong Kong, China is a member.

Table 1
Trade-Related Environmental Measures in APEC Economies

Control Item	Ordinances/ Regulations	Brief Description
1. Ban on import and sale of amosite and crocidolite	Air Pollution Control Ordinance (Cap. 311)	Under section 80 of the Air Pollution Control Ordinance (Cap. 311), it is an offence for a person to import into Hong Kong any quantity of asbestos known as amosite or crocidolite or any substance or item made with or containing amosite or crocidolite unless with exemption granted by the Authority. It is however not an offence to import amosite and crocidolite if the substances form an integral part of the structure or fitting of a ship brought into Hong Kong for repair or breaking up
2. Import/ Export control of ozone depleting substance	Ozone Layer Protection Ordinance (Cap. 403)	Under section 4 of the Ozone Layer Protection Ordinance (Cap. 403), it is an offence for a person to import or export a scheduled substance without a licence. With this provision, coupled with an administrative quota system, import of halons for local consumption has been banned since January 1994. Import of other scheduled substances such as chlorofluorocarbons, carbon tetrachloride, 1,1,1-trichloroethane and hydrobromofluorocarbons have also been banned for local consumption since January 1996
3. Import/ Export control of products containing ozone depleting substances	Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation	Under the Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation made under the Ozone Layer Protection Ordinance (Cap. 403), it is an offence for a person to import a controlled product containing CFC or halons as listed in Part 1 or 2 of the Schedule of the Ordinance from any country or place which is not a party to the Montreal Protocol, unless these substances are imported under the exemption list as described in section 3 of the Regulation. In addition, portable fire extinguishers containing halons are banned from import from all countries since December 1996
4. Control of emissions for imported vehicles	Air Pollution Control (Motor Vehicle Design Standards) (Emission) Regulation	The Regulation stipulated that all vehicle seeking first registration shall comply with the emission standards in the Regulation. We are following closely the international trends to tighten the vehicle design standards
5. Control on composition of vehicle fuel	Air Pollution Control (Motor Vehicles Fuel) Regulation	The Regulation stipulated the composition of various vehicle fuel including, leaded and unleaded petrol and diesel. We are following closely the international trends in fuel specifications
6. Control of noise emissions for certain portable air compressors	Noise Control (Air Compressors) Regulations (Cap. 400)	The Regulation stipulated noise emission standards for certain portable air compressors. The standards are either identical with or substantially the same as international and/or appropriate overseas standards.

Table 1 (continued)

7.	Control of noise emissions for certain hand held percussive breakers	Noise Control (Hand Held Percussive Breakers) Regulation (Cap. 400)	The Regulation stipulated noise emission standards for certain hand held percussive breakers. The standards are either identical with or are substantially the same as international standards and/or appropriate overseas standards
8.	Control of noise emissions for motor vehicles including motorcycles	Noise Control (Motor Vehicles) Regulation (Cap. 400)	The Regulation stipulated noise emission standards for motor vehicles including motorcycles. The standards are either identical with or are substantially the same as international standards and/or appropriate overseas standards
9.	Import and Export permit control of waste other than specified uncontaminated waste intended for recycling or reuse purpose	Waste Disposal Ordinance (Cap. 354)	Section 20 of the Waste Disposal Ordinance stipulated that other than specified uncontaminated waste intended for recycling or reuse, prior consents from territories concerned and a permit from the Waste Disposal Authority must be obtained before the commencement of any waste shipment. Such control is in line with the requirements under the Basel Convention
10.	Regulation of international trade in endangered species	Animals and Plants (Protection of Endangered Species) Ordinance (Cap. 187)	The Ordinance provides that the import, export or possession of the endangered species listed in the Schedules to the Ordinance requires a licence issued by the Director of Agriculture and Fisheries

In order to promote the efficient use and conservation of energy, the Electrical and Mechanical Services Department introduced voluntary Energy Efficiency Labelling Schemes (EELS) for refrigerators, room air-conditioners and washing machines in June 1995, June 1996 and December 1997 respectively. Under the scheme, an energy label will be issued to manufacturers and importers who voluntarily have their products' energy consumption and efficiency levels recorded. This will also cover all new registered appliances imported or manufactured in Hong Kong, China with effect from the date that is declared by the participant. The Hong Kong, China Government plans to expand the scheme to include compact fluorescent lamps in 1998 and to non-household electrical appliances and gas appliances in the future. Although responses from manufacturers have been encouraging, the Government is still considering implementing the scheme on a legislative basis in the future.

Legislation and Pollution Control

The EPD is responsible for the implementation of most of the measures contained in the main pollution control legislation (see Table 1).

Air

According to the Air Pollution Control Ordinance (1983), installation or alteration of fuel burning equipment requires approval from EPD. In addition, major emitters, known as Specified Processes, are subject to licensing control.

The Government has placed the entire Hong Kong, China territory under specific Air Control Zones and Air Quality Objectives. For instance, the use of solid and liquid fuels in Shatin are prohibited under the Fuel Restriction Regulations. Sulphur emissions and liquid fuels are also restricted in other parts of the Territory.

Another concern of environmentalists is the emission of unleaded petrol, which was made available as of the 1st April 1991. It contributes to about 80 per cent of all petrol sales. To deal with this problem, car emission limits based on the strictest international standards became effective on the 1st January 1992. Currently, more than half of the petrol cars are fitted with catalytic converters. To further reduce the permitted sulphur content in automotive diesel fuel from 0.2 percent to 0.05 percent, strict international emission standards were made for all diesel vehicles effective as of the 1st April 1997.

The Smoky Vehicle Spotting Scheme is another measure for quality air control created by the Government. Owners of vehicles reported to have emitted heavy smoke by authorized government and community spotters are required to present their vehicles for testing at designated centres.

The Ozone Layer Protection Ordinance passed in 1989 bans the production of chlorofluorocarbons (CFCs) and halons, and restricts their import and export through licensing and quota controls. To remain in accordance with the amendments of the Montreal Protocol, new ozone depleting chemicals have been added to the list of controlled substances. Regulations are in force to ban the venting of CFC refrigerants and the import of certain products containing the controlled substances.

Legislation for the control of asbestos in buildings and ships came into effect in early 1997 with the registration of asbestos consultants, supervisors, laboratories and contractors. The Asbestos Administration Regulation also bans the import and sale of blue and brown asbestos.

The Open Burning Regulation, which prohibits open burning of construction waste, tires and metal salvage, came into operation in February 1996.

Waste

The Waste Disposal Ordinance enacted in 1980 provides for the collection, treatment and disposal of waste control. It was amended in early 1995 to enable permit control on import/export and transshipment of wastes in accordance with the Basel Convention.

Since May 1993, the government has adopted a cradle-to-grave control of chemical wastes. Regulation requiring waste producers to pay for part of the treatment cost of delivering waste to the Chemical Waste Treatment Centre was made effective in March 1995. The charging scheme aims to create an economic incentive for waste minimization. Under the same principle, polluters are charged for waste disposal at landfills.

In June 1988, a scheme to prevent pollution by livestock waste was introduced and aimed at reducing pollution from indiscriminate discharge of livestock waste by 80 percent by 1996, an amount equivalent to the raw sewage waste from 1.3 million people. A new Dumping at Sea Ordinance came into effect in April 1995 to enable permit control on marine dumping activities.

Water

The Water Pollution Control Ordinance was enacted in 1980 and amended in 1990 and 1993. It created 10 water control zones to cover the entire Territory and imposed licensing controls over all discharges in these zones. The Technical Memorandum of Effluent Standards provides a guideline for setting licensing limits and are designed to improve water quality. By June 1994, regulations were made to ensure that owners of premises disposed waste in public sewers.

Noise

The Noise Control Ordinance, enacted in 1989 and last amended in 1996, provides for the control of noise from construction sites, domestic and public places, industrial and commercial premises, motor vehicles as well as from specific noisy equipment. A construction noise permit (CNP) is issued by EPD to regulate noise from general construction work at night, on public holidays, and Sundays. All percussive piling work requires a CNP and is prohibited at night, on public holidays and Sundays. In November 1996, the CNP system implemented a ban on non-essential noisy construction work in built-up areas at night and on public holidays. In addition, hand-held breakers (jack-hammers) and air compressors must comply with stringent noise emission standards at all times and be fitted with noise emission labels.

The police monitor noise from domestic premises and public places on a subjective assessment basis, whereas EPD controls noise levels from industrial or commercial premises through noise abatement notices. Since August 1996, road traffic noise has been minimized by regulations that require newly registered motor vehicles, including motor cycles, to comply with stringent noise emission standards.

Local Control Offices

To further improve the effectiveness and efficiency of EPD's control activities, six Local Control Offices (LCOs) have been established. These LCOs have proved very effective in facilitating communications with local communities, increasing the transparency of EPD's enforcement, and also improving pollution control in many districts.

Environmental Monitoring and Investigations

EPD has implemented several environmental monitoring schemes and investigations to establish an objective basis for local action.

For water quality monitoring, 86 stations have been set up to routinely sample inland waters and 167 stations for marine waters and bottom sediments. There are an additional 116 sampling stations for monitoring the water quality at beaches and 8 stations at water sport centres.

The Air Pollution Index (API) and forecasting system was introduced in June 1995 to provide the public air quality information daily. The addition of three more general air monitoring stations and two toxic air pollutants monitoring stations have led to an extensive network. A Territory-wide survey of waste initiated in 1981 is currently carried out bi-annually to provide information for planning future waste disposal facilities. In order to monitor radon in buildings, toxic air contaminants, indoor air pollution, recycling of construction wastes, pathogens in shellfish and hydrodynamics of semi-enclosed bays, investigations are frequently carried out.

The Import and Export of Waste

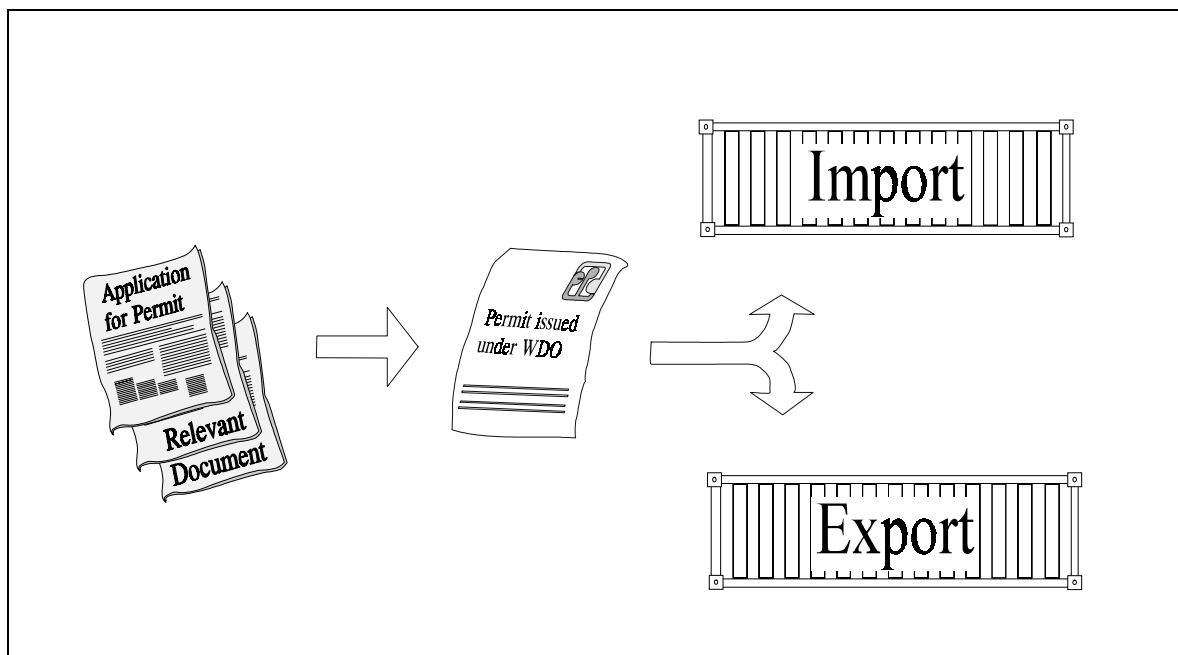
In February 1995, the Waste Disposal Ordinance (WDO) was amended to provide a sophisticated permit system that controls the movements of wastes into and out of Hong Kong. The system enables Hong Kong, China to manage its import and export of waste in an environmentally sound manner, which is a requirement of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Disposal.

Under the agreement, prior notification and approval from all countries concerned (countries of export, import and transit) are required before any proposed shipment of hazardous waste can be carried out. If any intended waste shipment is not completed, the authorities responsible are notified and a suitable alternative arrangement for disposal, reuse or return of the waste is made with the consent of the countries involved.

The Permit System of Waste Import and Export under WDO

According to the WDO, wastes are commonly classified under two main categories, namely the Sixth and the Seventh Schedules, which can be amended by EPD with notice published in the Gazette. With the exception of the import or export of uncontaminated waste in the Sixth Schedule for the purpose of reprocessing, recycling, recovery or reuse, all other waste import and export activities require valid permits issued by EPD.

Figure 1
Permit Control on Waste Import and Export



Offences and Penalties

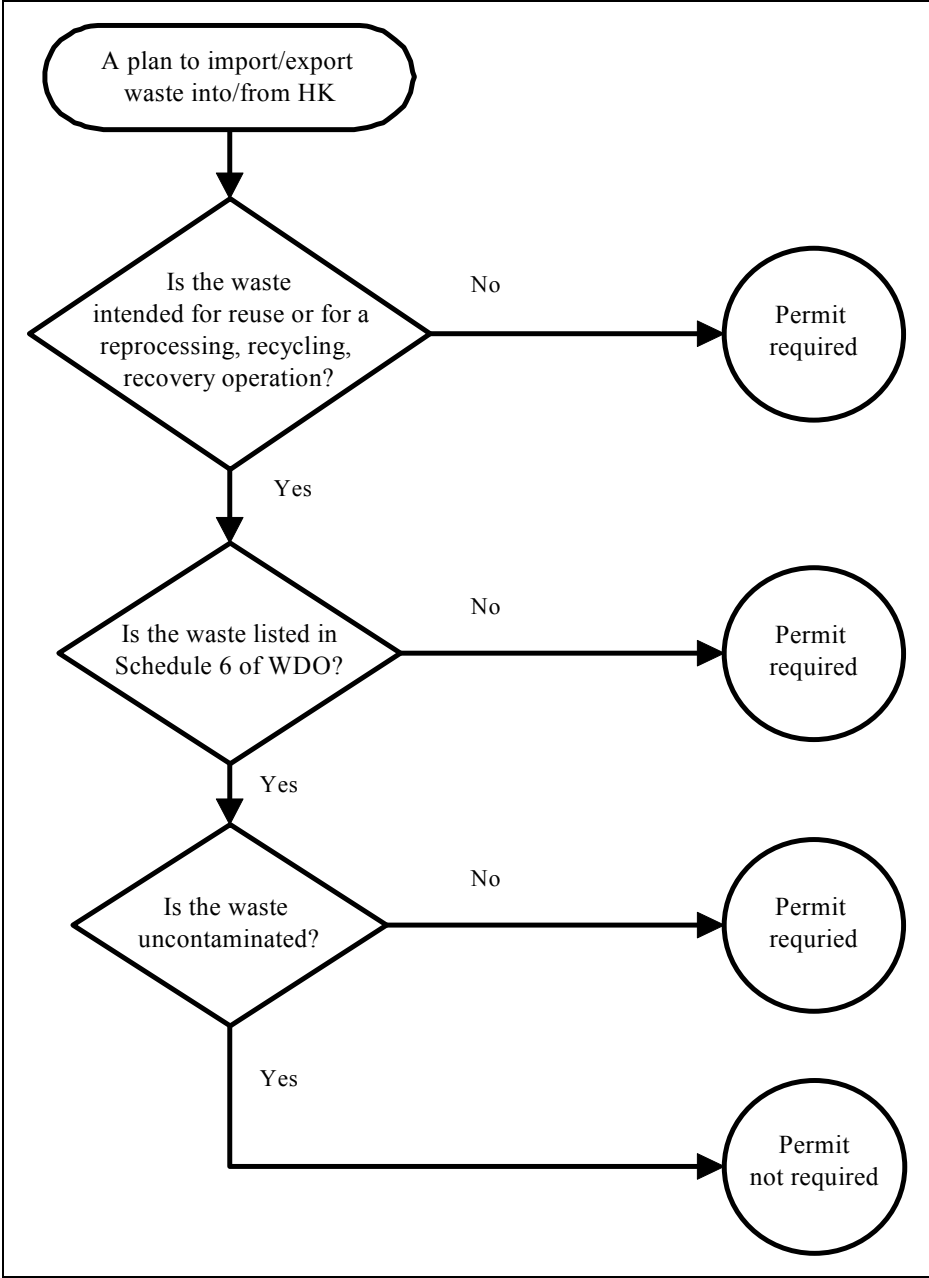
Any person who does not comply in accordance with permit rules or allows another person to handle waste import and export without a permit commits a serious offence. The penalty for such an offence is a maximum fine of HK\$ 200,000 and six months' imprisonment for the first offence, and a maximum fine of HK\$ 500,000 and two years' imprisonment for a second or subsequent offence. Any person who makes a statement which he/she knows to be false when applying for a permit, or recklessly makes a statement which is false, commits an offence and is liable to a fine of HK\$ 200,000 and imprisonment for six months.

The Issue of the Export of Domestically Prohibited Goods in WTO

In the mid-1980s, a number of developing countries participating in the GATT were concerned that certain hazardous or toxic products were being exported to their countries without them being fully informed about the environmental or public health dangers the

products could pose. As a result, a GATT Working Party in the late-1980s assessed the ways of treating trade in goods that were severely restricted or banned for sale in the domestic market of the exporting country. A key consideration was that the importing country should be fully informed about the products she was receiving and had the right to reject them if she felt that they would cause environmental or public health problems.

Figure 2
Procedures to decide whether a permit is required



Eco-labeling in WTO

Eco-labeling programs are important environmental policy instruments. Eco-labeling was discussed extensively in the GATT, and that laid the basis in CTE for a detailed examination of the issues involved. The key requirement from WTO's point of view is that environmental measures that incorporate trade provisions or that affect trade significantly do not discriminate between home-produced goods and imports, nor between imports from or exports to different trading partners. Non-discrimination is the cornerstone of secure and predictable market access and fair competition – it guarantees consumer choice and it gives producers access to the full range of market opportunities. Subject to that requirement being met, WTO rules place essentially no constraints on the policy choices available to a country to protect its own environment against damage either from domestic production or from the consumption of domestically produced or imported products.

The CTE Report states that well-designed eco-labeling programs can be effective instruments of environmental policy. It notes that in certain cases they have raised significant concerns about their possible trade effects. An important starting point for addressing some of those trade concerns is by ensuring adequate transparency in their preparation, adoption and application, including offering opportunities for the participation in their preparation to interested parties from other countries. Further discussion is needed on how the use in eco-labeling programs of criteria based on non-product-related processes and production methods should be treated under the rules of the WTO Agreement on Technical Barriers to Trade.

3. Transparency

The Government consults the relevant parties including importers, exporters, shipping companies as well as the trade associations and relevant government advisory bodies, in writing before proposing any environmental-related trade measures. In addition, the proposed measures would be published in the Government gazette before being enacted. The public may also find the environmental-related trade measures published on Internet. Overseas inquiries about these measures and access to these publications can be made to Hong Kong, China's Overseas Economic and Trade Offices. Seminars are also conducted to explain the measures to the relevant parties. Moreover, WTO will be notified prior to the implementation of any new standards/specification.

The WTO Transparency Provisions

The WTO transparency provisions fulfill an important role in ensuring the proper functioning of the multilateral trading system, in helping to prevent unnecessary trade restriction and distortion from occurring, in providing information about market opportunities and in helping to avoid trade disputes from arising. They can also provide a valuable first step in ensuring that trade and environment policies are developed and implemented in a mutually supportive way. Trade-related environmental measures should not be required to meet more onerous

transparency requirements than other measures that affect trade. The CTE Report states that no modifications to the WTO rules are required to ensure adequate transparency for trade-related environmental measures. The WTO Secretariat will compile from the Central Registry of Notifications all notifications of trade-related environmental measures and collate these in a single database which can be accessed by the WTO Members.

4. The Impact of Environment and Trade Measures on Trade and Investment Liberalization

Hong Kong, China makes a practice of adopting accepted international standards when implementing environment and trade measures, and doing so with transparency. This is considered to have a positive impact on trade and investment liberalisation.

ISO 14000

As a correspondent member of the International Organization for Standardization (ISO), Hong Kong, China is striving to conform to the recently established international standard of ISO 14000. ISO 14000 is a new series of environmental management standards in draft form. This emerging set of standards is expected to be a global benchmark against which environmental programs are checked. ISO 14000, used as an environmental management tool, can have significant benefits for many companies. Some of the expected benefits include:

- maintaining environmental regulatory compliance;
- establishing company environmental policies;
- reducing company environmental liability and risk;
- allowing recognition of exceptional environmental practices by investors, regulators, the public and other companies;
- improved internal management methods;
- providing a foundation for pollution prevention and waste reduction activities;
- increased operational flexibility and greater efficiency; and
- promoting a clean global environment.

In a sense, ISO 14000 represents a first step in privatization of regulatory processes. In fact, some agencies have already indicated that an ISO 14000 certified facility may receive greater regulatory and operational flexibility and reduced penalties for violations.

Trade Liberalization and Sustainable Development in WTO

Further liberalization of international trade flows, both in goods and services, has a key role to play in advancing economic policy objectives in Member countries. In that aspect, WTO Member countries have already made an important contribution to sustainable development and better environmental protection worldwide through the Uruguay Round negotiations. This contribution will steadily increase as the results of the Round move towards full implementation. UNCED also recognized an open, non-discriminatory trading system to be a

prerequisite for effective action to protect the environment and to generate sustainable development. This is based on the perspective that countries, particularly developing countries, are dependent on trade as the main impetus of continuous growth and prosperity.

5. Environmental Cost Internalization/Effect on Competitiveness

Hong Kong, China has adopted the “polluter pays” principle. Waste disposal and treatment costs are recovered at various levels from waste generators, including costs of treating and/or disposing effluent from polluting trades, sewage, chemical waste, MARPOL waste, etc. Plans are being developed to implement, in phases, charging schemes for disposal of municipal solid waste at landfills, and for disposal of clinical wastes. We have seen, for example, that the introduction of chemical waste disposal charges has expedited waste minimization and in-house treatment measures by waste producers. It has also contributed to decisions by some chemical waste producers to relocate their operations.

Economic Instruments

Economic instruments have been used by APEC member economies to address market failures associated with the problems of externalities, imperfect competition, information lag and public goods. A brief description of these problems is given below.

- **Externalities:** Externalities are negative (or positive) effects from a transaction which fall on third parties. As a result, they may not be taken into account in production decisions, and too much (or too little) of the externality may be produced. An example of an externality is pollution, emitted as part of a manufacturing process, the cost of which does not fall on the manufacturer. Governments may choose to use economic instruments or technical standards to ensure that prices reflect the cost of the externality, or that less of the externality is produced.
- **Imperfect Competition:** Where barriers of entry into a market exist, producers may be able to set prices higher than the competitive levels, and/or restrict output. Governments may wish to intervene to prevent this from happening (for example, through implementing anti-trust laws). Competition problems may also arise in the case of natural monopolies. A natural monopoly exists when one firm can provide the entire market demand at a lower cost than two or more firms. For example, electricity and gas transmission networks tend to be natural monopolies.
- **Information Lag:** Where producers or consumers do not have full information on which their decisions are based, it can lead to undesirable outcomes. For example, if consumers do not know about the quality of a good or service, they may not be willing to pay higher prices, thereby driving high quality suppliers away from the market.
- **Public Goods:** Public goods are non-rivalrous and non-exclusive. This means that consumption of the good by one person does not reduce the ability of others to consume the good, and it is difficult or even impossible to exclude people from consuming the

good. As a result, it can be very difficult to obtain payment for the good from users. Left to itself, the market is unlikely to supply enough of a public good to meet the needs of the economy.

Economic instruments seek to influence market behaviour by altering the relative prices of goods or services. Market behaviour can be influenced either indirectly (e.g. through a tax or user charge), or directly (e.g. through controlling the overall level of supply). Economic instruments are most commonly used as a response to externalities. They are a means of “internalizing” the costs of externalities, so that they will be taken into account in production and consumption decisions. The two main types of economic instruments are:

- Taxes or charges: They attempt to alter market behaviour through increasing prices. Common examples are environmental charges on polluting gases, such as carbon dioxide, which seek to include the costs of environmental damage in the prices of related goods. A tax or charge used to influence behaviour in this way is different from a tax or charge whose objective is to raise revenue and which will therefore seek to minimize behavioural change;
- Tradable permits: They are a means of controlling the quantity of some externality, such as pollution produced from electricity generation. Under tradable permit systems, the government sets a maximum supply level for a specific good. Producers must hold a permit or a right to produce the good, and may not produce any more than the level specified in the permit. Allowing such permits to be traded should ensure that resources continue to be used where they add the greatest value. In addition, permit trading can establish a price for the good which will be reflected in downstream prices, thereby “internalizing” the externality in consumption as well as production decisions. Tradable rights of this type have been used effectively in the United States to control emissions of sulphur dioxide, and in New Zealand to provide for sustainable management of commercial fisheries.

Table 2
Survey of Trade-Related Environmental Measures in APEC Member Economies

Name of Measures	Enacted By	Date of Enactment	Implementing Departments	Alignment with	
				GATT/ WTO	Multilateral Agreements
1. Ban on import and sale of amosite and crocidolite	Hong Kong Government	May 1996	Environmental Protection Department	Full	Not Applicable
2. Import/Export control of ozone depleting substance	Hong Kong Government	July 1989	Environmental Protection Department	Full	Full
3. Import/Export control of products containing ozone depleting substances	Hong Kong Government	May 1993	Environmental Protection Department	Full	Full
4. Control of emissions for imported vehicles	Hong Kong Government	January 1992	Environmental Protection Department	Full	Not Applicable
5. Control on the composition of vehicle fuel	Hong Kong Government	April 1995	Environmental Protection Department	Full	Not Applicable
6. Control of noise emissions for certain portable air compressors	Hong Kong Government	June 1992	Environmental Protection Department	Full	Not Applicable
7. Control of noise emissions for certain hand held percussive breakers	Hong Kong Government	June 1992	Environmental Protection Department	Full	Not Applicable
8. Control of noise emissions for motor vehicles including motorcycles	Hong Kong Government	August 1996	Environmental Protection Department	Full	Not Applicable
9. Import and Export permit control of waste other than specified uncontaminated waste intended for recycling or reuse purpose	Hong Kong Government	Import Control - 1980 Import/Export Permit Control - Sept 1996	Environmental Protection Department	Full	Full
10. Regulation of international trade in endangered species	Hong Kong Government	August 1976	Agriculture and Fisheries Department	Full	Full

Environment in the Context of APEC Trade and Investment Liberalisation: The Case of Indonesia

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1. Introduction

Preservation of the environment is of major importance for all mankind, in developed and developing economies alike, to sustain life on earth, particularly in view of increasing population and limited natural resources. With increased trade and foreign investment due to liberalisation, it is feared that environmental degradation and damage will accelerate rapidly through reckless exploitation of natural resources. Environmental concerns are strongly voiced by advanced economies, but unfortunately they tend to punish environmental negligence in developing economies with trade sanctions. Since exports are very important for the exchange earnings of developing economies, developed economies consider trade sanctions as effective measures to force developing economies to undertake necessary and sufficient environmental protection measures.

Quite often, greed is the root cause for environmental degradation. However, in developing economies, environmental degradation tends to result from the sheer necessity for survival: from the efforts to meet the basic needs of rapidly growing populations and from the dependence of many poor families on the exploitation of natural resources for their incomes. Developing economies also recognize the importance of environmental protection, but are hampered by widespread illiteracy and ignorance, lack of capital, lack of coordination, lack of organizational skills and inadequate enforcement by environmental agencies.

In international fora, such as the WTO Committee on Environment and Trade and APEC, the linking of environment with trade is pressed incessantly by advanced industrialised economies through measures such as, for example, eco-labeling and ISO 14000. Developing economies still have time to make necessary adjustments in view of these new developments, but ultimately will not be able to avoid complying with these international norms.

The present paper looks at environmental protection measures in Indonesia, their enforcement, and their impact on international trade for Indonesia.

2. Environmental Protection in Indonesia

Indonesia was among the first of the developing economies to recognize the importance of protection of the living environment. Indonesia signed the Convention produced by the

Special Conference on the Living Environment organized by the United Nations in June 1972 and, as early as 1978, established a State Ministry for Living Environment. In 1982, Indonesia passed a national Law on Living Environment, which since then has been renewed a couple of times. In addition, Indonesia is signatory to a number of international environmental agreements:

- the Vienna Convention for the protection of the Ozone Layer;
- the Montreal Protocol on Substances that Deplete the Ozone Layer (as adjusted and amended by the Second Meeting of the Parties);
- the United Nations Framework Convention on Climate Change;
- the Convention on International Trade in Endangered Species (CITES)
- the Basel Convention on Control of Transboundary Movement of Hazardous Wastes and Their Disposal; and
- the International Tropical Timber Agreement (ITTA); and

These agreements have significant implications for Indonesia's trade. For example, in the ITTA, Indonesia gave her commitment to reduce cutting tropical logs from 31.4 million cubic meters to 22.5 million cubic meters by the year 2000, which implies a reduction in the exports of plywood. In the Montreal Protocol, the parties agreed to phase-out the production and consumption of chlorofluorocarbons (CFCs) and halons by the year 2000. In this regard, Indonesia actually committed to ban the use of CFCs totally by the end of 1997. Under CITES, exports of aquarium sea fish, sea anemones and reef corals are limited by quotas set yearly; Indonesia is an important exporter of these natural resources.

In the ASEAN context, ASEAN member economies issued the Manila Declaration on regional environmental cooperation in 1981. In 1992, ASEAN also signed a cooperation agreement on harmonization of standards in respect of the quality of environment. Furthermore, a Strategic Plan of Action on the Environment has been worked out.

Within Indonesia, two institutions are in charge of environmental protection: the State Ministry for Living Environment and the Board for Environmental Impact Control. However, the effectiveness of their laws and regulations depends very much on the cooperation of other Ministries, like the Ministry for Forestry.

Despite the many laws and regulations and the presence of two government bodies, law enforcement is generally weak. This is understandable, as environmental protection entails the availability of skilled experts to install the equipment as well as of environment-trained judicial personnel and also involves additional costs for companies. As well, environmental protection standards in Indonesia are not as rigorous as those in Malaysia, Thailand or in developed economies. Moreover, the people's awareness on environmental matters is generally still vague.

Overall, environmental degradation in Indonesia is still within limits, except in certain areas. Industrial concentration in and around Jakarta has caused pollution beyond the absorptive capacity of the environment.

3. Trade- and Investment-related Environmental Measures

In 1997, Indonesian exports of agricultural products amounted to US\$ 2.9 billion, while the mining sector excluding oil and gas earned US\$ 3.1 billion. Nonetheless, compared with Indonesia's total exports of US\$ 53.5 billion, exports of natural products accounted only for a relatively small portion.

Indonesia has passed quite a number of environmental laws and regulations, but their linkage with trade and investment is generally weak or marginal. For example, Government Decree No. 20, Year 1990, on the management of water pollution (see Annex A1), which is a general provision, only affects industry and trade in a minor way. Law No. 5, Year 1990, on the conservation of living natural resources and their eco-systems (see Annex A2), is of greater importance in view of the fact that Indonesia exports quite a large number of products from its rich natural resource base.

To protect the tropical rainforest from excessive cutting and damage, Indonesia has a system of selected cutting of only old trees with a certain minimum girth. Moreover, logging companies are obliged to reforest logged areas (see Annex A3, Minister of Forestry Decree No. 252/KPTS-II/1993). To support the pulp industry, the government has introduced the so-called industrial forest development concept, meaning that industrial trees are to be planted in areas with relatively low forest density. Indonesia has also been successful in the forest management with respect to teak, pine and mahogany. In the case of teak, the forest management program has been successful for about 100 years.¹

Government Regulation No. 51, Year 1993, on Environmental Impact Analysis, which amended Regulation No. 29, Year 1986 (see Annex A4), specifies certain economic activities that might adversely affect the environment and sets up criteria that measure the extent of such environmental degradation. These are general rules that establish prerequisites for investments and the production of goods and services, some of which are being exported. In the same spirit, Decree No. 250/M/SK/10/1994 issued by the Minister of Industry (see Annex A5) sets up technical guidelines for the establishment of industrial activities. Specifically an environmental impact analysis license is required before an operation permit can be issued. Under this stipulation, 20 industrial activities are identified which must obtain a permit; among them are several that are important for Indonesian exports, including integrated plywood, cement, pulp, up-stream petrochemicals, tin, copper, aluminum and alumina. Both of these stipulations are further supported by the State-Minister for Environment Decree No. 39/MENLH/8/1996 on activities requiring environmental impact analysis certificates (see Annex A7). Also of relevance in this connection are environment audits. These are regulated by the State-Minister for Environment Decree No. 42/MENLH/11/1994, which establishes general principles and guidelines for environment audits (see Annex A6). Thus, theoretically, goods exported from Indonesia are basically already subject to a number of environmental protection measures.

The latest development was the enactment of Law No. 23, Year 1997, on the management of the environment, which replaced Law No. 4, Year 1982. In particular, this established requirements for environmentally sustainable development (for more detail, see Annex A8). This is a basic Law and thus ranks higher than decrees, regulations or stipulations.

¹ Tarmidi: 46

4. Environment-related Trade and Investment Measures

As can be seen from the Annexes, that there are not many laws and stipulations directed towards trade and investment. Moreover, those that do address this issue apply only to a specific activity or commodity. The following are some of the more important measures.

- Environment in a wider sense includes also ancient and historical heritage, as well as art and culture, which must be preserved and not be damaged or changed because of increased tourism. This is stipulated by Law No. 9, Year 1990, on Tourism (see Annex B1).
- The Minister of Trade Decree No. 99/Kp/IV/92 on the notification of imports of yellow-fin tuna and products (see Annex B2), was in fact a reaction to the import embargo imposed by the U.S. in early 1992 on the basis of an accusation that Indonesia was importing yellow-fin tuna from Thailand for re-export to the U.S., which was eventually proved not to be factual.
- The Trade Minister Decree No. 349/KP/XI/1992 on imports of plastic wastes (see Annex B3).
- The Trade Minister Decree No. 94/Kp/V/1995 on exports of Napoleon Wrasse fish (see Annex B4). The latter Decree was issued because the catch of these fish damages the ecosystem of coral reefs and other sea creatures.
- The Minister of Industry and Trade, in Decree No. 137/MPP/Kep/6/1996, also determined the criteria and the procedures under which industrial wastes might be imported (see Annex B5).
- The Minister of Industry and Trade's prohibition of production and trade of ozone depleting substances and of new products using ozone depleting substances as is stipulated by Decree No. 110/MPP/Kep/1/1998 (see Annex B6).
- Supplementing this Decree, the Minister of Industry and Trade also issued a stipulation prohibiting imports that damage the ozone layer (see Decree No. 111/MPP/Kep/1/1998 in Annex B7).

5. Environmental Measures in Developed Economies as Barriers to Trade

Environmental awareness and concern for environmental preservation and protection are already widespread in developed economies. Consequently, in international fora such as APEC or the WTO's Committee on Trade and Environment, the call to improve environmental protection and to broaden acceptance of eco-labeling is becoming louder and louder. From the viewpoint of developed economies, the growth of world trade adds substantially to the demand for goods and services, which in the end adds to the degradation of the natural environment. However, for most developing economies, environmental measures are seen as a new kind of disguised trade barrier; accordingly, they oppose the idea of linking trade with environment, especially of using trade as a sanction to address environmental neglect.²

² Compare Anderson, Blackhurst: 4-6

For developing economies, the threat of import sanctions on the part of developed economies is seen as a threat to many poor families, whose livelihoods depend on the exploitation of natural resources, quite often disregarding the maintenance of ecological balance or environmental protection.³ However, when it is in the interest of developed economies, they are less likely to raise the question of environmental protection in developing economies. For example, in relation to foreign investment, it is in their own interest if environmental protection measures in developing countries remain lax, because this minimizes operating costs for the foreign investor.

The introduction of eco-labeling is not confined to tropical timber and products alone, but extends to other industrial products like textiles and clothing, footwear, pulp and paper. And worse is the threatened or actual use of import restrictions extended to unrelated products.⁴ Indonesia has committed to apply eco-labeling by the year 2000 for forest products according to the ITTA agreement and, in anticipation, Indonesia has founded the Indonesian Institute for Ecolabelling. The introduction of eco-labeling and ISO 14000 for a wide range of products cannot be avoided in the future and therefore developing economies should prepare for it. Those that take early measures to prepare for it will gain through the opening of new opportunities and increased competitiveness in the world market.

The following are some cases where Indonesia faced environment-related trade barriers from developed economies, and in particular from the United States.

Foremost for Indonesia are exports of tropical wood products. These reached the quite substantial amount of US\$ 4.7 billion in 1997. Developing economies suspect that, by raising environmental issues in connection with tropical wood products, wood producers from developed economies were acting on their own interests to limit competition. A question often asked is: why don't the advanced economies exercise the same measures in respect of wood from boreal forests or from cold climates as well?

Measures taken on tropical wood products include a boycott set up by the European Union. In the U.S., Indonesia faced tariff discrimination on imports of plywood from different suppliers, 8.2 percent for Indonesia, 4 percent for Brazil and 0 percent for Malaysia and the Philippines. The Indonesian plywood industry includes in total 114 establishments, providing livelihood for a large number of workers and their dependents.⁵

J.F. de Leeuw from the Netherlands once stated that the deforestation in developing economies is a matter of poverty and hunger. Therefore, village development is a more important instrument to protect forests than wood certificates. If poverty could be eradicated, the degradation of forests caused by traditional moving settlers and thefts would be substantially reduced. His opinion is supported by the Forest Minister, who gave the example of Kidul Mountain in Central Java. In the 1950s, the mountain was barren because the poor people in the region had cut down the woods for cooking. But now with increased incomes, people use kerosene and gas instead and they conserve their forests.⁶

³ See Tarmidi, 1995: 44

⁴ Tarmidi, 1995: 45

⁵ Tarmidi, 1995: 46

⁶ Sanda: 13

Another case was the embargo on imports of yellow-fin tuna imposed by the U.S. from Mexico, Venezuela, Vanuatu, and extended to 20 other developing economies including Indonesia, on the ground that dolphins get entangled in the fishing nets and killed. Indonesia was under this embargo for five months in early 1992. The embargo was finally lifted after Indonesia proved that it did not re-export yellow-fin tuna from other economies. On the contrary, the government's policy is to protect tuna fish as is obvious from the Decree of the Minister of Agriculture, Year 1975, reinforced by Law No. 5 of 1990 (see Annex). The question here is whether the launching of this issue was not an indirect means to protect American fishermen?⁷

Still another case in point was the imposition by the European Community of trade restrictions on imports of manioc from China, Thailand and Indonesia, around 1989, on the grounds that the manioc plant heavily eroded the fertility of the soil. However, restricting imports of manioc also served to protect French farmers, who produce grain as an ingredient for animal feedstuff pellets, which can be substituted by manioc if grain prices are high.⁸

Developed economies, foremost the U.S., also threatened to ban imports of shrimp from Indonesia, as shrimp cultivation involves cutting down mangrove forests. Mangrove forests are needed to protect coastlines from waves and hurricanes, to conserve water, to prevent the intrusion of seawater, to filter pollution and to protect coral reefs and seaweed. In addition, mangrove forests have a number of ecological functions. Mangrove forests are by law protected by Presidential Decree No. 32, Year 1990, article 27. The latest threat was an embargo on imports of sea shrimp by the U.S., since the catching of these shrimps caused endangered species of turtles to be caught and killed. However, Indonesia could prove that, during the catch, Indonesian fishermen used turtle-escape devices.

However, despite the many threats, Indonesian commodity exports experienced no adverse effects so far. For example, exports of plywood could be rerouted to other economies which do not exercise stringent environmental rules.

6. Conclusion

Environmental protection is the concern of all people, including those from developing economies. This can be seen from the actions and measures taken by the developing economies to protect the environment and to engage in sustainable development programs. Though Indonesia was quite early in stipulating environmental measures, enforcement of laws and regulations is still very weak. This is understandable, as environmental protection requires skilled experts to install the equipment and environment-trained judicial personnel, and at the same time imposes additional costs on companies. As the compilation of laws and regulations in the Annex shows, there is not many that link environment with trade. Furthermore, developing economies suspect that measures taken by developed economies to link environment with trade might simply be disguised trade barriers.

⁷ Tarmidi: 46-7

⁸ Tarmidi: 47

It is argued here that environmental measures should be confined to environmental protection alone and not linked with trade sanctions. Environmental degradation and carelessness in developing economies are mainly due to ignorance and to backwardness in environment technology. Rather than applying trade sanctions on developing economies, it would be better if the advanced industrialized economies instead provided them with technical assistance in respect of environmental protection. It is unfair to punish developing economies for something they do not have: that is, the means, the capital and the technology to undertake due environmental protection measures as demanded by developed economies. Using trade sanctions to achieve environmental goals might indeed be counterproductive, as these will not only inhibit potential trade expansion which could bring more economic welfare to all concerned, but they are also less effective in achieving the goal of sustainable development as they do not directly affect the root cause of the environmental problem.⁹

Nonetheless, in view of the increased pressure from advanced economies, developing economies cannot avoid preparing themselves to accept international agreements on environmental protection in the near future. However, in applying pressure, the developed economies should also take into account the endangered livelihood of a large number of poor families in developing economies, whose incomes depend mainly on the exploitation of natural resources, alas quite often without due consideration to environmental preservation.

The Southeast Asian member economies of APEC, except Singapore, are all wood-producing countries and are in the process of industrialization. On the other hand, their main trading partners and source of investment are the U.S., Japan and other developed APEC member economies. Therefore, APEC is the appropriate forum for technical cooperation in the field of environmental protection. Rather than resorting to trade sanctions, which do not solve the problem, technical cooperation would help develop concrete measures which would be much more productive.

⁹ Compare Tarmidi, 1997: 343

References

- Anderson, K.; R. Blackhurst eds. (1992), *The Greening of World Trade Issues*, New York, etc.: Harvester-Wheatsheaf.
- Harahap, H., Minister of Forestry (1992), "Indonesia Sustainable Forest Management", paper delivered at the *Seminar on Development and Environment*, University of Indonesia, Jakarta, July 7.
- Roesad, K. (1996), "International Trade and Environment: Implications for Indonesia", in: M. Pangestu, R. Atje, J. Mulyadi (eds.), *Transformation of the Indonesian Industry in An Era of Free Trade*, Jakarta: CSIS, pp. 115-133.
- Salim, Emil (1988), *Environment-oriented Development*, 2nd printing, Jakarta, LP3ES.
- Sanda, A. (1995), "Between Ecolabelling, the Change in Europe's Position and Poverty", *Jakarta: Kompas Daily News*, June 16, p. 13.
- Tarmidi, L.T. (1995), "Indonesia's Position on Environmental and Social Clauses in Trade", in: R. Rasiyah, N. v. Hofmann (eds.), *Social and Environmental Clauses and Free Trade, Europe and Southeast Asia*, Bonn: Friedrich Ebert Stiftung, pp. 44-52.
- Tarmidi, L.T. (1997), "Indonesia-US Economic Relations Under APEC: Problems and Prospects", in: *Economics and Finance in Indonesia*, Vol. XLV No. 2, Jakarta: LPEM-FEUI, pp. 335-368.

ANNEXES

LAWS AND REGULATIONS ON ENVIRONMENT AND TRADE

Annex A: Trade-related Environmental Measures

1. The Government of Indonesia's Decree No. 20, Year 1990, on the Management of Water Pollution, signed by the President on June 5, 1990.

- Ch I General provisions
- Ch II Inventory of water quality and quantity
- Ch III Categorization of water
- Ch IV Water management
 - Art. 17 (1) Anybody or any corporate body that disposes of liquid waste is obliged to maintain a specified level of quality.
- Ch V Permit issuance
- Ch VI Control and monitoring
- Ch VII Cost allocations
- Ch VIII Sanction
- Ch IX Transitional provisions
- Ch X Closing provisions

2. Law No. 5, Year 1990, on The Conservation of Living Natural Resources and Their Eco-system, signed by the President on August 10,1990

- Ch I General provisions
 - Art. 1 Living natural resources shall be elements in nature consisting of living plant and animal resources that together with surrounding non-living elements constitute an ecosystem.
 - Art. 3 Conservation of living natural resources and their ecosystem is intended to sustain living natural resources and to balance the ecosystem in order to enhance human welfare and quality of human life.
 - Art. 4 Conservation of natural living resources and their ecosystem shall be the responsibility and obligation of the government and the people.
 - Art. 5 Conservation of living natural resources and their ecosystem shall be brought about through following activities:
 - a) protection of life support system;
 - b) preservation of plant and animal species diversity and their ecosystem;
 - c) sustainable utilization of living natural resources and their ecosystems.
- Ch II Protection of the living supportive system
 - Art. 10 Degradation within a life support system area due to natural processes or unwise utilization or other causes shall be followed by planned and continuous rehabilitation efforts.
- Ch III Preservation of biodiversity and its ecosystem
- Ch IV Natural reservation areas
- Ch. V Preservation of flora and fauna

Ch VI	Sustainable exploitation of natural living resources and its ecosystem
Ch VII	Natural conservation areas
Ch VIII	Wild Species Utilization
Ch IX	People's participation
Ch X	The transfer for assistance from other departments
Ch XI	Investigations
Ch XII	Provision of criminal punishment
Ch XIII	Transitional provisions
Ch XIV	Concluding provisions.

3. Minister of Forestry Decree No. 252/KPTS-II/1993 on The Criteria and Indicators for Sustainable Indonesian Natural Production Forests, April 29, 1993

Art. 1(1) The management of Indonesian natural production forests must be based on the principle of sustainability

Art. 2(1) Criteria for the management of sustainable natural production forests are:

- a) aspects of forest resources;
- b) aspects of sustainable production;
- c) aspects of conservation;
- d) social-economic aspects; and
- e) institutional aspects.

4. Government Regulation No. 51 Year 1993 on Environmental Impact Analysis, signed by the President on October 23, 1993. Amendment of Government Regulation No. 29 Year 1986.

Art. 1 The management of the living environment is an integrated effort in the utilization, planning, maintenance, control, management, recovery, and development of the living environment.

Art. 2 An undertaking or activity that might have an important impact on the living environment covers:

- a) changing the form of the soil and the scope of nature;
- b) exploitation of renewable and non-renewable natural resources;
- c) processing and activity that potentially can caused wastes, damage, and degradation in the utilization of natural resources;
- d) processing and activity that might affect social and cultural environment;
- e) processing and activity that might affect the sustainability of natural conservation areas and/or protection of cultural heritages;
- f) introduction of plant species, animal species, and microorganism;
- g) production and utilization of living and non-living substances;
- h) application of technology that might have great potential of affecting the environment;
- i) activities that have high risk and influence the state defence.

Art. 3(1) Important impact of an undertaking or activity on the living environment is determined by:

- a) the number of people that are affected;
- b) the extent of the area affected;

- c) the duration of the impact;
- d) intensity of the impact;
- e) the number of other components that are affected;
- f) the cumulative effect of the impact;
- g) reversibility or irreversibility of the impact.

5. Minister of Industry Decree No. 250/M/SK/10/1994 on Technical Guidelines for the Reporting of Containment of Impacts on Living Environment in the Industrial Sector, October 20, 1994

Ch I	General provisions
Ch II	Industrial activities that can pollute the living environment and obligations of industrial enterprises <ul style="list-style-type: none"> ▪ Art. 2 Any industrial enterprise must exercise impact control on the living environment due to industrial activity ▪ Art. 3 There are three classifications of industrial activities: <ul style="list-style-type: none"> 1) those that have important potential impact on the living environment 2) those that do not have important impact and/or technologically its impact can be managed 3) those that have other impact on the living environment
Ch III	Implementing the evaluation of environmental impact analysis
Ch IV	Reporting on efforts of environmental management and efforts of monitoring the environment
Ch V	Permit
Ch VI	Details on reporting
Ch VII	Plans for overcoming emergency situations
Ch VIII	Implementation of environmental management and controlling pollution
Ch IX	Sanctions
Ch X	Closing stipulations

Annex I. Industrial activities that need environmental impact analysis certificate

1. Cement through the process of clinker
2. Pulp
3. Chemical fertilizers
4. Up-stream petro-chemicals
5. Steel-melting
6. Black tin melting
7. Copper melting
8. Alumina processing
9. Mixed steel
10. Aluminum ingot
11. Pellet and sponge processing
12. Pig iron
13. Ferro alloy
14. Industrial estates
15. Shipyard with production of over 3,000 DWT
16. Aircraft
17. Integrated plywood

- 18. Arms, ammunition and detonators
- 19. Primary pesticides
- 20. Battery.

6. State-Minister for Environment Decree No. 42/MENLH/11/1994 on General Principles and Guidelines for Environment Audit.

7. State-Minister for Environment Decree No. 39/MENLH/8/1996 on Activities Needing Environmental Impact Analysis Certificates, August 26, 1996

- Art. 1 Economic activities that need environmental impact analysis certificate are listed in the Annex
- Art. 2 Activities that are not in the list, but where its location is next to a conservation area must also be supplied with an environmental impact analysis certificate
- Art. 8 This stipulation replaces the State-Minister of Environment Decree No. KEP-11/ MENLH/3/1994.

8. Law No. 23 Year 1997 on the Management of Environment, signed by the President September 19, 1997. This Law is an amendment of Law No. 4 year 1982 on the Principles of Environmental Management by adding environmentally sustainable development.

- Ch I General provisions
 - Art. 1 By environment is meant the whole of space with all its goods, capacity, condition and all living things, including man and his behaviour, that influences the preservation of lives and wellbeing of man and other living creatures.

- Ch II Principles, objectives and targets
 - Art. 3 Environmental management aims at sustainable development in the context of environmental concerns.

- Ch III Rights, obligations and role of the people
 - Art. 5(1) Every person has the same right to an environment which is good and healthy.
 - (2) Every person has the right to environmental information which is related to environmental management roles.
 - (3) Every person has the right to play a role in the scheme of environmental management in accordance with applicable laws and regulations.
 - Art. 6(1) Every person is obliged to preserve the continuity of environmental functions and protect and combat environmental pollution and damage.

- Ch IV Environmental Management Authority
 - Art. 8(1) Natural resources are controlled by the state and as such are utilized for the maximum wellbeing of the people, and the arrangements thereof are determined by the government.
 - Art. 9(1) The government stipulates national environmental management policies and management of space with due considerations as to religious values, culture and traditions and the living norms in the community.

- Art. 9(3) Environmental management must be performed in an integrated manner with spatial management, protection of non-biological natural resources, protection of artificial resources, conservation of biological natural resources and their ecosystems, cultural preservation, bio-diversity and climate change.
- Ch V Preservation of environmental functions
 - Art. 15(1) Every plan of a business and/or activity with the possibility that it can give rise to a large and important impact on the environment, must possess an environmental impact analysis.
 - Art. 16(1) Every party responsible for a business and/or activity must carry out management of wastes produced by their business and/or activity.
 - Art. 17(1) Every party responsible for a business and/or activity must carry management of hazardous and toxic materials.
- Ch VI Environmental Compliance Requirements
 - Art. 18(1) Every business and/or activity which gives rise to a large and important impact on the environment must possess an environmental impact analysis to obtain the license to conduct a business and/or activity.
 - Art. 21 Every person is prohibited from importing hazardous and toxic wastes.
- Ch VII Environmental dispute settlement
- Ch VIII Investigation
- Ch IX Criminal provisions
- Ch X Transitional provisions
- Ch XI Closing provisions

Elucidation

General

7. Development continuously exploits natural resources for increasing community prosperity and quality of life. Meanwhile, the supply of natural resources is limited and uneven, both in quantity and quality, while requests for such resources accelerate as a result of the increase in development activities to satisfy accelerating and increasingly diverse needs of the population. On the other hand, the environmental supportive capacity can be interfered with and the environmental carrying capacity can decline.

Accelerating development activities carry environmental pollution and damage risks with the result that the structure and function of the ecosystem which acts as a support to life can be damaged. This environmental pollution and damage will become a social burden, the cost of reparation of which will ultimately be borne by the community and government.

The maintenance of the sustainability of environmental functions constitutes a community interest, so that it demands responsibility, openness, and a role for members of the community, which can be channeled by people individually, environmental organizations, such as non-government organizations, traditional

community groups, and others, for maintaining and increasing environmental supportive and carrying capacity which becomes a mainstay of sustainable development. Development which incorporates the environment, including natural resources, is a medium for attaining sustainable development which is a guarantee of prosperity and quality of life of present and future generations. Therefore, the Indonesian environment must be managed by a principle of preserving environmental functions which are harmonious and balanced for supporting environmentally sustainable development for the increase in prosperity and quality of life of present generations and future generations.

8. ... This Law contains norms of environmental law. Apart from this, this Law will be a foundation for evaluating and adapting all applicable laws and regulations which contain stipulations on the environment, that is laws and regulations regarding irrigation, mining and energy, forestry, biological and ecosystem resource conservation, industry, human settlement, spatial ordering, land use, and others. ...

Article 15, Subsection (1)

Environmental impact analysis on the one hand is a part of a feasibility study for implementing a plan for a business and/or activity, and on the other hand is a condition which must be fulfilled to receive a license to carry out a business and/or activity. Based on this analysis important and large impacts on the environment can be known in more detail, both positive impacts and negative impacts which arise from an business and/or activity such that steps can be prepared to cope with negative impacts and maximize positive impacts.

To measure or clarify such large and important impacts among others criteria are used concerning:

- a) the number of people who will be affected by the impact of the business and/or activity plan;
- b) the extent of the area affected;
- c) the intensity and duration of the impact;
- d) the amount of other environmental components which will be affected;
- e) the cumulative nature of the impact;
- f) reversibility or non-reversibility of the impact.

Annex B: Environment-related Trade Measures

1. **Law No. 9 Year 1990 on Tourism, signed by the President October 18, 1990. The Law considers that nature, flora and fauna, ancient and historical heritage, art and culture owned by the Indonesian people are important resources and capital for the development of tourism. Therefore:**
 - Art. 6(c) Preserve the cultural heritage and the quality of environmental life
 - Art. 35 A penalty or body punishment will be applied to those who violates against the law of environmental life protection, cultural artifacts, conservation of natural living resources and the ecosystem, fishery, and other laws.

2. **Minister of Trade Decree No. 99/Kp/IV/92 on Notification of Imports of Yellow-fin Tuna and Products**

Art. 2 (1) Imports of yellowfin tuna and products not originating from sources or countries that use giant purse seine nets and giant drift nets in their fishing methods in the Tropical East Pacific Ocean that endanger the sustainability of dolphins must be protected by a certificate for imports of yellowfin tuna and products

(2) Imports of yellowfin tuna and products outside this area are free.

3. **Minister of Trade Decree No. 349/KP/XI/1992 on Import Prohibition of Plastic Wastes, November 21, 1992**

Clear, self-explanatory

4. **Minister of Trade Decree No. 94/Kp/V/1995 on Export Prohibition of Napoleon Wrasse Fishes (cheilinus undulatus)**

Considering that the method of catching Napoleon Wrasse fishes is causing damage to the ecosystem of coral reefs and other living sea creatures, the stipulation prohibits: Exports of Napoleon Wrasse fishes, alive or death or products thereof, except with a permit from the Minister of Agriculture.

5. **Minister of Industry and Trade Decree No. 137/MPP/Kep/6/1996 on Import Procedures of Industrial Wastes, June 4, 1996**

Imports of industrial wastes are allowed for processing industries that are in short supply from domestic sources, however measures should be taken to prevent damage to or cause degradation to the living environment, thereby endangering human health. Imports of industrial wastes need prior approval from the Director-General of International Trade and may not be sold to other parties.

6. **Minister of Industry and Trade Decree No. 110/MPP/Kep./1/1998 on the Prohibition of Producing and Trading Ozone Depleting Substances and the Production and Trade of New Goods Using Ozone Depleting Substances, January 27, 1998**

Ozone depleting substances that are still in stock at the time of the signing of this Decree can still be traded and used until January 1, 2005 (Art. 4).

Clear, self-explanatory

7. **Minister of Industry and Trade Decree No. 111/MPP/Kep/1/1998 on Goods Which Imports Are Subject to Regulation Substitution Stipulation No. 230/MPP/Kep/7/97, January 27, 1998**
- Art. 1 Prohibition of imports of goods that damage the ozone layer
 - Art. 5A Imports of CFC-12 are allowed until December 31, 2003, at a maximum of 700 ton a year through an appointed registered importer, prior to a permit.

Japanese Perspectives on Trade and Environment in APEC

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1. Introduction

The topic of trade and environment has been at the forefront of international environmental issues since the 1991 GATT panel decision on the famous Tuna/Dolphin case¹ which sparked heated discussions worldwide on the subject². The deficiency of the GATT and other international instruments was obvious from the outset of this controversy, and efforts have been made in various forums in order to overcome the confusion surrounding the issue. However, in spite of the high expectations of the international community, the first WTO Ministerial Conference held in Singapore in December 1996 did not reach any substantive consensus as to the relationship between trade and environment. The Conference merely indicated that further work was necessary in this area.³ Thus, the WTO Committee on Trade and Environment (CTE) has continued its discussion on the subject, but mainly in the form of an “educational” exercise. It does not appear that any clear-cut consensus will be emerging from the CTE in the near future.

At this juncture, APEC may be particularly well suited to address the problem for at least the following reasons: First, while China’s non-presence within the WTO/GATT forum has greatly undermined the efforts for formulating appropriate rules reconciling trade and environment, APEC benefits from China’s full participation. With its diverse, but manageably small membership, APEC will hopefully be very effective in finding commonly acceptable solutions. Second, as a regional forum for economic cooperation and trade and investment liberalization and facilitation, APEC has an important role to play in articulating the concept of sustainable development in terms of a “trade and environment” agenda.⁴ Although it is feared that the current economic recession in Asia has diminished the incentives to address the environmental degradation that is threatening the economic and social life of the region and that of the globe as a whole, this is an issue that APEC must address in order to safeguard the welfare gains achieved through economic liberalization.

In fact, the leaders of the Japanese Government, like those of other APEC economies, have committed themselves to sustainable development and to the thesis that the policies for trade and those for the environment should be mutually supportive. This is easy to say,

¹ *U.S. Restrictions on Imports of Tuna*, Mexico v. United States, 30 ILM (1991), 1594.

² Shinya Murase, “Perspectives from International Economic Law on Transnational Environmental Issues”, *Recueil des cours*, The Hague Academy of International Law, Vol. 253, 1995, p. 283f., p. 322f.

³ WTO, *Singapore Ministerial Declaration*, paragraph 16, 36 ILM (1997), 220.

⁴ Daniel C. Esty, “Trade and Environment in APEC”, *Final Report: Japan-United States Collaboration on Trade and the Environment*, Global Environment and Trade Study & Global Industrial and Social Progress Research Institute, February 1998, pp. 85-101.

but difficult to implement. Japan has grappled with this problem in a number of ways both nationally and internationally, in particular as a party to the several of the twenty-odd multilateral environmental agreements (MEAs) with trade provisions: in particular, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973, the Montreal Protocol on Substances That Deplete the Ozone Layer of 1987, and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal of 1989.⁵

This paper provides a brief description of Japan's basic policy considerations on trade and environment by referring to the relevant international agreements concluded by Japan and their implementing legislation, with a focus on trade-related environmental measures (TREM). It addresses the crucial issue of establishing compatibility between trade liberalization provisions and the measures taken under multilateral environmental agreements (MEAs). Further, it attempts to analyze some issues related to regulation on the basis of "processes and production methods" (PPMs) and also considers the implications of environmental subsidies and the use of economic instruments for environmental protection. Finally, it touches on the question of dispute settlement and dispute mediation on trade and environment issues in the context of APEC. Being an academic international lawyer, I will confine myself to *legal* aspects of the problem, and I should add that the views herein expressed are purely personal.

2. The Relationship between Trade Liberalization Provisions and the Measures Taken Pursuant to Multilateral Environmental Agreements

While there are considerable differences among the Multilateral Environmental Agreements (MEAs) as to the kinds of trade measures that the MEA parties are authorized or required to apply and the conditions pursuant to which the measures are taken, they can nonetheless be divided roughly into two types of provisions. One type intends to create disincentives for, or to impose sanctions on, non-participants in a particular treaty regime; a case in point is the Montreal Protocol. The other type is part of a mechanism the aim of which is to effect the attainment of the goal of the instrument in question; an example would be CITES. The former type is more likely than the latter to pose problems. In fact, the question of compatibility of a MEA with the GATT was first addressed in connection with Article 4 of the Montreal Protocol which provides for trade sanctions vis-à-vis non-members, an issue that has since been debated most enthusiastically at the WTO Committee on Trade and Environment.

⁵ In addition to the three agreements mentioned in the text, Japan was a party to the Convention on Conservation of North Pacific Fur Seals of 1957, which has now been terminated. Japan is also a member of the International Commission for the Conservation of Atlantic Tunas (ICCAT) which imposes multilateral trade measures against non-member nations whose fishing practices are considered as diminishing the ICCAT's conservation measures. For general background information on Japanese laws and regulation for the protection of the environment, see Akio Morishima, "Environmental Law of Japan", in Schlickman, *et al.* (ed), *International Environmental Law and Regulation*, Butterworths, 1991, pp. Jpn 1-30. With regard to the Japanese practice of international environmental law, see Shinya Murase, "Country Report-Japan", in *Yearbook of International Environmental Law*, Vols. 2-7, 1991-1996

There have been a number of proposals and suggestions on how to accommodate the trade measures of the MEAs in the WTO/GATT context. They range from modest options of utilizing existing mechanisms such as the waiver procedure, to the relatively progressive approach of adopting the method of collective interpretation in the form of "Guidelines" or an "Understanding", and further to the more ambitious proposals for amendments of the existing provisions. Those who feel that the existing GATT/WTO provisions are adequate to deal with the question consider that any clarification can be provided, as necessary, *ex post* through the WTO dispute settlement mechanism. Some others who support the progressive or ambitious approaches have suggested that the issue of the use of trade measures in MEAs needs to be addressed from an *ex ante* point of view.

In our search for the most appropriate method for harmonizing the conflicting obligations of trade agreements and the protection of the environment, we must determine the means by which legal stability and predictability can be assured, while at the same time maintaining flexibility. From such a point of view, the *ex post* approach cannot be said to be appropriate.

For example, one of the *ex post* approaches that has been suggested is to wait for clarification through the dispute settlement procedure. This, however, may not be acceptable for some economies since environmental disputes often require speedy resolution. Evidently, there is not a sufficient accumulation of WTO/GATT case law on trade and environment, which was precisely why legislative efforts were considered necessary at the time of establishment of the CTE. The option of doing nothing, which effectively preserves the *status quo*, is therefore unacceptable. Another *ex post* suggestion, the use of the waiver procedure to enable the WTO members to accommodate trade measures taken pursuant to MEAs, also has potential disadvantages, because a waiver is to be granted only in exceptional circumstances, on a case-by-case basis, only for a limited time, and with its terms and conditions strictly observed. Obtaining a waiver by a three-fourths majority (Article IX of the Marrakech Agreement) could also be time-consuming and uncertain.

In light of this, some sort of *ex ante* arrangement is inevitable. One such proposal is to develop an Understanding on differentiated treatment for trade measures applied pursuant to MEAs, depending on whether they apply between parties or against non-parties and whether they are specifically mandated in a MEA. According to this proposal, while specific and jointly notified trade measures applied among MEA parties would prevail over their WTO obligations, non-consensual measures, that is, those applied among parties but not specifically mandated in a MEA, could be tested through WTO dispute settlement against procedural and substantive criteria which would be set out in the Understanding. This seems to be a well thought-out proposal incorporating as a package a number of suggestions hitherto made to accommodate MEAs in the WTO legal regime. One resulting question is what the legal status of the Understanding would be in relation to the WTO dispute settlement: whether it would be binding on the WTO panels and appellate body in their decision-making, or whether it would remain a frame of reference allowing the decision-makers certain discretion and flexibility in their judgment.

Amending existing WTO/GATT provisions in order to make the MEA-based trade measures compatible would require a two-thirds or three-fourths majority of WTO Members, or even unanimity in some cases (Article X of the Marrakech Agreement). Such amendments can be realized only by the strong will and energy of WTO members, which now seems to be non-existent. Nevertheless, a number of proposals have been made.⁶

Finally, an approval procedure has been proposed to include measures undertaken in the pursuance of obligations under a MEA. Such a procedure would operate along the lines of Article XX(h), which provides for the measures taken under an international commodity agreement “not disapproved by the competent organ of the WTO”. This method, with set criteria, will assure, in my view, that the WTO will have sufficient discretionary power to evaluate a MEA as regards its compatibility with the objectives and conditions of the WTO/GATT, while at the same time providing the necessary degree of predictability to the drafters of the MEA, which will help reduce confusion.⁷

In the course of consideration at the CTE, Japan proposed to draw up non-binding interpretative guidelines, with the possibility of making them legally binding with appropriate modifications as necessary. According to this proposal, guidelines could be used by MEA negotiators to provide them with an authoritative point of reference on the application of WTO provisions when they are considering the use of trade measures pursuant to MEAs. They could also be used by WTO dispute panels when examining the compatibility with WTO rules of trade measures applied pursuant to MEAs. Finally, they could serve as a basis on which the WTO Secretariat would provide technical advice on WTO provisions to MEA Secretariats and environmental negotiators. While the proposed guidelines are not intended to be used directly in a panel examination, they nonetheless could have a certain impact on the scrutiny of panels. It was also pointed out that formal decisions concerning substantive criteria made by the relevant MEA authority should be taken into sufficient account on the condition that the MEA meets procedural criteria that would reflect its consensual basis, and that these substantive criteria could incorporate characteristics of MEA trade measures such as their necessity, effectiveness and proportionality.⁸

⁶ One of the most popular suggestions is the insertion of the term “environment” into Article XX(b). However, that provision may not be a particularly comfortable place for an “environmental window” because the paragraph is primarily related to sanitary and quarantine measures. Another alternative is amending WTO/GATT so as to provide for a “tramping treaty clause” or a “coherent clause”, either by listing existing MEAs, such as the Montreal Protocol, Basel Convention and CITES as in the case of NAFTA Article 104, or by formulating abstract criteria for MEAs to be met by which obligations arising from those MEAs would override obligations of the WTO/GATT. The effectiveness of such a clause depends on its formulation: the NAFTA formula may be appropriate for a group of States which are parties both to the WTO/GATT and MEAs, but may not solve the problem for non-parties to MEAs, while an abstract formula may itself create more problems than a solution.

⁷ See Murase, *op.cit.* (Perspectives), p. 348; also see Robert E. Hudec, “GATT Legal Restraints on the Use of Trade Measures against Foreign Environmental Practices”, in Jagdish Bhagwati & Robert E. Hudec, *Fair Trade and Harmonization: Prerequisites for Free Trade?* Vol. 2 (Legal Analysis), pp.125f.)

⁸ Proposal by Japan, WT/CTE/W/31, 30 May 1996.

It appears that the Japanese proposal is a well thought-out and realistic one that deserves adequate attention or, at least, constructive criticism. In any event, it is indispensable for the international community to reach a consensus on the criteria and procedure to determine the required compatibility. In this context, the APEC forum can no doubt make a significant contribution.

3. Legal Aspects of the Trade-Related Environmental Measures

When Japan ratified the above mentioned environmental agreements, namely, the CITES, the Montreal Protocol and the Basel Convention, Japan simultaneously took measures to enact the domestic laws for their implementation⁹. These laws, incorporating the trade measures as provided for in the respective agreements, refer to the Foreign Exchange and Foreign Trade Law in enforcing import and export restrictions. These economic measures may not cause any serious problems either domestically or internationally, insofar as they are clearly based on the provisions of the widely-accepted environmental conventions. However, non-treaty-based requirements, such as those relating to the processes and production methods (PPMs) may be questioned from the viewpoint of law and policy.

PPMs and Related Questions

The first question to be addressed in this section is the permissibility of the PPM requirements. It was not until 1987 that GATT, which is basically an instrument designed to regulate the flow of goods as *products*, was faced squarely with the question of the *processes and methods* of production for the first time. In the course of negotiating the Montreal Protocol, the committee that drafted Article 4 relating to the trade restriction with non-parties to the Protocol discussed the question of compatibility of the PPM requirements with the General Agreement. At that time, the GATT Secretariat reportedly expressed the view that such requirements were permissible. As a result, Article 4 of the Montreal Protocol provides not only for the restriction of CFCs themselves and goods containing CFCs, but also for the restriction of “goods which are produced with CFCs even where the goods do not contain them.”¹⁰ It is this last category of regulations that concerns PPMs.

Under the WTO/GATT law, it is my understanding that, in order to recognize a PPM requirement as permissible, there should be “a clear and direct, or at least immediate, link” between a proposed PPM and the physical characteristics of the product. Unless we

⁹ Implementing legislation for the CITES is Law concerning Regulation, etc. of Transfer of Endangered Species (Law No. 58 of 1987). The Law concerning Regulation, etc. of Special Birds (Law No. 49 of 1972), the Nature Conservation Law (Law No. 85 of 1972) and the National Parks Law (Law No. 161 of 1957) are also relevant. For the Montreal Protocol, Law concerning Protection of the Ozone Layer through Control of Certain Substances (Law No. 53 of 1988). Regarding the Basel Convention, Law on the Control of Export and Import of Certain Hazardous Wastes (Law No. 108 of 1992) has been enacted. Law concerning the Disposal and Cleaning of Wastes (Law No. 137 of 1970) is also relevant.

¹⁰ The Conference of the Contracting Parties of the Montreal Protocol decided in 1993, however, that implementation of this clause should be postponed because it was determined that detection of violations of PPM regulation, for instance in the production of semiconductors made with CFCs, is not technically feasible or prohibitively expensive.

maintain this link, we will face unjustified impediments to trade. PPM requirements can easily be extended in an unwarranted fashion with the introduction of extra-legal considerations such as competitiveness and moral values, which should be avoided since they lead to a “slippery slope” argument, resulting, perhaps, in a type of “eco-imperialism!”¹¹.

The new Agreement on the Technical Barriers to Trade (TBTs) provides that technical regulations should not be applied in such a way as to create unnecessary obstacles to international trade, and that technical regulations “shall not be more trade-restrictive than necessary to fulfil a legitimate objective” such as protection of the environment (Article 2.2). Annex I of the Agreement defines a technical regulation as one which specifies “product characteristics or *their related* processes and production methods” (emphasis added). The adjective “their” is very important because it is considered as indicating the need for a direct link between the processes and the characteristics of the product in case of mandatory regulations.¹²

Under the TBT Agreement, Japan has made the following notifications on the environment-related measures: Gas oils for automobile emission reduction (G/TBT/Notif. 97.7) and Electric refrigerator-freezers for energy conservation (G/TBT/Notif. 97.764).

Closely related to the PPM requirements is a question regarding “labelling and packaging”. Labels and packages can be effective tools for enhancing protection of the environmentally sound products and for identifying environmentally deficient imports, but at the same time the requirement can sometimes be deemed “unjustifiable discrimination” and “disguised restriction on international trade”, creating friction among States¹³.

Japan has established the “eco-mark” system since 1989, which is carried out by the Nihon Kankyo Kyokai (Japan Ecological Association) established under the auspices of the Environmental Protection Agency. The objective of the eco-mark is to encourage consumers to choose environmentally sound products. The eco-mark is currently granted to some 2,600 items in 57 groups of products.

In coping with the problem of technical barriers to trade, non-binding standards may better serve the proposed goals in certain areas. In fact, the ISO standards play a very important role in harmonizing technical standards, including those for labeling and packaging. The International Standardization Organization certifies, under the ISO-14,000 series in particular, a production facility as capable of producing environmentally sound products. Though the ISO standards are voluntary in nature, they are complied with by major industries worldwide, making the standards in fact very effective.

¹¹ Shinya Murase, *op. cit.* (Perspectives), pp. 336-344.

¹² It may be noted that the definition of non-mandatory “standards”, by contrast, does not contain the word “their” before “related processes and production methods”, which may be construed as not requiring the direct link in case of voluntary standards such as ISO standards.

¹³ In this context, the dispute between Austria and the ASEAN economies over the export of tropical timber in 1992 may be recalled. Murase, *op.cit.* (Perspectives), pp. 342-343.

Environmental Subsidies

The evaluation of environmental subsidies is controversial. Clearly, environmental subsidies can help reduce emissions at least in the short-run. However, the long-run effects are not so obvious. Indeed, whether a given subsidy would create negative effects or positive ones in the long term would perhaps depend on various factors. While the studies conducted by the OECD¹⁴ and various economists¹⁵ stress the “evils” of subsidies, the Japanese Government does not appear to take a clear-cut position on the issue and merely suggests that further empirical study is necessary to adequately assess the impact of trade liberalization and improvement of market access on the environment.

Thus, at the WTO/CTE meeting, the Japanese delegate made the following remarks: “there are various inter-related factors, including natural conditions, and socioeconomic circumstances in each country, which cause environmental problems, and the CTE should advance empirical and theoretical analysis. Agricultural trade liberalization could cause environmental problems in some Members by intensifying pressure on and the degradation of their natural resources if effective environmental policies were not in place. In more general terms, trade liberalization without appropriate environmental policies may have negative effects on the environment.”¹⁶

Japan has made the following environment-related notifications under the Agreement on Subsidies and Countervailing Measures:

- 1) Subsidy for loans to the pollution prevention fund for the mining (metals) sector;
- 2) Subsidy for the Bekko and Ivory Industries in order to provide relief to the industry injured due to the prohibition of trade under the CITES;
- 3) Subsidy for development of rational energy use systems for the residential sector in order to assist technological development; and
- 4) The New Sunshine Program for research and development of technology for sustainable development.¹⁷

Japan has also made environment-related notifications under the Agreement on Agriculture as follows:

- 1) Environmental Programs in the form of payments for conversion and payments for maintaining paddy fields in environmentally good condition through cultivation of plants other than rice or other appropriate managements, and
- 2) Research in connection with environmental programs (G/AG/N/JPN/21).

¹⁴ OECD, *Subsidies and the Environment: Exploring the Linkages*, Paris 1996.

¹⁵ Hidenori Niizawa & Kazuhiro Ueta, “Environmental Subsidies in the Trade and Environment Context”, in *Final Report: Japan-United States Collaboration on Trade and the Environment*, GETS & GISPRI, 1998, pp. 1-15. It is stated that: “Because the subsidy would lower average costs, it would serve to spark new entries. Accordingly, since the subsidy would not only encourage the reduction of total emissions but would also increase the number of enterprises, the long-term tendency would be to increase the amount of emissions...” (*ibid.*, pp. 6-7).

¹⁶ Non-paper by Japan, June 24, 1996.

¹⁷ G/SCM/N/16/JPN/Suppl.1, G/SCM/N/25/JPN, G/SCM/N/25/JPN/Suppl.1.

The above assistance programs implemented in Japan are largely identified as favorable tax treatment such as special depreciation measures and long-term low-interest financing. The legal basis for such programs is found in Article 22, paragraph 1 of Japan's Environment Basic Law (Law No. 91 of 1993) which stresses the necessity of rendering "proper economic assistance" to reduce emissions.¹⁸ Under the WTO Agreement on Subsidies and Countervailing Measures, the above measures are considered legitimate "green-light" subsidies and assistance programs. Nonetheless, the adequacy of these programs as exceptions to the "polluter pays principle" should further be studied, and by so doing, improvements should be sought for the procedure of monitoring such environmental subsidies.

Economic Instruments

The use of economic instruments has been under discussion for several years in Japan as experts have become concerned with the fact that many environmental regulations based on the so-called "command and control" method, in spite of high administrative costs necessary for its implementation, have not resulted in environmentally sounder products, technologies or behavior. The use of economic instruments is premised on the notion that the market can be used effectively to internalize environmental costs and to provide incentives to guide human behavior which can be achieved comparably at less expensive cost.

Apart from a limited implementation of "deposit and refund" systems, Japan has not yet adopted any major economic instruments such as environmental taxes and tradable emission permits. Yet the Environment Basic Law of 1993 encourages in Article 22, paragraph 2, consideration and adoption of the use of economic instruments.¹⁹ In line with this provision, the Environment Protection Agency has actively pursued the possibility of introducing environmental tax system by way of "greening" the tax system, but the national consensus on this point has not yet been materialized.

The rationale behind the charges and taxes for environmental purposes is that they create an incentive for polluters to limit activities which can be harmful to the environment, such as emissions, the generation of waste, and the excessive use of natural resources. The difference between a charge and a tax is reflected by the difference in the way revenue is allocated: Tax revenue is added to the general public budget, while charge revenues are

¹⁸ Article 22, paragraph 1 stipulates: "The State shall, by encouraging persons...to take appropriate measures to prevent interference with environmental conservation such as improvement of the facilities for reducing environmental load, make efforts to take necessary measures to give them necessary and proper economic assistance considering their economic situation, etc."

¹⁹ Article 22, paragraph 2 of the Environment Basic Law provides that "...the State shall conduct appropriate surveys and researches on the effectiveness of implementing measures related such policies [of using economic instruments] with regard to prevention of interference with environmental conservation and on the effect, etc. on Japanese economy, and if it is necessary to take such measures, the State shall make efforts to obtain the understanding and cooperation of the people with regard to prevention of interference with environmental conservation by utilizing the policies related to such measures. In this case, if such measures are related to the policies for global environmental conservation, the State shall consider international collaboration to properly ensure the effectiveness of such measures."

specifically to finance environmental measures. Obviously, the effect on the environment is much greater in the latter case.

While taxes and charges are very effective tools for the achievement of environmental goals, particularly in the context of global warming, the unavoidable question is their international impact on competitiveness. If a uniform environmental tax is applied to all economies, or at least to all of the major industrialized economies, it will pose no problem. It is unrealistic, of course, to perceive of such a uniform tax in the near future. Even if major industrialized economies come to adopt certain environmental tax systems, inevitably some kind of international coordination to offset the differences of the tax systems of each economy will be required. Accordingly, the mechanism of border-tax-adjustment²⁰ becomes very important, and it is hoped that the new guidelines will be worked out by the WTO with focus on the adjustment of environmental taxes.

With regard to economic instruments other than taxes, the Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted on 11 December 1997, has incorporated the systems of tradable emission permits and activities implemented jointly²¹. Implementation of these economic measures is being vigorously pursued both by the Government and private enterprises in Japan. These indirect methods of economic incentives and disincentives utilizing market mechanisms are considered much more efficient. They also have the advantage of creating much less friction and disputes among states and economies as compared to the regulatory methods of direct control. It seems, however, to be a long way before they become fully in operation.

²⁰ See, in detail, Murase, *op.cit.*(Perspectives), pp. 404-408.

²¹ With regard to the activities implemented jointly (AIJ), or joint implementation, as well as tradable emission permits, see Murase, *Ibid.*, pp. 408-412.

4. Conclusion

As I stated at the outset, the WTO/GATT law as it stands is helplessly vague for the solution of the problems on trade and environment, and the lack of substantive rules in this area is a serious question of the international community, considering the fact that disputes surrounding the issues of trade and environment are definitely expected to be on the increase. A word on dispute settlement mechanism may be in order in this conclusion.

The dispute settlement procedure has been substantially strengthened and “judicialized” under the new WTO, which has attained a rule-oriented, binding system of adjudication with compulsory jurisdiction over virtually the entire body of WTO law. The intention and aspiration of its drafters was clearly to move toward a “self-contained regime”, with the notion that unilateral measures can be effectively “contained”, and that resort to such measures is prohibited. In spite of such an improvement in the procedural law, no comparable substantive law has yet to emerge with regard to trade and environment. The resulting situation could justify a claim or resort to unilateral remedies under general international law, as was witnessed in the Tuna/Dolphin and Tropical Timber cases, which is naturally an undesirable and pathological phenomenon for the rule of law in the international community.²²

In view of such a situation, the task and responsibility of the APEC forum is clearly to work out not only the substantive rules on trade and environment but also the procedural law applicable to such disputes. Establishment of viable dispute settlement mechanism is indeed crucial in the context of APEC. While judicial settlement and arbitration are clearly effective mechanisms for resolving disputes, *mediation* seems to be a preferred alternative in APEC as recommended by its committees. Whatever the form, it is important in my view that the system can function effectively in the form of binding mediation with assurance of implementation by the parties.²³ In any event, APEC has an important role to play in making trade and environment mutually supportive and sustainable.

²² Shinya Murase, “Unilateral Measures and the WTO Dispute Settlement”, in Simon S.C. Tay & Daniel C. Esty, eds., *Asian Dragons and Green Trade: Environment, Economics and International Law*, Times Academic Press, 1996, pp. 137-144.

²³ James Cameron & Tanya White, “Dispute Mediation in APEC: Bringing the Legal and Cultural Gaps”, in *Final Report: Japan-United States Collaboration on Trade and the Environment*, GETS & GISPRI, 1998, pp. 119-145. See also Shinya Murase, “Comments on Dispute Mediation”, *ibid.*, pp. 146.

International Environmental Pressures and Korean Trade

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1. Introduction

Environment-related trade barriers have been ever growing due to public needs for a high quality of environment and amenities of life. Korea is not an exception. Even though the interrelationship between trade and environment has not been fully explored, Korea has already gained much experience in external markets suggestive that Korean trade has become hindered by foreign environment-related measures. These perceptions are, however, qualitative and preliminary in nature and not based on quantitative analyses.

Here, we classify all the measures related to environment into two categories: measures applied pursuant to Multilateral Environmental Agreements (MEAs) and those applied unilaterally. It has been clear throughout the discussions on this issue in the GATT/WTO that the preferred approach for governments to take in tackling transboundary and global environmental problems is cooperative, multilateral actions under an MEA.

Environmental trade measures for the purpose of curbing pollution outside the economy can be divided into four categories:

- 1) trade measures explicitly authorized by international agreement and imposed multilaterally;
- 2) unilaterally imposed trade measures for the purpose of supporting internationally agreed upon standards;
- 3) unilaterally imposed trade measures aimed at global or transboundary pollution affecting the economy imposing the measures;
- 4) unilaterally imposed trade measures invoked without any MEA and aimed at extraterritorial harms without direct physical harm to the economy imposing the measures.

Measures in Category 1 are applied pursuant to MEAs. A recent WTO report (1994) stated that 18 of the 180 MEAs in existence contain trade measures. The most important examples are the Vienna Convention and Montreal Protocol on Ozone Depleting Substances (ODSs), the Convention on International Trade in Endangered Species (CITES), and the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal.

In addition to these three MEAs, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biodiversity, and the negotiation process within the United Nations Conference on Environment and Development (UNCED) may have trade effects even though they do not include explicit trade measures as an enforcement

mechanism. For example, the UNFCCC has been considering several global measures such as joint implementation, tradable permits, and an international carbon tax. Among them, especially the international carbon tax may seriously affect international trade.

Measures in Categories 2, 3 and 4 may be considered in broad conceptual terms as unilateral trade measures which, to varying degrees, may not be strictly compatible with WTO rule. Categories 2 and 3 are examples of so-called “multilateral unilateralism.” Here, the imposition of environmental trade measures, although unilateral in appearance, has an element of multilateralism, in the sense that the measures, while not explicitly authorized by international agreements, do aim to give effect to such agreements. Therefore, these cases even if unilateral, need an appropriate examination for the legitimacy of the environmental injury suffered or multilateral factors and the appropriateness of the trade penalties imposed. We can find a lot of examples in the trade realm for multilateral unilateralism. There is a good example in Korea for Case 2, namely, U.S. taxation on Ozone Depletion Substances (ODSs), which will be described below.

Measures in Category 4 constitute an extreme instance of unilateralism. Psychological spillovers and/or competitiveness concerns related to external environmental issues appear to be the main driving forces behind such unilateral trade measures. However, the underlying environmental problems should be dealt with through international agreements, consistent with the Rio Declaration suggestion that unilateral environmental trade measures should be avoided.

Nevertheless, in recent years, there have been several examples of measures that fall into Category 4. A prime example is the tuna-dolphin dispute between the United States and Mexico. It is well known that the US dolphin-protection standard was inappropriately “extrajurisdictionally” applied to Mexico under the GATT rule. This means that it is improper under the GATT to use trade measures to try to alter foreign production processes. However, the GATT does permit countries to use trade measures to protect their own domestic environmental standards as long as the restrictions are imposed on the products themselves.

Another example that would fall within Category 4 is that of environmental countervailing duties, which have never yet been exercised but have been seriously debated for a long time.¹ Korea has been concerned that unilateral and extraterritorial trade actions might do serious harm to the free trade system and, in particular, to Korean exports. Many other free traders fear what aggressive unilateralism might do to trade liberalization as well.

The following table shows what would be appropriate unilateral measures according to locus significance of environmental harm, which is given by Esty (1994). Measures in each cell represent the most severe action that ought to be taken. But in each case this or any less-restrictive measures could be employed. Severe measures would be justified only after less trade-intrusive measures had been tried and failed. If international standards have

¹ US House of Representative’s minority leader Dick Gephardt’s call for a Green 301 provision referred to Section 301 of the US Trade Act of 1974, which authorizes the USTR to take unilateral action in response to unfair trade practices by foreign producers. In 1991, the U.S. Senate had proposed the International Pollution Deterrence Act which included environmental countervailing duties as a trade measure for balancing environmental costs between U.S. and exporting economies such as Mexico.

been adopted, more serious restrictions might be justified. Nevertheless unilateral actions should be taken only under extraordinary circumstances.

Table 1
Matrix of Appropriate Unilateral Measures by
Locus Significance of Environmental Harm

Locus of harm (vis-à-vis country imposing trade measures)	Rapid, major, certain, irreversible harms (serious)	Less rapid, major, certain, or reversible harms (moderate)	Least certain, slower, reversible, or narrower harms (limited)
Domestic	Bans	Bans	Bans
Transboundary	Sanctions	Sanctions	Import restrictions
Global	Sanctions	Bans	Labeling
Foreign with spillovers	Sanctions	Bans	Labeling
Foreign	Labeling	Labeling	Labeling

Source: Esty, D.C., *Greening the GATT: Trade, Environment, and the Future*, IIE 1994.

There are too many cases of international environmental regulations affecting trade to be illustrated in a short paper. Therefore this paper concentrates on several major cases, which might affect the Korean economy and trade seriously. Included are major MEAs such as CO₂ emission limits and the international carbon tax considered in the context of the UNFCCC, the trade restrictions on ODSs pursuant to the Vienna Convention and the Montreal Protocol, the trade restrictions on toxic wastes authorized by the Basel Convention, and the Convention on Biodiversity, etc. And environmental countervailing duties, US taxation on products made with CFCs, foreign environmental standards, and eco-labeling are also mentioned. It should be noted that the international carbon tax and environmental countervailing duties are hypothetical issues at this stage and have not yet been introduced in reality.

2. UNFCCC

Climate Change and UNFCCC

The United Nations Framework Convention for Climate Change (UNFCCC) is a global convention which aims at stabilizing greenhouse gas concentrations in the atmosphere. In order to secure food production and to ensure sustainable economic development, this Convention seeks to prevent anthropogenic risk related to the climate system, within a time frame sufficient for the ecosystem to adapt naturally to climate change.

The UNFCCC was adopted on May 1992 in New York and opened for signature during UNCED held in June 1992, in Rio de Janeiro. Korea signed it in December 1993. The Convention entered into force on March 21, 1994.

The obligation of a developed economy party included in Annex I is to “adapt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sink and reservoirs,” and returning “by the end of the present decade to

earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases...”. More specifically, the Kyoto COP3 meeting in December 1997 decided that the advanced economies should, by the year 2010, reduce greenhouse gases emission by 5.2 percent on average from 1990 levels.

The developing economy parties not included in Annex I and II do not have any explicit targets and schedules for greenhouse gas reduction. Nevertheless, in the Convention, all parties are bound to periodically publish data on national inventories of anthropogenic emissions by sources and removals by sinks, using methodologies agreed upon by the Conference of the Parties. Moreover, “all parties should take precautionary measures to anticipate, prevent or minimize the cause of climate change and mitigate its adverse effects.”

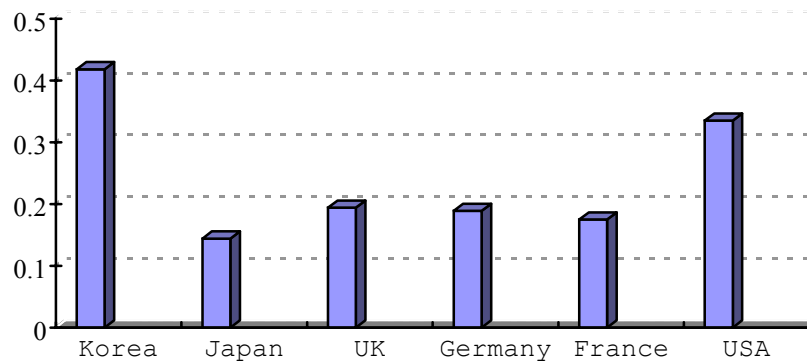
Korea, as one of the developing economy parties in the Convention, has not been yet obligated by the explicit emission limits or the schedule for stabilizing the greenhouse gas emission. However developed economy parties such as United States and Australia have been insisting that Korea and Mexico, both of which have recently joined the OECD, should commit to appropriate CO₂ reduction target.

Korea should make great efforts to reduce greenhouse gas emissions not only because the external pressure during the negotiation process of the Convention will be getting higher and higher but also because Korea must play a proper role as a member of the OECD. Furthermore these efforts might be essential to preserve and enhance domestic air quality.

Energy Consumption and CO₂ Emissions in Korea

As shown in Figure 1, Korea spends considerably more energy (0.418 toe) to produce one thousand dollars worth of GDP, indeed two or three times as much as Japan, the UK, Germany and France. This reflects the fact that the growth of Korea’s resource- and energy-intensive heavy industry sectors outpaced other sectors of the economy.

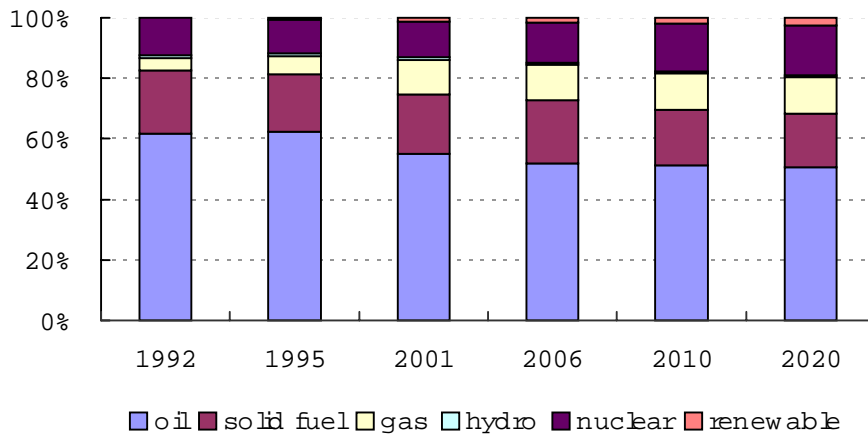
Figure 1
International Comparison in Energy Intensity (1995)
(toe / \$1000 GDP)



Source: IEA

In Korea, primary energy consumption is heavily weighted towards oil. However, in the future, there will be substantial shifts away from oil and into natural gas, renewable energy and nuclear power. This means that the energy mix will become less carbon-intensive.

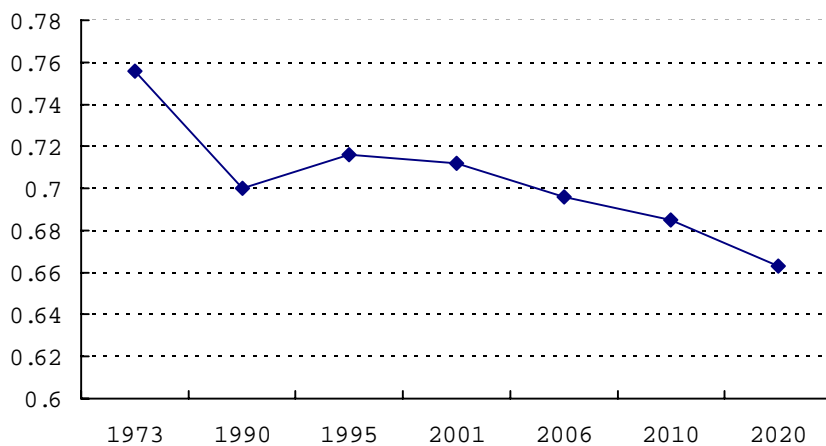
Figure 2
Estimate of the Structure of Primary Energy Consumption (percent)



Source: Korea Energy Economics Institute

CO₂ emissions from fossil fuel combustion increased by 470 percent between 1973 and 1995. Since 1995, however, the growth in CO₂ emissions has slowed reflecting both a declining rate of growth of total energy consumption and also a gradual decline in the carbon intensity (TC/toe) of the energy consumed.

Figure 3
Long-term Trend in Carbon Content (TC/toe)
of Korean Energy Consumption



Source: Korea Energy Economics Institute.

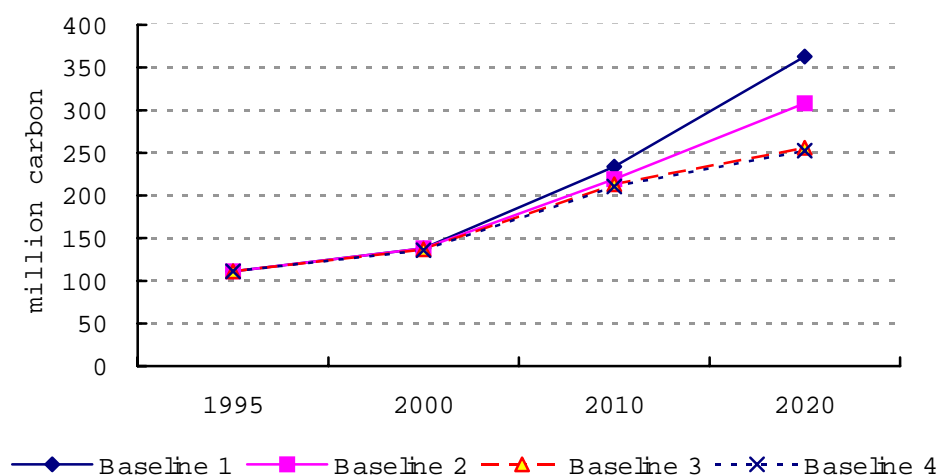
Yoo and Lim (1998) forecasted CO₂ emission for the year 2000, 2010 and 2020 under 4 different sets of assumptions regarding changes in industrial structure industry (i.e.,

increase in share of service sector in total GNP), autonomous improvements in energy efficiency and changes in intra-industrial structure change (i.e., reflecting voluntary efforts to save energy and improve value-added in the iron and steel, petrochemical and cement industries). Baseline 1 assumes no change in any of these areas while Baseline 4 assumes changes in all three areas. The intermediate cases hypothesize some changes in these areas. Table 2 lays out the assumptions and Figure 4 indicates the results.

Table 2
Assumptions Underpinning 4 Baseline Scenarios

	Inter-industrial Structural Change	Autonomous Energy Efficiency Improvement	Intra-industrial Structural Change
Baseline 1	No	No	No
Baseline 2	Yes	No	No
Baseline 3	Yes	Yes	No
Baseline 4	Yes	Yes	Yes

Figure 4
4 Baseline Forecasts of CO₂ Emission

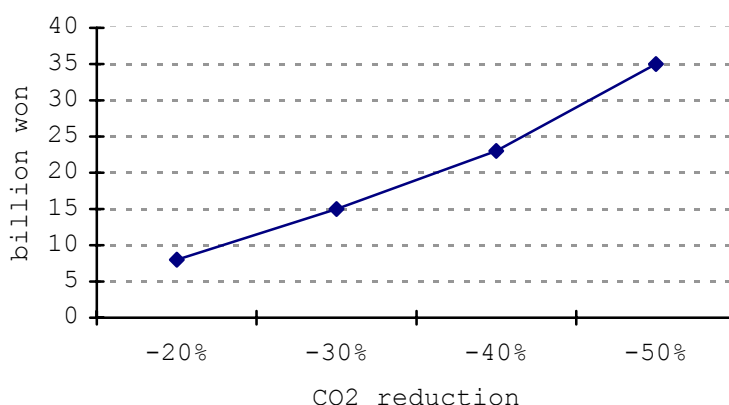


Even in the most optimistic scenario (i.e., Baseline 4) Korea experiences a sharp increase in CO₂ emissions until 2020. Indeed by 2010, CO₂ emissions are projected to be more than double the level in the base year 1995. This implies that the Korean economy will face significant costs in holding CO₂ emissions to a reasonable level.

Economic Cost of CO₂ Emission Constraint

In order to stabilize CO₂ emissions at the level of the year 1995, these scenarios imply that by the year 2010, Korea would have to reduce CO₂ emissions by at least 50 percent from their projected trend levels. To achieve this, it is estimated that GNP in 2010 would be 3.9 percent or 35 billion won lower than in the trend forecast (Baseline 4).

Figure 5
Economic Costs of CO₂ Emission Constraints



According to the estimation results of the Korean Energy Economic Institute (KEEI) using a Computable General Equilibrium (CGE) model, cutting Korean CO₂ emissions by 20 percent below BAU (or baseline) estimates by the year 2020 would require the introduction of a carbon tax of \$840 per ton of carbon, which may entail a loss of 6.7 percent of GDP. As seen in Table 3, the KEEI estimate for Korea shows a big difference with that of others, which might reflect a variety of model specifications, availability of backstop technologies, substitution possibilities and industrial structure.

Table 3
Alternative Estimates of the GDP Loss of Reducing Carbon Emissions in Korea

	CO ₂ Reduction (percent)	Carbon Tax (\$/TC)	GDP Loss (percent)	Target Year	Region
Jorgenson	-27	37	1.0	2000	USA
	-31	43	1.1	2025	USA
OECD	-17	21	0.1	2000	World
	-43	215	2.2	2020	World
KEEI	-10	146	1.8	2010	Korea
	-20	589	6.9	2010	Korea
	-30	1,583	17.5	2010	Korea
	-10	210	1.8	2020	Korea
	-20	840	6.7	2020	Korea
	-30	1,115	8.8	2020	Korea

Source: Korea Energy Economic Institute.

Trade Effects of International Carbon Tax

Yoo (1994) examined the effects of an international carbon tax (US\$10 per barrel of oil equivalent) on international competitiveness, with a particular focus on Korean exports to the US, EU and Japan.² The simulation is based on the following assumptions:

- Full origin-based carbon tax is applied.
- There are only 4 traders (US, EU, Japan, Korea) in the world market.
- There is no revenue-neutrality.
- Domestic and foreign goods are not perfect substitutes.

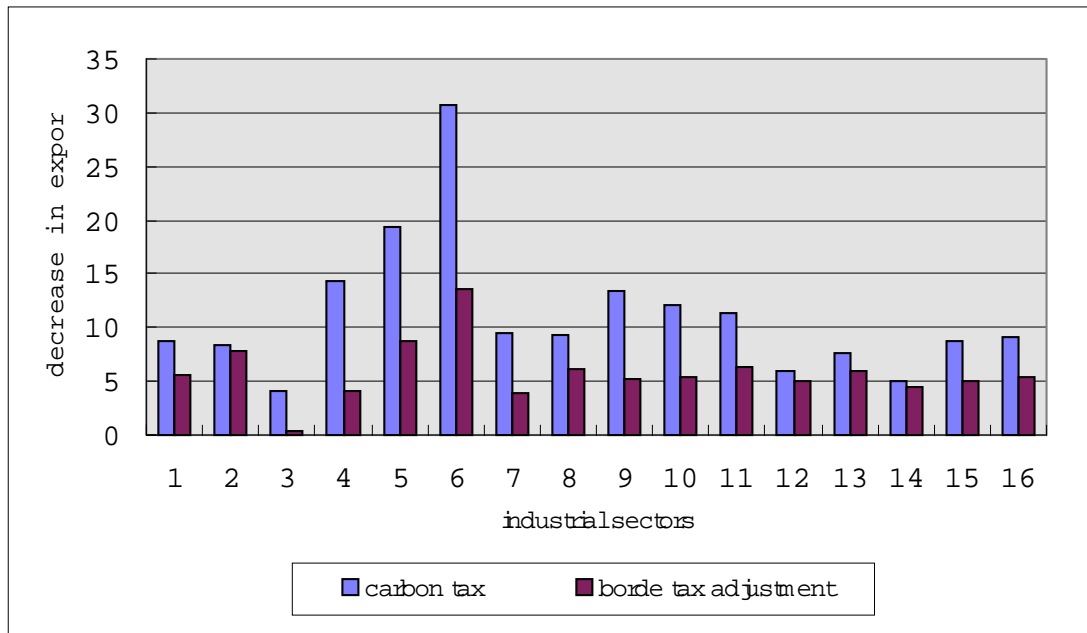
The simulation has been done under two scenarios: Scenario 1 is that all the traders (US, EU, Japan, Korea) introduce an international carbon tax (US \$10 per barrel of oil equivalent). Scenario 2 is that all the traders except Korea introduce the international carbon tax, but importers apply border tax adjustments (BTA) for the Korean goods. The effects of border tax adjustments turned out to be milder than those of the international carbon tax in all the industry sectors. It reflects the fact that the border tax rates for Korean goods will be based on additional increases in importers' domestic prices on them due to the carbon tax.

The effect of an international carbon tax on Korean exports appears very serious (a more than 10 percent decrease in exports) especially for chemicals, rubber and plastics, iron and steel manufacturing, primary iron and steel products and fabricated metal products, which are more or less energy-intensive or resource-intensive. However there are four reasons for the simulation results above:

- Korean industries are more pollution-intensive than other developed economies.
- Korean exports consist of products produced by pollution-intensive industries.
- The US, EU and Japan, where the environmental restrictions are very stringent, account for more than half of the Korean export market.
- The demands for major export goods from Korea are very elastic in the US, EU and Japan markets and also competition between them tends to be more and more intense.

² Yoo, S.-H., "Effect of Carbon Taxes on Korean Industry," *Korean Journal of Resource Economics*, Vol. 4, No. 1, November 1994.

Figure 6
The Effects of an International Carbon Tax on Korean Exports



Note: The sectors are as follows: 1) Cement; 2) Glass; 3) pulp and paper; 4) chemicals and chemical products; 5) rubber and plastics; 6) petroleum products; 7) textiles and apparels; 8) footwear and leather products; 9) iron and steel manufacturing; 10) primary iron and steel products; 11) fabricated metal products; 12) electric and electronic equipment; 13) general industrial machinery; 14) motor vehicles; 15) other transportation equipment; 16) total Korean exports to the US, EU and Japan.

However, there is considerable uncertainty as to whether or not OECD countries will succeed in introducing an international carbon tax for cutting CO₂ emissions to their target levels by year 2010. Meanwhile additional measures such as joint implementation and tradable emission permits are going to be introduced.

Joint Implementation and Tradable Permits

The Climate Change Convention provides that Annex I Parties may implement climate change policies jointly with other Parties and may assist other Parties in contributing to the achievement of the objectives of the Convention. This concept of ‘joint implementation’ has not yet been defined, but one interpretation is that an economy could receive credit towards its own emission objectives by reducing emissions or enhancing sinks in another economy.

The concept of joint implementation has evoked concern among many economies, in particular developing economies. First, an international crediting mechanism could induce developed economies to undertake insufficient mitigation action at the national level, or that the allowance to buy cheap offsets abroad may enfeeble incentives for technological innovation at home. Second, joint implementation may reduce the willingness of economies listed in Annex II to provide the financial assistance to which they have committed themselves.

Joint implementation is a cost-effective measure that not only reduces emissions but also stimulates investment and efficiency in recipient economies. Therefore, despite the many difficulties with regard to joint implementation, the Convention decided to launch a pilot phase of joint implementation for two years in order to examine its potential.

Korea considers joint implementation to be a very useful and efficient measure to attain the objectives of the Convention if transparency and objectivity of the process can be ensured. The reason behind Korea's affirmative position on joint implementation is that the CO₂ abatement costs in Korea are very high compared to other economies due to Korea's high carbon-content energy mix and energy-intensive industrial structure. In particular, a joint implementation project linked to power plant exports in North-East Asia seems to be the most promising one for Korea.

Korea's Responses

Korea has made the climate change problem its top priority. Korea acceded to the Convention in 1993 and implemented a long-term policy for sustainable energy use and cleaner energy substitution. The objective was not only to reduce CO₂ emissions but also to enhance the total air quality by cutting other gases such as NO_x, SO_x, TSP, VOC and so forth.

As regards future directions, first, national energy efficiency should be enhanced both to reduce greenhouse gases and to improve the competitiveness of Korean industries. For this purpose, the Government should promote:

- improving energy efficiency;
- converting energy-intensive industry to energy-saving industry;
- inducing energy conservation by rationalizing the energy price structure; and
- expanding the capacity of the collective energy supply system through district heating and combined heating plants

Secondly, the Government should promote substitution of fossil fuels by alternative clean energy sources through the following action plans:

- restructuring the energy supply system to use cleaner fuels and non-carbon-based fuels;
- expanding the use of LNG and other fuels with low carbon content;
- providing more facilities for cleaner energy; and
- promoting the use of renewable energies such as sunlight, wind, and so forth.

3. Vienna Convention and Montreal Protocol

General Description

The depletion of the ozone layer is caused by the antropogenic emission of ozone depleting substances (ODSs), particularly chlorofluorocarbons (CFCs) and halons. The resulting increase in ultraviolet radiation may cause serious harm to human health and the environment, including organisms in the marine environment.

The conclusion in 1985 of the Vienna Convention for the Protection of the Ozone Layer, followed by the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987, institutionalized global cooperation for the protection of the ozone layer in the stratosphere. The Montreal Protocol was designed to regulate the production and consumption of ODSs. The most common ODS – i.e., CFCs – are used as heat transfer fluids for refrigeration and air conditioning, for aerosol propellants and foam blowing and as solvents, sterilants and surface treatment agents (for example, cleaning electronic components).

The five CFCs in most widespread use were originally scheduled merely for a 50 percent cut in production and consumption from 1986 levels by 1998. In 1990, a total phase-out by the year 2000 was agreed and two years after, in 1992, the phase-out schedule was brought forward to 1996.

Korea ratified the Montreal Protocol in 1992 wherein it was treated as a developing economy. Article Five permits a developing economy with an annual level of consumption of the controlled substances in Annex A (the original five CFCs and three Halons) of less than 0.3 kg per capita at any time before 1 January 1999 to delay for ten years its compliance with the control measures in order to meet its basic domestic needs. In addition, financial support is available for conversion to new substances and technologies. The Multilateral Fund pays the incremental costs of Article Five parties in meeting their control requirements.

Table 4
ODSs Phase-out Schedule for Developed Economies
(Percent reduction from base year level)

Items	Base Year	1994	1995	1996	2004	2010	2015	2020	2030
CFC-11,12,113-5	1986	75		100					
Halon-1211,1301, 2402	1981	100							
CFC-13,111-2, 211-7	1989	75		100					
Carbon tetrachloride	1989		85	100					
Methyl chloroform	1989		50	100					
HCFC (40 items)	1989				35	65	90	99.5	100
HBFC-22B1				100					

Trade Provisions

The trade provisions of the Montreal Protocol govern trade with non-signatories (formally, non-parties) to the treaty. These provisions include:

- A ban on imports of controlled substances to signatories from non-signatories beginning in 1991, and a ban on exports from signatories to non-signatories beginning in 1993.
- A ban on imports to signatories from non-signatories of products containing controlled substances, beginning in 1992.

- A possible ban on imports to signatories from non-signatories of products made using, but not containing, controlled substances, to begin in 1994. However, it was decided not to implement this trade restriction at the present time.
- Signatories are required to discourage the export to non-signatories of technology for producing or using controlled substances.

There are three categories where imports from non-signatories to signatories are banned:

- a) controlled substances: ozone depleting substances (ODSs): CFCs, Halons, etc
- b) products containing controlled substances (ODSs): domestic and commercial refrigeration and air conditioning/heat pump equipment, automobile and truck air conditioning units, aerosol products(except medical aerosols), portable fire extinguishers, insulation boards, panels and pipe covers, and prepolymers, etc.
- c) products made with but not containing controlled substances(ODSs): electronic components which use CFCs as a cleaning solvent, etc.

It is impossible to implement a trade restriction on the third category (c). This is largely due to not only practical implementation problems but also because it involves costs out of all proportion to the benefits from preventing the depletion of the ozone layer. Therefore the Parties agreed not to implement trade restrictions, but to review the issue at regular intervals. However, the threat of such restrictions might play an important role in the decisions of various countries to join the Protocol.

Korea's Response

Korean domestic ODS production increased in the early years of the Protocol. In 1989, domestic production covered only 36 percent of consumption. But, in 1990, it covered 52 percent and Korea almost certainly could have become self-sufficient. However, even though Korea was classified as an Article Five or developing economy under the Montreal Protocol, it moved rapidly to phase-out ODS use. The main reason was the risk of trade restrictions by Montreal Protocol members such as EU and US on Korean exports such as refrigerators, air conditioning systems (particularly in cars), or potentially even worse on the many Korean electronic goods produced with, but not containing, ODSs (which was still at that time – and in theory still is – possible ground for trade-restrictive measures).

When Korea signed the Protocol in 1992, the total domestic annual use of CFCs was 32,000 tons, and in view of rapid growth in the electronics, refrigerators and precision machinery industries, the demand for CFCs had the potential to increase very fast.³ At the same time, the international market prices of ODSs were very high (for example, the price of HFC-134a was US\$ 20,000 per ton). Furthermore, technology transfer from advanced economies was seemingly impeded in the early years of the Montreal Protocol.

³ In general, CFCs and Halons have been used for various purposes: heat transfer fluid, cleaning solvents, foam blowing, aerosol propellants, etc. The most important application was for foam blowing because of rapid growth in the domestic refrigerating industry and motor vehicle industry. The next most important source of demand was for insulation materials in refrigerators and foamed polyuretan in car interiors.

Under those circumstances, Korea was seriously concerned about the decline in international competitiveness of related industries. Therefore, the Korean Government decided to establish a chemical company, namely, 'Hankook Shinwha', to develop the technologies for ODS substitutes in order to meet its domestic demand for these products. Over the next 4 or 5 years, Korea invested about US\$ 13 million in order to develop CFC substitutes such as HFC-134a, HFC-123/125, HFC-152a, and HCFC-141/2b among others. By the end of 1996, HFC-134a and HFC-152a were already developed and put into a mini pilot plan for commercialization. HFC-123/4/5 was also developed by the end of 1996.

Table 5
Substitutes for ODSs

Usage	ODSs	Intermediate Substitutes	Final Substitutes	Remarks
heat transfer fluid (home refrigerator, car air conditioning)	CFC-11 CFC-12		HFC-134a	plan to commercialize HFC-134a in 2000
heat transfer fluid (home air conditioning, heat pump equipment)	CFC-114 HCFC-22 R-502	HCFC-22	HFC-32/134a/125 – compound HFC-143a HFC-245 HFC-236	need to develop a pure substitute for compound refrigerant
Cleaning solvents (semiconductors, precision machinery, electronics,)	CFC-113	HCFC-141b/ 123-compound	CFC-N-(CF ₂)-O HFC-4-3-10 PFCs	no substitute except HCFC has been developed yet in Korea
Foam blowing (foaming resin for insulation)	CFC-11 CFC-12	HCFC-141b HCFC-142b	HFC-245 HFC-356 HFC-143a	same as mentioned above
aerosol propellants	Halon-1301 Halon-1211	NAF-2LIII (HCFC-compound)	FJC-1311 HFC-227ea (CF ₃ I)	CF ₃ I is a promising substitute because it has a low global warming index
heat transfer fluid for ultra low temperature (showcase, industrial refrigerators)	R-502 CFC-114 CFC-115		HFC-143a/32/125	compound refrigerant is a promising substitute

Source: Ministry of Industry, Trade and Energy, the Republic of Korea.

However, the market for these products developed very differently than expected and in fact decreased sharply as they proved to be unable to fully substitute CFCs in technical aspects. Consequently, a large portion of the demand went to non-CFC substances. In 1995, the total domestic consumption (domestic production plus imports) of CFCs in Korea amounted to 10,000 tons and the demand for the substitutes such as HCFC-141/2b and HFC-134a was 4,000 tons, or less than half of the demand in 1992. In view of a gloomy and uncertain world market outlook as the demand for CFC substitutes shrank,

and the fact that HFC-134a faced a possible ban as a greenhouse gas, these investments now appear to have been ill conceived.

Table 6
The Change in the Structure of CFC Use in Korea (percent)

	1986	1994
Foam Blowing	45	55
Cleaning Solvents	22	11.5
Heat Transfer Fluid	18	30.7
Aerosol Solvents	12	1.1
Others	3	2.7

Source: Ministry of Industry, Trade and Energy, the Republic of Korea.

Global Market for CFC Substitutes

The world capacity to supply CFC substitutes has grown rapidly since the beginning of the 1990s. In particular, major CFC manufacturers such as Dupont, Atochem, Allied Signal and Daikin, expanded their capacity to far above the world demand level, which decreased continuously due to the substitution of CFCs by non-CFCs. This led to a drastic decline in the world price of CFC-substitutes. For example, the price of HFC-134a decreased to US\$ 4,422 per ton in 1996 from US\$ 15,000 in 1992.

Table 7
The Recent Trend in Price (US Dollar per ton) and Quantity (tons) of CFC Substitutes in Korean Imports

	HCFC-123		HCFC-141b		HCFC-142b		HFC-134a	
	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
1992	7	10,119	27	4,156	7	6,813	7	15,000
1993	54	9,503	313	3,576	59	4,254	600	7,800
1994	94	6,656	1,143	2,798	57	3,599	1,208	5,427
1995	194	6,469	2,088	2,554	20	3,356	1,904	4,922
96.1-6	118	7,005	1,177	2,316	54	2,645	1,298	4,422

Source: Foreign Trade Statistics, Korean Customs Administration, 1996.

Effects on Korean Industry

About 1,370 companies using CFCs and 200 companies using Halons in Korea, most of which are electronics manufacturers and precision machinery manufacturers, have changed or plan to change their production processes suited for CFC substitutes or non-CFC substitutes. Korean industry related to CFCs and Halons are seriously concerned about the possible weakening of international competitiveness brought about by the massive investment expenditures on the new production process and adjustment costs. The survey done by the Korean Chamber of Commerce in 1995 tells us that Korean

manufacturers consider the Montreal Protocol as the international environment agreement that has had the most serious negative impact on the Korean economy.

4. Basel Convention

General Description

The volume of hazardous and toxic wastes generated by human activities and resulting from industrialization is increasing exponentially. The capacity for waste disposal has not kept pace, resulting in improper disposal of hazardous wastes. Major problems include generation, transboundary movement and environmentally unfriendly disposal of hazardous and toxic wastes, including disposal of wastes at sea. International concern about the transboundary movement and disposal of hazardous wastes includes shipment from developed to developing economies least likely to be able to afford sound disposal.

The Basel Convention is a global environmental treaty that strictly controls the transboundary movements of hazardous wastes, and obliges the Parties to ensure the environmentally sound management of wastes, particularly their disposal. The Convention was adopted on 22 March 1989 and came into force on 5 May 1992. As of 17 July 1996, the Depository of the Convention had received 100 instruments of ratification, accession, acceptance or approval. At the Second Meeting of the Conference of the Parties (COP2) held in Geneva, Switzerland from 21-25 March 1994 the members decided to establish an immediate prohibition of all transboundary movements of hazardous wastes which are destined for final disposal from OECD to non-OECD economies. The Parties also adopted a resolution by which the transboundary movement of hazardous wastes destined for recycling or recovery operations were to be phased out by 31 December 1997.

Korea's Response

In February 1994, Korea became a party to the Basel Convention. Implementation was through relevant national laws and acts including measures adopted on December 8, 1992 and on May 28, 1994. A list of 118 specified wastes subject to the law were designated and announced to public in 1995 and have since been controlled with customs clearance procedures.

Hazardous wastes should be handled and managed safely to protect public health and the environment and to prevent and minimize adverse effects of them. For this purpose, hazardous waste should be reduced at an early stage of the production process. The Korean government adopted various effective action plans to comply with the Basel Convention.

Firstly, the government has adopted and implemented waste reclamation technology as part of the Highly Advanced National (HAN) Projects in order to reduce hazardous waste generation.

Secondly, in order to minimize hazardous waste costs and to strengthen the Polluter Pay Principle, the government introduced and implemented a set of economic instruments,

namely, the Refundable Depository System (1992) and the Waste Treatment Charge System (1993).

Thirdly, the regional public treatment centers for handling special hazardous waste will be established according to the Act of Promoting Construction of Waste Treat Facility and the Support of Inhabitants Near the Facility (enacted in 1995). And economic incentives such as construction loans and tax aid will be granted to a new specified waste treatment facilities constructed by the private sector.

Fourthly, in order to promote more effective management and control of hazardous waste, current laws on waste management regulate those producing more than a certain amount of specified waste with reporting by vouchers, monitoring with an electronic data management system, and public education and awareness programs.

Lastly, Korea has been actively participating in international meetings related to the Convention in order to learn the management system and the treatment method of developed economies on the transboundary movement control of hazardous waste. And Korea will promote international cooperation through bilateral and multilateral agreements with economies that often trade hazardous waste.

Effects on the Korean Economy

Korea imports about 50 materials recovered from wastes; the value of these imports totals about US\$ 1.5 billion per annum. Among these materials the following are subject to the Basel Convention: waste or scraps of copper, lead, zinc, cadmium, plastic, tantalum, antimony, beryllium and thallium. However, waste rubber, recapped tire and synthetic fiber waste are not subject to the Convention but classified as specified waste by Korea's national law on waste management.

As seen in Table 8, Korea has been spending a lot of money to import copper waste and scrap, scrap iron and scrap paper. In particular, the imports of scrap iron has been increasing recently. Korea imports 40 percent of domestic demand for scrap paper from the United States and Canada since there is a big shortage in the domestic supply for scrap paper, which is mainly used to produce newspaper, paper board and toilet paper. Therefore, if scrap paper would be subject to a trade ban by the Convention, Korea should import pulp which is more expensive than scrap paper. It follows that Korean paper products may lose their international competitiveness due to increases in their production costs.

Fifty percent of the world supply of lead, which is essential to produce batteries and solder, is generally extracted from ore and the remaining 50 percent is obtained by recycling and recovering lead waste/scrap from waste batteries. Most of recovered-lead producers in Korea import scrap lead from United States, Saudi Arabia, Australia and Japan. Plastic scrap is used mainly for PVC paper-covered floor, PVC vinyl, synthetic leather, PVC pipe, and acryl products for sale promotion and is imported from Japan and the United States.

Table 8
Trend in Korean Imports of Major Recovered Materials (US\$ '000s)

Classification	Items	Code	1990	1991	1992	1993
Subject to the Basel Convention and the national law	waste oil	Y9	3,423	3,607	5,386	5,641
	plastic waste/scrap	Y13	5,754	6,598	4,456	3,703
	copper waste/scrap	Y22	294,731	356,182	245,460	241,165
	lead waste/scrap	Y31	11,866	6,265	1,425	647
	zinc waste/scrap	Y23	388	254	3	148
	cadmium waste/scrap	Y26	73	61	10	11
	Total			316,235	372,967	256,740
Only subject to the national law	nickel waste/scrap		2,334	2,532	2,304	1,508
	aluminum waste/scrap		43,782	62,163	38,037	26,761
	tin waste/scrap		7	3	17	20
	rubber/hard rubber waste		2,536	1,852	1,266	1,551
Classified only as specified wastes	scrap iron		548,020	632,890	466,231	775,833
	scrap paper		281,713	249,749	240,309	208,210
	glass waste		821	3,799	2,826	3,569
	recapped tire		3,524	3,065	4,203	63
	synthetic fiber waste		274	274	132	222

Source: Korea Institute for Industrial Economics and Trade (KIET)

Waste and scrap of nonferrous (lead, zinc, copper, etc.) compounds are traded extensively in the world markets as a major source of materials because they do not need expensive fixed costs as does steel-making by ore. In Korea, in particular, the proportion of scraps in the total use of lead and copper is above the world average. Hence, if the restrictions on transboundary movement of scrap iron, scrap paper, lead scrap, plastic scrap and copper scrap are elaborated and clarified in the near future, Korean industries such as paper products, iron and steel and petroleum chemicals are likely to have negative effects from the shortage of those materials.

5. CITES

General Description

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was adopted on 3 March 1973, and entered into force on 1 July 1975. CITES establishes a worldwide system of controls on international trade in threatened animals and plants and specimens derived from them. The aim is to ensure that trade in such species is controlled and monitored to ensure their sustainability.

Trade Provisions

CITES has used trade measures in order to protect species threatened with extinction (listed in Appendix I to the Convention) and species which may become endangered unless trade is strictly regulated (listed in Appendix II). Trade in these species must be authorized by export and import permits approved by the Scientific Authorities of the Parties concerned (Articles III and IV). Species that a Party identifies as being subject to regulation within its own jurisdiction and as requiring international cooperation to control trade (listed in Appendix III) is subject to an export permit authorized by the Scientific Authorities of the Party (Article V). The import of Appendix III species requires a certificate of origin and an export permit is required to prevent circumvention to non-Parties.

Table 9
State of Mammals, Birds and Fish (early 1990s)

	Mammals		Birds		Fish	
	Species known	Threatened	Species known	Threatened	Species known	Threatened
Korea	76	21 (27.6)	383	54 (14.1)	960	29 (3.0)
Canada	193	15 (7.8)	514	23 (4.5)	1,066	47 (4.4)
Mexico	449	143 (31.8)	1150	339 (29.5)	4,000	140 (3.5)
USA	466	49 (10.5)	1090	79 (7.2)	2,540	64 (2.4)
Japan	188	14 (7.4)	665	54 (8.1)	200.	n.a.
Australia	348	48 (13.8)	850	50 (5.9)	3,600	13 (0.4)
Greece	116	43 (37.1)	407	48 (11.8)	111	41 (36.9)
Spain	119	20 (16.8)	327	38 (11.6)	68	16 (23.5)

Note: Parentheses indicate percent threatened.

Source: OECD, *OECD Environmental Data Compendium, 1995*. The Ministry of Environment, the Republic of Korea, *Environmental White Paper, 1995*.

Korea's Response

Korea acceded to CITES in 1994 and has adopted several designation systems such as "natural monument", "special wild fauna and flora", and "protected wild birds and mammals and others", in order to preserve wild species threatened with extinction or endangered by mismanagement. Despite these efforts, over 180 species including tigers and leopards are known to have become extinct or be endangered now in Korea.

Effects on Trade

CITES could result in unintended trade and competitiveness effects on some parties. For example, if an economy using national measures is able to manage specific controlled species sustainably, then trade measures could result in unnecessary economic losses without environmental gains. In other words, CITES does not give parties incentives to manage species sustainably due to the lack of proper rewards.

Table 10
World Trade in Orchids (1990-1994)

Economy	1990	1991	1992	1993	1994
Net Imports (\$1000)					
Korea	548	808	140	83	27,361
USA	350	569	1,402	2,436	3,719
Japan	8,000	9,145	10,500	11,066	2,164
Net Exports (\$1000)					
Chinese Taipei	1,505	1,984	2,861	3,854	15,438
Thailand	7,969	10,221	9,003	9,447	13,779
China	671	1,839	703	580	1,651
Total	10,665	14,544	13,268	14,368	34,316

Source: World Conservation Monitoring Centre, Cambridge, UK.

Korea is by far the largest importer of orchids which is covered by Appendix I and II in the Convention. The trade in orchids is conducted pursuant to registration documents that certify the specimens from authorized captive breeding operations or nurseries. These documents replace all or part of required trade permits.

But export permits are still required for captive-bred specimens of Appendix I species. For example, the trade in crocodylian skin requires markings under the universal tagging system that distinguish specimens originating from captive breeding, artificial propagation, or approved ranching operations, from those taken in the wild.

6. Convention on Biological Diversity

General Description

Threats to biodiversity can have different causes such as tropical deforestation, destruction of temperate forests, wetlands and coral reefs. The loss of biodiversity and habitat also implies risks of losses of other environmental amenities, including genetic resources, ecosystem functions, water quality protection, natural pest management, carbon sinks and climate regulation.

The Convention on Biological Diversity was opened for signature during the United Nations Conference on Environment and Development, held in June 1992 in Rio de Janeiro, and entered into force on 29 December 1993. The Convention aims at conserving biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the use of genetic resources.

Korea's Response

Korea is strongly involved in international efforts to protect wild fauna and flora from extinction. It acceded to the Convention through the Natural Environment Conservation Act passed in 1992, which serves as the legal basis for a comprehensive nature-conservation policy. Most Koreans believe that conservation and sustainable use of biodiversity is indispensable for securing sustainable economic development and for satisfying public needs to live in a better environment. For this purpose, Korea set forth various action plans as follows:

- developing a national plan based on the research “Biodiversity Korea 2000”;
- implementing the “Nation-wide Green Network Plan”;
- enhancing *in-situ* and *ex-situ* conservation capacity;
- upgrading the Environmental Impact Assessments (EIA); and
- establishing biodiversity information management system.

Effects on Korean Economy

Korea, as a nation scarce in resources and raw materials, imports great amounts of natural resources and raw materials. Since the Convention has improved protection of property rights or ownership for genetic resources, Korea may pay a prohibitive price for importing timber and buying biotechnology. Furthermore, there will be a need to do the Environmental Impact Assessments (EIA) for biotechnology developed by use of biology and genetic resources, of which suppliers will be granted the first claim of technology transfer or the proper rewards for it. Moreover, Korea might have to pay extraordinary compensation for damage to the environment and ecology evoked by overseas resource development or export of biotechnology.

On the other hand, the Korean economy may be expected to get benefits from the Convention. Firstly, Korea may stimulate the development of rural areas through conserving or commercializing biogenetic plants and livestock species. Secondly, the Convention will give a rise to new emerging industries related to diverse biological resources in Korea.

7. US taxation on products made with, but not containing, ODSs

Korean Automobile Case

The Internal Revenue Services Code (Section 4681 – Imposition of Tax; Section 4682-Definitions and Special Rules) requires that automobile manufacturers annually submit a report on ODSs (particularly for foam blowing) used in the manufacturing process. If a manufacturer does not provide the required information, the IRS may unilaterally impose a tax based on its own calculation. It has often been reported that numerous foreign manufacturers, including a Korean motor company, have paid a tax imposed by the U.S. Internal Revenue Service. The method to calculate the tax amount is given by the following equation.

Tax amount = (base tax amount) x (ozone depletion factor) x (quantity used (in pound)).

The base tax amount is defined as $(0.45Y-39.65)$, for which Y (year) is expressed in a two-digit number (for instance, in 1995, $Y=95$). The ozone depletion factor is defined as:

- 6.0 for Halon-2402,
- 3.0 for Halon-1222,
- 1.1 for Carbon Tetrachloride,
- 1.0 for CFC-11, 12, 114, 13, 111, 211, 212, 213, 214, 215, or 217,
- 0.8 for CFC-113,
- 0.6 for CFC-115 and
- 0.1 for Methyl Chloroform.

MEA and WTO-Consistency

This is an example of a Border Tax Adjustment (BTA) based on Process and Production Methods (PPMs). A trade restriction on products made with, but not containing ODSs, has not yet been authorized explicitly by the Montreal Protocol, even if the Protocol contains provisions for the parties to “determine the feasibility of banning or restricting imports from non-parties or products produced with but not containing controlled substances.”

The footnotes of Annex II in the Agreement on Subsidy and Countervailing Measures of the Uruguay Round agreements states that “inputs consumed in the production process are inputs physically incorporated, energy, fuels and oil used in the production process, and catalysts which are consumed in the course of their use to obtain the exported product.” Here, catalysts may include ODSs such as Halons used in automobile production processes. However, the *OECD Report on Trade and Environment to the OECD Council at Ministerial level (1995)* concludes that “WTO rules have been interpreted as generally allowing, subject to agreed disciplines, for border tax adjustments on products on the basis of product characteristics or physically incorporated inputs, but not for taxes on imports on the basis of domestic process taxes.”

However, the problem has not been settled but still is under discussion and needs to be resolved. If a complaint for imposing the BTA based on production process was made to the WTO, it is not clear at this moment how the panel would rule in this case, or what changes such a ruling would bring about, given that a large number of WTO members are also parties to the Protocol.

Evaluation for US Taxation

Even though an U.S. tax on Korean automobiles is not a serious burden causing overly negative impacts on the competitiveness of the Korean automobile industry, this case may influence the future direction of the problem. Therefore, this problem should be dealt with thoroughly. We may evaluate this kind of BTA in three aspects: environmental, competitiveness and practical.

First, with regard to environmental effectiveness, a BTA may reduce the effectiveness of environmental taxes, particularly those applied for pollution in production process. If the externality is local or global and stems from the production process, then the tax imposed

on domestic consumption with BTA would not reduce domestic pollution, since domestic producers can export their products abroad.

Secondly, due to the perception of competitiveness effects of the tax, a BTA for a domestic production process tax may be a necessary component for enhancing economies' efforts to implement economic instruments on production process in order to prevent serious global environmental problems. However there is no solid evidence for competitiveness effects of these taxes. Furthermore, BTAs based on PPMs may lead to protectionist abuses and to "unacceptable interference in countries' sovereign rights to evaluate and internalize as appropriate their domestic environmental costs."

Thirdly, there are several practical problems in implementing BTAs for taxes on production processes: these include technical difficulties in measuring the BTA amount, as well as efficiency and equity problems. Although a GATT panel on the US Superfund case agreed that a tax could be based on the "predominant production method", this can not be a general rule since there are a variety of production methods reflecting the various circumstances in individual economies. From the perspective of efficiency, global emissions could be reduced at a lower cost if more efficient policies would be adopted based on agreement through negotiation instead of through unilateral BTAs. As for equity aspects, BTAs applied for non-free-riding countries would be vulnerable on fairness grounds.

In conclusion, BTAs on the basis of PPMs, which are used to neutralize the competitiveness effects of a domestic tax, are not suitable for environmental purposes nor for its own purposes, namely, competitiveness compensation. Furthermore there exist various practical feasibility problems. Moreover, the most important thing is that BTAs based on PPMs may distort trade and hurt the existing multilateral trading system and its participants seriously.

8. Environmental Countervailing Duties

Even if there are no pollution spillovers and the environmental harm entirely belongs to a foreign territory, there is a serious concern among many environmentalists that low standards foster "political spillovers," which put downward pressure on environmental standards elsewhere due to fears about competitiveness. Competitiveness concerns may give loom for unilateral measures such as countervailing duties.

Environment-related countervailing duties (eco-duties) are a kind of tariff levied on imported products to attempt to equalize the domestic and foreign environmental costs in producing the product. Eco-duties seek to counter the "implicit subsidies" or "eco-dumping" that support traded products not subject to stringent environmental regulations or subject to stringent, but weakly or ineffectually enforced, environmental standards.

This kind of view apparently underpins the US Congress moves to regulate unfair trade practices based on low environmental standards in economies that export to the United States. Actually, Senator David Boren proposed an International Pollution Deterrence Act. And also Representative Dick Gephardt and Senator Max Baucus called for ecoduties on

the imported products to offset any economic advantage gained by producing the product under less stringent environmental protection regulations.

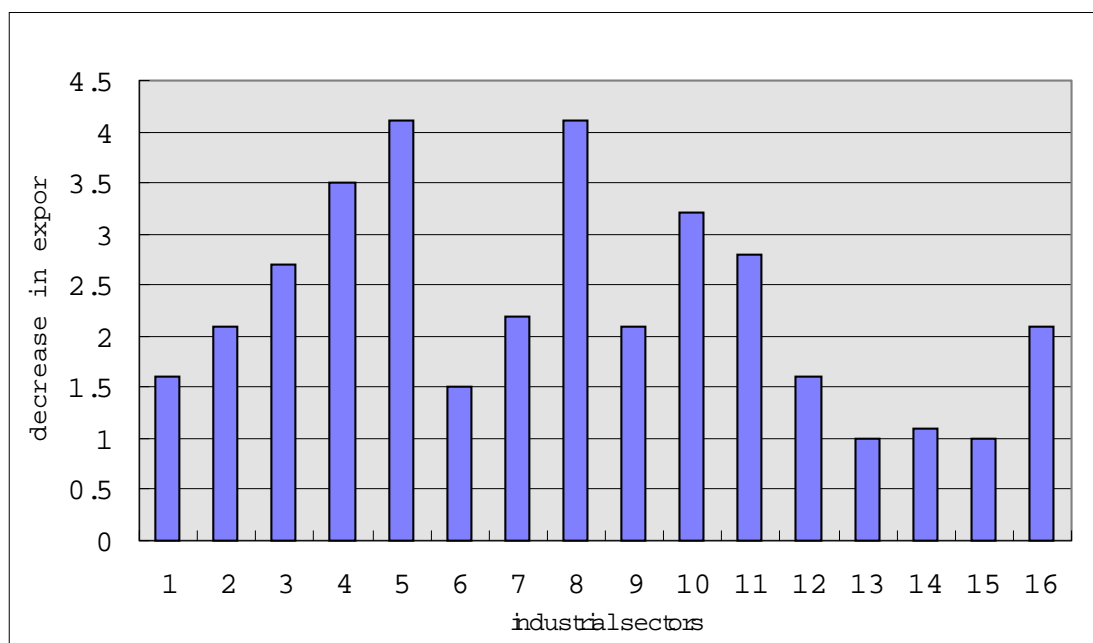
Even though they have been discussed for many years, in fact, eco-duties have never been used to redress competitive imbalances due to differences in the stringency of environmental standards. However, eco-duties are not compatible with WTO rules and cause concern as a major challenge or threat to the current multilateral trading system to most WTO members, in particular, to developing economies.

Yoo (1993) simulated the effects on Korean exports of hypothetical eco-duties, i.e., “pollution abatement and control expenditure (PACE) equalization tax.” The data used in the simulation is as follows:

- 1991 U.S. data and 1992 Korea data on pollution abatement operating costs;
- estimates for elasticities of import demand, export supply and substitutions widely used in other studies; and
- 1992 OECD trade statistics.

The total trade effects of the PACE equalization tax were calculated using reduced form equations to measure trade creation, trade substitution and trade diversion. The simulation result shows that Korean export volume might decrease by 2.1 percent if eco-duties were to be imposed to Korean products imported by the U.S., EU and Japan. The effects vary by industrial sector. The industries which are anticipated to be relatively highly affected are rubber and plastics (4.1 percent), footwear and leather products (4.1 percent) and chemicals and chemical products (3.5 percent) since the import demand of these industries are very elastic. However, machinery (1.0 percent) and motor vehicles (1.6 percent) turned out to be moderately affected.

Figure 7
The Effects of an Eco-tax on Korean Exports
(percent Decrease in Export Volume)



Note: The sectors are as follows: 1) cement; 2) glass; 3) pulp and paper; 4) chemicals and chemical products;

5) rubber and plastics; 6) petroleum products; 7) textiles and apparel; 8) footwear and leather products; 9) iron and steel manufacturing; 10) primary iron and steel products; 11) fabricated metal products; 12) electric and electronic equipment; 13) general industrial machinery; 14) motor vehicles; 15) other transportation equipment; 16) total exports.

9. National Environmental Requirements

According to a GATT report (1995), the total number of existing technical regulations has been reported to the GATT Technical Barriers to Trade (TBT) Committee between 1980 to 1994. Among them, there were 349 cases related to environmental protection, representing 8.4 percent of all technical regulations. But the share of environmental regulations is rising. It grew to 7.8 percent between 1980 and 1990 and to 9.4 percent between 1991 and 1994. Toxic chemical materials or products and ODSs account for the major items. And test requirements, labeling and sales bans have been frequently used as policy measures.

KOTRA (1995) has surveyed national environmental requirements that might be substantial trade barriers to Korean trade in a number of Western countries (USA, Sweden, Finland, Belgium, France, and Denmark) as well as Japan. There are 17 cases identified although none in Japan. It turns out that all the cases are related to product requirements, not to PPMs. The number of cases related to environmental risk rendered by products is 8 – for example, noise, hazardous substances and chemicals. There are also 8 cases related to waste and recycling problems – for example, charges for disposal of waste tires or collection of waste battery, tax for disposable camera, regulation on packaging materials. The remaining 2 cases are related to minimum energy efficiency standards in the U.S.

Table 11
National Environmental Requirements Affecting Korean Exports
(Unit: number of cases)

	Environmental Risk of Product	Energy Efficiency	Waste and Recycling	Total
U.S.	1	2	1	4
Sweden	2	0	0	2
Finland	0	0	1	1
Belgium	2	0	1	3
France	2	0	4	6
Denmark	1	0	0	1
Japan	0	0	0	0
Total	8	2	7	17

Source: KETRI, *Trade and Environment*, 1996.

Measures used in those cases include import bans, sales bans, charges, labeling and prior information consent. But there have not been reports of any serious impact. However Korean firms are very concerned about substantial increases in difficulties or costs incurred by more demanding environmental measures in these economies in near future.

10. Eco-labeling

Background Information

Eco-labels are intended to provide consumers with easily recognizable information on expert assessments of the environmental characteristics of products and to promote the production and consumption of “greener” goods. However, there are increasing concerns that these schemes, particularly when based on life-cycle approaches, may pose non-tariff barriers to trade or be easily exploited for protectionist purposes. Since eco-labeling schemes intrinsically aim at discrimination against products based on environmental characteristics, they will have effects on both domestic and foreign industries, which might be not only adverse but also beneficial.

Life-cycle assessment (LCA) contained in eco-labeling schemes is a tool to evaluate the environmental effects associated with extraction and processing of raw materials, manufacturing, transportation, distribution, use and reuse, maintenance, recycling and final disposition. But LCA is still at a very early stage of development. Therefore there are many practical problems such as aggregation of various environmental effects, comparison of such effects between products and the high cost of conducting LCA.

There are different types of environmental labels, which vary in their complexity and their trade implications.

- *Single-issue mandatory labels*, which give environment-related information on one aspect of a product and are required by the government (for example, flammable, eco-toxic, biodegradable).
- *Single-issue voluntary labels*, which give environment-related information on one aspect of a product and are usually marked by the manufacturer or retailer (for example, organically-grown, energy-efficient, ozone-friendly and recycled content).
- *Multi-issue voluntary labels*, (in general term, eco-labels) which give environment-related information on the overall environmental quality or characteristics of a product. They are, even if generally granted by government-supported bodies for the sake of credibility and transparency with exception of the U.S., voluntary systems based on the manufacturer’s choice whether or not to apply for an eco-label.

The third category, which as noted is generally referred to as eco-labels, has been implemented by 23 out of 25 OECD economies and a few non-OECD economies such as Singapore and India. In particular, single-issue mandatory labels are covered by the Standards Code of the GATT and have not rendered undue trade distortions since they are applied to consumption externalities. Similarly, single-issue voluntary labels, even if not governed by the Standards Code of GATT, have not evoked many trade problems either. Eco-labeling programs have not caused any international controversy until now since they have not yet applied a comprehensive LCA but instead a few consumption-related criteria.

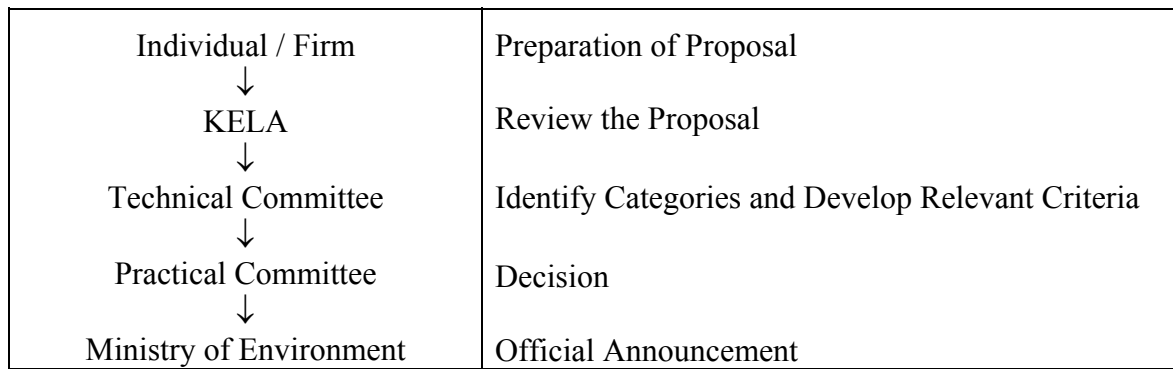
However, the situation may well change in the near future. First, governments and private sectors will use single-issue labels to address transboundary and global environmental problems (for example, sustainably produced timber by Austria, dolphin-safe tuna by the

U.S.). Secondly, there is strong tendency to use eco-labeling programs based on more extensive LCA for production-related pollution problems.

Eco-labeling in Korea

Korean eco-labeling schemes have been established and implemented since 1992. The schemes aimed at promoting individual firms' efforts to reduce pollution during the whole life cycle of products and consumers' awareness of environment conservation. In general, the main steps involved in awarding eco-labels are as follows: product selection, criteria development, public review process, adoption of final criteria, and application to a competent body for the eco-label award and license (OECD 1996).

**Figure 8
Development of Product Criteria in Korea**



Source: KETRI, Environment and Trade, 1996.

In Korea, KELA (Korea Environmental Labelling Association) is playing a major role to award eco-labels. Up to June 1994, there were 162 products that had been awarded eco-labels, including 59 sprays not using CFCs, 29 products made by recycled paper, 23 aluminum can products with a cap, etc. But, in reality, it seems that most products awarded eco-labels cannot attract consumers' preferences in Korea since consumers doubt the quality of products made by recycled or reused materials.

Trade Issues Related to Eco-labeling

The rapid growth of eco-labeling programs involving LCA or PPMs extensively has become a worldwide phenomenon, even in developing economies. Therefore industrial sectors are concerned about possible trade distortions. There is no question that the potential exists for eco-labels to favor domestic products and to act as non-tariff barriers to exporters. But more important issues are how they act as trade barriers and how significant their trade effects are.

In principle, eco-labeling schemes are voluntary and open to both domestic and foreign suppliers. However, domestic producers can more easily influence the development and implementation of national eco-labeling schemes. First, domestic producers can more easily guide the selection of product categories for eco-labeling, than can foreign producers. Secondly, the selection of product categories can work to exclude products made by foreign firms in environmentally friendly production processes.

There are two ways eco-labeling in developed economies may affect the competitiveness of products exported from developing economies. First, the selection of criteria and thresholds may be too strict; e.g., only 15 to 20 percent of eco-friendly products within a particular product category may be granted eco-labels. Secondly, eco-labeling compliance costs may be higher in developing economies, adversely affecting the competitiveness of their products compared to developed economies' products.

Although developing economies' general concerns about the trade effects of eco-labeling are non-trivial, there is no empirical evidence that eco-labeling has significantly affected exports from developing economies. This reflects the fact that eco-labels are applicable to a relatively small number of product categories, and are granted to only a small percentage of the eligible market.

However, there may be greater repercussions in the future as the EU and other OECD economies are investigating possibilities of expanding eco-labeling schemes to textiles, clothing, tropical timber and tropical timber products, paper, and footwear, which are exported mainly by developing economies. This would be particularly the case if the comprehensive life cycle assessment (LCA) aspect of the EU's eco-labeling program is applied to some highly-traded products such as paper and textiles.

For example, an eco-label for paper implemented by the EU might require the use of a high percentage of recycled waste paper in order to reduce waste generation and to preserve regional forest resources, adversely affecting exporting economies with large plantation forest resources. Similarly, an eco-label for textiles implemented by the EU could exclude the use of dyes and pesticides which are commonly used in developing economies. In some cases such as natural dyes, these inputs may be different from those approved under the eco-labels but may still be equally environmentally-friendly. These examples give rise to PPM issues such as extra-territorial environmental problems and trade distortions.

Eco-labeling and international certification of PPMs and other environment-related measures are not strictly trade measures. They are considered part of domestic environmental measures, and possibly subject to the rulings of TBT Agreements, where Article 7 requires that such systems should be formulated or applied in a way that they do not have the effect of creating unnecessary obstacles to trade. When an eco-labeling scheme is imposed by governments, it should be notified to the WTO if the eco-labeling is subject to TBT rules. However, where a system is promulgated by voluntary bodies, the notification obligations should be made to the ISO (International Standard Organization) information center.

The Code of Good Practices for the Preparation, Adoption and Application of Standards, which will be part of the revised TBT text under the Uruguay Round, states that autonomous bodies should comply with the same principles and rules as central bodies. An eco-labeling scheme, even if voluntary, might be considered to be an unnecessary barrier to trade by TBT Agreement if:

- The determination of the criteria is not based on objective or scientific consideration or fails to take into account adequately the production processes prevailing in other economies.
- Procedures for verification in granting the label are unnecessarily strict or rigorous, thereby making it almost impossible for a foreign producer to obtain the label.
- The eco-label is adopted for a product that is almost entirely imported and the right to grant the eco-label rests entirely with the authorities of the importing economy.

Unless the provisions which will extend the present obligations to private certification systems are adopted and enforced, the treatment of autonomous eco-labeling schemes under the GATT rules is open to question. The formulation and implementation of eco-labeling schemes could form a barrier to trade for developing economies. In order to minimize the concerns of developing economies and to make environmental objectives and trade mutually supportive, developing eco-labeling schemes requires the application of principles such as transparency, consultation, international consensus building, mutual recognition and technical assistance.

Korean trade and eco-labeling

The Korean Chamber of Commerce (1995) surveyed Korean firms' awareness about eco-labeling abroad. About 1.3 percent of the sampled firms had already been granted eco-labels by importing economies, while an additional 1.6 percent had outstanding applications and a further 20.1 percent planned to apply in the near future. About 52.6 percent among them did not produce products subject to eco-labels. The remaining 24.4 percent had no interest at all or knew nothing about eco-labels.

As for EU eco-labeling, Korean exporters are concerned about two product categories: textiles and footwear. In 1993, Korea exported US \$ 118 million worth of textiles made with man-made fibers that are subject to EU eco-labels, which constituted 2.5 percent of the total imports of the EU in this category. The German textile industry has already introduced labels on textiles such as MST (product label) and MUT (process label). The MST aims at preventing damage from hazardous chemicals or dyes contained in textiles. The MUT label sets norms for production processes, in other words, the degree of permitted levels of pollution of air, water, and soil, and particularly focuses on reduction of chlorine and chrome-based dyestuff, as well as other chrome and allergenic compounds. These German eco-labels will be a trade barrier for developing economies for the following reasons. Firstly, it may be easier for the German industry to comply with the criteria, which they already have the technical competence to meet. Secondly, developing economies would have to import the expensive dyestuffs permitted under the MST label from Germany or other EU economies. Thirdly, the verification procedures related to award of the MUT label may be difficult to implement in practice, particularly in developing economies, as they may involve on-site plant inspection.

According to UNCTAD (1995), the share of products subject to EU eco-labels in the total import of EU amounts to 3.26 percent. Of this share, about 45 percent of products subject to EU eco-labels are imported from developing economies.

Table 12
The Share of Products Subject to Eco-labels in
Total Imports of Selected Economies from Developing Economies

	Total Imports (US\$ mil.)	Products subject to eco-labels (US\$ mil.)	Percentage Share	Imports from Developing Economies (US\$ mil.)	Percentage Share
	(A)	(B)	(B/A)	(C)	(C/B)
Canada (1992)	129,200	1,512	1.17	88.7	5.8
Northern EU (1990)	97,000	2,422	2.49	21.5	0.8
EU (1992)	636,300	20,794	3.26	9,343.0	44.9

Source: UNCTAD (1995), *A Statistical Overview of Selected Eco-labeling Schemes*, TD/B/WG.6/Misc.5.

International Eco-Labeling and the ISO 14000 Series

The proliferation of eco-labels based on different impact assessment methodologies, environmental criteria, and technical specifications raises the transaction costs of global eco-marketing and thus seriously risks impeding “green trade”. To avert this, it will be necessary to create an international eco-labeling framework through international cooperation. For this purpose, the International Standards Organization (ISO) may be the most suitable lead player. The ISO recently established a Technical Committee on the Environment with subcommittees on eco-labeling, Practitioner Programs, and Terms and Definitions. The ISO has adopted a general directive to assist economies in establishing new programs and to guide programs which exist. It has also embraced a resolution that eco-labelling programs should not constitute unnecessary trade barriers.

The ISO 14000 series was initiated in 1993 with the formation of a Technical Committee (TC/207). Under TC/207, there are six subcommittees, including SC1 (Environmental Management System), SC2 (Environmental Auditing), SC3 (Life-Cycle Assessment), and SC6 (Terms and Definitions). At this stage, the ISO 14000 series covers only procedural aspects, not substantive aspects. When the procedure-oriented standard is set up, the next step might be to set substantive standards. The ISO 14000 series, which is now discussed only by about 30 economies, will have substantial effects on international trade when it is established as an international norm.

Recently, Korea has carried out pilot programs (from 1995 to 1996) for the ISO 14000 series certification system. Until now, there have been about 120 Korean firms certified under the ISO 14000 series, about 60 by domestic certification authorities and about 60 from foreign certification authorities.

Since eco-labels and the ISO 14000 series may have trade-restrictive effects, the resultant trade implications need to be reviewed thoroughly at the multilateral level. Regarding eco-labeling, the WTO/CTE is discussing how to govern eco-labeling within a multilateral trading system. The key issue is whether to adopt the TBT Code to encompass eco-labeling. Due to the LCA property of eco-labeling, using TBT as WTO rules for eco-labeling presents the problem of the WTO introducing PPM-based measures within its framework.

However, in reality, the negotiations for the ISO 14000 series are moving fast without close consultation with the WTO. This might be a serious problem when ISO 14000 series works as a de facto working force and the WTO has no rules to govern it. Therefore, the close consultation between WTO/CTE and the ISO upon eco-labelling is needed.

11. Concluding Remarks

The interrelationship between trade and environment has not been explored extensively to date. The dominant view in the developed economies appears to be that stringent environmental policies do not have serious adverse effects on trade and competitiveness, and, moreover, their effects can even be positive. However, there is still a great concern on the part of developing economies about the negative impacts they will face, in particular, on the part of small and medium-sized enterprises (SMEs). Furthermore, since environment-related measures are becoming more PPM-oriented, they may affect market access or be open to protectionist abuses.

The trade effects of environment-related measures may have a wide spectrum depending on a variety of key factors related to industrial status such as composition of exports, firm scale, etc. Korean exports consist of a relatively small number of industrial sectors, which are known as pollution-intensive. Furthermore the share of these in total exports has been increasing in the 1990s. This means that Korean exports may be affected seriously by environment-related measures as seen in the simulation result of hypothetical eco-duties. In Korea, SMEs have been playing an important role in exports, for example, about 60 percent of the electronics exports are manufactured by small scale firms.

SMEs may experience difficulties due to domestic or external environmental requirements. The difficulties stems from a range of factors, including: lack of economies of scale with respect to environmentally sound technologies (ESTs); lack of financial assets available for environmental investments; lack of information on developed economy markets and ESTs; lack of ability to pass increased costs on to the consumers; and limited opportunities to obtain environment-friendly input materials.

Even though further research has to be done on trade-environment interrelationships in Korea, it would appear that growing international pressures related to environmental concerns, in particular those based on PPMs, will affect Korean industry adversely in the short or medium term. As noted before, Korean industry is most seriously concerned about unilateral measures based on PPMs such as eco-duties and eco-labelling.

On the other hand, external pressures (well-designed without unnecessary trade distortions) could have a range of possibly positive impacts on the Korean economy and ecology, including: playing a major role in the improvement of the quality of the domestic environment; stimulating expansion of domestic environmental industries; stimulating the upgrading domestic environmental policies to the level of developed economies; prompting conversion to eco-friendly domestic production and consumption patterns; and finally, helping to build up a basis for the sustainable development of the Korean economy.

However, environment-related measures which aim at competitiveness gain or are based extensively on PPMs, even if well-designed, will seriously hurt the current trading system, and, in particular adversely affect the trading position of developing economies and potentially distort trading patterns.

For example, suppose that the US were to impose an eco-duty on Korean automobiles because Korea's air pollution requirements for auto manufacture were much less stringent than US standards. This would affect sales in US market but do little to help US auto producers in their vast export markets. In fact, it might hurt General Motors, Ford, Chrysler's third-country sales because the Korean car makers might cut prices in other markets in order to compensate for their sales loss in the US market. Furthermore the eco-duties may hurt the US domestic environment.

Therefore, environment-related measures based on PPMs should be avoided. Furthermore, environment-related trade measures authorized by MEAs also should be carefully designed and be supplemented with proper technology transfer and financial assistance in a cost-effectiveness sense.

References

- Ahn, Gee-Chul, H. Park, D.-J. Lee and Sang-Hee Yoo, *Eco-friendly Industrial Development*, KIET, 1998. 2.
- Bank of Korea, *Input Output Table (1990)*, 1993.
- Deardorff, A. V., and R. M. Stern, *The Michigan Model of World Production and Trade: Theory and Applications*, the MIT Press, 1986.
- Dixon, P. B., B. R. Parameter, J. Sutton, and D. P. Vincent, *ORANI: A Multisectoral Model of the Austrian Economy*, North-Holland, 1982.
- European Economy, *The Economics of Limiting CO₂ Emissions*, Special Edition No. 1, 1992.
- European Economy, *The Climate Challenge – Economic Aspects of the Community’s Strategy for Limiting CO₂ Emissions*, 1992.
- Esty, D. C., *Greening the GATT: Trade, Environment, and the Future*, Institute for International Economics, 1993.
- Goulder, Lawrence H., *Effect of Carbon Taxes in an Economy with Prior Tax Distortions: An Intertemporal General Equilibrium Analysis*, Stanford University, unpublished paper, 1993.
- Han, T. W., “Trade and Environment: A Korean Perspective”, in *Trade and Environment – International Issues and Policy Options*, The Korea Environment Institute, 1996.
- IEA, *Climate Change Policy Initiatives*, 1992.
- Laird, S., and A. Yeats, *Quantitative Methods for Trade-Barrier Analysis*, New York University Press, 1990.
- Min, B. S., *Eco-Labeling and its Effects on Environment and Trade: A Korean Perspective*, 1996.
- Ministry of Environment, Republic of Korea, *An Environmental White Paper*, 1995.
- National Statistical Office, Republic of Korea, *Monthly Statistics of Industrial Production*, 1993, 12, 1996, 12.
- National Statistical Office, Republic of Korea, *Monthly Statistics of Korea*, 1997, 1.
- OECD, *Environmental Data Compendium*, 1995.
- OECD, *Environmental Performance Review-United States*, 1996.
- Piggott, J. R., and J. Walley, *U.K. Tax Policy and Applied General Equilibrium*, Cambridge University Press, 1992.
- UNCTAD, *A Statistical Overview of Selected Eco-Labeling Schemes*, D/B/WG.6/Misc.5, 1995.
- World Bank, *International Trade and Environment*, 1992.
- Yoo, Sang-Hee, “Simulating Effect of Pollution Abatement Cost Equalization Tax on Korean Trade”, *Korean Journal of Resource Economics*, Vol. 3, No. 1, June 1993.
- Yoo, Sang-Hee, “Effect of Carbon Taxes on Korean Industry”, *Korean Journal of Resource Economics*, Vol. 4, No. 1, Nov. 1994.
- Yoo, Sang-Hee, *International Environmental Regulation and Industrial Competitiveness*, KIET, 1997.

Trade- and Environment-Related Measures: Lessons from Studies in Malaysia

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1. Introduction

Overview

The demand for natural resources and environmental amenities continues to increase sharply for three principal reasons: population pressure, increasing growth of economic activity (which has been driven by trade), and production processes that are increasingly becoming more capital- and technology-intensive.

Economists generally argue that the internalization of environmental externalities of economic activity is a necessary step towards sustainable development. Research and discussion at the OECD in the early 1970s established the *polluter pays principle*, which internalizes environmental costs in the production process, as the most economically efficient and most equitable approach to environmental policies. As long as damage to the environment and full resource costs are not incorporated into production costs, there will be scope to improve the efficiency of resource allocation.

However, the problem of internalization is an extremely complex one, not only in terms of the identification of instruments to be used for its implementation, but also as regards the implications of such use at the international level. Thus, while trade and environment experts generally agree that internalization of environmental costs is a key to reconciling environmental and trade policies, it has also been argued that international competition makes internalization of resource and environmental costs more difficult because industries that internalize these costs to a greater degree than similar industries elsewhere suffer a competitive disadvantage. By the same token, not requiring full cost internalization constitutes, in the view of some, a trade distorting subsidy that furnishes putative grounds for countervailing duties or other measures to “level the competitive playing field”.

This paper presents a synthesis of some studies on trade and environment linkages carried out in Malaysia. The impact of environmental measures (domestic and international) on trade is presented in the cases of the palm oil and timber industries, respectively. The impact of trade liberalization on the environment is presented by the case of electronics industry. And finally, Malaysia's participation in international environmental agreements is represented by the case assessing the impact of the phasing out of Ozone Depleting Substances (ODS) in the refrigerator and air conditioners industry pursuant to the Montreal Protocol. Additional issues covered in this paper include conformity to, and the possible effects of, meeting international standards.

Background on Malaysian Economic Growth

Malaysia's Gross Domestic Product (GDP) grew (in constant 1978 prices) from RM 22 billion in 1970 to RM 120 billion in 1995, an annual average growth rate of 7.1 percent (see Table 1). In the first half of the 1990s, growth accelerated to 8.7 percent.

Table 1
Malaysian GDP by Industry 1970 -1995
(RM million in 1978 prices)

	1970	1980	1990	1995	Average Growth (%) 1991-1995
Real GDP	21,548	44,511	79,329	120,316	8.7
Primary Sector					
Agric., Forestry, Livestock & Fishing	6,254 (29.0)	10,190 (22.9)	14,827 (18.7)	16,406 (13.6)	2.0
Mining & Quarrying	2,962 (13.7)	4,487 (10.1)	7,757 (9.8)	8,938 (7.4)	2.9
Secondary Sector					
Manufacturing	2,995 (13.9)	8,742 (19.6)	21,340 (26.9)	39,825 (33.1)	13.3
Construction	811 (3.8)	2,066 (4.6)	2,832 (3.6)	5,277 (4.4)	13.3
Tertiary Sector					
	8,069 (37.4)	18,325 (41.2)	32,573 (41.1)	49,870 (41.5)	9.3

Source: Seventh Malaysia Plan, 1996 - 2000

Notes: Figures in parentheses are percentage shares of GDP

The economy has undergone major structural changes during the last two and a half decades. The manufacturing sector expanded from 14 percent of GDP in 1970 to 33 percent in 1995, while the share of agriculture to GDP declined from 30 percent in 1970 to 14 percent in 1995. The services sector has grown from 40 percent in 1970 to 42 percent in 1995 reflecting the expanding role of the government and general improvement in the provision of services.

The composition of all sectors has also changed during the last two decades. Within the agricultural sector, the share of rubber in terms of value declined from about 50 percent in 1970 to 20 percent in 1990 before bouncing back to about 24.6 percent in 1995, while the output share of palm oil increased from 10 percent in 1970 to 29.8 percent in 1990 before soaring to 63 percent in 1995. In the mining sector, crude petroleum became a major contributor to growth while tin output declined. The manufacturing sector shifted from agro-based industries to the manufacture of electrical and electronic machinery and appliances, petroleum products, and processed palm oil products.

The export sector was a significant contributor to growth; its share of GNP increased from 42 percent in 1970 to 91.5 percent in 1995 (Table 2). The composition of exports

also changed significantly. Rubber and tin, which had accounted for, respectively, 33 percent and 20 percent of total exports in 1970, declined to only 2.2 percent and 0.3 percent respectively in 1995. Palm oil, which contributed 5 percent of total exports in 1970, became an important export commodity, contributing 10 percent of total exports in 1980, although it subsequently declined to 5.6 percent in 1995. Crude petroleum, which represented 4 percent of total exports in 1970, rose to become the leading export commodity contributing 20 percent of total exports in 1980, before declining to about 13 percent in 1990 and to 3.6 percent in 1995. However, manufactured goods increased in importance, rising from 10 percent of total exports in 1970 to 79.6 percent in 1995.

Table 2
Malaysia's Key Exports 1970 - 1995
(RM million in current prices)

	1970	1980	1990	1995	Average Annual Growth Rate (%) 1991-1995
Overall Indicators					
Nominal GNP	12,155	51,390	110,637	202,474	12.8
Nominal GDP	-	-	115,701	213,729	13.1
Total Exports	5,163	28,172	79,646	185,325	18.4
Agriculture Exports					
Palm Oil	264	2,515	4,421	10,331	18.5
Rubber	1,724	4,617	3,028	4,038	-3.0
Saw logs	643	2,621	4,041	2,264	-10.9
Sawn Timber	n.a.	n.a.	3,065	3,839	4.6
Cocoa	-	-	449	172	-17.4
Mining Exports					
Crude Oil	205	5,630	10,639	6,701	-8.8
LNG	n.a.	n.a.	2,635	3,171	3.8
Tin	n.a.	n.a.	902	545	-9.6
Manufactured Exports					
	522	6,319	46,835	545	25.8

Source: Seventh Malaysia Plan, 1996 - 2000,

Notes: n.a. indicates not available

The overall employment situation has been relatively stable, with the rate of unemployment moving from 3.8 percent in 1970 to 3.6 percent in 1980, 5.1 percent in 1990 and 2.8 percent in 1995. However, the structure of employment changed significantly with the manufacturing sector's share of total employment growing strongly and the primary sector's share shrinking commensurately (see Table 3).

Table 3
Sectoral Shares of Total Employment 1970 -1995
(Percent)

	1970	1980	1990	1995
Primary Sector (Agriculture and Mining)	56.0	44.0	28.3	18.5
Secondary Sector (Manufacturing and Construction)	12.0	19.0	26.2	34.2
Tertiary Sector (Services)	32.0	37.0	45.5	47.2

The strong growth of the Malaysian economy was accompanied by improvements in the quality of life, as evidenced by increasing per capita incomes and declining incidence of poverty (see Table 4).

Table 4
Per capita Incomes and Incidence of Poverty in Malaysia, 1970 -1995

	1970	1980	1990	1995
Per Capita GNP (Nominal RM)	895	3,014	6,099	9,786
Incidence of Poverty in Peninsular Malaysia (percent)	49.3	29.2	16.5	8.9
Incidence of Poverty in rural areas (percent)	58.7	37.7	21.1	15.3

It is anticipated that Malaysia will continue to be among the fastest growing economies in the world, with the National Development Policy and Vision 2020 providing a policy framework to seek new areas of growth and ensure sustainability within a context that will be highly technology- and skill-driven, while placing greater emphasis on ethics and the quality of human development.

Pollution in Production Processes

Water, air and land pollution are serious problems in Malaysia, posing dangers to the health of people and degradation of the environment.

Water Pollution

Water pollution poses serious consequences in certain areas in Malaysia. The percentage of clean rivers has declined over time while the percentage of 'very polluted' rivers has increased (see Table 5).

Table 5
Pollution of Rivers in Malaysia, 1987-1995

Percent of Rivers Reported as:	1987	1991	1995
Clean	47.3	42.5	41.7
Slightly Polluted	49.5	50.5	46.0
Very Polluted	3.3	6.9	12.2

Note: In 1991, the survey covered 87 rivers. In 1995, the survey covered 115 rivers.

Studies have shown that the major sources of water pollution are agriculture and agro-based industries, including the processing of palm oil, rubber, pineapple, tapioca, sugar, and sago; and to some extent paper and pulp manufacturing. The range and complexity of water pollution problems caused by the discharge of industrial effluents have increased, particularly in industrial centres in Selangor, Johor, Penang and Perak. The major sources are food and beverage processing industries, textile and leather tanneries, distilleries, chloro-alkali plants, sulphuric acid plants, and electronics hardware processing factories. Many of these industries discharge wastes containing different inorganic compounds including heavy metals into open water courses without prior treatment.

The seas surrounding Malaysia are also being increasingly polluted. Oil pollution could be due to oil prospecting operations, oil spills, oil tanker accidents, bilge pumping and deballasting of vessels. The Straits of Malacca has long been an important route for ships trading between the east and the west. With the passage of large cargo ships and oil supertankers, the Straits has become one of the most polluted routes in the world. Other problem areas in the coastal zone include silting and coastal erosion, discharge of industrial effluents, human and animal waste disposal.

Air Pollution

Air pollution is approaching critical levels in a number of urban areas like Kuala Lumpur, Petaling Jaya, Johor Bahru and Prai. The problem is expected to grow both in complexity and extent in the face of Malaysia's expanding manufacturing activities and increased reliance for mobility on private motor vehicles.

The major air pollution sources in Malaysia are transportation, fuel combustion from stationary sources, industrial processes and solid wastes. In recent years the number of vehicles on the road has increased. The exhaust fumes from this rapidly expanding fleet of vehicles is a principal cause of worsening air quality.

Another form of air pollution is the contamination of the atmosphere by particulate matter emitted from factories, quarry works and lorries carrying earth.

Land Pollution and Exploitation of Resources

The exploitation of natural resources has also created environmental problems. The development of the timber industry entailed extensive logging. Indiscriminate felling of trees has resulted in frequent flooding due to surface run-off of water. Erosion of bare land surfaces has also resulted in silting of reservoirs and dams as well as of the lower reaches of the rivers, reducing their flow capacity and increasing flood potential.

Even in the cities, the problem of flooding has increased tremendously due to increased volumes of surface run-off of water and inadequate drainage facilities. Again, irresponsible actions by housing developers have resulted in blockages of public drainage systems, contributing to further incidences of flooding.

With growing population, the need for increased production from the land has resulted in increased pollution. In rice production, for instance, large amounts of fertilizers and

insecticides are now required, and machines are doing the ploughing and harvesting work, replacing human labour.

Trade Policy

Malaysia's trade regime is fairly liberal, with the trade-weighted tariff for industrial products reduced to 8.9 percent as a result of the Uruguay Round from 10.2 percent in the pre-Uruguay Round period. At the global level, Malaysia is a signatory to the GATT/WTO. At the regional level, Malaysia is a member of the ASEAN Free Trade Area (AFTA) and APEC. Although APEC is not an explicit trading regime, stressing development cooperation as well as trade facilitation programs, trade and investment liberalisation matters currently constitute a major agenda of APEC's agenda.¹

AFTA is operationalised via the Common Effective Preferential Tariff (CEPT) scheme with tariff rates in the manufacturing and agricultural sectors expected to fall to between 0 and 5 percent by 2003. AFTA implementation was originally scheduled to be completed in 15 years by 2008 and to cover manufactured and processed agricultural products only. However, in September 1994, ASEAN members decided to accelerate the process by moving the end-date forward to 2003. In addition, ASEAN members widened the scope of AFTA by including non-processed agricultural products in the tariff reduction scheme. Further, they agreed to work on customs harmonisation, the reduction of non-tariff barriers, and to work out an agreement on protection of intellectual property rights. The acceleration of the AFTA program and its expansion reflects ASEAN's desire to demonstrate ASEAN's commitment to strengthening regional trade and cooperation as well as to reaffirm the grouping's support for trade liberalisation.

Environmental Policy

The Malaysian Government has depended very much on legal and institutional arrangements for the implementation of its environmental policy objectives and strategies. Malaysia has enacted more than 35 environment-related statutes since the early 1920s when various water acts were passed:

- The Water Enactment (1920) prohibits the disruption of rivers, such as by interfering with the flow of water or discharging specific substances detrimental to the beneficial uses of the river.
- The Mining Acts (1929) control discharges from mining activities into water courses.
- The Forest Enactment (1934) provides for the establishment of forest reserves as well as control logging practices.

¹ Malaysia has also promoted the formation of an East Asia Economic Caucus (EAEC) that would include the ASEAN states along with Japan; China; Korea; Chinese Taipei; Hong Kong, China; and Papua New Guinea. This caucus would focus on regional economic cooperation and trade and investment liberalisation issues, including the work program of the WTO. The EAEC initiative reflects Malaysia's desire to present a united, East Asian voice against what it sees as the worrisome trend in the world trade body to link trade with environmental and labour/social issues.

- The Land Conservation Act (1960) helps to control soil erosion and siltation.
- The National Land Code (1965), which divides land use into three categories (namely, agriculture, building and industry), enables environmental factors to be taken into consideration in land use planning.
- The Factories and Machinery Act (1967) deals with the working environment.

These legislative initiatives were found to be limited in scope and insufficient to handle the more complex emerging environmental problems. Comprehensive legislation and the establishment of an agency to control pollution and to enhance the environment came into being with the Environmental Quality Act, 1974 (EQA). The EQA and its subsidiary legislation along with the establishment of the Department of Environment (DOE), represented an effort by the government to consciously manage the environment in conjunction with economic development.

Sustainable development will continue to be emphasized during the Seventh Malaysia Plan (1996-2000) period to ensure that the well-being of the present generation is not met at the expense of future generations. Economic, social and environmental aspects will be increasingly integrated into the development process. Environmental considerations will be integrated into sectoral policies in order to ensure sustainable economic and social development. Besides acquiring the requisite technical capacity, the government will implement more efficient and cost-effective command and control measures to reduce and minimize pollution as well as to improve the quality of life.

Environment and resource management will be guided by the proposed National Environmental Policy, which aims at promoting economic, social and cultural progress through environmentally sound and sustainable development. A plan of action will be drawn up to operationalize the Policy, which focuses on the establishment of a strengthened institutional framework, enactment of relevant legislation and regulations and creation of an efficient and effective enforcement and monitoring machinery.

2. Institutional Arrangements for Trade and Environment

The Federal Government of Malaysia is a parliamentary system headed by a Prime Minister, with government agencies headed by ministers (chosen from among members of Parliament) and staffed by professional civil servants. At the State level, the government consists of state assemblies and chief ministers. Much decision-making authority is vested in the chief ministers, who head the States' Executive Councils. These function as State-level cabinets and have particular authority over natural resources, especially land and forests.

At the federal level, the power to make laws is vested in the Parliament, subject to the assent of the Yang Di Pertuan Agong (The National Ruler). Under the mandate of the Federal Constitution, various acts and ordinances have been formulated, especially within the stipulated Federal List, the Concurrent List and also in some cases under the State List (See Chapter 4).

At the State and Local levels, institutional arrangements start at the State Constitutions, which in actual fact refer to the Federal Constitution when it comes to matters related to natural resources and other environment-related matters. At the State level, laws are made by the state Legislative Assembly with the assent of the Ruler, which in this case can either be the Sultan, Raja or the Yang Di Pertua Negeri.

As noted, a significant body of environment-related legislation, much of it sector-specific and State-based, has been developed in Malaysia over the years to meet prevailing needs and changing circumstances and priorities. The Federal and State authorities share responsibility for promulgating and administering this legislation. In some cases, government agencies are responsible for administering certain aspects of environment-related policy without full legal powers, while other legally empowered agencies deal with enforcement. Local authorities are empowered to safeguard the environment in areas where the Department of Environment does not have jurisdiction. Ambiguity in the definition of powers, functions and responsibilities has led to conflicts which undermine the Federal-State relationships in environmental management.

Responsibility for administering legislation is assigned by the legislation to the relevant Federal Minister, State Minister or Executive Councillor. Provision is made for administration of the statutes, including in some cases through agencies vested with legal powers to attend to matters under their jurisdiction. In certain cases provision is also made for an advisory board or council.

Some of the Federal Government agencies having jurisdictional powers in environmental matters are presented in Table 6. In agriculture, for example, the Department of Agriculture and the Department of Environment are the two departments equipped with legal powers in the administration of environmental resources and other environment-related matters. However, many more government agencies are involved within the internal public planning process or act as advisers. At the State level, the set up is similar, with almost every State having a department in charge of particular matters related to environmental resources and other matters related to the environment.

Table 6
Government Agencies Equipped with Legal Powers in the
Administration of Environmental Resources and
Other Environment-Related Matters

Subject	Agencies with Legal Powers
Land	Department of Land and Cooperative Development; Land and District Office.
Water	Drainage and Irrigation Department; Department of Land; Department of Environment; Department of Fisheries; Local Authorities; Department of Health;

Subject	Agencies with Legal Powers
	Department of Mines.
Marine	Department of Environment; Department of Marines; Department of Fisheries; Marine Police.
Forest	Department of Forestry; Police.
Wildlife and National Parks	Department of Wildlife and National Parks.
Agriculture	Department of Agriculture; Department of Environment.
Air	Department of Environment; Local Authorities; Department of Road Transport; Department of Land and Cooperative Development; Department of Mines.
Solid Waste	Local Authorities; Department of Environment; Malaysia Highway Authority; Department of Forestry.
Noise	Department of Environment; Local Authorities; Factories and Machinery Department; Police.

There are also inter-agency bodies set up to coordinate activities of different agencies, especially to overcome problems of duplication in responsibilities. One such coordinating institution is the Committee of Ministers and Executive Councillors responsible for the environment that was set up to coordinate matters as regards the environment by way of discussions and negotiations. Through this committee a number of issues and problems relating to the environment and its management have been solved.

The structure of the existing institutional arrangements relevant to the focus of this study, including the roles, responsibilities and missions of the various bodies, are addressed below.

The Ministry of Science, Technology and the Environment (MOSTE)

This Ministry is involved in many ways, directly or indirectly, in issues related to the environment. The Department of Environment and the Standards and Industrial Research Institute of Malaysia (SIRIM), the national focal point for the ISO, fall within its jurisdiction, as do matters such as illegal trade in wildlife, movement of toxic and hazardous wastes, and control of ozone-depleting substances.

The Department of Environment

The Department of Environment (DOE) is a department within the Ministry of Science, Technology and the Environment. The DOE's mission is to promote, enhance and sustain sound environmental management in the process of nation building. The DOE is responsible for administering and enforcing:

- the Environmental Quality Act, 1974 (Amendment) 1985, and (Amendment) 1996 and the Subsidiary Legislation Made Thereunder, and
- Section IV of the Economic Exclusive Zone Act, 1984.

The DOE's main functions are to gazette regulations and orders, to issue licenses to regulate the discharge of wastes, and more generally to provide environmental inputs to the development of policies of other agencies, including at the Federal and State levels, to ensure that utilization of land and other natural resources is based on the principles of sustainable development.

Major activity areas of the DOE include: Project Planning Approvals, Issuing of Licenses, Enforcement, Solving Public Complaints, Revenue Collection, and Relations with Top Administration.

In order to achieve national environmental objectives, the DOE has adopted a three-pronged strategy based on:

- Pollution control and prevention,
- Integration of environmental factors in project planning and implementation, and Environmental inputs into resource and regional development planning.

The Environmental Quality Council

The Environmental Quality Council (EQC) was established under Section 4(1) of the Environmental Quality Act, 1974 and launched on April 12, 1977. Its mission is to advise the Minister of Science, Technology and the Environment on matters pertaining to the Act and also on any matter referred to it by the Minister. In addition, the Council provides policy guidance to the Department of Environment in the formulation of policies and strategies towards a more holistic approach to environmental management. Council members are appointed by the Minister from academia, the State Governments, Federal agencies, the industrial sector and non-governmental organizations. The Department of Environment is represented on the Council by the Director-General of Environment and serves as its Secretariat.

In the past, priority has been given to enforcement issues and the strengthening of environmental legislation, including:

- the amendments to the Environmental Quality Act;
- the expansion of the EIA Order and the development of specific sectoral guidelines for EIA prescribed activities;
- addressing environmental issues raised by the monitoring and surveillance programs and privatization proposals; and

- addressing the emerging problems of toxic and hazardous wastes associated with industrialisation.

Among other matters, the Council has discussed new developments arising from the amendments to the Natural Resources and Environment Ordinance of Sarawak to provide for environmental requirements and the implementation of EIA for natural resources development. It considered proposals to strengthen existing enforcement programs such as proposals to introduce a scheme for monetary reward to informers of environmental pollution. It reviewed the achievements in the treatment of rubber and palm oil mill effluents, and deliberated on proposals to review the fees for disposal of their effluents. Further, the Council paid particular attention to activities for promotion of environmental awareness and education and strongly recommended that efforts be made to intensify these activities.

The Department of Wildlife and National Parks (PERHILITAN)

The Department of Wildlife and National Parks is another department within MOSTE with a mission to conserve habitat and species diversity in Peninsular Malaysia and to ensure sustainable use of these resources. To meet its objectives, the department carries out the following functions:

(i) Wildlife Research

Research activities are conducted by the Wildlife Research and Conservation Division. The current research focus is on endangered wildlife species such as the Sumatran rhinoceros, gaur, elephant, tiger, avifauna, small and medium-sized mammals, wetlands and migratory bird species. Wildlife inventories are carried out especially in Taman Negara, wildlife sanctuary and reserves. The Department with various research agencies and institutions both local and abroad is also conducting joint-research.

(ii) Wildlife Management

Wildlife Management activities focus on reducing conflicts between wildlife and human populations, especially in agricultural areas. Endangered wildlife species are managed through both *in-situ* and *ex-situ* approaches. Conservation breeding facilities are set up for species such as the Sumatran rhinoceros, Malayan tiger, gaur, elephants, and pheasants to name a few. Elephant relocation is one of the major activities conducted by the Department due to the increasing conflicts between elephants and humans. Problem herds are captured and relocated to safer areas like the Taman Negara. These herds are monitored by the Department, including through radio and satellite telemetry methods. A study on relocated herds is being conducted jointly by the Department and the USA's Smithsonian Institute.

Global Environment Fund (GEF) funding was made available to the Department to manage the endangered Sumatran rhinoceros both in its habitat and in conservation breeding centers.

(iii) Management and Development of Taman Negara, Wildlife Reserves and Sanctuary

Taman Negara, the oldest national park in Peninsular Malaysia was established in 1939. Formerly known as the King George V National Park, it houses one of the oldest rain forests in the world and receives a steadily growing number of visitors both from local areas and abroad. Most of the overseas visitors are from the European Union. Among the attractions in the park are the canopy walkway, jungle trekking, fishing, wildlife observation and photography, and mountain climbing.

(iv) Law Enforcement

Law enforcement is part of the Department's strategy to protect wildlife species from over-exploitation in the peninsular. The Wildlife Protection Act No. 76 of 1972 has been amended on several occasions to afford better protection to wildlife species. Wildlife species under the CITES appendices have been included under this Act to enable the Department to monitor wildlife trade in the countryside. The Department is the authority for the CITES Convention in Malaysia.

(v) Training & Public Awareness

The Department conducts both in-house training and international courses and workshops for field biologists/staff in the region. The International Conservation Biology and Wildlife management Training Course is being jointly conducted by the Department and the Smithsonian Institute with the cooperation of the National University of Malaysia (UKM) and Royal Forestry Department, Thailand. This course, now into its tenth year, caters to wildlife biologists from around the region. Currently, the Department runs three Nature Study Centers in the peninsular to cater to students in Malaysia. The nature program is jointly conducted with the Ministry of Education, Malaysia.

The activities of the extension programs include talks and weekend camping trips for students from various schools throughout the peninsular. The Department also participates in exhibitions related to nature conservation organized by local government, schools, institutions of higher learning and the private sector.

The Standards and Industrial Research Institute of Malaysia (SIRIM)

SIRIM Berhad, formerly known as the Standards and Industrial Research Institute of Malaysia is a government-owned multi-disciplinary research and development company incorporated under the Ministry of Finance. The company came into operation in September 1996 with the mission to enhance customers' competitiveness through technology and quality enhancement while fulfilling the needs of its stakeholders. The company's vision is to be a world class corporation of choice for technology and quality.

As the national organization for standardization and quality, and as the prime mover in industrial research and development, SIRIM Berhad plays a critical role in "turning

technology into quality and profits for the nation". It acts as a catalyst in bringing about national economic dynamism through excellence in technology and promoting international recognition of Malaysian standards and quality. It develops processes, products and technologies for industry; promotes standardization and quality in industry; and provides technical services to industry and the public.

Over the years, SIRIM has undergone tremendous change. In its early years in the second half of the 1970s, when Malaysia's industrialisation strategy emphasized nurturing import-substitution industries, the Institute's research and development activities were basically oriented towards developing or adapting techniques and processes with potential for direct industrial applications. The main focal points at that time were energy, natural resource and environmental protection technologies, product development, and development of indigenous technologies. As a result, the Metal Industry Technology Centre was established in August 1978, followed by the Metal Industry Research and Development Centre in December 1984. In 1986, the two were integrated to form the Metal Industry Development Centre. The establishment of other technology centres quickly followed in line with the emphasis in the Industrial Master Plan. Over the course of the past two decades, SIRIM has expanded into 13 industrial technology areas.

SIRIM's active participation in international standards-related activities in organisations such as the International Organisation for Standardisation (ISO), International Electrotechnical Commission (IEC) and Codex Alimentarius Commission has achieved recognition and resulted in the appointment of SIRIM to the ISO Governing Council (1991-1993 and 1995-1996) and the ISO Technical Management Board (1996-1997).

SIRIM also participates actively in regional fora, representing Malaysia in the APEC Standards and Conformance Sub-Committee (APEC-SCSC) and the ASEAN Consultative Committee on Standards and Quality (ACCSQ). Through SIRIM, Malaysia has successfully bid for the Secretariatship of the ISO Technical Committee on Rubber and Rubber Products (ISO TC 45), thereby thrusting Malaysia into the leading role in influencing international standards of rubber and rubber products.

Through the reputation and credibility built up over the years in its standards and quality assurance programs, SIRIM has been accepted as inspection agent for 20 foreign quality certification agencies from 12 economies including United Kingdom, Canada, China and Japan, thereby helping Malaysian manufacturers in the export of Malaysian products to foreign markets.

In support of the national industrial development and consumer protection programs, SIRIM has to date: developed 2,319 Malaysian Standards; registered 829 companies and organisations to ISO 9001 and ISO 9002; approved 1296 products and 609 companies under the product certification scheme; and provided a wide range of testing services to industry. In view of the rising concern regarding the environment and the impending introduction of the ISO 14000, SIRIM has also launched a pilot program on Environmental Management System Certification and has accepted 32 companies into the program.

In an effort to encourage private sector participation in R&D, SIRIM continues to give priority to the promotion of its contract research activities with the private sector. Through market-driven programs SIRIM has been able to meet the needs of industries.

In its efforts to build capability and capacity in advanced technologies, SIRIM also continues to undertake government-funded R&D programs that have no immediate benefits to industry but are of great importance to the economy in terms of developing technological strength and mastery. The automated batik painting system is an innovation that resulted from a government-funded R&D program.

The primary objective of the Institute's Small and Medium Scale Industry Development Program (SMIDP) is to provide technical support to SMIs in order to improve their technological capacity, to help them diversify into more value-added activities, and to enhance their export capability. Through programs such as the Quality Improvement Practices (QIP), Technical Consultancy, the Incubator Projects and ITAF, SIRIM is able to create an entrepreneurial society, increase the number of technically competent entrepreneurs, encourage and stimulate the formation and growth of technology-based industries.

Ministry of International Trade and Industry

The mission of the Ministry of International Trade and Industry (MITI) is to promote and safeguard Malaysian interests in the international trade arena and to spur the development of industrial activities to further enhance Malaysian economic growth towards realizing Vision 2020. Its functions, carried out by its eight major divisions and six agencies, are as follows:

- To plan and implement Malaysia's international trade and industrial policies.
- To promote local and foreign investment and to coordinate and facilitate industrial development.
- To promote and facilitate export of Malaysian goods, by strengthening bilateral, multilateral and regional trading cooperation.
- To increase national productivity through management training programs, development of entrepreneurs and management consultant services.

MITI has been proactive in both local and international forums in addressing environmental issues, including the Montreal Protocol with regard to the depletion of the ozone layer, the Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal, the Framework Convention on Global Warming and the Convention on the Conservation of Biological Diversity.

With regard to the phase-out of CFCs and Halons, the Malaysian Country Program targets the year 2000 as the phase-out date. MITI has obtained US\$ 2.3 million to assist industry with the phase out and, in collaboration with other relevant agencies and departments and associations such as the Federation of Malaysia Manufacturers (FMM), has disseminated information about, and organized seminars and workshops on, this program. In addition a Technical Advisory Committee was established at MITI

to evaluate applications to import CFCs. In its evaluation of applications, the Committee takes into account factors such as a company's past consumption of the controlled substances and the availability of substitutes. The Customs Department, under the Custom Order (Amendment) 1989, records and monitors the imports of ODS, to ensure that the country's consumption of ODS remains below 0.3 kg per capita. The Committee also controls the approval of permits for all imports of CFCs by industries.

Recognizing the importance of a proper and systematic disposal of toxic and hazardous wastes, Malaysia, on 8 October 1993, acceded to the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal. The Department of Environment has taken measures to differentiate between wastes imported for recovery and those for disposal or dumping, as required under the Basel Convention. The Customs Department, under the Customs (Prohibition of Import) Order, monitors the importation of wastes to the country.

Ministry of Primary Industries

The Ministry of Primary Industries (MPI) oversees the development of the primary commodity sector, covering research and development, production, processing and marketing. Its mission is “to establish and enhance Malaysia's competitive advantage in a globalized market for selected commodities produced, as well as their value-added products and to promote specific commodities considered economically and socially strategic in our national development”. The policies and programs of the Ministry are to foster the orderly development of the commodity sectors, to achieve higher value-added through downstream processing and to promote the marketing of commodities, particularly semi-processed and processed products.

The MPI was established in 1972 through the amalgamation of the Export Commodities Division of the Ministry of International Trade and Industry and several units from the Ministry of Agriculture and Land. MPI's role was to establish an integrated approach to the development of primary commodities sector as it played an important role in Malaysia's economy contributing some 70 percent of total export earnings in the 1970s.

The MPI started off with two commodities under its responsibility (i.e. the twin pillars of the economy, rubber and tin). However, in line with the agricultural diversification policy, it has expanded its role to include the development of other commodities such as palm oil, cocoa, timber, other minerals, pineapple, pepper and tobacco. With the implementation of the Industrial Master Plan (IMP), MPI promotes the development of higher value-added resource-based industries such as processed and semi-processed products in order to maximize their export earnings and socio-economic contributions. The functions carried out by the divisions in the Ministry include *inter alia*,

- planning and managing the various commodity sectors;
- maintaining an information data base on primary commodities;
- deliberating on international commodity issues and problems;
- administering the financial and development performance of the Ministry and its departments and agencies; and
- managing operational and current issues related to the various commodity sectors

such as rubber, oil palm, forestry and timber, cocoa, pineapple, pepper and tobacco.

In its work, the MPI is supported by various Departments and Statutory Bodies under its purview. There are three departments, eleven statutory bodies and a corporation directly under the MPI. As well, in line with the concept of Malaysia Incorporated, it cooperates with other Ministries, Departments and relevant private sector organizations.

Ministry of Agriculture

The establishment of the Ministry of Agriculture dates back to the early years of this century, prior to independence. The present ministry has the following objectives:

- to increase income of farmers, livestock breeders and fisherman by increasing output from agricultural, livestock and fishery activities through the efficient utilization of the nation's resources; and
- to increase food production for domestic consumption and for export as well as diversifying agricultural, fishery and livestock activities including downstream activities in line with market opportunities, both domestic and abroad.

The functions of the ministry include:

- to formulate and plan policies, strategies and agricultural development programs
- to monitor, evaluate and coordinate the implementation of project/programs executed under the integrated Agricultural Development Projects (IADP) as well as non-IADPs
- to provide economic analysis services including scientifically collecting, analyzing and storing all statistical data and making them available to users and to other Divisions/Departments and Agencies
- to formulate and execute publicity programs, provide reference and research services and to implement the Agriculture Management Information System
- to ensure the participation of the Ministry of Agriculture in international programs
- to serve as one-stop agency for the private sector for the provision of advisory and expert services in the agricultural sector

The Royal Customs and Excise Department

This is one of the three departments under the Ministry of Finance. Its main task is to collect various indirect taxes such as import duties, export duties, excise duties, sales tax, service tax, and vehicle levies. The department also coordinates enforcement of import/export procedures and regulations. Some of the environment-related trade measures administered by the department are summarized in Tables 7 and 8.

Table 7
Trade- and Environment-Related Measures administered by
The Royal Customs and Excise Department: Imports
 Customs (Prohibition of Imports) Order 1988

International Environmental Agreements / Domestic Regulations	Description of Goods	Originating Economy	Ministry, Department, or Statutory Body Issuing licence
Montreal Protocol	Substances covered by the Montreal Protocol: Annex A (Groups I Na II) and Annex B (Groups I, II, and III) to the Protocol	All Economies	Ministry of International Trade and Industry
Basel Convention	Toxic and/or hazardous wastes (56 as listed)	All Economies	Director-General of Environmental Quality
Pesticides Act 1974	All household and agricultural pesticides including weedicides, insecticides, fungicides, rodenticides, bactericides, molluscides and veterinary pesticides under the First Schedule (section 2) of the Pesticides Act 1974	All Economies	Pesticides Board, Ministry of Agriculture
Pesticides Act 1974	All pesticides imported for research and educational purposes under section 14(1) of the Pesticides Act 1974	All Economies	Pesticides Board, Ministry of Agriculture
CITES / Protection of Wildlife Act 1972	Any animal or bird, other than a domestic animal or domestic fowl, whether alive or dead or any part thereof including all animals and birds specified in any written law in the Federation	All Economies	Wildlife Department

Table 8
Trade- and Environment-Related Measures administered by
The Royal Customs and Excise Department: Exports
 Customs (Prohibition of Exports) Order 1988

International Environmental Agreements / Domestic Regulations	Description of Goods	Economy of Destination	Ministry/Department/Statutory Body Issuing licence
Basel Convention	Toxic and/or hazardous wastes (56 as listed)	All Economies	Director-General of Environmental Quality
Pesticides Act 1974	Pesticides as listed: Aldrin, DDT, Dieldrin, Dinoseb, BHC, Fluoroacetamide, Chlordane,	All Economies	Pesticides Board, Ministry of Agriculture

International Environmental Agreements /Domestic Regulations	Description of Goods	Economy of Destination	Ministry/Department/Statutory Body Issuing licence
	Chlordimeform, Ethylene dibromide, Heptachlor, and Mercury compounds.		
CITES / Protection of Wildlife Act 1972	Any animal or bird, other than a domestic animal or domestic fowl, whether alive or dead or any part thereof including all animals and birds specified in any written law in the Federation	All Economies	Wildlife Department
CITES / Protection of Wildlife Act 1972	Skins and other parts of birds, with their feathers or down, feathers and parts of feathers (whether or not with trimmed edges) and down, not further worked than cleaned, disinfected or treated for preservation; powder and waste of feathers or parts of feathers	All Economies	Wildlife Department
Protection of Wildlife Act 1972	Coral alive or dead except those which have been processed and used as jewelry	All Economies	Wildlife Department
Timber Certification	Logs, sawn timber, moulding, plywood, veneer chips or particle boards, fibre boards, wood chips and groundwood	All Economies	Malaysian Timber Industry Board

Other responsibilities of the department include monitoring implementation of government policies related to duty exemption, warehouse and free zone procedures. It studies and assesses proposed amendments to the Customs Act, Regulations and Orders administered by the Customs Department. For customs, Malaysia adopts the Harmonized Nomenclature Coding System of the World Customs Organisation.

While tax enforcement and collection is its main program, the department also plays an important role in the development of local industries through tariff protection and other facilities. The department also acts on behalf of other departments/ministries such as Ministry of International Trade and Industries, Ministry of Home Affairs, Department of Agriculture, Department of Wildlife and National Parks and Department of Health.

3. Trade- and Environment-Related Measures

The main international institution governing trade is the General Agreement on Tariffs and Trade (GATT) which came into being in the late 1940s. Its purpose is to set out rules and procedures to be followed by nations in their international trade relationships. GATT is especially aimed at reducing trade barriers, constraining nations from imposing tariffs and quotas on imports or subsidies on exports, and in general to move toward conditions of free trade. One section of the GATT agreement prohibits what are called non-tariff barriers (NTBs), such as excessive inspection requirements, excessive product specifications, and the like. But there are exceptions to the rules: for example, under article XXb and XXg, governments are allowed to set restrictions in order to

achieve the protection of human, animal or plant life or health, and the conserving of natural resources, respectively.

Although there is little evidence that environmentally related product standards have been used as disguised trade barriers, economies (especially developing economies) are concerned about the potential of legislation such as the US Toxic Substances Control Act and similar legislation in other economies to act in that fashion. Whether by intent or not, regulatory product standards can have the effect of impairing market access by fragmenting markets, increasing production costs and requiring testing and verification procedures that discourage imports.

One of the main issues that the World Trade Organisation (WTO) will examine in the area of trade and the environment is the relationship between the multilateral trading system and trade measures for environmental purposes, including those that are part of international environmental agreements. The basic question is whether the use of trade measures as part of domestic environmental policies or even as part of international environmental agreements, violates current WTO rules. Related to this is, of course, the question of whether WTO rules need to be modified to incorporate environmental considerations. Deliberations on these major issues will determine how the WTO responds to the question of trade and environmental linkages.

In particular, these deliberations will attempt to resolve the current ambiguities regarding some of the WTO rules and waivers which have been used by some economies to justify the use of trade measures for environmental purposes. Much of the uncertainty lies in attempts by economies to restrict imports of goods produced using methods that violate the environmental policy or regulation in the importing country. This question of extra-territoriality is an important one, and needs to be urgently addressed.

Trade in wildlife is covered by the Convention on International Trade in Endangered Species (CITES). In Malaysia, implementation of the provisions of this Convention is by the Department of Wildlife and National Parks, or PERHILITAN, another agency under MOSTE. Enforcement of CITES which had traditionally focussed on wildlife had been somewhat complicated by the emergence of concern over trade in non-animal species, for example *ramin*, a light hardwood. This move resulted in the involvement of the Ministry of Primary Industries which had reportedly taken up the *ramin* issue, and efforts to exclude it from the CITES Endangered List had been successful.

Toxic and hazardous wastes and ozone depleting substances, both on the agenda of the Department of Environment (DOE), and also of MOSTE, are regulated respectively through the **Basel Convention** on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, and the **Montreal Protocol** on Substances that Deplete the Ozone Layer. Over and above these international instruments of control, domestically derived pollution (indirectly related to trade) emanating from local industries is addressed through the **Environmental Quality Act 1974** and Regulations thereunder, enforced by the DOE.

To handle the trade aspects of toxic and hazardous wastes and thereby enforce the requirements of the Basel Convention in Malaysia, a new control procedure was set in place under the **Customs Act 1967** which put into effect two regulations in August 1993, i.e. the **Customs (Prohibition of Exports) (Amendment) (No. 2) Order 1993** and the **Customs (Prohibition of Imports) (Amendment) (No. 3) Order 1993**. These Orders, enforced jointly by the Royal Customs and Excise Department and the DOE, specify that any export or import of toxic and hazardous wastes into or out of Malaysia must obtain prior written consent from the Director General of Environmental Quality. Following the enforcement of these new regulations, Malaysia then deposited its instrument of accession to the Basel Convention on October 8, 1993, which established January 6, 1994 as the date of this Convention coming into force in Malaysia. In implementing the **Montreal Protocol**, a National Steering Committee (NSC) was established to control and monitor the use of ODS under the auspices of DOE, the national focal point for the Protocol.

Other areas with trade implications involving MOSTE include chemicals in general, other than pesticides (which come under the Pesticides Board of the Ministry of Agriculture). By virtue of its position as the national focal point for the United Nations Environment Program (UNEP), DOE has been designated the Malaysian National Correspondent for the International Register of Potentially Toxic Chemicals (IRPTC), International Program on Chemical Safety (IPCS), implementation of the **London Guidelines** for the Exchange of Information on Chemicals in International Trade (Amended) 1989, operation of the information exchange and the Prior Informed Consent (PIC) procedure, and other international chemical programs. The DOE in this context plays a complementary role as the Designated National Authority (DNA) for non-pesticides, or more specifically industrial chemicals.

The Department of Agriculture (DOA) implements an Agricultural Information System (AIS) and enforces the **Pesticides Act 1974** and **Plant Quarantine Act 1976**. The DOA has the following objectives:

- to increase farm productivity through transfer of technology and research findings;
- to effect changes in the attitudes of farmers to be more receptive of new technologies and to be more actively involved in agricultural development; and
- to increase the contribution of agricultural sector to the national economy by promoting the cultivation of selected crops.

DOA Agricultural programs are implemented at both the Federal and State levels. In addition to enforcing the Pesticides Act and Plant Quarantine Act, the Federal DOA focuses on: farmers' training and development and commodities development. The State DOAs implement development programs and activities planned by their Federal counterpart and also plan and execute programs and activities according to the needs of the State Governments.

Environmental Quality Act, 1974

Malaysia has had environment-related legislation since the early 1920s. However, as noted earlier, the early legislation was inadequate to handle the complex emerging environmental problems. The Environmental Quality Act (EQA) 1974 was introduced to address the emerging issues.

The purpose of the EQA was set out as follows: “the prevention, abatement, control of pollution and enhancement of the environment, and for purposes connected therewith”.² A study of the provisions in the EQA shows that the Malaysian approach to environmental management is wide-ranging in scope and is not concerned with pollution *per se* but with pollution that affects the beneficial use of the environment or is hazardous to the general use of the environment. Beneficial use involves “a use of the environment or any element or segment of the environment that is conducive to public health, welfare or safety and which requires protection from the effects of wastes, discharges, emissions and deposits”.³ The EQA further declares that pollution consists of “any direct or indirect alteration of the physical, thermal, chemical, biological or radioactive properties of any part of the environment by discharging, emitting or depositing wastes so as to affect any beneficial use adversely, to cause condition which is hazardous or potentially hazardous to public health, safety, or welfare, or to animals, birds, wildlife, fish or aquatic life, or to plants or to cause a contravention of any condition, limitation or restriction to which a license under this Act is subject”.

To control pollution, the EQA relies on the mechanism of licenses issued pursuant to a ministerial regulation by the DOE. These licenses cover:

- the use and occupation of prescribed premises;
- discharging or emitting wastes exceeding acceptable conditions into the atmosphere, noise pollution, polluting or causing to pollute any soil or surface of any land; and
- emitting, discharging or depositing any wastes or oil into inland waters or Malaysian waters exceeding acceptable conditions.

Currently, 16 sets of regulations and orders are enforced under the EQA (Table 9).

It has been found that enforcement measures need to be further enhanced to ensure full compliance with laws and regulations. In particular, monitoring and surveillance capability needs to be strengthened and the structure of penalties for environmental offenses needs to be revised to ensure more effective deterrence, especially by repeat offenders. As well, the enforcement function of agencies such as the DOE, Health Department, Pesticide Board and Local Authorities needs to be rationalized and streamlined and adequate training provided to enforcement staff.

Table 9
Laws and Regulations Enforced by the Department of Environment

Purpose	Regulations
Control of Agro-Based Water Pollution	<ul style="list-style-type: none"> • Environmental Quality (Licensing) Regulations 1977 • Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977 • Environmental Quality (Prescribed Premises) (Crude Palm Oil)

² Preamble to the EQA.

³ Section 2 of the EQA.

Purpose	Regulations
	Regulations 1977 (Amendment) 1982
	<ul style="list-style-type: none"> • Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order 1978 • Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978
Control of Municipal and Industrial Waste Water Pollution	<ul style="list-style-type: none"> • Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 • Environmental Quality (Prohibition on the Use of Controlled Substance in Soap, Synthetic Detergent and Other Cleaning Agents) Order 1995
Control of Industrial Emissions	<ul style="list-style-type: none"> • Environmental Quality (Clean Air) Regulations 1978 • Environmental Quality (Compounding of Offences) Rules 1978
Control of Motor Vehicle Emissions	<ul style="list-style-type: none"> • Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977 (made under the Road Traffic Ordinance of 1958) • Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985 • Environmental Quality (Motor Vehicle Noise) Regulations 1987
Control of Toxic and Hazardous Waste Management	<ul style="list-style-type: none"> • Environmental Quality (Scheduled Wastes) Regulations 1989 • Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 • Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989 • Promotion of Investments (Promoted Activities and Products) (Amendment) (No. 10) Order 1990 (made under the Promotion of Investments Act, 1986)

Criminal sanctions are provided for in several sections of the EQA:

- A maximum fine of RM 10,000 (now enhanced to RM 100,000 in the 1996 Amendment) or two years imprisonment (now enhanced to five years) or both is imposed for offenses related to “emitting or discharging any waste into the atmosphere, polluting or causing or permitting to be polluted any soil or surface of any land and emitting, discharging or depositing any wastes into any inland waters” in contravention of acceptable conditions.
- A further maximum penalty of RM 1,000 per day is imposed for every day the offence is continued after a notice from the Director General is served on the offender requiring him to cease the act.
- An offender is liable to a maximum fine of RM 5,000 (now enhanced to RM 100,000) or one year (now, 5 years) imprisonment and a maximum fine of RM 500 a day for every day the offence is continued for offenses related to emitting or causing or permitting to be emitted any noise greater in volume, intensity or quality in contravention of the acceptable conditions.
- A maximum fine of RM 10,000 (now enhanced to RM 100,000) or two years' (now five years) imprisonment or both is also imposed on persons “discharging wastes

(whether liquid, solid, gaseous or radioactive) into Malaysian waters in such volume, composition or manner as to cause an alteration of the environment”.

- An offender is liable to a maximum fine of RM 25,000 (now enhanced to RM 500,000) or two years (now, five years) imprisonment for offenses relating to “the discharge or spill of any oil or mixture containing oil into any part of the sea outside the territorial waters of Malaysia if such discharge or spill will result in oil or mixture containing oil being carried, spread or washed into Malaysian waters”.

Protection of Wildlife Act, 1972

Legislation providing for the protection of wildlife in Peninsular Malaysia is embodied in Act 76 of the Laws of Malaysia (1972) and in Act A697 (Protection of Wildlife (Amendment) Act 1988) which received the Royal Assent and was gazetted in February 1988. The main thrust of the amendments of 1988 was to redefine certain terms in the principal Act, and to increase the penalties for infringement of the Act, as well as to enhance the powers of the enforcement authority; namely, the maximum for penalty unlawfully shooting totally protected animals was increased to RM 5,000 and three years imprisonment (from RM 3,000 and two years); and in the case of the unlawful killing of a Sumatran rhinoceros, a tiger or a clouded leopard, the fine would be RM 15,000 and five years imprisonment. All lower penalties were upgraded proportionately.

The protection of wildlife in Malaysia is divided between Peninsular Malaysia, Sabah and Sarawak. In Peninsular Malaysia, the principal protection for wildlife is afforded by the Protection of Wildlife Act, 1972. Wildlife species accorded protection under the Act are categorized into two types: totally protected animals and birds, and protected animals and birds. For the first category, the possession, import and export in such species are totally prohibited without prior consent from the Ministry of Science, Technology and the Environment. For the second category, the possession, import and export in such species are permitted with licences issued by the Department of Wildlife and National Parks.

Hefty penalties are imposed for offences involving totally protected species. A maximum penalty of RM 15,000 or imprisonment of up to five years are imposed on those found shooting or in possession of the Sumatran rhinoceros, a tiger, the clouded leopard, or part thereof.

In Sabah, wildlife is protected under the Fauna Conservation Ordinance of 1973, while in Sarawak, wildlife is accorded protection under the Wildlife Protection Ordinance.

The Pesticides Act, 1974

Currently, the Pesticides Act 1974 is the principal legislation for the control of pesticides in Malaysia. Supporting this are five main rules/regulations:

- Pesticides (Registration) Rules 1976,
- Pesticides (Importation for education and research purposes) Rules 1981,
- Guidelines on Applications for Approval of Advertisement on Pesticides 1981,
- Pesticides (Labelling) Regulations 1984, and

- Pesticides (licensing for sale and storage for sale) Rules 1988

The Pesticides Act spells out the procedures to be taken in case of injury or death from exposure, contact with or handling of pesticides. The Act also empowers the Ministry of Agriculture to direct an inquiry to be conducted in the event of death from pesticides. However, there is no legislation on pesticide use, waste and disposal. A farmer can spray as much and as often as he wishes, so long as it is not a banned product. Pesticide waste can consist of the pesticide itself (such as old stocks, leftovers or spillages), its packaging, diluted product, contaminated clothing or other materials and rinsing water. For now, pesticide wastes and effluents from factories are controlled by the Environmental Quality Act (Amendment) 1985. Some more important and crucial areas are neglected. These include:

- safety measures for workers engaged in the manufacture of pesticides and workers who are daily exposed to these chemicals;
- safe transportation of pesticides in bulk;
- safe disposal of used pesticide containers;
- levels for pesticide residues in food, and
- safe disposal of toxic wastes of pesticide manufacture.

The non-existence of legislation to cover these vital areas reflects a lack of an overall perspective of pesticides management.

The Pesticides Board which came into existence under the Pesticides Act 1974 is the sole authority charged with the responsibility of regulating pesticide use in Malaysia. It took the Board two years to draft rules on the registration of pesticides and another five years before these rules came into force on 1 April 1981. Only pesticides registered by the Pesticides Board, under the Ministry of Agriculture, are allowed to be manufactured, sold or used in Malaysia. The Board has registered as safe for use several pesticides that are either banned or restricted in many economies. These include DDT, Chlordane, Heptachlor, Leptophos, Lindane, Endrin, Aldrin, Dieldrin, Endosulfan, Dichlorvos, BHC, 2,4-D and 2,4,5-T. In the 1960s and early 1970s, a certain deadly poison, sodium arsenite, was used to kill off weeds and old rubber trees in plantations. Despite its telling effect on livestock grazing on land in and around plantations, sodium arsenite continued to be used for many years. Sodium arsenite was eventually banned in late 1976 when the Malaysian Rubber Research Institute (RRI) withdrew its recommendation for its continued use. Sodium arsenite was replaced by 2,4,5-T and paraquat, which are believed to be equally toxic.

Table 10
Implementing Agencies & Legislation to Control Chemicals and Hazardous Waste

Agency	Legislation
Pesticides Board, Ministry of Agriculture	<ol style="list-style-type: none"> 1. Pesticides Act, 1974 <ol style="list-style-type: none"> 1.1. Pesticides (Amendment of First and Second Schedule) Order 1982 1.2. Registered Pesticides 1976-1988 1.3. Pesticides (licensing for Sale and Storage for Sale) Rule 1988 1.4. Guidelines on Applications for Approval of Advertisement on Pesticides 1981 1.5. Guidelines on Application for Permit to Import Pesticides for Educational and Research Purposes 1981 1.6. Guidelines on Registration, Labelling and Classification of Pesticides 1984
Ministry of Health	<ol style="list-style-type: none"> 1. Food Act 1983 2. Food Regulations 1985 <ol style="list-style-type: none"> 2.1. Sale of Food and Drugs Ordinance, 1952 2.2. Sale of Food and Drugs Regulations, 1952 2.3. Sale of Food and Drugs (Margosa Oil) Regulations, 1952 2.4. Sale of Food and Drugs (Cliquinol) Regulations, 1982 3. Control of Drugs and Cosmetics Regulations, 1984 4. Poisons Act, 1952 (Revised 1989) <ol style="list-style-type: none"> 4.1. Poisons List Order 1983 4.2. Poisons (Sodium Arsenite) Regulations, 1949 4.3. Poisons (Sodium Hydroxide) Regulations, 1962 5. Medicine (Advertisement and Sale) Act, 1956 (Revised 1983) 6. Dangerous Drug Acts, 1952 <ol style="list-style-type: none"> 6.1. Dangerous Drug (Amendment) Act, 1983 6.2. Dangerous Drug Regulation, 1952 6.3. Dangerous Drug (Special Preventive Measures) Acts, 1985 7. Hydrogen Cyanide Fumigation Act
Ministry of Domestic Trade and Consumer Affairs	<ol style="list-style-type: none"> 1. Trade Description Act, 1972 <ol style="list-style-type: none"> 1.1. Trade Description (Amendment) Act, 1982
Factories and Machinery Department & Ministry of Human Resources	<ol style="list-style-type: none"> 1. Factories and Machinery Act, 1967 <ol style="list-style-type: none"> 1.1. Factories and Machinery (Asbestos Process) Regulations, 1986 1.2. Factories and Machinery (Lead) Regulations, 1989 2. Petroleum (Safety Measures) Act, 1984 <ol style="list-style-type: none"> 2.1. Petroleum (Safety Measures)(Transportation by Pipeline) Regulations, 1985
Customs and Excise Department & Ministry of Finance	<ol style="list-style-type: none"> 1. Customs Act, 1967 <ol style="list-style-type: none"> 1.1. Customs (Prohibition of Export) Order 1988 1.2. Customs (Prohibition of Import) Order 1988 1.3. Customs (Prohibition of Export) (Amendment)(No. 2) Order 1993 1.4. Customs (Prohibition of Import) (Amendment)(No. 3) Order 1993
Department of Environment & Ministry of Science, Technology and the Environment	<ol style="list-style-type: none"> 1. Environmental Quality Act, 1974 <ol style="list-style-type: none"> 1.1. Environmental Quality Act (Amendment) 1996 1.2. Environmental Quality (Clean Air) Regulations 1978 1.3. Environmental Quality (Sewage and Industrial Effluent) Regulations 1979 1.4. Environmental Quality (Scheduled Waste) Regulations 1989 1.5. Environmental Quality (Prescribed Premises)(Scheduled Waste Treatment and Disposal Facilities) Order 1989

The government's cordial relationship with the industry has boosted sales and use of pesticides by allowing agribusiness firms to advertise their products in electronic media and in the Journal of the Ministry of Agriculture. Pesticides promotion are also undertaken by the government under the Farmers Organisation Authority (FAO) which has retail shops throughout the country whose function, among others, is to distribute pesticides. Pesticides are also distributed free-of-charge as a subsidy on specific government projects.

Sanitary and Phytosanitary Measures (SPS)

On signing the Uruguay Round Agreement of the General Agreement on Tariffs and Trade (GATT), the Malaysian Government tasked the Ministry of Agriculture with ensuring that Malaysian laws and regulations conform to the Sanitary and Phytosanitary Measures (SPS) of the GATT/WTO. According to the Ministry, the SPS has implications for the following laws and regulations of Malaysia:

- The Plant Quarantine Act 1976 and the Rules of Plant Quarantine 1981. This Act, which serves to protect the Malaysian agricultural sector from foreign plant diseases and pests, is considered to be sufficient and consistent with the SPS since its rules and regulations are based on both the Codex Alimentarius and the International Plant Protection Convention (IPPC). The Act is aimed at restricting the entry of plant pests including dangerous foreign pests (bacteria, virus, insects and fungus) and diseases. The implementation of these activities includes thorough inspection at all entry-points into Malaysia and the issuance of import permits for plant materials brought into the country. The Department of Agriculture plays an important role in facilitating the export of plant produce to comply with plant quarantine measures of importing economies by the issuance of exporting license for all propagative parts of plant materials. The department also disburses tags for vegetables meant for export as one of the efforts to curb high pesticide residue levels in vegetables.
- The Animal Ordinance 1953 including Animal Rules 1962 and Animal Importation Order 1962. This ordinance, which exists to prevent animal diseases and pests from infecting Malaysian livestock and animals, is aligned with the international standards on which the SPS is based. A Veterinary Act to replace the above ordinance is being developed with work ongoing to ensure that it takes into account the requirements of the SPS (something which the originally proposed version failed to do).
- Fisheries Act 1985 and its Amendment 1993. This Act only covers the distribution and marketing of live fish and related organisms. It does not cover the marketing of fish products and aquaculture, and the application of SPS provisions is not taken into account by this Act. At this point in time, the Government is studying the need for review of the Act in line with SPS requirements.
- The Food Act 1983 and Food Regulations 1985. This Act aims to control the production and sale of food products to ensure that the health and safety of the consumer is not compromised. The import of controlled substances such as non-nutritive sweeteners for sale, processing, and use is controlled through a system of import licensing. The Ministry of Health is responsible for enforcement of this Act. The Ministry of Health is in the process of aligning with Codex standards those

regulations that do not currently conform to Codex.

Malaysia has participated actively in various Codex Alimentarius Commission (CAC) activities. Malaysia has prepared five draft Codex standards for the CAC based on Malaysian standards for the following products:

- Codex Draft Standards for Palm Olein (based on Malaysian Standards/MS 816:1983).
- Codex Draft Standards for Palm Stearin (based on MS 815: 1983).
- Draft World-Wide Codex Standard for Carambola (based on MS 1127: 1993).
- Draft World-Wide Standard for Dried Anchovies (based on MS 989: 1984).
- Draft World-Wide Standard for Crackers/*Keropok* (based on MS 113: 1984).

Moreover, three other standards/guidelines were prepared by Malaysia in the following areas:

- Recommended International Code of Practice for Storage and Transport of Edible Oils and Fats in Bulk (based on documents prepared by PORIM).
- Draft Code of Hygienic Practice for Hawkers' (Street) Food.
- Draft Guidelines for the Use of the Term *Halal*⁴.

4. The Impact of Environmental Measures on Malaysian Exports

The impact of environmental measures on trade are briefly presented in this section from two aspects: (1) the impact of international environmental requirements on trade in the case of Malaysian timber, and (2) the impact of domestic environmental control on trade in the case of Malaysian palm oil. The two cases are based on studies by Khalid (1993, 1989-1994, respectively).

Vulnerability to External Environmental Requirements

The vulnerability of exports to domestic and external environmental requirements depends on many factors, such as the composition of exports in terms of products and markets, industrial structures, rate of economic growth, level of development and domestic and international facilitating policies.

Considering the structure of trade, Malaysia's exports could be vulnerable to external environmental requirements in sectors such as timber and timber products, textiles, air conditioners and electronics.

In international fora, Malaysia has taken a firm position against the use of unilateral trade measures for environmental purposes. The report prepared by the Government of Malaysia in the framework of the GATT Trade Policy Review Mechanism, points out that “a major concern for Malaysia is the increasing use of unilateral measures for reasons of environment. Environment could and has been used as a convenient cover for protectionist motives. An even more dangerous trend is the use of unilateral measures such as eco- labeling to restrict imports of products to impose a country’s

⁴ *Halal* foods are foods which have been prepared in accordance with Islamic religious requirements.

own environmental standards on a third country, merely because it originates from a country with environmental policies and standards different from its own”.

The case of tropical timber

Timber, comprising both saw logs and sawn timber, was Malaysia's third largest commodity export in 1993, after petroleum and palm oil. Apart from “commodity timber”, Malaysia exports timber products, such as plywood/veneer, mouldings and furniture. Since independence, forest utilization facilitated the process of industrialisation and poverty eradication, but Malaysia's economic development has become much less dependent on its forest base. Development and industrial policy now promote the manufacturing of timber products, rather than export of “commodity timber”.

The volume of exports of commodity timber decreased from 20.4 million m³ in 1990 to 9.3 million m³ in 1993, which was entirely due to a fall in saw log exports. This decrease can be attributed to both domestic and external policies. With regard to domestic policies, both environmental regulations and Malaysia's development and industrial policies played a role. Domestic environmental regulations aimed at sustainable forest management (under the National Conservation Strategy⁵) caused a reduction in logging areas, and hence in the volume of timber production. Indeed, the production of saw logs fell from 50 million m³ in 1991 to 37.3 million m³ in 1993. Apart from environmental policies, national development and industrial policies aimed, through export taxes and other measures, at discouraging exports of timber as a commodity in favour of high-value-added manufactured exports.⁶ These policies were, at least in part, responsible for the reduction in the share of production destined to exports from 85 per cent in 1980 to 25 per cent in 1993.

External factors, such as unilateral measures and consumer concerns over deforestation also had adverse effects on exports. Studies have pointed out that unilateral measures constitute non-tariff barriers to trade, in particular where such measures target only tropical timber. Unilateral measures include bans or restrictions on the use of tropical timber, mandatory and voluntary labeling requirements and campaigns.

Studies listed Austria, Belgium, Germany, Hong Kong, the Netherlands, Switzerland and the United Kingdom, among those implementing or contemplating unilateral measures. Such measures have also been implemented by local authorities, including

⁵ The National Conservation Strategy includes an action plan on sustainable management of Malaysia's forests. Some aspects of this plan include: (a) a decline in logging areas; (b) a reduction in the number of logging permits or licenses; (c) production quotas in accordance with recommendations by the International Tropical Timber Organisation (ITTO); (d) progressive reduction of annual coupes in the framework of Malaysia's 5 year Plans; (e) stiffer penalties for illegal logging; (f) stronger enforcement; and (g) EIAs for forestry activities.

⁶ The government has adopted the following measures: log exports from Peninsular Malaysia were restricted in 1975, and completely banned as from 1985; raw rattan exports from Peninsular Malaysia were banned in 1989; an export levy was imposed on certain type of sawn timber and veneer in 1990; a temporary ban, effective January 1993, was imposed on log exports from the state of Sabah (the primary purpose of the ban was to ensure the availability of logs to local saw mills).

municipalities. Austrian legislation concerning labeling of tropical timber was eventually revoked after Malaysia had taken up this issue in the GATT Council.

The significance of the effects of external environmental requirements depends to a large extent on the geographical distribution of timber exports as well as Malaysia's response to external developments. In the case of saw logs, Malaysia's principal export markets are Japan, the Republic of Korea and Chinese Taipei (together these economies accounted for 86 per cent of the value of Malaysia's exports in 1993). These economies have not implemented environmental regulations affecting timber trade.

In the case of sawn timber, however, some of Malaysia's export markets (notably the Netherlands) have implemented or indicated intent to implement measures which may affect trade in timber. The pilot study on timber certification, which began in mid-1996 is being carried out under the Malaysia-Netherlands Joint Working Group. The Malaysian Timber Industry Board and Netherlands Timber Trade Association are the focal points for the study. In the study, timber products such as sawn timber would be subjected to the timber certification process, following which the "certified" timber products would enter the Keurhout Hallmark System implemented in the Netherlands to track these products to the final end-use. The pilot study has provided "experience and information" which would be useful in planning and implementing the proposed timber certification scheme for Malaysia.

Malaysia's response to developments in overseas markets has been, first, to organize campaigns to oppose unilateral measures. Second, Malaysian industry has responded by diversifying export markets, including by switching from markets where unilateral measures are emerging to other markets. Malaysia's policy to encourage domestic higher value-added activities could also be seen as one form of market substitution. Finally, the responses consist of adaptation, i.e. altering production methods to suit requirements of external markets. In this context, timber certification is increasingly seen as a marketing tool that can help to gain access to green markets. In practice, unilateral measures in overseas markets have not significantly affected Malaysia's timber exports. This is at least partially due to the responses listed above.

Eco-labeling for timber and timber products

International initiatives are likely to focus on eco-labeling or certification of sustainable forest management, covering tropical as well as temperate and boreal timber and to be based on multilaterally agreed principles.⁷

There are several proposals for the introduction of eco-labels for timber; and various definitions of sustainably managed forests have already been proposed. Some of them refer to the concept of "sustained yield", meaning that harvesting should not exceed the

⁷ In this context, the third session of the Commission on Sustainable Development (CSD) decided to establish an open-ended ad hoc Intergovernmental Panel on Forests to pursue consensus and formulation of coordinated proposals to promote the management, conservation and sustainable development of all types of forests. Trade and environment relating to forest products and services, including the issue of voluntary labelling and certification and its impact on developing economies, is listed among the issues for priority action by the Panel.

forest's growth rate. Other definitions are wider, covering also water quality, biodiversity and non-wood forest products. Some definitions include social issues in relation to forest management. Timber certification is seen by Malaysian industry as a useful marketing tool in greener markets, provided that labeling is applied to all types of timber and based on internationally agreed criteria for sustainable forest management. Malaysia has attempted, though so far unsuccessfully, to get the International Tropical Timber Organisation (ITTO) to include temperate and boreal forests in addition to tropical forests under the International Tropical Timber Agreement. The ITTO has set the target year of 2000 as a date beyond which all trade in tropical timber will be from sustainably managed forests. It has been estimated that RM 2.9 billion would be required by the Forestry Departments in Peninsular Malaysia, Sabah and Sarawak to implement measures to comply with the requirements of the Malaysian Criteria, Indicators, Activities and Management Specifications for "Forest Management Certification" by the year 2000.

Malaysia's position is that labeling must fulfil the following conditions:

- 1) Labeling must be applied to all types of timber. Temperate and boreal timber account for almost half of the world's forest cover and almost 90 per cent of world timber trade.
- 2) Labeling must be based on internationally agreed standards and criteria for sustainable development and not merely on standards developed by one or a few economies.
- 3) All actions not consistent with the foregoing should be revoked or abrogated.

Pollution Control in Key Export Sector

The Environmental Quality Act (EQA) authorized the DOE to "prescribe" particular classes of industrial premises and to require licenses. Thus, in order to control pollution, the EQA *inter alia* makes it mandatory to obtain licenses for the use and occupation of certain premises, and for pollution at levels that exceed "acceptable conditions". The EQA authorizes the Minister of the Environment to prescribe the levels of "acceptable conditions". Polluters are subject to prosecution and criminal sanction if emissions exceed levels corresponding to "acceptable conditions".

The EQA also authorizes the DOE to attach license conditions related to pollution control. In determining the conditions, the EQA has directed the DOE to consider factors related to the economic cost of pollution control. A novel feature of the licensing provisions has been the authorization to vary the size of the license fee according to: (a) the class of premises; (b) the location of such premises; (c) the quantity of wastes discharged; (d) the pollutant or class of pollutants discharged; and (e) the existing level of pollution. An example of internalization of environmental externalities and its trade consequences is provided by the case of palm oil industry which is presented in this section.

The case of palm oil industry

In the 1960s, when rubber prices began a prolonged decline, the Malaysian Government started to encourage palm oil production. With very fast growth rates, Malaysia soon became the world's largest producer of crude palm oil (CPO). By 1980 Malaysia accounted for half of world production of CPO and three-fourth of world exports of crude and refined palm oil (RPO).⁸ Palm oil played a key role in the Government's policy aimed at reducing rural poverty as well as income disparities between ethnic groups. Oil palms are grown by technologically advanced estates (55 per cent of the total area dedicated to oil palms) or by smallholders (45 per cent), who have been assisted by government land development schemes. In general, yields per hectare are higher in estates.

However, by 1975, CPO had become the country's worst source of water pollution. Pollution caused by the organic wastes from CPO mills was equivalent to pollution generated by a population of more than 10 million people. Production of CPO increased threefold between 1975 and 1985. Extrapolating from 1975 pollution load, the population-equivalent of the industry's pollution would thus have increased to 33 million if no policies had been implemented to abate pollution. The fact that the population-equivalent of the pollution actually fell to 0.08 million people by 1985 shows the success of Malaysia's policies in this sector: high rates of growth were achieved simultaneously with significant environmental improvements. The case of palm oil in Malaysia has been cited as an example where a trade-dependent industrializing nation moved decisively against pollution in a key export industry.

(i) Pollution abatement

In the crude palm oil industry, severe pollution was caused by the discharge of palm oil mill effluent (POME) into watercourses. The POME problem was unique to Malaysia and no proven treatment technology existed. Under the Environmental Quality Act (EQA), 1974 the DOE began the process of formulating license conditions by forming an expert committee with representatives from both industry and government. The committee's assignment was to investigate possible treatment technologies and to advise the DOE on regulations that were "not only environmentally sound but also sensible within the framework of economic feasibility and available technology".

In July 1977, the DOE announced the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, imposing standards on eight parameters of POME. The regulations required CPO mills to apply for an operating license every year. The DOE also announced that it would make the standards increasingly stringent over four years.

The DOE used several provisions to alleviate the burden of compliance. First, by phasing in the standards over four years, the DOE recognized that the industry needed time to construct treatment facilities, and to gain experience in operating them.

⁸ Since the 1970s the Government of Malaysia has encouraged domestic palm oil refining through the introduction of a variable export duty on CPO and duty exemptions on processed palm oil. As a result, whereas in 1974 palm oil was exported entirely as crude, in 1985, 97 per cent of Malaysia's palm oil was exported in processed form.

Informally, at least, the DOE weighted the environmental benefits of a more rapid implementation of the standards against its costs to industry, and it found that the latter exceeded the former. Secondly, the DOE used the flexibility in the licensing provisions to relate the size of the annual license fee to a mill's POME discharge. Indeed, the license fee consisted of two parts: a flat processing fee and a variable effluent-related fee. Thirdly, mills could choose the least-cost option: either paying the cost of treating the POME to meet the standard, or paying the excess fee to discharge POME with a BOD concentration exceeding the standard. Fourthly, the DOE recognized the importance of research and development and included a provision authorising the granting of waivers of fees to mills conducting research on POME treatment.

High effluent-related fees and the waiver of fees for research on effluent disposal or treatment as provided for in the regulation⁹ expedited research with remarkable breakthroughs in the treatment technology. Mills that succeeded in developing technologies to reduce BOD were rewarded by being charged lower effluent-related license fees. The legislation empowers the Director General to waive partially or completely effluent-related fees payable if he “is satisfied that research on effluent disposal or treatment of a kind or scale that is likely to benefit the cause of environmental protection is being or to be carried out at any prescribed premises...” In determining the extent of the waiver, the authority considers the quantity and quality characteristics of effluent discharged or to be discharged that is involved in the research. Palm oil mills are required to report the total effluent discharge, its composition and the method of disposal every three months, in addition to the annual application for an operating license.

(ii) Enforcement and performance of the regulations

During the initial years of the enforcement of the regulation the palm oil industry regarded effluent treatment as an additional cost of production. Compliance with the discharge standard of 5,000 mg/l BOD was not mandatory during the first year of implementation both to allow sufficient lead time for the building and commissioning of treatment systems and for further development of relevant treatment technology. The performance of the regulations during the first year was somewhat disappointing since the standards were not mandatory. Many mills chose to pay the excess fee. From the second year onwards, the DOE made the standards not only more stringent, but also mandatory. The average mill reduced its daily discharge of BOD significantly from 220 to 60 tonnes daily. The BOD load continued to decrease in succeeding years. The industry's efforts to develop better treatment technologies were given another boost in 1980 when the government established the Palm Oil Research Institute of Malaysia (PORIM). The industry's ability to reduce its BOD discharge was also facilitated by the development of various commercial by-products made from POME (e.g. in feed mixes for pig and poultry, as fertilizer or biogas).

The implementation of the regulations to control pollution from the palm oil mills are encouraging, as these mills have been constructively receptive to the regulations and

⁹ Regulations 17(1), 17(2) of Environmental Quality (Prescribed Premises)Crude Palm Oil) Regulations, 1977.

have progressed satisfactorily towards meeting the desirable target of 100 mg/l BOD. The industry did incur additional costs due to the implementation of the regulation. Capital costs accounted for most of the costs associated with treatment systems. However, relative to the industry's total production costs, treatment costs were low: only 0.2 percent in 1983 (Chooi, 1984). Due to the nature of the world market structure for fats and oils, the increased costs of production were unable to be shifted onto the consumers. Instead, two-thirds to three-fourths of the costs were shifted upstream and ultimately borne by oil palm growers, who had no outlet for palm oil fruits aside from sales to the palm oil mills (Khalid, 1991; Khalid and Braden 1993). The regulations caused prices of fresh fruit bunches (FFB) to be much lower than they would have been otherwise due to the oligopsonistic nature of the market. Thus, environmental protection need not necessarily impair the overall competitiveness of the industry in the open economy and the industry continued to expand even when the regulations were more stringent.

(iii) Distribution of compliance costs

With regard to the competitiveness effects of these regulations, a key question is who actually paid the compliance costs. Both crude and refined palm oil are sold in an extremely competitive world market for oils and fats. This prevented industry from passing the costs of treating POME onto the consumers in importing economies. Instead, CPO mills lowered the prices they paid farmers for fresh fruit bunches (FFBs).¹⁰ Thus, most of the costs are ultimately borne by palm oil growers, who have no other outlet for their FFBs. One study estimates that while the competitiveness effects on the RPO and CPO sectors were very small, the FFB growing sector (both smallholders and plantation owners) suffered significant losses in revenues (Khalid, 1991).

Thus, while environmental protection did not impair the competitiveness of the exporting sector, it significantly changed the distribution of returns to trade, affecting in particular producers of primary inputs.¹¹

(iv) Research and Development

Malaysia has been successful in addressing the pollution problems in the palm oil industry: in particular, controlling effluent discharge. In this regard, research has centred on the treatment of palm oil mill effluent (POME). As a result, POME, both raw and treated, as well as empty fruit bunches containing high plant nutrients is being recycled for usage as fertilizer resulting in significant savings in fertilizer cost. For this purpose, a guideline for effluent application has been drawn up. This includes making use of heat and electricity generated from biogas as an energy source in several palm oil mills.

¹⁰ Many mills processing FFB into CPO are integrated into the estates. Mills are also centrally sited in the development schemes among smallholders.

¹¹ A.R. Khalid and J.B. Braden, "Welfare Effects of Environmental Regulation in an Open Economy: The Case of Malaysian Palm Oil." *Journal of Agricultural Economics*, Vol. 44, No 1. January, 1993.

R&D efforts on utilizing oil palm by-products have proven successful. Intensive research on the full utilization of by-products from the mills and plantations continue in line with the 'Zero Waste' concept promulgated by the industry. Production of pulp and paper from oil palm fronds, pulping of oil palm trunk, production of blackboard from oil palm lumber, utilization of oil palm empty fruit bunches for the production of roof tiles and conversion of oil palm trunks into furniture have been shown feasible. Some of these are being commercialized through pilot plant studies and small-scale production evaluations with the help of private sector companies.

(v) Lessons from Malaysia's Palm Oil Pollution Control Experience

Malaysia's Crude Palm Oil Regulations were similar to effluent charge systems implemented in other economies with respect to those being linked to standards and being motivated by objectives other than cost-effective pollution control. These are not equivalent to a pure effluent charge system. The most these resembled a pure charge system was in the first year, when the BOD standard was not mandatory. After the first year, the motivation to comply with the standard was not the excess charge, but rather the risk of being shut down for violating the mandatory standard. It follows that the standard, not the excess charge, deserves most of the credit for the rapid reduction in the aggregate BOD load discharged.

Malaysia's experience with the regulation in the palm oil industry offers several lessons for pollution control efforts.

- Pollution reduction and industrial expansion can occur simultaneously. The fact that an industry is economically important is not grounds for being reluctant to address its pollution problems. One reason for success in merging environmental and industry objectives was the development of effective and relatively inexpensive technology. Industry was able to develop numerous by-products from the effluent. Another reason was the industry's ability to shift the costs associated with pollution control onto the suppliers of the raw materials.
- Effluent charges were not responsible for most of the reduction in BOD discharge. During the first year of implementation, standards were not mandatory and firms chose to pay effluent charges. After the first year of implementation, the motivation to comply with the standard was not the effluent charge, but rather the risk of being shut down for violating the mandatory standard. The effluent charges were seen as a means of reinforcing a system of uniform standards.
- Effluent charges offer abatement cost savings compared to uniform standards but the savings can be small (Khalid, 1994). The magnitude of potential savings depends on the degree of variation in the marginal abatement costs across pollution sources. The greater the variation, the greater the scope for efficiency gains through a reallocation of resources for abatement.
- The industry can be worse off under an effluent charge than a uniform standard. The sum of effluent charges and abatement costs under the former can exceed the abatement costs under the latter. From a social perspective, effluent charges are still better: the objective is not to minimize industry's costs, but to minimize society's. The effluent charges can be interpreted as potential compensation to the victims of pollution. Even if such compensation is not directly paid out, the revenue from

effluent charges benefits society if it is used to fund monitoring, enforcement, and clean-up activities. The higher costs understandably make effluent charges less attractive to industry.

- Effluent charges can result in local pollution problems. The simulation results indicate that some mills would discharge effluent with a BOD concentration well above historical standards if faced with only an effluent charge. Although it is possible to design a cost-effective system of “ambient charges” which vary across pollution sources and are linked to local ambient conditions, such a system is information-intensive, difficult to administer, and in essence not much different from a system of firm-specific effluent standards, which offers an environmental agency greater certainty about pollution abatement.
- Malaysia's experience with environmental regulation in the crude palm oil industry offers no lessons about the determination of optimal pollution levels. The effluent charges and standards were not chosen by comparing marginal abatement costs and marginal abatement benefits. Information on the value of environmental benefits is limited in Malaysia.

5. The Impact of Trade Liberalization on Malaysian Environment: The Case of Electronics Industry

The electronics industry dominates the manufacturing sector in Malaysia, contributing the largest macroeconomic benefits in terms of output, export earnings and employment. The electronics industry took off in the early 1970s when the government shifted its emphasis from an import substitution to an export oriented strategy to promote the country's industrial development. This was at a time when major structural changes were taking place in the electronics production sector in the United States, Western Europe and Japan, where industries in those economies needed to adjust very quickly to the intensely competitive international market and, inevitably to locate some of the operations to lower-cost production centres overseas. Malaysia, then on the threshold of its new export-led industrial program, offered an ideal location. The attractive investment climate, including a ten-year pioneer status incentive for the electronics industry, the huge reservoir of trainable labour at low cost, the establishment of Free Trade Zones (FTZs) and Licensed Manufacturing Warehouse facilities (LMWs), was one which many electrical and electronics multi-national companies found difficult to resist in their quest for greater competitive advantage.

The electrical and electronics industry is one trade-driven activity favoured for the “value-added” edge of its manufactured products over primary commodities. Indeed current statistics have shown the electronics industry to be the country's major revenue earner next to crude petroleum. The downside to this is the pollution impact, which has to be adequately addressed in order to maintain the environmental soundness and competitiveness of this important economic activity. Pollution from the electronics industry is addressed by retrofitting as well as in-plant approaches, dealing with waste matter and the use of ozone-depleting substances respectively.

Industry Structure

With the government taking the lead in local electronics research and development, the industry has been transformed from the assembly and testing of semi-conductors using imported technology and materials in the 1960s into three broad sectors:

- Electronic components comprising integrated circuits, discrete active components such as transistors, diodes, opto-electronic devices, and discrete passive components such as capacitors, resistors, relays, inductors;
- Consumer electronics which cover home entertainment products such as radios, TV receivers, video cassette recorders; and electronic household goods such as microwave ovens, telephone receivers; and
- Industrial electronics which include computers and peripherals, office electronic equipment, process control.

Indeed, the electronics industry is now a major component (66 percent in export value) in Malaysia's manufacturing sector, due to government efforts in encouraging multinationals from the United States, Japan, Europe, Chinese Taipei, Singapore, Korea and Hong Kong, China to set up export-oriented plants in Malaysia.

Structural Changes

Since its inception in the early 1970s, the electronics industry had been dominated by the electronic components sector, accounting for 80 to 85 percent of the sectoral output. In view of this, the Industrial Master Plan (IMP) recommended its restructuring by giving emphasis to the consumer and industrial electronics sectors. Although the manufacture of semiconductor devices and other electronics components still predominates, the output structure of the industry has changed significantly since the mid-1980s. In 1984, the electronics components sector contributed 84 percent of the total output of the industry while the consumer and industrial electronics sectors contributed 12 percent and 4 percent respectively. By 1986 the electronics components sub-sector contributed 81.5 percent of the total output of the industry while the consumer and industrial electronics sub-sectors contributed 12.3 percent and 6.2 percent respectively. However, from 1986, considerable structural adjustments took place within the industry and in 1991, the distribution was 58 percent, 23 percent and 19 percent for components, consumer and industrial electronics, respectively. In 1993, the output structure for components, consumer and industrial electronics was respectively 43 percent, 27 percent and 30 percent. This output structure indicates the achievement of the IMP targets of 24 percent and 15 percent by the year 1995 for the consumer and industrial electronics. This earlier-than-expected achievement of the targets is a clear indication of the attractive investment climate that Malaysia offers to investors.

Exports

Malaysia has a very strong global competitive position for a range of electronics products. For many multinational companies, it has become the largest production base outside their home economies or in Southeast Asia, due to the substantial

improvements in production and the processing technology. Export earnings of the electronics industry increased significantly from RM 6.6 billion in 1986 to RM 54.7 billion in 1996, recording an average annual growth rate of 29.6 percent in 1991-1995 period. Electronic components remained the major export sub-sector as semi-conductors continued to be the mainstay of exports, especially to the United States and Japan.

Environmental Profile of the Electronics Industry

Pollution by Waste Matter

The electronics industry encompasses, amongst others, the manufacturing of semi-conductors, chip boards and micro-chips, which consume large quantities of acids, alkalis and oil-based chemicals. These chemicals often end up in the wastes discharged, contaminated further by heavy metals, halogens and other toxic compounds by virtue of the processes involved. A conservative estimate from a 1986 feasibility study estimated the total amount generated from electronic factories in Malaysia at 50,000 tonnes per year, resulting in an approximately US\$150 million expenditure on waste management, if managed individually. The magnitude of this figure alone justified the consideration of a centralized waste treatment system, a project which is now under implementation. In terms of regulatory control over the wastes, three sets of Regulations under the Environmental Quality Act 1974 apply, one governing atmospheric emissions, another industrial effluents, and the third dealing with toxic and hazardous components of the wastes.

In Malaysia's manufacturing industry in general, the lack of proper and efficient effluent treatment systems has been cited as one of the main reasons for non-compliance, especially in the electroplating, oleo-chemical, rubber-based and textile industries particularly with respect to meeting heavy metal, COD and BOD standards. The electronics industry, however, is one of the major industries with a high percentage of compliance (93.3 percent in 1993, 89 percent in 1995) with the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 (see Table 11).

Table 11
Environmental Quality (Sewage and Industrial Effluent) Regulations 1979
Parameter Limits of Effluent of Standards A & B

Parameters	Unit	Standard	
		A*	B
Temperature	°C	40	40
pH Value	-	6.0 - 9.0	5.5 - 9.0
BOD ₅ at 20°C	mg/l	20	50
COD	mg/l	50	100
Suspended Solids	mg/l	50	100
Mercury	mg/l	0.005	0.05
Cadmium	mg/l	0.01	0.02
Chromium, Hexavalent	mg/l	0.05	0.05
Arsenic	mg/l	0.05	0.10
Cyanide	mg/l	0.05	0.10
Lead	mg/l	0.10	0.5
Chromium, Trivalent	mg/l	0.20	1.0
Copper	mg/l	0.20	1.0
Manganese	mg/l	0.20	1.0
Nickel	mg/l	0.20	1.0
Tin	mg/l	0.20	1.0
Zinc	mg/l	1.0	1.0
Boron	mg/l	1.0	4.0
Iron (Fe)	mg/l	1.0	5.0
Phenol	mg/l	0.001	1.0
Free Chlorine	mg/l	1.0	2.0
Sulphide	mg/l	0.50	0.50
Oil and Grease	mg/l	Not Detectable	10.0

* This standard applies to the industrial and development projects that are located within catchment areas.

The issue of toxic waste disposal and treatment was a significant problem to be resolved. With a lack of proper treatment systems the electronics industries had been forced to store their waste materials, which were accumulating in storage within their premises. Some, as a short-term measure, had exported the wastes to other economies, especially the US, UK, Germany, Japan and Singapore, for treatment and eventual disposal. Members of the Malaysian-American Electronics Industries (MAEI) had called for the setting up of a national landfill as a top priority for environmental management. The government had commissioned a Danish firm, in joint venture with local firms, to build an Integrated Waste Disposal Facility at Bukit Nenas, Negeri Sembilan.

Used oil is one of the major liquid wastes being stored and is increasing at the rate of 5 percent per month. Efforts are now taken to progressively deplete these stocks through licensed used-oil recyclers.

The storage of 1,982 tonnes of heavy metal sludge by MAEI members constitutes about 30 percent of the countrywide stockpile. It is growing at an average rate of 8.5 percent or 168 tonnes per year.

The stocks of some organic wastes, such as M-Pyrol are gradually depleting since they have high commercial reclaim values. Solder dross also does not cause significant problems as most members are able to engage licensed solder reclaimers to handle this high valued waste.

Environmental Compliance

Emissions to the atmosphere in the form of smoke, dust, particulates, gases and fumes, come under the purview of the Environmental Quality (Clean Air) Regulations 1978, whereby the installation and operation of any equipment giving rise to these emissions is regulated. Department of Environment statistics reveal rather satisfactory compliance of the Electrical and Electronic group at 97 percent with regards to Clean Air regulations (Environmental Quality Report 1995). Given that the electronics industry comprises the better half of this group, being mostly multinational companies adequately installed with emission control equipment, it follows that atmospheric pollution from the electronic manufacturers is relatively small. This is substantiated by the fact that of complaints received by DOE on air pollution, none arose from electronics factories.

For discharges into watercourses, the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 impose standards of discharge (as shown in Table 11 above). Again, the Electrical and Electronics industry achieved a 89 percent compliance in 1995, which is to be expected as industries within the sector concerned invariably possess their own treatment systems for non-toxic effluents. Effluents at Motorola Semiconductors, as a case in point, are recycled for use in its air conditioning chillers and for watering greenery on the premises. Table 12 shows a typical electronic waste composition, which dictates the type of wastewater treatment to be employed.

Table 12
Categories of Wastes from Electronics Manufacturing

Type	Percentage by Mass	Some Treatment Processes Involved
Mineral Oil	1.7	Activated-clay Absorption, Filtration, Oil recovery, Incineration
Solvent	11.6	Distillation, Recovery, Incineration, Landfill
Organic	4.5	Aerobic, Anaerobic, De-sludging, Landfill, Fertilizer recovery
Inorganic	18.4	Chemical coagulation, Flocculation, Redox Neutralization, Sludge fixation, Landfill
Sludge	46.9	Chemical fixation, Physical Stabilization, Landfill

Source: Unpublished Information from Malaysian-American Electronics Industries

To handle toxic and hazardous wastes, the Environmental Quality (Scheduled Wastes) Regulations 1989, which covers the generation, storage, handling, transport and

disposal of scheduled wastes, requires notification of all matters concerning such materials to the Director General of the Environment, and the obtaining of written permission. Categories of wastes classified as “scheduled” include the oily wastes, solvent-based waste (halogenated and non-halogenated), organic-based chemical wastes and inorganic wastes typical of the electronics industry. Pending the completion of the centralized facility, all toxic and hazardous wastes not treated on the premises are required to be stored safely on-site. From enforcement records, toxic and hazardous wastes storage from the electronics industry has so far not experienced any major problems.

6. International Environmental Agreements

International environmental agreements are aimed at addressing problems of global proportions. Malaysia has ratified several international agreements including the Framework Convention on Climate Change, the Convention on Biological Diversity, the Basel Convention on the Transboundary Movement of Toxic and Hazardous Wastes and their Disposal, Convention on International Trade in Endangered Species (CITES), Wetlands of International Importance (RAMSAR), the Convention on Desertification and the Montreal Protocol for the Protection of the Ozone Layer to phase out CFCs.

The economic impact of the Montreal Protocol has been studied in part by the Institute of Strategic and International Studies (ISIS) Malaysia within a broader study on trade and environment.

Malaysia's Participation in the Montreal Protocol

Malaysia does not produce chlorofluorocarbons (CFCs) or halons but imports these to service its industrial and consumer needs mainly from the United States, United Kingdom and Japan. The consumption of CFCs in Malaysia is broken down into the following categories of use:

- 1) Commercial and residential refrigeration and air conditioning.
- 2) Mobile air conditioning.
- 3) Solvent cleaning and degreasing in engineering and electronics sectors.
- 4) Production of plastic foam and foam insulation products.
- 5) Aerosol propellants.
- 6) Fire protection system and fire fighting.
- 7) Other miscellaneous uses.

As a developing economy defined by the first Meeting of Parties to the Protocol and with the estimated consumption level of the controlled substances less than 0.3 kg per capita on 27 November 1989 (when the Protocol came into force), Malaysia qualified for the special situation of developing economies under Article 5 of the Protocol. Under this Article, developing economies with consumption of the CFCs and halons less than 0.3 kg per capita are exempted from the control requirements for a period of ten years.

(i) Policy Response

With the proactive role of Malaysia on environmental issues, the government has formulated policies including legal, administrative, voluntary measures, financial and technical assistance as well as phase-out investment projects to restrict the use of controlled substances ahead of the time frame granted. The government prepared its country program and the National Action Plan in 1991, a joint effort between the government and the industry. The country program and the National Action Plan, which are largely industry generated, gained acceptance by the government and industries themselves, thus eliminating unnecessary bureaucratic delay and confrontation that might arise without adequate consultation.

Malaysia received about US\$ 4.2 million for the period 1991-93 in financial assistance from the Multilateral Fund of the Montreal Protocol to cover the phase out of ten ODS investment projects, institutional strengthening for the Department of Environment, and technical assistance, including the organization of conferences and workshops.

The first legal initiative was the enforcement of the Customs Duties Order 1988, which was amended by the Customs Duty (Amendment) (No. 35) Order 1989 dated 14 December 1989. With this amendment, the import inventory was updated and arrangements were made for the monitoring of the import of controlled substances listed in Annex A of the Montreal Protocol.

The Fire Services Department issued an Administrative Order in June 1990 prohibiting the use of Halons and has since stipulated the use of carbon dioxide as the extinguishing medium in all new installations except for specific applications. Malaysian Industrial Development Authority (MIDA) also issued some guidelines in 1992 discouraging the use of CFCs in new manufacturing operations.

Under the EQA 1974, the Environmental Quality (Prohibition on the Use of Chlorofluorocarbons and Other Gases as Propellants and Blowing Agents) Order 1993 was gazetted on 25 October 1993 which prohibits:

- a) the use of any controlled substance as propellant in aerosol industry and in portable fire extinguishers with effect from June 1, 1994
- b) the use of any controlled substance as propellant in aerosol in any pharmaceutical product with effect from January 1, 1999
- c) the use of any controlled substance as blowing agent for extruded polystyrene foam, thermoformed plastic packaging, molded flexible polyurethane foam with effect from July 1, 1995
- d) the use of any controlled substance as blowing agent for rigid polyurethane foam with effect from January 1, 1999
- e) the use of combustible petroleum gas or other combustible as propellant in aerosol with effect from January 1, 1999

The Application Permit (AP) system which was implemented on April 7, 1994 requires companies intending to import ODS in Annexes A and B to obtain permits from the

Ministry of International Trade and Industry (MITI). The Advisory Committee on the AP (comprising representatives of MITI, DOE, Customs Department and MIDA) set import quotas for companies on the basis of their historic use of controlled substances, and of priority uses established under the Country Program.

Also in 1994, the DOE issued guidelines on Control Measures for the Protection of the Ozone Layer to assist enterprises in the phase out program. The Customs Duty (Amendment) Order 1994 (Schedule II) was issued in 1995 to monitor the import of controlled substances listed in Annex C and Annex E of the Montreal Protocol. The Amendment also monitors trade with economies that are non-parties to the Montreal Protocol. Fiscal measures aimed at providing incentives to investment in ozone friendly technologies include:

- duty exemption on imports of non-ODS technology particularly CFC and Halon recovery technologies.
- New manufacturing investment using environmentally friendly technology as well as non-ODS technology is subject to reduced tax regime up to 30 percent.
- duty exemption on imports of HCFC134a.

Table 13 provides an overview of consumption of ODS in Malaysia by sector, over the period 1989-1993.

Table 13
ODS Consumption by Sector

User Sector	Substance	1989		1990		1991		1992		1993	
		Q*	%	Q	%	Q	%	Q	%	Q	%
Solvent Cleaning	CFC113	1441	19.3	1244	15.1	1100	12.0	800	9.2	370	4.0
	MTC	2348	31.5	3057	37.2	2701	29.4	2829	32.4	2620	28.5
Foams	CFC11, 12	590	7.9	696	8.5	870	9.5	1088	12.5	1360	14.8
Car air-conditioning	CFC12	894	12.0	1012	12.3	1126	12.3	1171	13.4	1276	13.9
Residential & small commercial air-conditioning	HCFC22	1296	17.4	1309	15.9	2439	26.6	1809	20.7	2600	28.3
Refrigeration & large commercial air-conditioning	CFC11, 12	485	6.5	320	3.9	378	4.1	435	5.0	495	5.4
Aerosols	CFC11, 12, 113, 114	180	2.4	350	4.3	300	3.3	300	3.4	300	3.3
Fire-fighting	HALONS	201	2.7	207	2.5	231	2.5	263	3.0	137	1.5
Agriculture	METHYL BROMIDE	24	0.3	28	0.3	33	0.4	30	0.3	30	0.3
TOTAL		7459	100.0	8223	100.0	9178	100.0	8725	100.0	9188	100.0

Note: Data in this table are provided by DOE, Chemical Suppliers, Major Users and Chairmen of Working Groups. * Q represents quantity; percent refers to percentage of industry-wide consumption per year.

(ii) Country Program on Phasing Out ODS

As shown in Table 13, ODS consumption in Malaysia in 1993 was reported in the solvent cleaning sector (32.5 percent), foams (14.8 percent), mobile air-conditioning (13.9 percent), residential and small commercial air-conditioning (28.3 percent), refrigeration and commercial air-conditioning (5 percent), aerosols (3.3 percent), fire-fighting (1.5 percent) and agriculture (0.3 percent). The solvent cleaning sector uses CFC113 for the cleaning of electronic parts and Methyl Chloroform (MTC) for the cleaning of metal parts and as a solvent in correcting fluid. Carbon tetrachloride (CCl₄) is not commonly used as an industrial or commercial solvent in Malaysia due to its known carcinogenicity. There is no regulation in Malaysia prohibiting the use of CFC113, MTC and CCl₄. Phasing out of these ODS is largely voluntary by electronics firms. While many large companies have already begun phasing out of these ODS, small and medium-sized enterprises (SMEs) have yet to do so, due mainly to financial considerations and application complexities.

In the foam sector, CFC11 and CFC12 were the main ODS used. Between 1989 and 1993 the sector has been growing in terms of ODS use. The government has gazetted an Order under the Environmental Quality Act, 1974 prohibiting the use of CFCs in foam making with different effective dates depending on the types of foam manufactured, the latest effective date being January 1999. With the phasing out program, the estimated consumption by industries had begun to decline in 1994. Alternatives for blowing agents include HCFC141b, Methylene Chloride and water blown CO₂, which is mostly used substitute.

HCFC22 is used as a refrigerant for residential and small commercial air-conditioning and CFC11 and CFC12 for refrigeration and large commercial air-conditioning. Alternatives to CFC11 and CFC12, such as HFC134a and HCFC141b are available. No cost-effective technology has been found yet to replace HCFC22 and thus its consumption is expected to rise. Regulations do not prohibit use of ODS in this sector.

The main refrigerant used for the mobile air-conditioning and refrigerated transport sector is CFC12. Consumption of ODS in this sector, which includes users of vehicular air-conditioners and refrigerated transport including cars, air-conditioned buses, coaches, trucks and ships, has shown an increasing trend since 1989 to 1993. The sector is divided into two sub-sectors reflecting the breakdown in the needs for ODS in the two types of market based on the equipment (i.e. original equipment market and replacement equipment market) in use. While new vehicles have been switching to the use of HFC134a as the refrigerant in their air-conditioning units, the use of CFC12 in the original equipment market (OEM) is expected to decline. The consumption of CFC12 in the replacement equipment market (REM) will remain more or less the same unless the air conditioners are retro-fitted to use HFC134a, and/or HCFC22 / HCFC124 / HFC152a blends. Alternatively, CFC12 can be recovered (during servicing) and recycled. No regulation prohibiting the use of CFC12 in this mobile air conditioning and refrigerated transport sector is available in Malaysia. Since the production of CFC12 is stopped by the end of 1995 in developed economies, users in Malaysia will face critical shortage if no steps are taken to use alternative refrigerants. Car air-

conditioner manufacturers have been informed by their suppliers that the availability of CFC12 cannot be arranged after 1995.

In the fire-fighting sector Halons 1301 and 1211 are widely used while Halon 2402 is rarely used. Halon 1211 is used mostly in portable extinguishers. In fixed extinguishing systems where the room is intended to be flooded with the extinguishing medium, both Halon 1211 and 1301 are used. Halon 1301 is more widely used than Halon 1211 since it has no toxic effect on humans. The main usage of Halons is for electrical installations where conventional water systems are less appropriate or where space and weight are of critical importance as in an aircraft. Thus, the major users in Malaysia are Tenaga Nasional Berhad for their transformers and switch-gears in sub-stations, Syarikat Telekom Malaysia for their telecommunication switching centres, Petroleum Nasional Berhad in their petrochemical industries, and the Ministry of Defence for their equipment and installations. The phasing out of Halon production in developed economies in 1993 has created a supply shortage in Halons in Malaysia and the price has rocketed. Carbon dioxide has been used as a substitute for Halons in fire extinguishers as well as fixed installations, while CO₂ and chemical powders have been used in portable extinguishers. Other alternative systems evaluated by the Fire Services Department include pre-action water sprinkler system, fine water mist system and inert gas system. In addition, major chemical producers are conducting research for substitutes which can replace Halons in existing fire-fighting installations.

Products classified under aerosols include insect sprays, personal care products, household products, medical products, automotive products, spray paints and industrial products. In some aerosol products, CFC11 and CFC12 are commonly used as propellants while CFC113 and CFC114 as solvents. Some HCFC22 is also being used as a substitute for CFC11 and CFC12. Insect sprays have been the first to convert to using non-ODS, i.e. hydrocarbon as propellant. Spray paints have also begun to use Dimethyl Ether, which appears to be an ideal substitute. However, due to its flammability, it is not used for other aerosol products. It is estimated that 60 percent of aerosol manufacturers, especially of insecticides, have converted to hydrocarbons. Some 20-30 SMEs producing aerosols are believed to be still using ODS.

In the agriculture sector, the most commonly used ODS is Methyl Bromide. In Malaysia, Methyl Bromide is used in four basic areas: soil fumigation (5 percent); structure treatment (36 percent); commodity treatment (55 percent); and quarantine treatment (4 percent). Methyl Bromide is also used as a broad-spectrum pesticide and plays a critical role in the export of agricultural products.

(iii) Economic Impacts of CFC Phase-out on Malaysian Industries

The use of trade restrictions promoted in the Montreal Protocol may hamper the industrial growth of many developing economies. The Protocol mandates that parties ban the import and export of controlled substances from or to non-parties. As the major producers have cut back production, CFCs have become scarce and expensive and substitutes are not readily available. Some industries have reported difficulties in obtaining supplies, and the cost has gone up by some 30 percent.

Despite concerns on increasing costs and the loss of competitiveness by the industries, production of refrigerators and air-conditioners in Malaysia grew at a remarkable rate during the early 1990s. The values of production have consistently increased in line with the increase in the cost of raw materials. Evidence suggests that the increases in the cost of production are passed forward to consumers in terms of higher prices, or that technology is available to produce increasingly more output through increasing productivity. This is shown by the share of input cost to the value of output, which has remained fairly constant at about 70 percent. Similarly, the share of labour cost to the value of output has remained constant at about 6 percent over the years.

In other words, despite the increase in the cost of compliance to the Montreal Protocol, industries are able to shift the burden onto consumers as well as to develop productivity-enhancing technology through the various government incentives and encouragement. The structure of the industry has much bearing to the effect. The industry is made up of only few multinational corporations, such as Matsushita, Sharp-Roxy and Sanyo for refrigerators and Carrier, National, Hitachi and Sanyo for air-conditioners. These few corporations have a generally larger consumer base in a wide global market.

Restricting the supply of a resource to protect the environment can bring serious consequences to economic activity. Besides raising resource costs, downstream activities could be affected by loss of income, loss of jobs, and raising product prices that will ultimately be borne by consumers. This study has shown that the environment-related policy variable takes the form of input restriction while raising the resource price. The Montreal Protocol has demonstrated the linkage between resource policies and their trade impacts. Although in the study the magnitude of the impacts could not be ascertained due to insufficient data it is believed that the impact is small, and so producers can pass on the increase in costs to consumers.

(iv) Industry Response to ODS Phase-out

Industries were invited to submit their phase out strategies to the government setting out their proposed timetable for phase out, the major problems faced, the measures that will be taken to implement phase out and the estimated costs of investment. The user sector action plans were prepared through the Industry Working Groups and submitted to the National Steering Committee. Individual agreements on phase out dates were reached with the national operators of all multinational companies based in Malaysia. The seven Industry Working Groups were given voluntary support in working towards the objectives of the Protocol. Reports submitted by the these working groups formed the basis for preparing the country's strategy for Ozone Layer Protection (Malaysian Strategy) prepared by DOE in June 1992 to reduce and eliminate the consumption and emissions of ozone depleting substances.

In the Mobile Air-Conditioning and Refrigeration Sector, the first reduction in consumption was expected by 1996 based on the 1989 base-year for calculation purposes. Evidences show that in actual fact, ODS consumption in this sector in 1993 has increased by 43 percent over the base-year. The commercially available alternative to CFC12 is the HFC134a which is presently the most suitable replacement in new car

air-conditioning applications. As new car models are expected to be fitted with car air-conditioners using HFC134a by 1996, consumption of CFC12 in the Original Equipment Market is expected to decline substantially. About 50 percent of the cars manufactured or locally assembled are already using non-ODS system. These include car models such as Proton Wira, Perodua (Kancil), Toyota Corolla, Honda Accord, Volvo, Mercedes Benz, BMW and Daihatsu Charade G202 which are already fitted with air-conditioners using HFC134a.

In the Replacement Equipment Market of the sector, the use of HFC134a as the alternative to CFC12 has encountered several problems. Conversion of the car air-conditioning system from using CFC12 to HFC134a requires some equipment modification. Depending on the model and age of the cars the cost of retro-fitting an existing system from using CFC12 to HFC134a varies from RM600 to RM2,000 (US\$240 to 800). For a retrofitted unit, the cost of servicing doubles although the consumption of the refrigerant is only 75 percent of that before retrofitting. Since after 1995 the availability of CFC12 cannot be assured recovery and recycling of CFC12 for service purposes are encouraged within the country. The Executive Committee of the Montreal Protocol Multilateral Fund has approved a total sum of US\$910,000 to finance the purchase of some 200 units of recovery and recycling equipment as well as for training and certification of car air-conditioners service and maintenance operators and public awareness programs. The workshops where the equipment is installed will be required to contribute towards the Mobile Air-Conditioning Trust Fund for training and systems maintenance after the project is completed in 1995. Each set of recovery equipment costs between US\$2,000 to 3,000. Ten sets of the recovery units have been installed at training centres operated by major car assemblers for training purposes. Even with recovery and recycling, this refrigerant is still required to replace losses through leakage from components like compressors, condensers, hoses and valves.

7. Conclusion

The national vision to make Malaysia a fully developed nation by the year 2020 will see a profound shift towards industrialization leading to the creation of an affluent society. This trend in national development challenges the role of food and agricultural sector. While facing problems relating to production inputs, the sector is also expected to grow in balance with other economic sectors. Confronted with diminishing levels of protection from external competition, the sector is left with no other alternative except to be competitive: the food and agricultural sector must be more productive and efficient, and be cost competitive in producing products with the desired quality. This requires the support of innovative technologies.

Industrialization and economic growth have both positive and negative effects on the environment. Malaysia's economic development has brought large improvements in those environmental problems that are primarily related to poverty and to a low level of economic development. Investments in infrastructure, carried out as part of national development policies, have alleviated a number of environmental problems. Water supply, for instance, has improved significantly and now reaches almost 90 per cent of all households, compared to only 55 per cent in 1980 and 42 per cent in 1970. The sanitation system has also improved significantly. One third of the population had no

sanitation facilities in 1980, but this share went down to 8.5 per cent in 1990 and further decreased in the Sixth Malaysia Plan period (1991-95).

With economic growth, however, some environmental problems have intensified. For example, agricultural activities and agro-based industries, such as the processing of palm oil and rubber, were among the major sources of water pollution in the 1970s and early 1980s. From about the second half of the 1970s the problem of air pollution, especially in large urban areas, became a matter of concern (the major sources of air pollution are transportation, fuel combustion and stationary sources). More recently, rapid industrialization has generated large volumes of solid wastes.

To a certain extent, specific regulations, introduced under the Environmental Quality Act (EQA), were a reflection of the concerns and magnitude of the environmental problems that emerged. This was the case, for example, of specific regulations concerning Crude Palm Oil (1977), Rubber (1978), Clean Air (1978) and Scheduled Wastes (1989). In a similar manner, the regulations on sewage and effluent (1979), control of lead concentrations in motor gasoline (1979), and motor vehicle noise (1987) were introduced following concerns with water quality and health respectively.¹²

Exploitation of natural resources also created environmental problems. For example, the development of the timber industry entailed extensive logging. In the case of forestry, the National Forestry Act (1984) now provides the basis for environmental legislation.

Malaysia's economic success has been closely related to its national development policies. For example, the "Industrial Master Plan (IMP)", which covered the period 1986 to 1995, provided a framework for achieving a more diversified and integrated manufacturing sector and for moving towards an advanced industrial economy, in particular by promoting technological capability and competitiveness.

The IMP recognized the importance of both the market mechanism as well as of planning in achieving Malaysia's industrial development objectives.¹³ Under this approach, industrial development objectives were set and government policies were subsequently directed towards their achievement. Market forces played an essential role in ensuring allocative efficiency within the framework of the plan. Thus, a main function of the IMP was to indicate to private investors the goals and targets of the Malaysian government as well as to coordinate the functions of the public sector in supporting private sector led growth with a view to achieving the objectives of industrial development. The IMP achieved its major goals of ensuring industrial growth and diversification inter alia through the development of new manufacturing industries in both resource-based and other sectors.

¹² Sham Sani, *Environment and Development in Malaysia, Changing Concerns and Approaches*, Centre for Environmental Studies at ISIS Malaysia, July 1992.

¹³ By providing a major role to planning, Malaysia's approach to industrial development had many elements in common with the strategies adopted by Japan and the Republic of Korea in their successful post-war economic reconstruction.

While providing a comprehensive framework for industrialization, targeting a large number of sectors and also covering support policies in areas such as human resource development, science and technology, and infrastructure, there was no explicit attempt to ensure coherence between industrial development policies and environmental management within the framework of the IMP itself. Environmental policies were being developed and implemented separately, principally through the efforts of the Department of the Environment within the Ministry of Science, Technology and the Environment.

Development objectives and environmental management have been integrated, however, within the framework of more recent government plans and policies. One example is the Second Outline Perspective Plan (OPP2) for the period 1991-2000, aimed at accelerating the process of poverty eradication and at the correction of social and economic imbalances in the context of a rapidly expanding economy. One of the four principles of the OPP2 is a “prudent management of natural resources and the ecology as well as the preservation of natural beauty and a clean environment for the present and future generations”.

Furthermore, in recognition of the importance of integrating environmental issues in the overall framework of development, the National Policy on the Environment sets out the principles and strategies necessary to ensure that the environment remains productive both ecologically and economically. The policy is based on principles that harmonize economic development goals with environment imperatives. To ensure that these environmental strategies are being taken on board in the national development strategies, the membership of the National Development Council, which is chaired by the Prime Minister, has been extended to include the Minister of Science, Technology and the Environment.

A clear recognition of the importance of preserving the environment and natural resources to ensure that growth and development are sustainable can also be found in “Vision 2020”, which aims at transforming Malaysia into a developed country (not only economically, but also socially, politically and in other aspects) by the year 2020, while ensuring sustainability and improving the quality of life.

During the Seventh Malaysia Plan (1996-2000), a Plan of Action will be drawn up to operationalize the different aspects of **National Policy on the Environment** which is being promulgated to ensure long-term sustainability and improvement in the quality of life. Focus will be given to providing a framework for an integrated approach to development, enhancing the effectiveness of the regulatory and institutional framework, recommending suitable mitigating measures, improving environmental education, communications and awareness, training programs as well as incorporating environmental considerations in resource management and development planning. With the increasing emphasis towards an integrated and preventive approach, the *institutional framework* will be strengthened to ensure the provision of adequate capacity to undertake planning, regulatory and enforcement functions, training and education as well as R&D. Environmental considerations will be further integrated into decision-making at the Federal, State and Local Authority levels. The actual problem in the effectiveness of the institutional arrangements in Malaysia was the harmonisation

between laws and implementation when there was insufficient mechanism such as enforcement officers and funding for enforcement purposes.

During the Plan period, the *legislative* mechanism will be streamlined at various levels as an integral part of overall project planning in order to reduce adverse impact of proposed projects. The legal and regulatory framework will be complemented by the use of innovative economic instruments such as presumptive charges which collect payment based on presumed annual total pollution discharge, forest taxes based on impacts of different types of activities, pollution charges based on levels of compliance, exemptions on import duty, sales tax and special capital allowance for importation of environment-friendly machinery. Studies are being carried out to determine appropriate instruments and incentives that can be applied to highly polluting sectors.

The Pesticides Board and related agencies should be strengthened to ensure that only recommended pesticides are used, and to monitor pesticide residue in the environment and take appropriate follow-up actions. Legislation should be reviewed to control the field application of pesticides as well as the disposal of pesticide containers. Environmental-friendly farming methods such as organic farming and the use of non-chemical methods of pest management such as biological control should be promoted. Programs to train and educate pesticide users on the safe handling of pesticides including aspects of environmental protection should be intensified.

To reconcile trade and environment conflicts and promote sustainable development, the coordination of international trade and environment protection policies should be given high priority. While the government plays a proactive role in formulating policies and strategies to promote fair and equitable treatment in international trade, the private sector should keep abreast with new trading rules. It must be equipped with the ability to adapt to economic instruments, as well as environmentally-related product standards and technical regulations, such as the ISO 14000, packaging, labelling, process and production methods, recycling, and intellectual property rights requirements, in order to maintain and improve competitiveness.

References

- Anon., "Malaysian Palm Oil. Industry Shares World Concerns for the Environment", PORIM Publication Committee.
- Anon., "The Oil Palm Industry: Its Impact on the Environment", PORIM Publication Committee.
- Association of Southeast Asian Nations (ASEAN), 1994, "ASEAN Strategic Plan Of Action On The Environment", *ASEAN Plan of Action*, ASEAN Secretariat, Jakarta.
- Cheah Saw Hong (1991), "Present position of the electronics industry in Malaysia and its future prospects", paper presented at the seminar, *Electronics industry in Malaysia: Investment opportunities and incentives*, Kuala Lumpur.
- Chooi, C.F. (1984), "Ponding System for Palm Oil Mill Effluent Treatment", in *Proceedings of the Workshop on Review of Palm Oil Mill Effluent Technology vis-a-vis Department of Environment Standard*, PORIM Workshop Proceedings No. 9, Palm Oil Research Institute of Malaysia, Bandar Baru Bangi, Malaysia.
- David O.C (1993), "Electronics and industrialisation: Approaching the 21st Century", in Jomo O. K., ed., *Industrialising Malaysia: Policy, Performance, Prospects*, Routledge, London.
- Economic Planning Unit, EPU (1993), "Malaysian National Conservation Strategy: Towards Sustainable Development", Volume 4: *Natural Resource Accounting*. Prime Minister's Department, Kuala Lumpur.
- ISIS Malaysia (1996), "Trade and Environment Linkages: A Malaysian Case Study", Final Report on *A Study of Trade and Environment Linkages for Selected Malaysian Industries*, February, Kuala Lumpur.
- Khalid Abdul Rahim (1989), "Trade and Welfare Effects of Unilateral Environmental Regulation: The Case of Malaysian Palm Oil", *Ph. D. Dissertation*, University of Illinois, May.
- Khalid Abdul Rahim (1991), "Internalization of Externalities: Who Bears the Cost of Pollution Control?", *The Environmentalist*, 11(1): pp. 19-25.
- Khalid, A. R. and Wan Mustafa, W. A. (1992), "The External Benefits of Environmental Regulation: Resource Recovery and the Utilisation of Palm Oil Mill Effluents", *The Environmentalist*, 12(4): pp. 277-285.
- Khalid, A. R. and J. B. Braden (1993), "Welfare Effects of Environmental Regulation in an Open Economy: The Case of Malaysian Palm Oil", *Journal of Agricultural Economics*, 44(1): pp. 25-37.
- Khalid Abdul Rahim (1993), "Environmental Policy in Malaysian Woodbased Industries: A Background Study", Part II of the Research Report on IRPA Project 1991/92.
- Khalid, A.R. (1994), "The Standard-cum-Charge Approach in Environmental Policy: The Malaysian Experience" in *Applying Economic Instruments to Environmental Policies in OECD and Dynamic Non-Member Economies*, ISBN 92-64-14212-6, OECD, Paris, p. 59-82.

- Malaysia: Bank Negara, *Bank Negara Annual Report*, Various issues, Kuala Lumpur.
- Malaysia: Department of Environment (1996), *Environmental Quality Report 1995*, Kuala Lumpur.
- Malaysia: Department of Environment, *Investment Guide (Environmental Requirements)*.
- Malaysia: Government of, *Seventh Malaysia Plan, 1996-2000*, Kuala Lumpur.
- Malaysia: Ministry of International Trade and Industry (1994), *Review of the Industrial Master Plan 1986-95*, Kuala Lumpur.
- Malaysia: Ministry of Finance (1996), *Economic Report, 1996/97*, Percetakan Nasional Malaysia Berhad, Kuala Lumpur.
- Mohammad Ilyas, ed. (1991), *Ozone Depletion: Implications for the Tropics*, University of Science Malaysia, and United Nations Environment Program, Penang, Malaysia.

The International Trade and Environment Regulatory Framework: The Mexican Case

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1. Introduction

With globalization, the linkage between international trade and environment has arisen as an important policy issue and Mexico has signed various international agreements that address this nexus of issues. This paper reviews Mexico's involvement in this international activity.

The structure of the paper is as follow. First, we provide a brief description of the Mexican legal system regarding trade and environment. We also describe the philosophy, policy and attitude toward the link between trade and environment adopted in recent years. Next we list the laws and regulations pertaining to trade and environment at both the national and state levels. Subsequently, we describe international agreements concerned with international trade and environmental protection. We then briefly review the recent efforts made by the Mexican government to enhance transparency in trade and environment measures through official standards and norms. Finally, we briefly describe the cost internalization principles adopted by Mexico.

2. Background on the Trade and Environmental Regime

The first government agencies devoted to environmental protection in Mexico were established during the 1960s; these were the Ministry of Health and Public Assistance (SSAP) and the Ministry of Human Settlements and Public Works (SAHOP). Later, in 1983, the Ministry of Urban Development and Ecology (SEDUE) was created as the regulatory authority on environment with the power to set state standards, rules and procedures pertaining to environmental protection.

In 1987, Mexico's Constitution was reformed to increase the authority of the states and municipalities to make laws on environmental protection. The reform of Article 73 by the Congress set out the respective jurisdictions of the federal, state and municipal governments for the conservation of the environment. The reform of Article 122 established the faculty to legislate for preserving and protecting the environment.

In 1992, the Ministry of Urban Development and Ecology was replaced by the Ministry of Social Development (SEDESOL), which interacted with other two institutions: the National Institute of Ecology (INE) and the Federal Procuracy of Environmental Protection (PROFEPA). In December 1994, PROFEPA was restructured to create the Ministry of Environment, Natural Resources, and Fisheries (SEMARNAP). In the process, the environmental functions of SEDESOL were transferred to the new ministry. SEMARNAP has the following functions:

- Evaluation of objectives about environmental protection.
- Design of the conservation policy of natural resources.
- Design of environmental policy for the states.
- Implementation of norms, laws, and regulations about environmental protection.
- Regulation of the use of federal water resources and the discharge of residuals in federal waters.
- The granting and regulation of private and public concessions for the use of federal water resources.

SEMARNAP is organized as follows:

a) Under-Secretaries:

- Fisheries
- Planning of Sustainable Regional Development
- National Commission of the Water (CNA)

b) Autonomous Agencies:

- National Institute of Ecology (INE)
- Federal Procuracy of Environmental Protection (PROFEPA)
- National Commission of the Water (CNA)

c) Research Institutes:

- Mexican Institute of Technology of the Water
- National Institute of Fisheries
- National Institute of Forestall Research

d) Offices Of The Ministry:

- Coordination of Federal Delegates
- Coordination of International Business
- Legal Issues
- Economic and Social Analysis
- Public Communication
- National Commission for Appreciation and Use of the Ecology

The 31 states and the Federal District of the Mexican Republic have promulgated their own environmental legislation and created their own local entities to implement norms, laws and regulations. Recent reforms to the General Law of Ecological Equilibrium and Environmental Protection delegated responsibility for environmental issues to the states. In the Federal District (Mexico City) environmental protection has been regulated by federal laws and agreement with the Congress, and by the New Environmental Law of the Federal District. The municipal authorities have some specific faculties on environmental issues as long as they do not interfere with federal laws.

In Mexico, the implementation of norms, laws and regulations related to international trade and environment is based on the Exterior Commerce Law (LCE) and the General Law of Ecological Equilibrium and Environmental Protection (LGEEPA). In addition, there exists a Program of Industrial Environmental Regulation 1997-2000 (PNAI) which refers to the implementation of official standards about environmental protection.

Title IV of the Exterior Commerce Law (LCE) provides information about tariffs, as well as regulations and non-tariff restrictions for exports and imports. In this paper, we consider

only the non-tariff restrictions. Article 16, part VI, deals with matters not included in the Mexican Official Norms (NOM) pertaining to national security, public health, and sanitary inspection of plants and animals. The regulations and non-tariff restrictions have implications for the allocation of resources. However, their implementation is consistent with the public interest as stated in Mexico's Constitution and the LCE. The measures, from article 16, part VI, of the LCE, could be implemented with previous authorisation, certification or other instruments that lead to the best trade policy.

Article 26 in the LCE establishes that the importation, circulation and traffic of commodities are subject to the NOM. The Mexican Official Norms are obligatory and issued by the competent authority of the Federal Executive with the purpose of standardizing products, methods, processes, or commercial and industrial practices according to the applicable laws or regulations. The Mexican Official Norms constitute a benchmark to determine the quality of products and services in order to protect consumers.

The Federal Law about Metrology and Standards (LFMN) establishes that the Offices of the Federal Public Administration (FPA) must issue the Mexican official norms. Each office expedites norms according to its attributions. For instance, the Ministry of Commerce and Industrial Development (SECOFI) expedites Mexican official norms in the areas referred in parts I to IV, VI, VIII, IX, XII, XIV, Y, XVII of article 40 of the LFMN:

In this subject area, the LFMN has the following objectives:

- Promote the transparency of the elaboration of Mexican official norms
- Found the National Commission of Standardization to assist the different offices of the FPA
- Establish unifying criteria for the elaboration of Mexican official norms by the offices of the FPA
- Promote the concurrence of the public, private and scientific sectors as well as consumers in the elaboration and observation of Mexican official norms
- Coordinate the activities of standardization of the offices of the FPA
- Establish the National System of Accreditation Institutions of Standardization
- In general, promote standardization and similar activities

According to the LFMN, foreign commodities being imported into the national territory must be demonstrated to satisfy the NOM. The LFMN contains information about norms, regulations, metrology, production control and quality certification. This ordering in the LFMN defines the functions of SECOFI as regards the participation of Mexico in international and regional institutions of standardization. For instance, the International Standardization Organization (ISO), the International Electrical Commission (IEC), the Pan-American Commission of Technical Norms (COPART), and Codex Alimentarius Commission (CAC).

Mexico is a member of the WTO Technical Barriers Agreement which promotes international systems of norms and evaluation to facilitate international trade. Under this agreement, participating countries can take measures necessary to protect life and health, to preserve their forests, and to protect the environment as long as these measures are not applied with arbitrary discrimination in the form of barriers to international trade.

3. Trade and Environmental Regulation

The Office of Norms within the Ministry of Commerce and Industrial Development is in charge of Standardization and Metrology and acts according to laws, decrees and agreements published in the Official Diary of the Federation. In the following list of laws, decrees and agreements, we describe and define the philosophy, policy and attitudes toward international trade and environmental policy:

- Political Constitution of the Mexican United States
 - Published in the Official Diary of the Federation on July 1, 1992.
 - Reforms published in the Official Diary of the Federation on December 24, 1996, and May 20, 1997.
- Customs Law
 - Published in the Official Diary of the Federation (ODF) on December 15, 1995.
 - Reforms published in the ODF on December 30, 1996.
- Organic Law of the Federal Public Administration, Specific Laws of SECOFI
 - Published in the ODF on December 29, 1976.
- Exterior Commerce Law
 - Published in the ODF on July 27, 1993.
 - Reforms published in the ODF on December 22, 1993.
- Rules and Regulations of the Exterior Commerce Law
 - Published in the ODF on December 24, 1992.
- Federal law of Exterior Competition
 - Published in the ODF on December 24, 1992.
- Federal Law of Consumer Protection.
 - Published in the ODF on December 24, 1992.
 - Reforms published in the ODF on July 21, 1993, September 23, 1993, August 5, 1994, and May 23, 1996.
- Interior Rules and Regulations of the Ministry of Commerce and Industrial Development
 - Published in the ODF on October 2, 1995.
- Agreement on the Faculties of the Ministry of Commerce and Industrial Development.
 - Published in the ODF on July 24, 1996.
- Deregulating Agreement of the Ministry of Commerce and Industrial Development
 - Published in the ODF on June 28, 1996.
- Agreement that identifies the tariffs of the General Tax Law of Imports in which appear the commodities that must have labels of information in Spanish
 - Published in the ODF on December 26, 1995.
 - Reforms published in the ODF on June 28, 1996, November 13, 1996, and February 24, 1997.
- Agreement that Identifies the tariffs and taxes of the General Tax Law of Imports and the General Tax Law of Exports in which appear the commodities that must comply with the Mexican Official Norms
 - Published in the ODF on June 2, 1997.
 - Reforms published in the ODF on October 10, 1997.
- Agreement that establishes the verification procedures for commodities importers that accept to comply with the Mexican Official Norms NOM-050-SCFI-1994 and NOM-051-SCFI-1994 in the National Territory

- Published in the ODF on February 24, 1997.
- Announcement to state the official certification of the products that must comply with the Mexican Official Norms
 - Published in the ODF on June 14, 1994.
- Policies and procedures of certification and verification of products subject to the Mexican Official Norms
 - Published in the ODF on October 24, 1997, derogating what was published in June 14, 1994.
- Program of Industrial Environmental Standardization 1997-2000
 - Published in the ODF in 1997.
- General Law of Ecological Equilibrium and Environmental Protection
 - Published in the ODF in 1997.
 - Reforms published in the ODF in 1996.

4. International Agreements on Trade and Environment

For Mexico, the challenge has been to reconcile participation in international agreements with national objectives and priorities such as democracy, social development, environmental protection, economic growth and culture. In the area of international trade and environmental protection, it has been important to avoid creating new non-tariff barriers while devising environmental measures, and to build domestic support for these measures.

At the moment Mexico participates in the following international agreements/fora bearing on trade and environment:

- The United Nations Framework Convention on Climate Change.
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention).
- The Montreal Protocol on Substances that Deplete the Ozone Layer.
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- The environmental regulation and self-regulation aspects of the ISO 9000 and ISO 14000 Agreements.
- The United Nations Conference on Environment and Development (UNCED).
- Agreement with the North American Development Bank.
- North American Free Trade Agreement (NAFTA), including the side agreement, the North American Agreement on Environmental Cooperation
- The North American Commission on Environmental Cooperation.
- The North America Environmental Fund.
- Agreement for the Prevention and Control of Environmental Pollution at the North Border.
- Agreement for the Verification and Control of Transportation of Dangerous Residuals at the North and South Borders. La Paz Agreement signed with The United States.

- Environmental Cooperation Program between Mexico and Canada.
- Support to Central American countries through an active cooperation with the Environmental and Development Central America Committee.
- Protection of natural areas through donations from industrial countries.
- Agreement on the Management of Watersheds.
- Agreement addressing Illegal Trade of Wild Flora and Fauna.
- Modernization of production and technological innovation to achieve cleaner and sustainable production.
- Agreement on Transportation of Hazardous Residuals at the Border.
- Agreement on International Trade and Competitiveness.
- Incorporation of the National Accounts System to the Environmental Peripheral Accounts.
- Creation of efficient systems of information and environmental promotion.

The North American Free Trade Agreement (NAFTA) which came into effect on 1 January 1994 had the broad purpose to encourage free trade of goods and services among Mexico, Canada and the United States and to create mechanisms to resolve trade issues. For Mexico, a key objective was to ensure steady access for Mexican exports to the other countries that are party to the agreement.

NAFTA allows its member countries to use trade measures in pursuit of legitimate objectives related to national security, protection of human life and health, protection of fauna and flora, protection of the environment, and consumer protection. In particular, it is respectful of the freedom of each country to adopt and to apply ecological norms and indeed even to prohibit the importation of commodities and services, if there are legitimate environmental concerns.

Most of the explicit environmental provisions associated with the NAFTA are set out in a side agreement on environment entitled 'The North American Agreement on Environmental Cooperation'. This Agreement obligates the participant countries to refrain from extra-territorial application of their domestic environmental measures in the territory of the other members of the agreement, to commit themselves to reach high levels of environmental protection, and to implement the legislation effectively, including by providing equitable legal procedures.

One of the most important consequences of the side agreement was the creation on 11 July 1994 of the North American Commission on Environmental Cooperation to supervise the implementation of the side agreement; to serve as a trilateral discussion forum on environmental issues; to promote cooperation amongst the member governments; and to facilitate the finding of solutions to controversial issues.

The side agreement also states that the Ecological Cooperation Committee of the Border has as a goal the certification of environmental infrastructure projects in the Mexican north border by means of the identification of priorities and the fulfilment of environmental standards. One of the faculties of the Committee is to propose environmental infrastructure

projects such as treatment of water, residuals and sewage to be financed by the North American Development Bank.

Mexico has also signed a number of multilateral, regional, trilateral and bilateral trade agreements. At the multilateral level, these include:

- WTO Agreement
- General Agreement on Trade and Tariffs (which Mexico joined in 1986)
- General Agreement on Trade in Services (GATS)
- Agreement on Agriculture
- Agreement on the Application of Sanitary Measures on Plants
- Agreement on Textiles and Clothing
- Agreement on Technical Barriers to Trade
- Agreement about Measures on Investment Issues Related to Trade
- Agreement regarding the Application of Article VI of the 1994 GATT
- Agreement regarding the Application of Article VII of the 1994 GATT
- Agreement on Rules of Origin
- Agreement on Procedures for Official Channels on Import Licences
- Agreement on Subsidies and Compensatory Measures
- Agreement on Aspects of Intellectual Property Rights Related to Trade

Other international agreements to which Mexico is party are:

- Latin American Association of Integration (ALADI). This association was created in 1980 and signed by Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela. At this moment this association is unable to respond to trade needs of the region.
- Agreement with the European Community.
- Cooperation Agreement with Italy.
- Cooperation Agreement with France.
- Cooperation Agreement with Spain.
- Agreement of Economic Cooperation with Russia.
- Agreement of Economic Cooperation with the Republic of Korea.
- Agreement of Economic Cooperation with Thailand.
- Agreement of Economic Complementation between Mexico and Chile (January 1, 1992).
- Agreement of Economic Complementation with Peru.
- Free Trade Agreement between Mexico and Costa Rica (January 1, 1995).

- Free Trade Agreement between Mexico and Bolivia (January 1, 1995).
- North America Free Trade Agreement, including the side agreements on labour and environment (January 1, 1994).
- Free Trade Agreement among Mexico, Colombia and Venezuela (January 1, 1995).
- Convention for the Protection of Flora, Fauna and Natural Scenic Beauties of American Countries (November 20, 1940).
- International Convention to Regulate the Whale Hunt (December 2, 1946).
- Protocol of the International Convention to Regulate the Whale Hunt, signed in Washington (December 2, 1946).
- International Agreement to Prevent the Pollution of Sea Water by Oil (June, 1962).
- Treaty that establishes the Prohibition of Nuclear Tests in the Atmosphere, Outer and Submarine Spaces (November 7, 1963).
- Agreement for the Establishment of an Inter-American Commission of Tropical Tuna (November 29, 1964).
- Convention on the Continental Shelf (September 1, 1966).
- Convention on Fisheries and Preservation of Live Resources from the High Seas (September 1, 1966).
- Convention about the High Seas (September 1, 1966).
- Treaty on the Principles Regulating Activities of the Countries to Exploit Outer Space, including the Moon and other celestial bodies (January 31, 1968).
- Convention on the Prohibition of Development, Production, Production and Storage of Bacteriological, Biological and Toxic Weapons (March 26, 1975).
- Memorandum of the First Meeting of Mexico-United States of America, Joint Committee for the Wild Life Conservation (July 17, 1975).
- The London Agreement of the Prevention of Sea Pollution Caused by the Residual Spillovers (August 3, 1975).
- Amendment of the International Agreement to Prevent Sea Water Pollution with Oil. Relative to the Regulation of Tanks and their Capacity Limits (May 6, 1976).
- International Convention of Flora Protection (May 26, 1976).
- International Agreement associated with the Intervention in High Seas in Case of Accidents that Cause Pollution with Oil (June 7, 1976).
- United Nations Convention about the Rights of the Sea (December 10, 1982). Confirmed by Mexico (Effective March 18, 1983).
- Agreement for the Protection and Marine Environmental Development in the Caribbean Region (March 24, 1983).
- Protocol of Cooperation to Fight Oil Spillovers in the Caribbean Region from the Agreement for the Marine Environmental Development of the Caribbean Region (March 24, 1983).

- Protocol Relative to the Intervention on High Seas in Case of Pollution by Oil (Effective March 30, 1983).
- Agreement between Mexico and the United States of America on Cooperation for the Protection and Improvement of the Environment at the North Border (August 14, 1983).
- Agreement between the General Office of Wild Flora and Fauna of SEDUE representing Mexico and the Service of Fisheries and Wild Life of the Interior Office representing the United States of America about the Cooperation for the Preservation and Wild Life Development (December 9, 1983).
- Convention to Protect the Cultural and Natural World Heritage (March 23, 1984).
- Treaty on the Prohibition of Nuclear Weapons and other Weapons of Mass Destruction in the Deep Sea and Subsoil (March 24, 1984).
- Agreement of Cooperation between Mexico and the United States of America for the Solution of Problems of Draining in San Diego, California, and Tijuana, Baja California (July 18, 1985).
- Agreement of Cooperation between Mexico and the United States of America on Environmental Pollution at the International Border Caused by Hazardous Substances and Residuals (July 18, 1985).
- International Convention on Humid Zones, Especially in the Habitat of Sea Birds (July 4, 1986).
- International Protocol to Correct the Convention Relative to Humid Zones, especially the Habitat of Sea Birds (December 3, 1986).
- Cooperation Agreement between Mexico and the United States of America for the Border Crossing of Hazardous Residuals and Substances (December 12, 1986).
- Cooperation Agreement between Mexico and the United States of America about Air Pollution at the North Border Caused by Copper Factories (January 29, 1987).
- The Vienna Convention for the Protection of the Ozone Layer (January 4, 1985). Confirmed on November 14, 1987.
- The Montreal Protocol on Substances that Deplete the Ozone Layer (September 16, 1987).
- Memorandum of Understanding among Mexico, the United States and Canada to Protect Migratory and Aquatic Birds and their Habitats (February 16, 1988).
- Memorandum of Understanding for the Creation of the Committee for the Protection of Natural Areas in Mexico and the United States (June 30, 1988).
- Agreement of Cooperation between Mexico and the United States regarding International Transportation and Pollution of Urban Air (October 3, 1989).
- Protocol Relative to Flora and Fauna Protection and Development of the Marine Zone in the Caribbean Regional (January 18, 1990).
- Environmental Cooperation Agreement between the Governments of Mexico and Canada (March 16, 1990).

- The Vienna convention on Legal Responsibility for Nuclear Damage (July 9, 1990). Ratification on October 19, 1990.
- Agreement on Cooperation in Environment Issues between the Mexican Government and the Central American Commission of Environment and Development (June 13, 1990).
- Ratification of The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (September 30, 1991).
- Agreement between the Government of Mexico and Belize on the Protection and Improvement of the Environment and Conservation of the Natural Resources at the South Border (September 20, 1991).
- Contribution Agreement between the Department of Foreign Affairs and International Trade of Canada and the Ministry of Urban Development and Ecology (March 27, 1992).
- International Agreement to prevent Marine Pollution caused by Ships (MARPOL 73/78). After 17 years as observer, Mexico ratified its revenue to this agreement (March 1992).
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (May 5, 1992).
- Agreement for the creation of the Inter American Institute of Research of Global Change (July 1992).
- Financing Agreement between European Economic Community and the National Ecology Institute (September 1992).
- The United Nations Framework Convention on Climate Change (Approved by the Senate of Mexico December 3, 1992). Publicised by the DOF (January 13, 1993).
- Agreement of Copan (1993).
- North America Free Trade Agreement and side agreements on labour and the environment (January 1, 1994).
- Technical-Scientific Collaboration Agreement between the Ministry of Science and Technology of Argentina and the National Institute of Ecology of Mexico (1994).
- Cooperation Agreement between Guatemala and Mexico for the prevention, Control, Combat and Eradication of the Illicit Traffic of Species of Wild Flora and Fauna, that are raised in both countries (March 24, 1995).
- Cooperation Agreement on Environmental Issues between the Governments of Mexico and Brazil (signed October 10, 1990 and promulgated on June 19, 1995).
- Complementary Agreement on Environmental Issues to the Basic Agreement of Technical and Scientific Cooperation between the Governments of Mexico and Chile (September 7, 1995).
- Mexico and Central America Joint Declaration in the framework of the XVII Ordinary Meeting of the Central America Environment Commission and Development (October 6, 1995).

- The State and Government Chiefs Joint Declaration from Mexico and Central America (Tuxtla II) on February 16, 1996.
- Memorandum of Understanding for Cooperation on Environment and Natural Resources between the Ministry of Environment, Natural Resources and Fisheries of Mexico and the Ministry of Science, Technology and Environment of Cuba (May 22, 1996).
- Program for the Sustainable Development on Mexico-Guatemala Border (September 1996).
- Cooperation Agreement on Environment Issues between the Governments of Mexico and Argentina (November 1996).
- Declaration of Tulum. Reefs' System of the Meso-American Caribbean. Quintana Roo (June 5, 1997).
- Cooperation Agreement of Environmental Issues between the Ministry of Environmental, Natural Resources and Fisheries of Mexico and the National Commission of Environment of Guatemala (October 31, 1997).
- Environmental Cooperation Agreement between the Governments of Mexico and Canada (March 16, 1990).
- The Vienna Convention on Legal Responsibility for Nuclear Damage (July 9, 1990). Ratified on October 19, 1990.
- Cooperation Agreement on Environmental issues between the Mexican Government through The Ministry of Urban Development and Ecology and the Central American Commission of Environment and Development (June 13, 1991).
- Ratification of The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (September 30, 1991).
- Contribution Agreement between the Department of Foreign Affairs and International Trade of Canada and the Ministry of Urban Developmental and Ecology of Mexico (March 27, 1992).
- International Agreement to Prevent Marine Pollution caused by Ships (MARPOL 73/78). After 17 years as observer, Mexico ratified its participation in this agreement in March 1992.
- Memorandum of Understanding on Environmental Education among Canada, Mexico and the United States (May 1992).
- Agreement for the Creation of the Inter-American Institute of Research of the Global Change (July 1992). Adopted in Montevideo, Uruguay, on May 13, 1992.
- Agreement for the Mexican Government and the Republic of Guatemala for Protecting Species of Flora and Fauna and other Resources of Cultural Heritage (October 1992).

Issuing norms is the basis of ecological policy; it represents a regulatory effort to modify the behaviour of economic agents to reach social objectives of environmental quality. The publication of the Federal Law on Metrology and Standardization in 1992 led to the modernisation and perfection of the Mexican system of standards. The design and issuing

of norms on environmental issues has remained subject necessarily to technical considerations and to cost-benefit analysis. The procedure includes the participation of different representative agents of the various economic sectors to form the Consultant Committee of Standardization for Environmental Protection. The Committee has seven subcommittees in charge of natural resources, dangerous residuals, air, quality of fuels, water, environmental risk, and pollutant energy.

5. Mexican Official Norms in Trade and Environment

The NOM constitutes a very powerful instrument not only in terms of its capacity to control productive processes, but also for its capacity to change behaviour and to internalise environmental costs. It should be pointed out that the majority of the generated procedures up until now applied to industrial activities and have had very poor results in the use and protection of natural resources, where the environmental negative impacts are of great magnitude and frequently irreversible. The NOM specifies the prohibitions or restrictions on imports, as well as the requirements to be fulfilled by commodities. The Mexican catalogue of norms contains the prevailing Mexican Official Norm. This catalogue classified the norms in terms of economic activity and products.

The Mexican Official Norms are technical regulations, the observance of which is obligatory, that establish rules, specifications, attributes, characteristics, processes, installation, operation, terminology, symbols, labels and requirements. This catalogue contains 538 official norms, nine of which address emergency situations and 266 projects issued from 1993 up to now. The Norms related to International Trade and Environment are as follows:

Project NON-005-SCT3-94 regulates the maintenance service and/or repair of aircraft abroad (November 1995).

NOM-041-SSA1-1993 provides sanitary specifications for goods and services; in particular, bottled purified water (March 24, 1990).

NOM-051-SCFI-1994 provides general specifications of food labelling and bottled non-alcoholic drinks (January 24, 1996).

NOM-066-FITO-1995 establishes the requirements and sanitary specifications for the avocado for importation and exportation (August 26, 1996).

NOM-050-SCFI-1994 regulates commercial information: general requirements for products (January 24, 1996).

NOM-005-FITO-1995 establishes quarantines to prevent the introduction of the weevil khapra (July 4, 1996).

Project NON-028-FITO-1995 establishes specifications and sanitary requirements for imported grains and seeds, except for sowing (September 19, 1995).

NOM-008-FITO-1995 establishes requirements and sanitary specifications to import fruits and fresh vegetables (July 8, 1996).

NOM-014-FITO-1995 establishes quarantines to prevent the cotton disease (December 29, 1996).

Project NOM-013-RECNAT-1997 regulates the importation of natural Christmas trees of the species *Pinus Pylvestris*, *Pseudotsuga Menziesii* and of the kind *Abies* (July 7, 1997).

NOM-015/ISCFI/SSA-1994 regulates safety and commercial information with regard to toys and school supplies. Limits the contents of metals in articles covered with paints and inks. Establishes chemical specifications and test methods (September 2, 1994).

NON-0130FITO-1995 establishes quarantines to prevent the rice disease (December 2, 1996).

Project NON-020SCT2-1995 provides general requirements for the design and construction of containers to transport hazardous materials and residuals. Specifications SCT 306, SCT 307 y SCT 312 (August 12, 1996).

NOM-001-PESC-1993 regulates the capture of tuna in federal waters in the Eastern Pacific Ocean (December 31, 1993).

NOM-001-SCFI-1993 regulates commercial information on alcoholic beverages (December 17, 1993).

Project NOM-010-SCTI-1994 regulates the use of foreign optical fibre cables (February 9, 1995).

Project NOM-027-FITO1995 establishes quarantines to prevent the introduction of the cacaotero disease (September 19, 1995).

NOM-019-FITO-1995 establishes quarantines to prevent the coffee disease (December 10, 1996).

NOM-016-FITO-1995 establishes quarantines to prevent the sugar cane disease (December 2, 1996).

Proyecto NOM-145-SSAI-1995 establishes sanitary specifications of meat products (August 13, 1997).

NOM-004-ZOO-1994 provides measures to control toxic residuals of meat, fat, liver and kidney of bovine, equines, and pork (October 25, 1996).

NOM-009-ZOO-1994 states sanitary measures to process meat (November 12, 1996).

NOM-030-1995 gives the specifications and procedures to verify meat and viscera in sanitary inspection stations (April 17, 1996).

Project NOM-051-ZOO-1996 obliges quarantine for animals and their products (March 10, 1997).

Project NOM-105-ECOL-1996 establishes the permissible maximum emission to the atmosphere of solid particles and reduced sulphur compounds from the production of cellulose (November 15, 1996).

NOM-040-ECOL-1993 establishes the permissible maximum emission to the atmosphere from cement factories (October 22, 1993).

NOM-009-SSAI-1993 states the methods to test the quantity of lead and soluble cadmium from producing glazed ceramics (November 15, 1994).

NOM-001-FITO-1995 establishes quarantines to prevent the citrus fruit disease (September 24, 1996).

Project NOM-004-FITO-1995 establishes the requirements and sanitary specifications to export citrus fruits (July 28, 1995).

NOM-015-FITO-1995 establishes quarantines to prevent the cocoa-palm disease (April 22, 1997).

NOM-024-SCFI-1994 regulates commercial information, directions and warranties of electronic and electric products of domestic and foreign origin (cancels the NOM-024-SCFI-1993) (January 3, 1996).

Project NOM-009-SCTA-1994 regulates the terminology and hazardous commodities classification transported in crafts (March 12, 1997).

Project NOM-137-SSAI-1995 provides general specifications of labelling that must be exhibited on medical equipment of domestic and foreign origin (January, 1996).

Project NON-045-FITO-1995 establishes the requirements and sanitary specifications for the guava for the domestic and international markets (January, 1996).

Project NOM-117-ECOL-1996 establishes the environment protection specifications for the installation and maintenance of systems of transportation and distribution of oil and petrochemicals in liquid and gaseous states, located at agricultural, cattle and uncultivated zones (April 22, 1997).

NOM-015/2-SCFI-1994 regulates commercial information in labelling toys (December 21, 1995).

NOM-018-FITO-1995 establishes quarantines to prevent the corn disease (December 10, 1996).

Project NOM-046-FITO-1995 establishes sanitary requirements and procedures for exporting mango (January 10, 1996).

Project NOM-044-FITO-1995 establishes sanitary requirements and specifications for importing nuts and dehydrated products and by-products (October 30, 1995).

NOM-012-FITO-1996 establishes quarantine to prevent the potato disease (February 13, 1996).

NOM-005-SSAI-1993 regulates the use of chromium-lead pigments, the extraction and determination of soluble lead and test methods (November 17, 1994).

NOM-006-SSAI-1993 regulates the use of paints and varnishes, and the preparation of acid extractions of liquid or dry paints for the determination of soluble lead (November 17, 1991).

NOM-008-SSAI-1993 regulates paints and varnishes and the preparation of acid extractions of paints for determination of soluble lead and other methods (November 24, 1994).

Project NOM-039-FITO-1995 establishes requirements and specifications for the sanitary protection of the Northwest region (October 26, 1995).

NOM-017-FITO-1995 establishes the minimum requirements applicable to vegetables, their products and by-products for importation, when such requirements are not established in any specific official norm (February 26, 1996).

NOM-022-FITO-1995 establishes the characteristics and specifications for the notice of beginning of operation and certification that should be fulfilled by firms interested in providing sanitary services for vegetables, their products and by-products for importation and exportation (January 2, 1997).

Project NOM-007-FITO-1995 establishes sanitary requirements and specifications for importing vegetables (August 11, 1995).

Project NOM-029-FITO-1995 establishes sanitary requirements and specifications for importing seeds for sowing (September 20, 1995).

NOM-097-ECOL-1995 establishes the permissible maximum limits of emission of particles and nitrogen oxides to the atmosphere due to the glass production (February 1, 1996).

NOM-011-SSAI-1993 states the limits of lead and soluble cadmium in glazed pottery articles (November 17, 1994).

NOM-037-FITO-1995 establishes the specifications of the processing of organic agricultural products (April 23, 1997).

NOM-054-ECOL-1993 establishes the procedures to determine the incompatibility between two or more residues considered as dangerous by the Mexican Official Norm NOM-052-ECOL-1993 (October 22, 1993).

NOM-055-ECOL-1993 establishes the requirements to be satisfied by sites destined for hazardous residues, except those that are radioactive (October 22, 1993).

NOM-022/NUCL-1996 establishes the requirements for the installation of definitive storage of radioactive residues of low level near the surface (September 5, 1997).

NON-010-PESC-1993 establishes the sanitary requirements for the importation of live aquatic organisms, in whatever development phase, intended for ornament in the national territory (August 16, 1994).

NON-011-PESC-1993 establishes quarantines to prevent certifiable diseases in importing live aquatic organisms, in whatever development phase, intended for the aqua-culture and ornament in the Mexico (August 16, 1994).

NON-033-SSAI-1993 addresses contamination of foods, permissible dosage in foods, raw material and food complements (March 7, 1995).

Project NOM-062-FITO-1995 establishes the requirements and sanitary specifications for importing vegetable, their products and by-products by means of mail (September 9, 1996).

Project NOM-064-FITO-1995 establishes the requirements and sanitary specifications for transporting vegetables, products and by-products in international traffic in the Mexican territory (January 22, 1996).

Internalisation of Environmental Externalities

Another important aspect in trade-related environmental issues and environment-related trade issues is the internalisation of pollution externalities that are generated by various economic agents. Environmental cost internalisation is of great importance in setting strategies among governments, consumers and firms from different economies.

In Mexico, to internalise costs in trade and environmental agreements there is a couple widely accepted principles in judging the fairness of alternative environmental policies. Either the polluter pays for the cost of pollution or the cost of pollution is paid by whoever would benefit from the pollution. In many cases, consumers are the ultimate beneficiaries of production that does not cover environmental costs. If a producer is then forced to use cleaner production methods, or to pay an environmental tax per unit of pollution, these higher costs are likely to be passed on to consumers in the form of higher product prices. In such cases, we have the same result when the polluter pays or when the beneficiary pays.

Environment and Trade: Related Regulatory Measures in Papua New Guinea

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1. Background

Trade, Environment and Setting

Papua New Guinea (PNG) has a very open economy, heavily dependent on exports of primary commodities – cash crops, logs, minerals and crude oil – and importation of a wide range of manufactured goods. It enjoys a high rate of external aid per capital and plenty of foreign direct investment, especially in the exploration and the development of minerals and petroleum, and harvesting of timber. The reciprocal effects between this pattern of development and the protection of the environment and conservation are of a great concern.

Diversity is a key word that could be used to label Papua New Guinea, distinguishing it from most other economies. The tyranny of the terrain sharply contrasts with its rich natural resources and scenic beauties on shore and offshore.

Papua New Guinea is the largest island nation in the South Pacific and the best endowed with natural resources in the Pacific Rim. Located north of Australia, it stretches from 12-degree south latitude to the equator, encompassing a land area of about 465,000 square kilometers. It comprises the eastern half of the main island of New Guinea, the great islands of the Bismarck Archipelago and the northernmost Solomon group, as well as some 600 additional smaller islands.

Environment concerns pose challenges to the development of Papua New Guinea's abundant resources, comprising minerals, petroleum, gas, fisheries, timber, and tourist resources. Protecting the environment and promoting conservation is necessary and easily comprehensible. Few countries are as beautiful in their natural environment as Papua New Guinea. The country is recognized as a centre of exceptional bio-diversity of flowering of plants, coral reefs systems, mangroves, and many other species.

Estimates of biodiversity include 20,000–40,000 species of insects; more than 750 species of birds, including the world's largest and smallest parrot; more than 80 varieties of birds of paradise, about two-thirds of all the world's birds of paradise; more than 200 mammals; 20,000 species of flowering plants; 300 species of reptiles; 15,000 species of forest tree; 3,000 species of fish; 300 out of 700 of the world's species of coral; and the largest butterfly, the Queen Alexandra Birdwing. It is believed that Papua New Guinea harbours seven percent of the earth's species.

Large river systems spring from high ridges through deep gorges, sustaining traditional livelihood and lifestyle that is only beginning to be affected by development that is promoted mainly through trade of primary commodities.

The culture is equally diversified: Papua New Guinea's 4.5 million people speak 800 languages, constituting 20 percent of the world's languages.

The Government of Papua New Guinea (PNG) considers the development of mineral and petroleum resources to be of the highest priority. It realizes that foreign expertise and capital are essential for the development of these resources. In this context, it welcomes foreign investment.

It would seem to an investor that the environmental standards in the mining, petroleum, and timber industries are relatively lax because they lack specific requirements. While the resource owners appear to be eager to see major projects developed, they also jealously guard against damages to the environment that might affect their livelihood and lifestyle.

Trade is very important for PNG. More than 40 percent of the gross domestic product (GDP) is derived from exports. Mineral and petroleum exports have increasingly dominated the economy, comprising about 71 percent of the total exports in 1996. In the 1970s and 1980s, agricultural products, namely coffee, cocoa, copra, palm oil, including logs were the mainstay of the exports. These commodities still earn nearly 30 per cent of the foreign exchange.

Currently, the economy is driven by mineral and crude oil exports. This dependency is expected to continue for many years, considering huge known mineral, petroleum and gas reserves and the prospects of further discoveries of these reserves. Plans are underway to develop huge gas deposits.

The Constitution provides a framework for the development of "Natural Resources and Environment". Its fourth National Goal and Directive Principle serves as the basis for environmental legislation and regulations. It calls for:

- "a wise use to be made of the natural resources and the environment in and on the land or seabed, in the sea, under the land and in the air, in the interest of development and in trust for future generations; and
- "the conservation and replenishment, for the benefit of ourselves and prosperity of the environment and its sacred, scenic and historical qualities; and
- "all necessary steps to be taken to give adequate protection to our valued birds, animals, fish, insects, plants and trees".

2. Environment and Trade Measures

Trade-related environment measures

Environmental laws and regulations can be divided into two broad categories. The first represent policies that are domestically initiated and aimed at environmental protection and conservation. These measures generally affect exports indirectly. The second generally consist of environment measures that are the outcomes of international agreement, conventions or arrangements to which PNG has acceded or is a party.

The Government and the people wish to proceed with economic development but they also want to protect the environment. Surpluses generated from the exports have been used for development. Cash crop production is mainly undertaken by smallholders who adopt traditional methods of cultivation, which scarcely impacts on the environment in an adverse fashion.

However, mining and petroleum exploitation, and logging are the main sources of environmental degradation. Concerned about the undesirable effects of uncontrolled or inappropriate development of mining, petroleum and timber industries, the Government demands a framework for environmental impacts assessment and management plans to be included in the project proposals.

Following Papua New Guinea's independence in 1975, a number of major, comprehensive environmental legislation were passed by the National Parliament to ensure effective environmental management responsive to the National Goals:

- Environmental Planning Act (EPA), 1978
- Environmental Contaminants Act (ECA), 1978
- Conservation Areas Act (CAA), 1978
- Dumping of Wastes at Sea Act, 1979
- Water Resources Act, 1982
- National Parks Act, 1982 and
- Physical Planning Act, 1989.

Lists of environment and related legislation in force in Papua New Guinea are given in Tables 3 and 4 in the Annex. The major Acts of Parliament which provide the foundations of environmental legislation are:

- Mining and Petroleum Act;
- Environmental Planning Act;
- Water Resources Act;
- Environmental Contaminants Act;
- Dumping of Wastes at Sea Act; and
- Forest Industries Council Act

The Mining and Petroleum Act 1978: this serves as the basis of mineral policy development in Papua New Guinea. Papua New Guinea's mineral policy stipulates that minerals are the property of the State and therefore allows for their exploration and mining through the granting of various tenements. Under the fiscal provisions of the Act, the

holder of a Special Mining Lease (SML) must pay a royalty to the State equivalent to 1.25 percent of the net proceeds of sale of minerals. However, it was recently announced that royalty payments will be increased to 2 percent.

The Petroleum Act (1977): with the Petroleum Policy, this governs the operations of petroleum projects in the country. The policy stipulates that ownership of petroleum resources onshore or offshore belongs to the state, which has the right to license others to explore for, extract and sell petroleum resources. Other legislation governing petroleum development include:

- Income Tax Act, Chapter 110 Division 10A, fiscal regimes,
- Central Banking Act – Chapter 138,
- Foreign Exchange Regulations, and
- Environmental Planning Act (1978).

Under the Mining Act (revised in 1991), for each project an environmental plan (EP) must be submitted with the feasibility study. The EP is discussed and an agreement is reached at a Development Forum, consisting of a developer, the landowners, and national Government as well as the Provincial Government representatives.

The Environmental Planning Act 1978 (EPA) (Ch 370) establishes proper environmental considerations as part of policy and project planning. Companies proposing mining and petroleum developments and other development projects are required to identify, assess the environmental effects of the project and to adequately outline protective measures and environmental management plan. The Ministry of Environment and Conservation together with relevant Government departments and agencies will determine the adequacy of the environment planning and may suggest modifications and new approaches. Clearly, the requirements vary from project to project. A realistic stance, consistent with the state of technology and the particular characteristics of the project area, have been adopted.

All investors of major projects related to mining, logging, roads, and agriculture, which have significant environmental impacts, must submit an environmental plan. However, in the past, some major projects went ahead before the environmental plan was submitted.

The Environmental Contaminants Act 1978 (ECA) (Ch 368) is the basic Act controlling pollution of air, land, and water and is similar to pollution control Acts in other countries. A primary aim of the Act is to ensure that pollution does not become unreasonable as a result of development. However, the Act permits imports of pesticides for agriculture and forestry, licensing of discharge of contaminants into the environment, and regulation of noise, air pollution, and littering. The Environmental Contaminants Act allows the Papua New Guinea Government to control the discharge or deposition of any material into the environment.

The Act defines an ‘environmental contaminant’ as any substance that may cause an alteration of the environment. The relevant sections of the act are the right to discharge, emit or deposit environmental contaminants into the environment with prescribed license conditions.

The Act also covers hazardous environmental contaminants. It requires potential contaminants to be registered and the control of their importation and distribution. Noise and dust pollution are also controlled by the Environmental Contaminants Act. The three mandates under this Act include:

- Pollution control: Environmental Contaminants Act (Ch 368)
 - Control of discharges or emissions to the environment through Licenses;
 - Regulate use of hazardous environmental contaminants through permits; and
 - Reduce Pollution (includes noise & littering).
- Pollution of the sea: Dumping of wastes at Sea Act (Ch 369)
 - Section 6 deals with issue of permits for emergency dumping; and
 - Section 7 deals with administrative appeal to Minister.
- Water pollution and conservation: Water Resources Act (Ch 205)
 - Permits for Water Use;
 - Permits for Water Investigations; and
 - Sets Water quality standards.

The Conservation Areas Act 1978 provides for the protection of “certain sites, lands, and land-forms, etc.” which may be considered as part of the National Heritage of Papua New Guinea, including both the natural environment and the natural cultural heritage, by conserving certain areas or sites having particular biological, geological, historic, scientific or cultural importance. Through the Act, any place of special value for a group of people whether it be a beautiful place or building, a breeding ground for birds and animals, a shipwreck, an area of historical or traditional significance etc., can be declared a Conservation Area. The Act does not take ownership of the land away from the landowners but rather has provisions for the creation of local management committees who will be responsible for the preparation of a management plan for the area. The following conservation measures complement the Conservation Act:

- Crocodile (Trade & Protection) Act 1982: This Act regulates the Crocodile Industry by the provision of licensing and export controls. It aims to maximize the benefits to the village, both hunter and farmer. A new Act is on a drawing board to ensure control over crocodile farms and amend size limits.
- Customs Regulations 1973: Before any animals or part of animal, alive or dead, can be exported from or imported into Papua New Guinea a permit must be issued by the Conservator of Faun; the Secretary of Department of Environment and Conservation is gazetted for this responsibility.
- Fauna (Protection & Control) Act (1966) 1974: This Act makes provisions for the establishment of Wildlife Management Areas, Sanctuaries and Protected Areas in PNG in close co-operation with the traditional landowners. These areas may act as sanctuaries for the protection of an endangered species, or they can allow for certain wildlife (e.g., Crocodiles, cassowaries, butterflies and deer) to be managed and farmed using techniques suitable for village use. This Act also establishes a list of protected species, which may not be hunted or kept except with traditional weapons and for traditional purposes. Only under restricted conditions the protected species such as ornithoptera Soliath – birdwing butterfly may be taken, exported or used for scientific research purposes.
- International Trade (Fauna and Flora) Act 1979: Through this Act, PNG has implemented the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) by fully controlling the import and export of certain endangered species of animals and plants between member countries.
- National Parks Act 1982: This Act provides for the investigation, negotiation, and purchase of land for the establishment of national parks and other similar reserves that will constitute a park system unique to PNG. The legislation covers both terrestrial and marine areas.

The Water Resources Act 1982 provides for the control and management of water resources within the country. This includes rivers, streams, underground water, wells, and coastal waters. Under the Act, domestic water usage (i.e. customary, public and private) rights are safeguarded, but the unauthorized taking and pollution of water is an offence. The Water Resources Act has been fairly effectively enforced since its inception. However, like the other environmental acts, monitoring and enforcement are limited by lack of adequate financial and human resources. There is currently overlap between the aims of the Environmental Contaminants Act, the Dumping of Waste at Seas Act and the Water Resources Act. There was no coordination between the Water Resources Board and Department of Environment and Conservation (DEC) in planning these Acts. The result is that there is duplication of effort in monitoring and enforcing these Acts. Beginning from 1998, in order to address these shortcomings, the Secretary of DEC has been appointed the Chairman of Water Resources Board who will coordinate the policies of the two institutions.

The Dumping of Wastes at Sea Act 1979 provides for the prevention of pollution of the sea by the dumping of wastes and other matter that may create hazards to humans and marine resources. Given Papua New Guinea's large coastline, and in view of the limited human and financial resources, it has been difficult to effectively implement this Act. A

further limitation of the Act's effectiveness is the low penalties for contravention. Part 3 of the Act stipulates that the penalty for hindering or obstructing an enforcement officer or for breaching the Act is K500. Additionally, Subsection 2 outlines that the penalty for removing a detained ship or aircraft from the port of detention is K2000.

The Forestry Acts provide the primary foundation for sustainable utilization of forest resources. A set of guidelines, code of practice and forestry reforms has been initiated in the 1990s to address the need for environmental protection and conservation. Papua New Guinea has a very limited land area under protection and conservation status. The PNG forestry are part of the Malesian phytogeographical zone which extends from Peninsular Thailand in the northwest to PNG and the adjacent islands of the southeast, covering 36 million hectares of land, about 77 percent of PNG's land area. The rain forests are among the least degraded in the world. In absence of environmental preservation measures, they will quickly disappear. The Acts and measures below are indicative of the importance that the Government attaches to sustainable forest management.

- Forestry Industries Council Act, 1984 (Chapter 215) is the predecessor of the Forestry Act 1991 (amended 1993). Its provisions were general, requiring the promotion of the interests of the forest products industry and ensuring that the forest products operators are registered and are genuine businessmen who are fit to carry on business as a forestry operators to the satisfaction of the Forest Industries Council.
- The Forestry Act 1991 (1993) provides enabling framework for the state to:
 - manage, develop and protect the Nation's forest resources and environment in such a way as to conserve and renew them as an asset for the succeeding generations;
 - maximize Papua New Guinea participation in the wide use and development of the forest resources as a renewable asset;
 - utilize the Nation's forest resources to achieve economic growth, employment creation and increase downstream processing of the forest resources;
 - encourage scientific study and research into forest resources so as to contribute towards a sound ecological balance, consistent with the National development objectives;
 - grant timber permits where the holder of the permit operate in accordance with the terms and conditions therein the project area;
 - control the exportation and/or importation of certain species of timber; and
 - regulate certain volume of allowable timber harvests per year.The Act also requires that each Province shall establish Provincial Forest Management Committee for consultation and co-ordination of forest management between relevant groups and governments; acquisition and allocation of forest resources; forest plan and forestry development programs; environment protection, agro-forestry, reforestation and for related purposes.
- Forestry Environmental Guidelines (1992) was prepared to meet a requirement under the Environment Planning Act, and empowered through a regulation to the Forestry Act 1991. The guidelines consist of two parts:
 - a feasibility study of the project; and
 - forestry environmental plan, detailing:
 - the existing biophysical environment;

- biophysical environmental impacts and safeguards; and
 - environmental monitoring and management plan.
- Papua New Guinea Logging Code of Practice 1996 is a set of standards for the management and harvesting of the forest resources. It is recognized that the forests are by valuable assets that bring revenue to both the customary owners and the state. The code offers a practical guidance to reduce adverse impact of logging, large scale commercial agricultural and construction developments on the forest and communities living in them. The PNG Forestry Authority requires a full compliance of 24 Key Standards that are identified as the minimum set of standards in the Code which can be found in a separate booklet entitled Key Standards for Selection Logging in Papua New Guinea, April 1995. The guidelines have been added to the Forest Authority's "Planning, Monitoring and Control Procedures for Natural Forest Logging Operations under Timber Permit".
 - Structural Adjustment Program 1995 included reforms for the forestry industry. It provides a strong set of conditionalities that are aimed at sustainable forest harvest. The reforms include: legislative protection of the independence of the Forestry Board; surveillance of log exports; and taxation and royalty setting to boost the government and the resource owners' share of logging revenues. The key objectives are:
 - improvement in landowner participation in forest decision-making and benefits sharing; and
 - enhancement of the Forestry Authority's capacity to plan, implement and enforce sustainable and environmentally responsible forest management.

Implementing Institutions

Environmental Acts relevant to environmental planning and management are the jurisdiction of the Department of Environment and Conservation which has established since 1985. It is responsible for the formulation and implementation of policy and for administering legislation related to:

- environmental assessment of major projects including forestry, and mining proposals;
- pollution control and the regulation of hazardous substances;
- environment policy development;
- conservation of flora and fauna;
- establishment and management of national parks and protected area;
- species management; and
- administration of Papua New Guinea's international environmental agreements.

The Department contains two operational divisions, namely Nature Conservation, and Environmental Protection and Management. It is headed by the Secretary's Office, a Finance and Administration Branch and a growing Policy and Planning Branch.

It appears the Department of Environment and Conservation is a toothless bull. Environmental policies and legislation, mandates or agreements relevant to specific economic activities come under other government institutions such as the Department of

Mining and Petroleum, Forestry Authority, and National Agricultural Quarantine Inspection Authority (NAQIA) which are listed in Table 5.

International Arrangements, Agreements and Treaties

The South Pacific Regional Environmental Program (SPREP) 1982 (1989) (1996)

Recognizing the need for a regional approach to addressing the numerous environmental problems in the South Pacific, Papua New Guinea mooted the idea of a regional environmental program in 1974. This was accepted by the South Pacific Forum. Following technical meetings, which examined country statements on various environmental issues, an action plan was drafted and adopted in 1982. The United Nations Environmental Program made a significant contribution to SPREP via the Regional Seas Program. This external assistance is supplemented by direct voluntary contributions from Forum member countries and indirect inputs from various regional research and training institutions.

The Regional program operates through the SPREP Coordinating Group via two networks, the Research and Monitoring Network and the Education, Training, and Information Network. The Association of South Pacific Environmental Institutions communicates with these networks. Network membership includes government environmental agencies, universities, and non-government organizations (NGOs). The SPREP secretariat is located in Noumea, New Caledonia, and provides logistic, administrative and technical support to the program.

SPREP research and monitoring activities include: watershed management, inland and coastal water quality, coastal ecosystems, pesticides, climate change and sea-level rise, and protected areas and conservation strategies. The Education, Training, and Information Network has an active publications program that produces leaflets, booklets, tapes and slides, videos, films, and other materials. It also produces an environmental magazine, PLES, on a regular basis.

The Convention for the Protection and Development of the Natural Resources and Environment of the South Pacific and the Convention on the Conservation of Nature in the South Pacific are the major regional agreements, respectively, in 1989 and 1996 which give backing to the work of SPREP. The government of Papua New Guinea has ratified both Conventions.

SPREP has also assisted Papua New Guinea and other Pacific Island economies to publicize their environmental concerns. An example was the recent Global Conference on Sustainable Development of Small Island States, which was held in Bridgetown, Barbados.

The Torres Strait Treaty 1985

The Torres Strait is located between the tip of Cape York Peninsula in Australia and Papua New Guinea. It consists of over one hundred islands and reefs that are believed to have evolved from flooded land bridges which were once part of the Great Dividing Range. The Torres Strait Treaty was entered into by Australia and Papua New Guinea in

February 1985. It is concerned with sovereignty and maritime boundaries in the area between the two economies and the protection of the way of life and livelihood of the traditional inhabitants and the marine environment. The Treaty also establishes the Torres Strait Protected Zone (TSPZ) in which each economy exercises sovereign jurisdiction for marine species on the respective sides of the agreed jurisdiction lines.

The Protected Zone Joint Authority (PZJA) is responsible for the management of the following fisheries in accordance with Commonwealth law in the Australia component of the TSPZ:

- traditional fishing;
- fisheries which Australia and Papua New Guinea have agreed to jointly manage in the TSPZ under Article 22 of the Treaty, namely prawns, Spanish mackerel, pearl shell, tropical rock lobster, dugong and turtle; and
- the barramundi fishery in the territorial waters adjacent to the six Australian islands near the Papua New Guinea coast: Saibai, Boigu, Moimi, Kaumag, Aubusi and Dauan.

Under the terms of the Treaty, Australia and Papua New Guinea are expected to cooperate in the conservation, management and optimum utilization of the commercial fisheries of the TSPZ. When part of a fisheries stock under joint management arrangements with Papua New Guinea belongs substantially to the TSPZ but also extends outside but near the Zone, the Treaty allows Australia and Papua New Guinea, when adopting a management plan, to apply the plan in those areas. Fisheries Managers from Australia and Papua New Guinea meet on an annual basis to discuss management issues including joint enforcement initiatives, research, and the improvement of techniques for dealing with illegal fishing.

APIA Convention 1976

The Convention on Conservation of Nature in the South Pacific (Apia Convention) was signed by PNG but never formally ratified.

Agenda 21 and the Rio Convention 1992

At the Rio Earth Summit in 1992, countries undertook to enact effective environmental legislation that will bring about the elimination of unsustainable patterns of production and consumption. The Declaration also called for environmental standards to be linked to trade.

The Papua New Guinea Government endorsed Agenda 21 and adopted the concept of a National Sustainable Development Strategy (NSDS) for PNG to implement it. The aim of the NSDS is to better integrate economic, environmental and social policy objectives, sustain renewable resources and Papua New Guinea's diverse cultural traditional, and to capitalize the yield from non-renewable resources to sustain benefits per head for a rising population.

Other Agreements

There are a few other international agreements on the environment and conservation to which PNG has acceded to that affect trade:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973;
- Basel Convention of Transportation of Transboundary Movement of Hazardous Wastes and their Disposal (1987); and
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987).

Environment-Related Trade Measures

Papua New Guinea's environment-related trade measures are either by-products of domestic trade policies or of international trade arrangements, regulations, agreements or conventions to which PNG has acceded or is a party. There are only limited instances where the formulation of domestic trade policies directly takes into account environmental consideration. It has been mentioned earlier that PNG's trade mainly comprises primary exports of raw materials – minerals, crude oil, logs and cash crops, and imports of manufactured goods.

Papua New Guinea's trade policies are largely aimed at raising government revenue, protecting infant industries and domestic substitutes, or curtailing imports of luxury goods. Recent moves towards trade liberalisation may have serious implication for environmental degradation. For example, trade liberalisation, if it is accompanied by free logging, will adversely impact on the rain forest. However, environmental considerations and subsequent measures are constantly being reviewed to accommodate or counteract the effects of trade policies on the environment and conservation.

Important trade measures that have direct environmental implications include:

- Import bans (see Box 1).
- Log export taxes (1998). The 1998 Budget increased log taxes to 30 percent. The measure was applauded by Greenpeace Pacific and approved by the World Bank, which promised to provide some relief to the Government because of the expected adverse effects this measure would have on log exports. Both these organizations want to see a considerable reduction in logging by the established logging company. The measure will promote sustainable small logging operations, which it is argued would benefit the landowners. However, since Papua New Guinea's exports have slumped since 1997 due to the drought which caused the stoppage of operations of Porgera gold mine and Ok Tedi copper and gold mine, and low prices for crude oil, logs and gold, the Government decided in June 1998 to boost the exports by reducing the log tax by 10 per cent. This is an example of trade promotion taking precedent over conservation.

Box 1: Import Bans

The following list shows those fruit and vegetables banned or subject to quota restrictions. It is unclear whether import prohibitions are due to protecting local substitutes or environment.

VEGETABLES		FRUITS	
Banned		Banned	On quota
Artichoke	Melons of all	Avocado	Apples
Asparagus	descriptions	Bananas	Apricots
Eggplant/Fruit	Okra	Breadfruit	Blackberries
Artichoke	Marrow	Custard apples &	Blueberries
Parsley	Parsley	related fruit	Cherries
Beans	Parsnips	Grapefruit	Figs
Beetroot	Peas	Guavas	gooseberries
Broccoli	Potato	Lemons	Grapes
Brussels Sprouts	Pumpkins	Lime	Kiwifruit
Cabbage - English	Radish	Mangoes	Lyches
Cabbage - Chinese	rhubarb	Pawpaw	Mandarins
Capsicum	Silverbeet	Passionfruit	Nectarines
Carrots	Spring onions	Pineapples	Oranges
Cauliflower	Squash	Pomolos	Pears
Celery	Eschollots	Strawberries	Persimons
Chicory	Swedes		Plums
corn	Sweet Potato		Pomegranates
Cucumbers Endive	Tomatoes		Raspberries
Fennel	Turnip		Tangelous
Garlic	Zucchini		Other fruit not
Ginger	Whiteleaf		available in PNG
Leeks	Other Vegetables		

Trade-related threats to the environment and conservation have been addressed by environmental measures such as the Crocodile (Trade & Protection) Act, Custom Regulations, and International Trade (Fauna & Flora) Act which have been outlined above.

As noted earlier, Papua New Guinea's main environmental-related trade measures largely derive from its membership of or its being signatory to many international arrangements, agreements and conventions (listed in Table 3). They include:

The South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA), the Australia Trade and Commercial Relationship Agreement (PATCRA) for PNG, the Generalized System of Preference (GSP), Lome Convention, Asia Pacific Economic Cooperation (APEC), and Uruguay Round of GATT. The main objectives of these international trade arrangements and relations are not environmental protection and conservation. However, their provisions for safeguarding the environment lack specific regulations (see examples in Box 2).

Box 2: Trade Agreements

As a signatory to several international and bilateral trade agreements, Papua New Guinea exports enjoy certain entry and duty concessions in several markets. The most important of these agreements and the benefits they offer to PNG exporters are:

Lome Convention

This agreement between the European Union (EU) and countries of Africa, the Caribbean and Pacific (ACP), was first signed in February 1975. Papua New Guinea signed in 1977.

The basic benefit to ACP countries comes in the form of preferential access of exports to EU markets, and development assistance to the production of primary products for export. However, the Fourth Lome Convention highlights the need to ensure that trade and revenue generation from tropical forests is achieved through “Sustainable management of forest resources” rather than by forest asset-stripping.

World Trade Organization (WTO)

PNG joined the WTO under Art XII on 9 June 1996, following special procedures for countries that joined GATT in 1994. PNG has therefore agreed to undertake specific liberalization commitments both in goods and services. Membership in the WTO has direct policy implications for trade and investment and indirect implications for macroeconomic policies, price reforms, agricultural sector, enterprise reforms and the environment.

Linkages between trade and the environment is widely recognized. Liberalized trade may result in unsustainable development. There is no international consensus on how best to manage the link between trade and the environment. However, current GATT rules permit a country to restrict imports which may harm human, animal or plant health, so long as similar controls are imposed on like goods produced domestically.

In this context, the agreement on Sanitary and Phytosanitary measures in the Uruguay Round will lead to the removal of bans imposed on vegetables and fruits in PNG (see Box 1).

PATCRA

This Papua New Guinea/Australia Trade and Commercial Relations Agreement came into being in February 1977, under which PNG exporters have duty free and unrestricted entry in the Australian market for most of their exports. Conditions do apply, however, in the case of textile, clothing, footwear, steel, passenger motor vehicles and sugar exports.

South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA)

As a member of the South Pacific Forum, Papua New Guinea is a signatory to the SPARTECA. This is a preferential, non-reciprocal agreement between Australia and New Zealand and member countries of the South Pacific Forum.

The agreement, similar to PATCRA, provides duty free, or concessional access for Papua New Guinea exports to New Zealand.

3. Publicity of the Measures

Documentary Source

Papua New Guinea practices a parliamentary democracy. All Acts, laws and regulations are passed by Parliament. The bills are available in the Hansard and gazetted. However, the first stop for a documentary search for all publications on PNG may be the New Guinea section of the Somare Library at the University of Papua New Guinea. Trade- and environment-related measures can be sought from implementing government line departments, agencies and statutory authorities such as:

- Department of Environment and Conservation;
- Department of Mineral;
- Department of Petroleum;
- Department of Trade and Industry;
- National Forestry Authority;
- Office of Quarantine;
- National Agriculture, Quarantine and Inspection Authority (NAQIA);
- Bureau of Water Resources; and
- Others (see a comprehensive list in Table 5).

The Research and Information Division of Investment Promotion Authority (IPA) helps investors to search for all information related to their business. The IPA plans a “one-stop-shop” which is likely to be established before the end of 1998.

Transparency

Efforts to enhance transparency and non-discriminatory trade preferences have been addressed in the 1995 Structural Adjustment Program. For example, there should be no special tax, duty or incentives granted to developers. The IPA's role should be limited to investment promotion.

There is no obstacle to the publicity of what measures are introduced or implemented. The media and the judiciary are fearlessly independent. The newspapers are privately owned and they reveal secret deals that are made by the Government.

4. Impacts of Trade and Environmental measures

The Impacts on trade and investment

There seems to be no shortage of foreign direct investment in the mining, petroleum and logging industries because of trade and environmental policies. However, there have been protracted negotiations in respect of environmental plans that have been submitted by the developers. Agreements have often been revised in the light of new developments in these industries. A good example is Ok Tedi copper and gold mine Supplemental Agreements which have gone through eight revisions from 1980 to 1995. These agreements are

concerned with environmental damages through mine operations and compensation payments.

Papua New Guinea's environmental legislation is not a trade deterrent. Compensation is sought for environmental damage caused through mining, petroleum extraction and logging operations. Delays in settlements of disputes and agreement on compensation payment appear to be the only effects on trade, namely, foregone output. There has been no experience of prosecuting environmental regulatory offences, or discontinuity of operations.

Lack of enforcement of environmental standards is due to two main reasons. First, there seems to be inadequate bureaucratic capacity to monitor and assess impacts and to enforce the regulations. Second, the readiness of the landowners to accept compensation undermines the state's ability to enforce the regulations.

The Trade-Off

The Government considers the development of mining, petroleum and logging for export to be a high priority and welcomes investors. The landowners are a strong political force and a social group to reckon with in matters of the development of natural resources in Papua New Guinea. They seek compensation for:

- damage to improvements on the surface (including crops and economic trees);
- severance of land from other land of the owner;
- loss of the surface right of way; and
- a blanket provision of all consequential damage (section 56, [Colonial] Mining Ordinance, 1928-1966)

From these perspectives, it is not difficult to see that environmental and conservation considerations are easily compromised in favour of trade promotion. However, investors pay high prices for environmental damage as a result of mining, petroleum and the logging operations.

5. Environmental Cost Internalization

Compensation paid by mining, petroleum and logging companies add to their operational costs. However, these costs may not be as high as the costs which would have been incurred to meet environmental standards. For example, the Ok Tedi and Porgera gold mines prefer to discharge wastes into the river systems rather than to build tailing dams. As long as considerations for trade promotion take precedence over the protection of the environment and enforcement of environmental standards, trading competitiveness can be achieved by not requiring excessive compensation demands.

Summary

Although the existing program of environmental regulation is fairly comprehensive in nature, its effectiveness is limited by: (a) lack of powerful or specific legislation; (b) lack of an integrated approach to legislation, monitoring and enforcement; (c) low penalties; and (d) lack of financial and human resources to monitor and enforce the legislation. As stated earlier, these constraints have created a situation in which the developers are forced to conduct their own environmental monitoring in order to satisfy the requirements of the Environmental Planning Act. The overlap between different development approval systems provides opportunities for some companies to maneuver or renegotiate the conditions of approval.

The Government and customary resource owners are committed to the protection, of the environment and conservation. However it is evident that sustainability has been comprised by resource development for trade and operation malfeasance.

References

- Asafu-Adjaye, J., assisted by A. Mawuli and R. Kameata (1997), *Integrating Environmental Considerations into Economic Decision-Making Processes: The mineral sector in Papua New Guinea*.
- Department of Environment and Conservation (DEC) and Papua New Guinea Forestry Authority (PNGFA) (1996), *Papua New Guinea Logging Code of Practice*, First Edition April 1996, DEC & PNGFA.
- Gane, M. (1985), *Papua New Guinea Report on Forest Policy*, (FAO) United Nations.
- Gladman, D., Mowbray, D. and Duguman, J., 1996. *From Rio to Rai: Environment and Development in Papua New Guinea*, Vol. 6, University Press, Port Moresby.
- Lindemalm, F. (1997), *Forest Certification and Community Forestry as a means of preserving bio-diversity in a Natural Tropical Production Forest*, Swedish University of Agricultural Science, Uppsala, Sweden.
- Lynch, Cyril Joseph assisted by Margorie Joyce Wight, (1991), *Revised Laws of Papua New Guinea for the Independent State of Papua New Guinea*:
- Crocodile (Trade and Protection) Act, 1974 (Revised 1982), Revised Laws of Papua New Guinea, Vol. 7: Ch. 213.
 - Environment Contaminants Act, 1978 (Revised 1983), Revised Laws of Papua New Guinea, Vol. 13: Ch. 368.
 - Environment Planning Act, 1978 (Revised 1982), Revised Laws of Papua New Guinea, Vol. 13; Ch. 370.
 - Fauna (Protection and Control) Act, 1966 (Revised 1980), Revised Laws of Papua New Guinea, Vol. 6: Ch. 154.
 - Fisheries Act, 1974 (Revised 1980), Revised Laws of Papua New Guinea, Vol. 3: Ch. 214.
 - Forestry Act, (Amalgamated) 1973, Revised Laws of Papua New Guinea, Vol. 7: Ch. 216.
 - International Trade (Flora and Fauna) Act, 1979 (Revised 1983), Revised Laws of Papua New Guinea, Vol. 13: Ch. 391.
 - Mining Act (Amalgamated), 1973 (Revised 1980), Revised Laws of Papua New Guinea, Vol. 7: Ch. 195.
 - Mining (Ok Tedi Agreement) Act, 1976, Revised Laws of Papua New Guinea, Ch. 196.
 - Mining (Ok Tedi Supplemental Agreement) Act, 1980, 1981, 1983, 1985.
 - National Parks Act, 1982 (Revised 1981), Revised Laws of Papua New Guinea, Vol. 6 Ch. 157.
 - Petroleum Act, 1977 (Revised 1980), Revised Laws of Papua New Guinea, Vol. 7: Ch. 198.

- Water Resources Act, 1982 (Revised 1983), Revised Laws of Papua New Guinea, Vol. 7: ch. 205.
- Papua New Guinea Forestry Authority (1992), *A Blueprint for Sustainable use of Forests: Definition and Indicators of Progress*, CSIRO Division of Wildlife and Ecology, Canberra, Australia.
- Papua New Guinea Forest Authority (1995), *Towards sustainable Forest Management*,
- Papua New Guinea Forestry Authority (1993), *Forestry (Amendment) Act*, 1993, No. 3 of 1993, Certified on: 21 April 1993.
- Takah, T., (ed.) (1998), Department of Environment and Conservation, *1997 Annual Management Report*
- Thomas, P.E.J. (1989), *South Pacific Regional Environment Programme*, Noumea, New Caledonia.
- Unimonen, Peter and Whallye, John (1997), *Environmental Issues in the New World Trading System*, London: Macmillan Press Limited.

Table 1
Survey of Environment-Related Trade Measures in APEC Member Economies

Environment-Related Trade Measures	Enacted By		Date of Enactment (M/Y)	Implementing Departments	Alignment With GATT/WTO Agreement			Alignment With Multilateral Agreements		
	F	P			Full	Part	No	Full	Part	No
International Trade (Fauna and Flora) Act, 1979 (Revised 1983)		✓	1979	Department of Environment and Conservation (DEC)						
Crocodile Trade (Protection) Act		✓	1982	DEC						
Quarantine Act, 1982		✓	1982	National Agriculture & Quarantine and Inspection Authority (NAQIA)						

Note: F means federal authorities while P stands for provincial or State government. "Measure" means the laws, regulations and administrative rules stipulated and enforced by federal and state (provincial) authorities.

Table 2
Survey Of Trade-Related Environment Measures in APEC Member Economies

Trade-Related Environment Measures	Enacted by		Date of Enactment (M/Y)	Implementing Departments	Alignment With GATT/WTO Agreement			Alignment With Multilateral Agreements		
	F	P			Full	Part	No	Full	Part	No
Environmental Planning Act, 1978 (Revised 1982)		✓	1978 (1982)	Department of Environment & Conservation (DEC)						
Environmental Contaminants Act 1978 (revised 1980)		✓	1978 (1980)	DEC						
Conservation Areas Act 1978		✓	1978	DEC						
Mining Act (Amalgamated) 1978 (Revised 1991)		✓	1978 (1991)	DEC						
Mining (Ok Tedi Agreement) Act, 1976 (Revised 1980)		✓	1976 (1980)	Department of Mining & Petroleum						
Mining (Ok Tedi Supplemental Agreement) Act, 1980, 1981, 1993		✓	1980, 1981 1993	Department of Mining & Petroleum						
Mining (Ok Tedi Supplemental Agreement) Act, 1980, 1981, 1993		✓	1995	Department of Mining & Petroleum						

Table 2 (Continued)

Trade-Related Environment Measures	Enacted by		Date of Enactment (M/Y)	Implementing Departments	Alignment With GATT/WTO Agreement			Alignment With Multilateral Agreements		
	F	P			Full	Part	No	Full	Part	No
Petroleum (Prospecting and Mining) Act, 1977 (Revised 1980)		✓	1980	Department of Mining & Petroleum						
International Trade (Flora and Fauna) Act, 1979 (Revised 1983)		✓	1979 (1983)	DEC						
Fauna (Protection & Control) Act, 1966 (Revised 1980)		✓	1966 (1980)	Department of Environment and Conservation						
Crocodile (Trade and Protection) Act, 1974		✓	1974	Department of Environment and Conservation						
National Parks Act, 1982		✓	1982	Department of Environment and Conservation						
Water Resources Act, 1982		✓	1982	Bureau of Water Resources						
Quarantine Act, 1982		✓	1982	Office of the Quarantine						
Forestry Industries Council Act, 1984		✓	1984	Forestry Industries Council (Defunct) PNG Forestry Authority						
Forestry Act 1991		✓	1991 (1993)							

Notes: F means federal authorities and P for provincial (State) government.

“Measure” means the laws, regulations and administrative rules stipulated and enforced by federal and state (provincial) authorities.

TABLE 3
Multilateral and Bilateral Agreements Signed by Papua New Guinea

Multilateral Agreements Signed	Date (M/Y)
Convention on International Trade in endangered Species	1973
Ramsar Convention on Wetlands of International Importance 2 February 1971	02/1971
Convention on the Conservation of Nature in the South Pacific, Apia, June 1976	06/1976
Convention on Biological Diversity, Apia	11/1976
Convention for the Protection of Natural Resources and Environment of the South Pacific, Noumea, 24 November 1986	11/1986
Convention on International Trade in Endangered Species of Wild Flora and Fauna Carried into effect by the International Trade (Flora and Fauna) Act (Ch. 391)	11/1972
Convention Concerning the Protection of World Cultural Heritage and Natural Heritage, Paris, 23 November 1972	
International Plant Protection Convention, Rome, 6 December 1951 and Plant Protection Agreement for S-E Asia and the Pacific Region, Rome, 27 February 1956	02/56
Convention on the Prohibition of Military or any Hostile Use of Environmental Modification Techniques, Geneva, 18 May 1977	05/1977
Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxic Weapons, and on their Destruction, London, Moscow and Washington, 10 April 1972	4/1972
Framework Convention on Climate Change	
South Pacific Regional Environmental Programme Convention (SPREP)	1982
SPREP Convention for the Protection of the Natural Resources and Environment in the South Pacific	1989
SPREP Convention on the Conservation of the Nature in the South Pacific	1996
Agenda 21 and the Rio Convention	1992
The World Trade Organisation Agreement	1993
The South Pacific Regional Trade and Economic Cooperation Agreement (SPARTEA)	
LOME Convention: Africa, Caribbean & Pacific Countries - European Union	1975
Generalized System of Preference (GSP)	
General Agreement on Trade and Tariffs's GATT	1947

Table 3 (Continued)

Bilateral Agreements Signed	Date (M/Y)
Torres Strait Treaty	1985
Papua New Guinea/Australia Trade and Commercial Relations Agreement (PATRA)	1977

Table 4
Environment and related legislation in force in Papua New Guinea

Act	Year	Ministry/ Department Responsible
Compensation (Foreign Legal Proceedings)	1995	Attorney General
Conservation Areas	1978	Department of Environment and Conservation (DEC)
Continental Shelf (Living Resources)	1972	DEC
Crocodile (Trade Protection)	1974	DEC
Cultural Development	1982	Culture & Tourism
Dumping of Wastes at Sea	1979	DEC/ National Forestry Authority (NFA)
Environmental Contaminants	1978	DEC
Environmental Planning	1978	DEC
Fauna (Protection and Control)	1966	DEC
Fisheries	1974	NFA
Forestry (Amalgamated)	1973	NFA
Forestry (Private Dealings)	1971	NFA
Industrial Safety, Health, and Welfare	1961	Health
International Trade (Flora and Fauna)	1979	DEC
Land	1962	Land Administration
Mining Act	1978	Department of Mining and Petroleum (DMP)
Mining Act (Revised)	1992	DMP
Mining (BCL Agreement)	1967	DMP
Mining (Ok Tedi Agreement)	1976	DMP
Mining (Ok Tedi Supplemental Agreement)	1983	DMP
Mining (Ok Tedi Supplemental Agreement)	1995	DMP
National Cultural Property (Preservation) Act	1965	Culture & Tourism
National Parks	1982	DEC
National Water Supply and Sewerage	1982	Bureau of Water Resources
Petroleum	1977	DMP
Physical Planning	1989	Land Administration
Poisons and Dangerous Substances	1967	DEC
Prevention of Pollution of the Sea	1979	DEC/NFA
Public Health	1975	Health
Tuna Resources Management (National Seas)	1977	NFA
Water Planning	1982	Bureau of Water Resources
Whaling	1974	DEC

Table 5
National Institutional Arrangements

Ministries/NGOS	Departments/ Institution	Functions
1. Finance	- Finance National - National Planning Office - National Statistics Office	- Economic and social planning, - Budgeting, - Social and economic statistics
2. Mining & Petroleum	- Mining & Petroleum	- Environmental safeguards & monitoring of mining operations, - Development forums, - Analysis laboratory
3. Environment	- Environment & Conservation - Bureau of Water Resources	- Environmental assessment, - Monitoring and enforcement
4. Foreign Affairs & Trade	- Foreign Affairs	- International treaties and conventions
5. Fisheries & Marine Resources	- National Fisheries Authority	- Management & conservation of fisheries resources, - Stock assessment
6. Forestry	- National Forestry Authority	- Forest management & assessment, - Reforestation, - National Forest Action Plan, - National Herbarium
7. Agriculture	- Agriculture and Livestock	- Establishing & monitoring of large agriculture projects - Papua New Guinea Resource Information Systems, - Subsistence agriculture, - Rural land use planning, - Analysis laboratory
8. Law & Order	- National Parliament - Judiciary Services - Attorney General - Police - Corrective Institutional Services	- Environmental legislation; - Arrest, prosecution, detention and trial of offenders
9. Education	- Education of Papua New Guinea - University of Technology - Schools - National Research Institute	- Environmental education; - Environmental planning; - Assessment & monitoring; - Research - Research, - Policy advice to Government
10. Culture & Tourism	- National Museum - National Culture Council	- Protection & development of cultural heritage & arts
11. NGOs	- Wau Ecology Institute - Melanesian Environment Foundation - Goroka Environmental Awareness Group - Friends of the Earth - Madang Citizens for a Better Environment	- Environmental awareness, - Environmental monitoring & advocacy, - Environmental education, - Lobbying

Notes on the Philippine Case

Dr Corazon Pb. Claudio
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Philippine Chamber of Commerce & Industry
Chair & CEO, The GREEN Group

1. Introduction and Background

The Philippine Economy over the Years

Over the past two decades, the Philippine economy has gone through five phases:

1983 – 1985	Crisis
1986 – 1989	Recovery
1990	Balance of Payments crisis
1991 – 1992	Stagnation
1994 – 1997	Recovery at an accelerating pace
1998 – 1999	East Asian crisis and recovery

The Trade and Economic Policy Regime

Trade liberalization has been at the heart of economic policy. Trade policy reforms have included:

- Tariff reduction and rationalization
- Import liberalization
- Realignment of indirect taxes

Openness to foreign investments has been increased through several measures:

- Foreign Investment Act of 1991
- Deregulation and Privatization Programs

Macroeconomic initiatives have also been taken to place the economy on a sound fiscal and financial footing, including:

- Improved tax collection
- Expenditure control
- External debt restructuring

As a result, the Philippines has weathered the global crisis that started in East Asia in comparatively good shape. The prospects for the Philippine economy in mid-1998 are as follows:

Table 1
Major Economic Indicators: the Philippines

	1997	1998	1999
Gross Domestic Product growth	5.1	2.4	4.0
Gross Domestic Investment/GNP	23.9	20.0	22.0
Gross National Saving/GNP	19.2	17.0	19.0
Inflation Rate (CPI)	5.1	10.0	8.0
Money Supply (M2) growth	20.5	17.0	17.0
Merchandise Export growth	22.8	21.0	21.0
Merchandise Import growth	14.0	9.0	10.0

Source: Bangko Sentral ng Pilipinas, National Statistical Coordination Board, Department of Budget and Management, and Bureau of Treasury

2. The Environment Regime

Environmental Conditions and Issues

The Philippines environment policy regime is shaped by the range of environmental issues that the economy faces, including:

- Resource depletion/degradation
- Loss of biodiversity and habitat destruction
- Accelerated soil erosion
- Inappropriate land-use conversion
- Pollution: including of the air, water and land
- Poor waste management
- Urban decay and congestion
- Water scarcity and ground water depletion
- Increasing threats to indigenous cultures and people
- Ecologically threatening land uses and extractive activities
- Risks from natural resources due to environmental degradation
- Weak/inadequate implementation of laws

The determinants of environmental degradation in the Philippines are generally understood to include the following:

- Pricing failure
- Institutional failure
- Government investment failure and
- Excessive scale of extraction of resources due to:
 - Poverty
 - Population pressure
 - High demand for Philippine exports

Environment-Related Trade Agreements Signed By The Philippines

The Philippines is party to the following trade agreements that have environment-related elements:

- GATT-Uruguay Round
- AFTA
- Bogor Declaration of APEC
- FAO Code of Conduct on the Distribution and Use of Pesticides

Trade-Related Environmental Agreements, Conventions, Commitments Signed By The Philippines

- Climate Change Convention
- Montreal Protocol
- APEC Agreement on GATT
- Basel Convention
- CITES
- Convention on Biological Diversity

Domestic Trade & Environmental Measures

The Philippines has enacted or implemented the following domestic measures that have trade and environment implications:

- PCSD and Philippine Agenda 21 (Business Agenda 21)
- Master Plan for Forestland Development
 - Community-Based Forest Management
- Water Resources Management Task Force
- National Marine Policy
- Fisheries Code & Fishery Resources Management Programs
- Philippine Wildlife Act
- Philippine Mining Act
- National Integrated Protected Areas Act
- National Biodiversity Strategy & Action Plan
- ENRA Project
- Use of Unleaded Gasoline
- Environmental Users' Fee System
- EcoWatch
- Law on BOT & BOO
- EIA System
- EIQS
- Sustainable Indicators, local initiatives
- Pollution Management Appraisals of SMEs
- WRA of big companies
- PRIME Project
- ISO 14000

Table 2
Results from 140 Philippine SMEs participating in
Pollution Management Appraisals (US\$)

Indicator	Target	Achieved
Investment by firms	Not Defined	US\$ 21 million
Annualized Net Benefits	US\$ 800,000	US\$ 31 million
Pollution Prevention (BOD)	5-10%	33%
Water Use Reduction	Not Defined	33 million cubic meters per year
Firms adopting waste minimization	50%	98%

3. The Estrada Administration’s Public Statement on Trade & Environment

Since coming into power, the Estrada Administration has indicated that it will adopt the following approach to trade and environment issues:

“... Restore market confidence in our commitment to various bilateral and multilateral agreements for global full markets and an open economy.”

The components of the economic policy objectives are:

- Export offensive with more resource-based exports
- Technology absorption by SMEs
- Further liberalization of foreign investment
- BOT scheme for infrastructure
- Productivity of land use
- Internationally competitive agricultural sector

All these aims the Estrada Administration hopes to achieve “while preserving the environment.” Here it has indicated that:

“The pace of economic growth must be calibrated with the environment’s carrying capacity.”

The key aspects of the policy include:

- MBIs and polluters’ pay principle
- Natural resource accounting
- Natural resource management by local communities
- Education of all citizens on sustainability and environmental protection
- Reforestation program
- Compliance with PSSD, Philippine Agenda 21 and IEAs signed

4. Determinants of Successful Adaptation to Trading Environment

Success in achieving environmental objectives in the context of an open and competitive international trading environment involves a combination of government, institutional and business sector efforts:

- Domestic policy: e.g., the DTI provides support to adopt ISO 14000
- Institutional support: e.g., Measures supportive of Montreal Protocol
- Individual industry or firm response: e.g., the BEMP Project

5. Proposed Strategic Adjustments To Greening Of International Trade

The keys to successfully greening international trade are:

- Be up-to-date on environmental regulations and eco-labeling
- Exporters to invest in EMS to meet international standards
- Disseminate ISO 14000 and other standards, rules and regulations
- Strengthen certification agencies
- Prevent indiscriminate use of PPM-based trade restrictions
- Press for greater transparency of eco-labeling programs

Trade, Environment and the Economy in Singapore

Dr Kog Yue Choong
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Singapore

Introduction

The promotion of economic development and rapid industrialisation is always balanced against the impact on the natural environment. In the following report, the focus is on the economy in Singapore, which is a newly industrialising economy, and the impact that environmental measures have had on trade and vice-versa. Part one of the report is on the state of the economy in Singapore, including a review of its salient features together with the process of economic development that has been planned and achieved. Part two of the report looks at the environmental performance considering the rapid economic growth rate that has been achieved in Singapore since the 1960s. Finally, in Part three of the report, the discussion will be on the broad strategies which have been introduced to cope with the environmental impact of the trade-related growth plans and programs which account for the success achieved by the Singapore economy so far. Where feasible, the report has drawn on existing research, including the co-authors' own original research.

1. The Economy

Since 1965, when Singapore split from its merger with Malaysia, the Singapore economy has enjoyed more or less steady economic growth and joined the ranks of the Asian newly industrialising economies (NIEs). At the time of its independence, Singapore had to overcome problems of high unemployment, housing shortage, inadequate infrastructure and communication facilities and deteriorating urban conditions. With scant natural resources, but a strategic location at the crossroads of the world's major shipping lanes, the solution was based on the development of port facilities, ship repair and building, along with the provision of affordable housing, promotion of tourism to generate income and an industrialisation program including petroleum refining, to generate jobs.

Singapore's rapid economic growth since the 1960s has been attributed to its efforts to attract foreign investment focused on high-technology, high-value-added products and services (Koh 1989, p. 240) which enabled it to overcome the constraints of lack of natural resources, including water and energy, and the small size of the domestic market. With the long period under colonial rule, Singapore has developed an outward-looking philosophy in terms of economic development, education and other areas of development. This together with the ability to respond swiftly and effectively to external changes contributed to its success in implementing its export-oriented and multinational corporations-based economic development concept. Singapore also had the advantage of industrializing via exports and foreign investments at a period when world trade was buoyant and Western multinational corporations (MNCs) were seeking export platforms to offset rising domestic costs. As an early starter, Singapore also did not face the intense competition experienced by latecomers in the 1970s (Chia 1989, p. 251).

Singapore's domestic economy is small and, in contrast to some other East Asian NIEs, unprotected (Chia 1989, p. 265). It is also highly dependent on imports.¹ This reflects various factors. In particular, key processing industries are entirely dependent on imports for raw materials and fuel, including the very important petroleum refining industry, vegetable oil refining, wheat milling, sugar refining, roasted coffee preparation, rattan processing, rubber processing and natural-gums processing. In total, these industries alone accounted for some 50 per cent of manufacturing production in 1983. The high degree of import dependence also reflects the absence of an import-substitution and domestic value-added content policy, and an inadequate development of domestic intermediate and supporting industries (Chia 1989, p. 259).

The high degree of import dependence has been the cause of concern to some economists who argue that import dependence can result in low domestic inter-industry linkage and value added (Chia 1989, p. 258) and draws down foreign exchange earnings.

The dependence on foreign direct investment has also been criticized on the basis that it adversely impacts on the development of local entrepreneurs. Direct foreign investments have dominated industries in Singapore. While government policy in the other Asian NIEs strives to make conditions conducive for local entrepreneurs to survive in a business downturn, government policy in Singapore concentrates its energy on creating conditions conducive for existing MNCs to stay on and encouraging new ones to come in (Koh 1989, p. 240). In the late 1980s, the Economic Development Board emphasized efforts to encourage MNCs to set up regional operating headquarters (OHQs) in Singapore. Measures included the extension of pioneer status to international countertrade houses. In 1986 for example, during the recession in Singapore, pioneer tax-exemption status was extended to six trading companies including Cargill Trading of the United States. Japan's Sony Corporation also decided to establish an OHQ in Singapore.

2. Economic Growth and Environmental Performance

In discussing the impact of economic growth and especially that of the manufacturing sector on the environment, several arguments have been made.² First, it has been suggested that developing economies that have pushed specialisation in their industrialisation process and focused on industries such as chemicals and heavy metals, do tend to face a great increase in pollution hazards because of the lack of experience with production and regulation in such manufacturing areas (Leonard 1985). Developing economies are also considered as having failed to accurately consider the benefits and costs of industrial policies as well as to rigorously conduct environmental impact assessments (Lee and Lim 1983). More commonly, the view has been that multinational corporations (MNCs) have shifted production to developing economies because environmental regulations have become far more stringent over time in their home economies implying that business costs would grow prohibitively as well (Castleman 1987; Jasanoff 1985).

¹ In fact, in 1973 and 1983, half of the manufacturing industries reported import content in excess of 50 per cent of gross output (see, Input and Output Tables, Department of Statistics, 1978, 1987).

² For example, Tyabji (1993, pp. 126-127) had several interesting observations culled from studies reviewed.

There has been no systematic or widespread evidence to bear out the expectation of MNCs seeking out havens in developing economies in order to circumvent environmental regulations in their home economies. As Lepkowski (1987) has argued, while the scope and stringency of environmental regulations in developing economies have increased over time, there is still a lack of interest, resources and capacity to enforce the regulations in most of these economies. Instead, the indications are that investment decisions by foreign as well as local investors rely on more than just environmental regulations that are in place in developing economies. Indeed, many other equally if not more important factors are taken into consideration (Tyabji 1993, p. 127). Thus, according to Pearson (1987, p. 114), “strict environmental regulations in developing countries, if explicit, certain and stable, are unlikely to result in widespread loss of investment and industrial production”. Singapore is a good example of such a regulatory approach towards environmental management and protection in the process of rapid industrialization and urbanization.

The view that trade and investment liberalisation are linked to environmental degradation has also been difficult to support. In fact, evidence from Latin America, India, Indonesia, Philippines, Thailand and China suggests that domestic firms tend to be greater polluters than the MNCs (Leonard 1985; Pearson 1987; Lepkowski 1987). In part, this is because domestic firms are usually much smaller than MNCs and also rely on older technology. Furthermore, some of the economies with the worst records in terms of environmental management and protection, are those that have been considered highly protectionist in terms of trade and investment. Singapore’s economy and market, in contrast, have been very open and Singapore is considered by many to have achieved one of the best track records in environmental management and protection. There is therefore far more evidence in support of the view that the main issue is that of more effective pollution control regardless of business ownership, multinational or domestic (Pimenta 1987).

Trade indicators since the global recession in 1985 have shown robust growth. Between 1986 and 1996, at current prices, the value of Singapore’s external trade (including re-exports) has practically tripled. If 1990 prices are used, the value has actually quadrupled. Oil remains the major single commodity in trade but there has been a growing trend in non-oil trade as well. In a discussion of the diversification of Singapore’s trade, Koh argues that:

“Overall, as far as foreign-exchange earnings and exports are concerned, the services sector is dwarfed by the goods sector, owing partly to the high export orientation of the manufacturing sector and also because a relatively high proportion of services is consumed domestically. Despite this, it is important to note that the foreign-exchange earnings ratio (net foreign-exchange earnings per unit of export) for services is about three times that for goods. This implies that if Singapore succeeds in expanding its exports of services, it is likely to succeed in giving a significant boost to its foreign-exchange earnings. There are strong grounds for believing this may be possible when one considers that the services sector (particularly transport and communications and financial and business services) has been growing faster than the goods sector, and the overall economy since 1980, was fairly resilient during Singapore’s first major recession in twenty

*years (in 1985/86), and excepting 'Other Services' was exhibiting higher-than-average labour productivity for the larger part of the 1970s and 1980s.”*³

On the basis of the available economic analyses, therefore, one can conclude that the economic growth that Singapore has achieved is not to be attributed to trading off environmental quality for high economic growth. Economic development has been paralleled by efforts to enforce increasingly high and stringent environmental standards as the following discussion intends to illustrate.

3. Trade-Related Environmental Measures and Environment-Related Trade Measures: The Environmental Policy Framework

The effort to distinguish between trade-related environmental measures and environment-related trade measures is not as important as understanding whether the strict enforcement of high environmental quality standards in any way contributes to poorer performance of the economy in terms of trade and investment. In Singapore, there was early recognition of the potential impact of rapid economic growth on the environment and the government moved to introduce environmental pollution controls. However, as shown by Singapore's rapid growth through this period, the early move to institute environmental controls was not disruptive of the industrialization and economic development process but rather paralleled it.

Broad strategies of trade and investment-related environmental measures

The Anti-Pollution Unit (APU) was established within the Prime Minister's Office in April 1970 to ensure that the ambient air quality would not deteriorate with greater industrialization. Shortly thereafter, in September 1972, the Ministry of the Environment (ENV) was created in order to improve sanitation services, public health and to prevent water pollution. Singapore thus became one of the first economies in the world to set up a Ministry specifically for the protection of the environment. Subsequently, in April 1983, the APU became a part of ENV.

Since its inception, the Ministry of the Environment has sought to maintain environmental standards at levels meant to ensure the health and well-being of the population, taking into consideration the control or preventive technology available, the practical constraints of enforcement, the potential threat to the environment, the cost to the economy and the long-term objectives of management (Hui 1998). Based on its relatively successful track record, the Ministry suggests that the key elements of its strategy are long-term planning, preventive control of environmental threats, comprehensive monitoring of environmental quality, effective legislation and enforcement, adequate provision of environmental infrastructure and use of appropriate environmental technology (Hui 1998).

Effective planning and preventive controls are particularly important because precautionary and pre-emptive measures such as screening out polluting developments, industrial processes and technologies can prevent major environmental problems from

³ Koh, 1989, p. 230-232.

arising in the first place. Moreover, the provision of adequate environmental facilities ensures that all wastes are disposed of in the appropriate manner and not inadvertently or otherwise discharged into the environment.

Strict and effective enforcement of environmental legislation, meanwhile, ensures that pollution control equipment is properly managed, maintained and operated and that infringements are quickly detected and duly penalised.

Enforcement, in turn, requires that a proper system be put in place for monitoring the state of the environment and checking if environmental controls and policies are having their desired effect. These are subject to change and may deteriorate with changing circumstances. Information enables the authorities to detect emerging environmental problems as well as to pre-empt such problems since the means are more readily available for reaching and implementing solutions at an early stage.

Environmental planning

Since land is a scarce and finite resource in Singapore, there can be little provision for large buffers between incompatible land-use developments such as industrial and residential areas. Although development as well as environmental management is faced with this limitation, the environmental management and planning authorities in Singapore have managed, through the co-ordinated efforts between the town planner and the environmental engineers, to maintain high quality environmental standards in parallel with rapid industrialization and urban growth.

Planning Controls

Environmental controls are an intrinsic part of land planning and have been incorporated into land use planning to ensure that developments are properly sited and are compatible with surrounding land uses. The process is as follows.

The Urban Redevelopment Authority (URA), which is the planning and development authority in Singapore, consults the Environment Ministry (ENV) on the environmental aspects of any new developments (Hui 1998). ENV then checks the environmental impact of the new development and its compatibility with the surrounding land use. When necessary, ENV imposes environmental pollution control requirements that have to be incorporated into the design of the development to prevent or minimize any adverse impact from the proposed development.

For new industrial developments, ENV assesses the environmental impact to ensure that the proposed development will not pose unacceptable health and safety hazards or environmental threats. A development proposal involving new industries and/or processes will be allowed only if it can be sited in a suitable industrial estate, and that emission of pollutants, if any, will be within the required standards. The development proposal will also need to show that that wastes generated will be safely managed and properly disposed of. The essential aspect of this control is the prevention of potential pollution through the weeding out at an early stage of developments or technologies that will not be able to comply with the requirements.

For major developments that are likely to have a significant impact on the environment, ENV requires an environmental impact assessment (EIA) be carried out. EIAs are thus required potentially polluting industries, industries that store and handle large quantities of hazardous chemicals, port development, landfill development, and so forth. EIAs must cover all possible adverse impacts of the development and the measures recommended to eliminate or minimize the impacts. The development would be approved only if the evaluation of the EIA shows that any adverse impact on the environment could be eliminated or mitigated to the extent where it would no longer pose a significant problem (Hui 1998).

Building Controls

Only when a proposed development has been granted planning approval, can the developer proceed to submit building plans to the Building Control Division (BCD) of the Public Works Department (PWD) for building plan approval. At the same time, the developer is also required to submit the building plans to the technical departments such as the Central Building Plan Unit (CBPU) of ENV for clearance on technical requirements. At the Ministry of Environment, the CBPU checks the building plans for compliance with technical requirements on environment health, drainage, sewerage and pollution control and, in particular, the incorporation of environmental facilities in the design of the buildings. Since the building plan approval will only be granted by BCD if its requirements and those of the technical departments are complied with, environmental management would be considered right at the outset before the implementation of any development proposal. This would include the industrial plants and factories being set up in industrial estates.

The checks also continue after construction has been completed, with ENV and other technical departments conducting inspections on the premises of the development to check for compliance with stipulated requirements before informing BCD of their clearance for issue of Temporary Occupation Permit (TOP) or Certificate of Statutory Completion (CSC) to the developer. Enforcement of the broad environmental requirements vetted and imposed at the planning phase is therefore effective because the comprehensive checking and approving system at the building phase enables ENV to ensure compliance by developers.

Air and water pollution control

The “polluter pays” principle applies in the control of air and water pollution in Singapore. This philosophy means that the sources identified and accountable for pollution are also held responsible for the cost of pollution control. Pollution control legislation like the Clean Air Act, requires factories to install and operate pollution control equipment in order to comply with the emission limits (for air pollutants) and effluent limits (for water pollutants) stipulated in the regulations. Setting of these emission and effluent limits has been effective mainly because of their simplicity and ease of enforcement (Hui 1998). Over the years, the Ministry of the Environment has progressively tightened standards in line with improvements in control technology. A

list of the current emission and effluent limits adopted by Singapore is given in Table 1 (see tabular annex).

A comprehensive three-pronged strategy has been in use by the Ministry of the Environment, which effectively controls air and water pollution in Singapore. The strategy comprises three key elements: monitoring of air and water quality; environmental planning control and enforcement control of sources of pollution. Clearly in spite of the raising of standards required of the industrial firms over time, these trade-related environmental measures do not appear to have been disruptive even as the economy has stayed open to trade and investment from abroad.

Air and Water Quality Monitoring

A sophisticated and well-distributed system of air and water quality monitoring has been put in place to provide the environmental agencies with the necessary information to determine the effectiveness of their management policies and strategies. Hence, the air quality in Singapore is currently monitored by a telemetric network of 15 air monitoring stations located throughout the main island. Standards have been generally good and improving over the years, as the air pollutants monitored at the stations show in the list provided in Table 2 (see tabular annex). These stations are linked by telephone lines to a control station in ENV and readings of air quality are transmitted directly from the monitoring stations to the control station at predetermined intervals or on demand. In the past decades since the start of the drive to industrialise and currently, the air quality in Singapore is generally within the ambient quality standards and guidelines set by the World Health Organisation and the USA's Environmental Protection Agency (EPA).

The water quality of various inland water bodies and coastal areas is monitored regularly. Within the water catchment areas, the water quality of 47 streams and 13 reservoirs are monitored on a monthly basis. Outside the water catchment areas, the water quality of 17 rivers and streams is also monitored on a monthly basis. The seawater quality around Singapore is monitored through analyses carried out on seawater samples collected from 9 sampling points in the Straits of Johore and 10 sampling points in the Straits of Singapore. The quality is generally within acceptable international standards.

Preventive and Enforcement Controls

The emphasis on the preventive control of air and water pollution is evident from the approach taken by the authorities in ensuring that right at the beginning, careful consideration is given to land use development and planning and to the approval, allocation and siting of new factories. Enforcement is equally emphasised and regular spot checks are carried out by ENV on factories and other premises, especially the larger potential polluters, as part of an ongoing enforcement programme to control pollution.

During the regular inspection rounds, all possible sources of pollution are scrutinised to ensure that appropriate pollution control systems have been installed and are being operated in the proper manner. In addition, source tests are also carried out to check for compliance with the emission and effluent limits stipulated in the Clean Air (Standards)

Regulations and the Trade Effluent Regulations. At the same time, ENV has also investigated complaints of air and water pollution received from the public.

Air Pollution Laws

Where burning of fossil fuels is the main source of energy generation, carbon dioxide emission into the atmosphere will rise too (Ministry of the Environment, 1993, p. 30). Power generation accounts for almost half of all CO₂ emissions in Singapore. In 1986, the function of the Anti-Air Pollution Unit was transferred to the Pollution Control Department (PCD) of ENV. Currently, the PCD is responsible for the prevention and control of environmental pollution in Singapore.

Clean Air Act

The main legislative instrument for air quality control is the Clean Air Act, which was introduced for the prevention and reduction of air pollution. The Act controls all industrial premises together with a programme of inspection to check on the sources of emission and to test for compliance with emission standards. According to lawyers Foo *et al.* (1998), Section 2(1) defines air pollution simply as “the emission into the air of any air impurity”. A more complete definition is found in Article 1(a) of the Convention on Long-Range Transboundary Air Pollution (Geneva, 13 November 1979) which defines air pollution as “the introduction by man, directly or indirectly, of substances or energy into the air, resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property, and impair or interfere with amenities and other legitimate uses of the environment.” This last and more comprehensive definition adapts the general concept of pollution, focusing on risk or harm from changes in the environment. Yet, the Clean Air Act appears to be concerned only with emission from stationary sources.

Under section 3(1) of the Act, the ENV may appoint a Director of Air Pollution Control who will help the authorities to implement the provisions of the Act or any Regulations made thereunder. Hence, there are certain polluting works stated in the schedule which require the permission of the Director, thereby making the premises “scheduled premises”. These comprise various kinds of works such as, cement works, concrete works, asphalt works, chemical works, gas works, ceramics work, petroleum works, pulping works, among others. The Act, for example, covers precautions that are enforced in relation to the premises used or intended to be used to store more than 100 tonnes of chemicals, chemical products, hydrocarbons or hydrocarbon products which are toxic or which produce toxic gases on burning or contact with water or air, fall within the meaning of “Scheduled Premises”. Industrial works with a high potential for pollution are covered.

Under the provisions of the Act, the Director may grant permission to operate such works provided certain equipment and other steps are taken to lessen the emission of air pollutants where the Director “is of the opinion that the occupant is likely to cause air pollution.” With developments in administrative law in Singapore, culminating in the Court of Appeal decision on one such case, the Act while giving the Director a discretion to refuse permission, also requires that there be good grounds for doing so, objectively assessed.

Other provisions can be found in the Clean Air Act. Section 9 prohibits the emission of dark smoke or air impurity. Dark smoke is defined under the Clean Air (Standards) Regulations 1972 as any smoke that is dark or darker than Shade No. 2 of the Ringelmann chart. The standard varies from industry to industry and so do the air pollutants involved.

In effect, the Director has very broad powers, which were enhanced in 1975. These powers range from prescription to require the occupier of the premises or works, whether industrial or trade, to install and operate any industrial plant or control equipment, to use certain types of fuel to reduce air pollution, or to dismantle or disconnect any industrial plant, fuel burning equipment, control equipment or chimney, and to install and operate monitoring instruments regarding air pollution. The Clean Air Act was amended to bring building sites within its ambit. Failure to comply with the Act or any condition specified by the Director with regard to any permission given is an offence punishable by hefty fines. There were 55 such prosecutions in 1992 and S\$ 107,000 in fines was collected (Ministry of the Environment 1992).

Further amendments in 1978 provided for stricter control over the emission of certain air particles like dust, acids, chlorine and carbon monoxide. A review on the standards for air emissions was expected to be completed by 1996 (Foo *et al.* 1998). During the review, industries were to be consulted and appropriate tax incentives given for factories being required to install pollution-control equipment (Ministry of the Environment 1992, p. 60).

Other legislation for air quality control includes the Clean Air (Prohibition on the Use of Open Fires) Order, which was passed in 1973. The use of open fires in any industrial or trade premises is prohibited by the Act. Such legislation controls open burning of industrial wastes which could give rise to low level smoke emission and create a health problem.

Control of Vehicular Emissions

Emission from vehicles is a major source of pollution especially since by the beginning of 1994, there were 584,322 vehicles registered with the Registry of Vehicles (ROV) (Ministry of Information and the Arts 1994). The ENV, that is the PCD, works closely with the ROV and Traffic Police to control vehicular emissions.

The strategy, which has been relatively successful in Singapore for reducing pollution from motor vehicles, has been two-pronged – improving the engines and fuel quality to reduce emissions and using traffic management measures to control the growth of vehicle population and fuel consumption.

All vehicles are inspected to ensure compliance with emission standards. Emission standards for oxygen, nitrogen, hydrogen, carbon monoxide and smoke will be made stricter to comply with U.S. Environment Protection Agency (EPA), European Community and Japanese standards. To illustrate the standards imposed, prior to 1 July 1992 all petrol-driven motor vehicles to be registered in Singapore for the first time have to comply with the standard for exhaust emission specified in Economic Commission for

Europe (ECE) Regulation 15.04. Since 1 July 1992, however, a more stringent standard, the ECE Regulation 83 has to be complied with. The stricter standard was possible because of the availability of unleaded petrol.

Since 1970, exhaust emissions standards for petrol and diesel engines have been in place. More recently, Singapore has accepted the ECE standards for voluntary compliance. Starting from 1 July 1991, all new cars imported into Singapore from 1 July 1991 must be able to use unleaded petrol. Such use allows for stricter emission standards that can only be complied through the use of catalytic converters. In February 1992, a financial incentive was introduced which made unleaded petrol cheaper than regular petrol. Not surprisingly, by the end of 1991, 51 percent of motorists with vehicles which can use unleaded petrol did so which has compared favourably with the EC: 53 percent (Ministry of the Environment 1992).

Between 1981 and 1987, the lead content in leaded petrol was gradually reduced from 0.8 to 0.15 gramme per litre. The use of unleaded petrol was promoted in February 1990 through a differential tax system which made unleaded petrol 10 cents per litre cheaper than leaded petrol at the pump. About 57 percent of all petrol sold in Singapore at the end of 1993 was unleaded petrol. The sulphur content in automotive diesel was reduced from 1.0 percent by weight in 1976 to the current limit of 0.5 percent by weight to reduce sulphur dioxide emissions from diesel vehicles. The sulphur limit will be further reduced to 0.3 percent by weight from 1 July 1996 onwards to reduce particulate (soot) emissions as lower sulphur diesel produces less particulate emissions. Ambient levels of pollutants such as lead and carbon monoxide have therefore be kept well below the ambient air quality standards recommended by the World Health Organisation and the United States Environmental Protection Agency.

Hazardous substance and toxic waste control

With the growth of industries that are dealing with specialist chemicals and other high technology processes over the years, the quantity and variety of chemicals imported, transported, stored and handled in Singapore has increased. These industries also generate toxic wastes through their processes and it is imperative that the wastes be disposed of in a safe manner. To minimize the risks associated with the transport, storage and handling of hazardous substances and toxic wastes, ENV has set up controls to ensure the safe and proper management of hazardous chemicals and toxic wastes.

Hazardous Substances Control

The import, transport, storage and use of hazardous chemicals are controlled under the Poisons Act and the Poisons (Hazardous Substances) Rules. This Act requires that any person or company engaged in such activities to obtain a poisons licence or permit from ENV. If the transport of hazardous chemicals in quantities exceeds limits, which are stipulated in the Poisons (Hazardous Substances) Rules, then the approval of ENV has to be obtained. Specified limits for each hazardous chemical are also listed. ENV imposes requirements on packaging, allowable load, route, timing and emergency plans in the transport approval to ensure the safe transport of hazardous chemicals. As well, only

drivers who have successfully undergone a special training course jointly organised by ENV, Port of Singapore Authority and Fire Safety Bureau are allowed to drive road tankers and tank containers carrying hazardous chemicals and dangerous petroleum products.

The ENV reportedly carries out inspections without prior warning on chemical stores of poisons licence/permit holders to audit the records of controlled chemicals and to ensure that they are properly accounted for. In addition, ENV also conducts joint road checks with the Registry of Vehicles and the Fire Safety Bureau to ensure that vehicles transporting hazardous chemicals are authorized to do so and comply with the safety requirements imposed on them.

Toxic Wastes Control

Requirements for the collection and disposal of toxic industrial wastes are provided under the Environmental Public Health (Toxic Industrial Wastes) Regulations. A licence is usually required. Types of toxic industrial wastes controlled under the Regulations are listed in Table 3 (see tabular annex). Licences are issued to companies that have the necessary facilities to collect and to dispose of those wastes specified in the licences in a safe and proper manner. Just as in the case of hazardous chemicals, approval is also required for the transport of toxic wastes whose quantities exceed those stipulated in the Regulations. Wastes from hospitals are classified as toxic and are required to be stored and collected separately in colour-coded bags and containers. Provision for safe disposal is emphasised so hospital wastes are required to be collected by licensed contractors and incinerated in dedicated high temperature hospital waste incinerators.

Wastewater treatment

A national priority has been the protection of water resources. Land is scarce and water catchment areas are thus limited. More importantly, it is recognized that water within the water catchment areas has to be protected from all forms of water pollution. Until now, developments or activities that generate water pollution or involve toxic chemicals are not permitted within the water catchment areas.

Generally, the main types of water pollution in Singapore are domestic wastewater (both sewage and sullage), industrial effluent and farm wastewater. A key feature of the strategy to protect water resources in Singapore is the provision of comprehensive wastewater treatment facilities for all the wastewater generated within Singapore. Beginning from its formation in 1972, ENV has launched a program to provide a comprehensive sewerage system for the collection and treatment of wastewater generated throughout Singapore. This sewerage system now serves about 99 percent of the population. The remaining areas, which would be mainly the outlying areas that are not served by the sewerage system, are provided with modular sewage treatment units.

The infrastructure provided ensures that wastewater from all sources including domestic, commercial and industrial premises throughout Singapore, is collected and channelled to 6 centralised sewage treatment works where it is treated. Treated water of acceptable standards is discharged into the sea.

Besides serving domestic and commercial premises, the public sewerage system also serves all industrial premises. As the public sewerage system is not designed to convey or to treat corrosive or hazardous wastewater, pre-treatment of industrial effluent at source to specified limits is necessary to prevent disruption to the treatment process. This would ensure that with further treatment the quality of treated effluent would be within acceptable standards for discharge into the sea.

Water Pollution Laws

The Water Pollution Control and Drainage Act governs the discharge of pollutants into inland waters. Section 14(2) defines “inland water” as including any river, stream, reservoir, lake or pond, whether natural or artificial. Section 15(1) makes it an offence to discharge any trade effluent, chemical, oil or any other substance which is noxious, injurious or polluting, to inland waters which is likely to give rise to an environmental hazard. The offence is one of strict liability so no proof of fault is required. Hence, Section 15(5) requires the Public Prosecutor's sanction to be obtained before prosecution.

Since a major cause of water pollution is the result of indiscriminate building works affecting drains and drainage systems, the Director of Water Pollution Control and Drainage may impose conditions before permission to proceed with the building works is given. Prosecutions are carried against those who do not comply with the requirements set out under the Act.

Under the Trade Effluent Regulations, permission can be given for trade effluents to be discharged into a watercourse although this is subject to certain allowable limits. Offences are usually punishable by fine. Enforcement has been crucial because it has been difficult to ensure compliance.

The monitoring of water quality in inland water bodies and coastal areas is carried out regularly by the Strategic Planning and Research Department. A total of 47 streams in water catchment areas were monitored in 1991 (Foo *et al.* 1998). Similarly, water quality of the 13 reservoirs are monitored by the Public Utilities Board.

Marine Pollution

Singapore is the world's busiest port with a shipping tonnage of 623.8 million gross tonnes in 1993 in part because of its strategic location at the crossroads between the Asia Pacific and the Middle East/Europe. In addition, the port is also the number one bunkering centre in the world and a leading regional refining centre. Both the Straits of Malacca and Singapore Straits are very busy waterways used by international maritime traffic. Hence, Singapore is vulnerable to marine pollution, whether accidental or operational, from ships. The fact is, however, that an estimated 10 percent of pollution of the seas worldwide comes from land-based sources.

The Implementation of MARPOL 73/78 : Prevention of Pollution of the Sea Act

Singapore passed the Prevention of Pollution of the Sea Act (PPSA) on 30 August 1990

and it came into effect on 1 February 1991. Such a measure was aimed at implementing the International Convention for the Protection of Pollution from Ships 1973 with the modifications by the Protocol of 1978 (MARPOL 73/78) (Ministry of the Environment 1992). Since the measure had wide reaching effect, extensive consultations with interested parties, i.e., shipping, marine and petroleum/chemicals industries were conducted before the Bill was passed. Essentially, the Act prescribes the measures to be put in place in order to prevent operational pollution and minimise pollution from ships anywhere in the world as well as other ships that are using Singapore waters.

With the Prevention of the Pollution of the Sea Act of 1990 in place, the 1971 Prevention of Pollution of the Sea Act was repealed but provisions falling outside the ambit of MARPOL 73/78 which were considered still useful in controlling marine pollution were retained in a modified form in the second part of the new Act (Foo *et al.* 1998). The now single piece of legislation provides for wide powers of enforcement including detention of ships and large fines.

Solid waste collection and disposal

The Ministry of the Environment provides daily, 7 days a week, refuse removal service at all domestic and trade premises, that is, shops. A comprehensive and efficient refuse collection system has been built up over the years. Large commercial and industrial establishments such as, hotels, shopping complexes and factories are responsible for the collection and disposal of their own solid wastes. Establishments such as these would engage private waste collectors licensed by ENV to collect and dispose of their waste. Further requirements introduced in 1992, provide for licensed waste collectors to ensure that incinerable wastes are brought to the incineration plants and non-incinerable wastes to the sanitary landfill.

Since Singapore has limited landfill sites for the disposal of refuse and needs to conserve the limited capacity of these landfill sites, incineration of refuse is a necessity. At the incineration plants, the energy generated is recovered to generate electricity while scrap iron is recovered for resale to a local steel plant. The ashes from the three incineration plants and the remaining 15 percent of the refuse that cannot be incinerated are disposed of by landfill.

Waste minimization

A Waste Minimisation Department (WMD) was formed only in February 1992 to drive ENV's waste minimization and recycling in all sectors of the community. Effort by the department has been multi-faceted. Apart from formulating policies and projects to enhance waste minimisation and recycling, WMD also promotes the use of recycled products in order to create demand for such products.

The department also provides secretariat support to the Green Labelling Scheme, which promotes "green consumption" in Singapore. The Green Labelling Scheme identifies products that are more environmentally friendly and allows them to use Green Labels as recognition of their status. Perhaps because the scheme is operated on a voluntary basis,

assessment has found that the impact is highly limited and confined to a very small proportion of the consumer market.

Waste Management Legislation

Legislation covering waste management is implemented by the Pollution Control Department (PCD). Such legislation is listed below.

- 1) Public Health (Environmental Public Health Act, and the following regulations passed under it, *i.e.*,
 - (a) Environmental Public Health (Public Cleansing) Regulations
 - (b) Environmental Public Health (Toxic Industrial Waste) Regulations
 - (c) Environmental Public Health (General Waste Collection) Regulations
 - (d) Environmental Corrective Work Order) Regulations
- 2) Water Pollution Control and Drainage Act which includes
 - (a) Trade Effluent Regulations
 - (b) Sewage Treatment Plants Regulations

In the discussion above on building controls, it was noted that the Central Building Plan Unit of the PCD is the authority which assesses the environmental impact of new industrial developments, and processes sewerage and drainage plan applications for wastes to be controlled at source.

Waste Management under the Environmental Public Health Act

As discussed above, the Act distinguishes between waste generally and toxic industrial waste. Industrial waste is not allowed to be disposed of except in or at the public disposal facility or one established with the permission of the Commissioner of Public Health. Under the Act, an occupier of any work place or premise can be required to recycle or treat any industrial waste at his own expense before it is brought to any public disposal facility for disposal.

Waste Management under Water Pollution Control and Drainage Act

The Act controls the discharge of sewage from domestic, industrial and other public or private premises. In particular, it provides for the management and disposal of trade effluent and sewage, requiring that all trade effluent be treated before discharge into a public sewer or watercourse. Control mechanisms such as sampling test points must be installed before discharging trade effluents. The trade effluent discharged must not contain substances listed in rule 10 of the Trade Effluent Regulations, which cover radioactive materials.

Singapore Resolution on Waste Management in the Coastal Areas of the ASEAN Region

A conference was organised by ASEAN and the United States Coastal Resources Management Project on Waste Management in the Coastal Areas of the ASEAN Region between 28-30 June 1991 in Singapore. Participants were from a number of economies and organizations including Canada, the multilateral financial institutions, donor agencies,

various NGOs, the International Centre for Living Aquatic Resources Management and the private sector.

Noise Pollution

Legislation has been passed to reduce noise from the main sources of noise pollution, such as, motor vehicles and general road traffic, Mass Rapid Transit trains, low-flying aircraft, construction sites, industries, public entertainment, and community activities.

Road Traffic (Motor Vehicles, Construction and Use) Rules

The law governing noise from motor vehicles is in the Road Traffic (Motor Vehicles, Construction and Use) Rules. All vehicles, for example, are required by the law to be fitted with a silencer to reduce noise caused by the escape of exhaust gases from the engine. Prescribed noise level emission for motor vehicles in the Road Traffic (Motor Vehicles, Construction and Use) Rules is shown in Table 4 (see tabular annex).

Other town planning and land-use development tools are in place to reduce the nuisance arising from noise pollution. Thus, the Mass Rapid Transit has set out standards for the noise generated by its train services.

Air Navigation Act

Since the operation of aircraft is a major source of noise pollution, the Act carefully specifies the legal actions that can be considered against aircraft. However, the noise and vibration caused by aircraft deemed inevitable in aerodromes is not actionable under the Act, provided that any conditions imposed under it are complied with. To minimize problems, the Urban Redevelopment Authority uses the Noise Exposure Forecast (NEF-40) contours to restrict residential developments fringing airports and airbases in Singapore. This forecast is being updated. Finally, the international regulation of aircraft noise is provided for by Article 9 of the Chicago Convention on International Civil Aviation of 1944. Aircraft may not land or take-off in Singapore unless the noise standards are complied with.

Miscellaneous Offences (Public Order and Nuisance) Act

This Act prohibits excessive noise-making by any instrument or other means which cause or are likely to cause annoyance or inconvenience to persons in any public place. There are recognizably problems with marshalling evidence in mounting a successful prosecution. A Magistrates' Court order can however, be obtained to ensure the noise nuisance is abated or does not recur in the same premises. Violation of the order is punishable with a hefty fine.

Environmental Public Health Act

Noise control is also covered under the Environmental Public Health Act. Under the Act, the Commissioner of Public Health may impose conditions on how construction works are to be carried out, specify the type of plant or machinery to be used, the hours during which

works may be carried out, and the level of noise or vibration which may be emitted. Starting 1 January 1991, the owner or occupier of any construction site has to undertake the responsibility of ensuring that the level of noise emitted from the construction site shall not exceed the maximum levels as set out in the Environmental Public Health (Control of Noise From Construction Sites) Regulations 1990. The acceptable noise levels are set out in Table 5 (see tabular annex).

Factories Act

Under the guidelines issued by the Department of Industrial Health, machines with a noise level exceeding 90 dB(A) measured 1 metre away are designated as having excessive noise; in these cases, engineering measures must be employed to reduce such noise (Foo *et al.* 1998). The standard in use is similar to that employed in the European Community.

In addition, employers are required to implement measures aimed at reducing noise in their factories. Employers have to provide ear protection equipment to employees who are exposed to a daily equivalent noise level exceeding 85 dB(A) over an 8-hour exposure period. Alternatively, the workers have to be shifted to areas that are not noisy for certain periods during the workday. The legal protection is important for workers since noise-induced deafness is a leading occupational hazard. This is particularly the case in the heavy industries and the building trades, where a sizeable portion of the workforce is comprised of foreigners.

Public Entertainments Act

The Public Entertainments Act is administered by the Public Entertainment Licensing Unit (PELU) of the Criminal Investigation Department of the Singapore Police. No public entertainment is allowed except when a licence has been obtained from PELU and the venue has had prior approval of the police.

Regional and International Agreements

The Montreal Protocol on Substances that Deplete the Ozone Layer

Singapore has been a party to global efforts to reduce environmental degradation in the atmosphere. On 5 January 1989, Singapore acceded to the Vienna Convention on the Protection of the Ozone layer, and the Montreal Protocol on Substances that Deplete the Ozone Layer. The measures that the State parties to the Protocol (as amended in June 1990 at the Second Meeting of the Parties held in London) be required to phase out their consumption of chlorofluorocarbons – i.e., synthetic gases used widely in refrigerants, aerosols, foam and industrial solvents – by the year 2000, and set intermediate targets of a 50 percent reduction by 1995 and 85 percent reduction by 1997. Singapore was ahead of this schedule because its 1992 consumption was 44 percent of the 1986 level.

In the effort to meet Protocol obligations, the Trade Development Board of Singapore introduced a quota allocation system that sets the amount of controlled CFCs and halons for use. Under this system, half of the available quota are allocated to successful tenderers based on the highest bids, while the rest is offered to those who have tendered, based on

their share of the previous year's consumption. Implementation was effected through the Control of Imports and Exports (Montreal Protocol) (Chloroflourocarbons) Order 1989. In 1991, an Amendment Order extended similar regulatory controls on halons. Both these orders have since been consolidated in the Control of Imports and Exports (Montreal Protocol) Order.

The United Nations Framework Convention on Climate Change

Singapore signed the Convention on Climate Change on 13 June 1992 during the Earth Summit. The prime objective of the Convention is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. Parties are required to create an inventory of greenhouse gas emissions, formulate measures to mitigate climate change, and promote and co-operate in the development of new technologies.

CITES

In order to implement the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to which Singapore acceded on 30 November 1986, the Endangered Species (Import and Export) Act was passed in 1989. This Act, with its three schedules, lists species of animals, animal parts and plants that are protected. Trade in the endangered animals, plants and their by-products is absolutely prohibited. The exception is when there is a permit from the Director of Primary Production (PPD). Penalties for non-compliance involve large fines. This Act also provides the Director wide powers of investigation and seizure.

Singapore has entered reservations on two crocodile species and one alligator species (Foo *et al.* 1998) although it has banned the sale of rhino horn and tiger parts. This International Agreement, which stops trades dealing with animals or animal parts prohibited by the Act, has major implications for an entrepot such as Singapore that imports for the purpose of re-export.

Regional Agreements

A number of regional agreements have been reached among member economies of ASEAN, including

- the Manila Declaration (30 April 1981);
- the Bangkok Declaration on the ASEAN Environment (29 November 1984);
- the ASEAN Agreement on Conservation of Nature and Natural Resources (9 July 1985); and
- the Singapore Resolution on Environment and Development (1992).

Biodiversity Convention

On 10 March 1993, Singapore became a signatory of the Biodiversity Convention. Implementation was on 29 December 1993, although the Convention is a framework convention which prescribes goals rather than the means of achieving the goals of

conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits arising from its use.

MARPOL 73/38

This has been regarded as one of the most important international agreements ever adopted in the fight against pollution of the sea. There are in addition, a number of international agreements specifically covering the related aspects of the effort at preventing marine pollution.

- 1) International Convention on Safety of Life At Sea (SOLAS 1974) which sets out international requirements for the design and construction of vessels that help to ensure the integrity of cargoes under adverse conditions.
- 2) Convention on the International Regulations for Preventing Collisions at Sea (COLREG 1972).
- 3) International Convention on Loadlines (LL 1966). This limits the extent of cargo loading on vessels. MARPOL 73/78 superseded the Oil Pollution Convention adopted in 1954. The 1954 Convention was concerned mainly with the prevention of oil pollution from routine shipping operations whereas MARPOL 73/78 dealt with all forms of marine pollution except the disposal of land-generated waste into sea by dumping which is covered by the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, 1972 (Foo et al 1998).

Singapore has passed various regulations to give effect to some of the Annexes of MARPOL 73/78. These include the following:

- 1) Prevention of Pollution of the Sea (Oil) Regulations: to give effect to Annex I MARPOL 73/78 (except Regulation 12).
- 2) Prevention of Pollution of the Sea (Noxious Liquid Substances in Bulk) Regulations: to give effect to Annex II of the Convention (except Regulation 7).
- 3) Prevention of Pollution of the Sea (Reporting of Pollution Incidents) Regulations 1991: to give effect to Protocol 1 of MARPOL 73.
- 4) Prevention of Pollution of the Sea (Reception Facilities) Regulations: to give effect to Regulation 12 of Annex I and Regulation 7 of Annex II of MARPOL 73/78.
- 5) Prevention of Pollution of the Sea (Detergents and Equipment) Regulations: to require the owners or operators of oil refineries/terminals to store detergents etc for cleansing purposes.
- 6) The Prevention of Pollution of the Sea (Composition of Offences) Regulations 1991 (Foo et al 1998).

Liability for Pollution By Ships

The Merchant Shipping (Oil Pollution) Act is meant to cover problems when oil is discharged or escapes from a ship into the territorial waters of Singapore (or that of any other Convention country). Under the Act, the shipowner shall be liable for any damage as a result of such discharge, the cost of any remedial measures taken and any damage caused

as a result of such remedial measures being taken. The Convention referred to here is the International Convention on Civil Liability for Oil Pollution Damage 1969. Strict liability is mitigated to some extent by Section 6 where the discharge or escape of oil had occurred without the shipowner's actual fault or privity.

Singapore Port Regulations

These are aimed at protecting the waters of the port from being used for the disposal of waste and other such pollutants. In high-density cities such as Singapore, where as noted there are no buffers allowing for space to be provided to separate land-uses, the port areas are located close to recreational areas and protection of the waters of the port are as important environmentally as it is for economic and land-use reasons.

Environmental Performance - Air Quality

In Singapore today, all levels of pollutants in the ambient air are within World Health Organisation and U.S. EPA Standards. The daily Pollutants Standard Index (PSI) based on U.S. EPA criteria ranges from 10 to 70 which indicates good to moderate air quality. The PSI, devised by U.S. EPA, is a composite index based on various common pollutants like sulphur dioxide, nitrogen dioxide, carbon monoxide, ozone and total suspended particulates (dust). ENV hoped to achieve the PSI of 50 at all times by 1995 barring any external circumstances.

A sophisticated air quality tracking system – the Telemetric Air-Quality Monitoring and Management System - is in place. Costing \$5 million, the system can provide real-time air-quality data, track air pollutants and detect changes in air quality at an early stage. Data is collected at fifteen automated remote monitoring stations and electronically transmitted to a Central Control Station.

As mentioned above, the major source of air pollution is from industrial and power generating plants. Sulphur dioxide is a significant component in the mix of air pollutants. To reduce the emission of sulphur dioxide caused by fossil fuel, the sulphur content in fuel being burnt has been limited to 2 percent. As a rule, premises located within 100 metres of any residential building shall use gaseous fuel or electricity and those located within 100 metres and 500 metres must use fuels with sulphur content not exceeding 1 percent by weight. Singapore will take steps necessary to limit sulphur dioxide emission in the year 2000 to its 1991 level (Ministry of the Environment 1992, p. 57). One possible way is to reduce dependence on fossil fuel, and use more natural gas for power generation. Stricter emission standards to stabilize the emission of sulphur dioxide and nitrogen dioxide are envisaged. As for carbon dioxide emissions, Singapore's per capital carbon dioxide emission level was 1.9 t/year in 1989. This is well below the average level of OECD economies, which was 3.4 t/year (Ministry of the Environment 1992, p. 29).

In 1993 a total of 424 complaints on air pollution were received by the PCD. Most of these incidents were caused by poor maintenance of existing pollution control equipment (Ministry of the Environment 1993, p.13).

Impact of Economic Growth on Land-use Changes and Natural Resources

The most visible impact of the open policy towards trade and investment, which was Singapore's development option, has been on land-use changes since the 1960s. In the years between 1960 and the 1990s, the built-up area has doubled, in terms of the land area occupied and increased by 64 per cent as a proportion of land-uses. According to Tyabji (1993, p. 131), "In the aggregate while land reclamation allowed an 8.3 per cent increase in total land area, to some extent this meant filling up mangrove swamps. Industry benefited from land reclamation, as has urban development."

Nature conservationists have generally been skeptical of the government's seriousness in protecting the island-state's few remaining nature reserves. Much of the natural vegetation had already been cleared during the colonial period for development of plantation agriculture for crops such as rubber. Between 1970 and 1990, the area of natural forest shrank by 12 per cent, areas classified as marsh and tidal waste shrank by 51.5 per cent and farm holding areas fell by 91.9 per cent. A decision was made that, not having the comparative advantage in agricultural production, the focus would be on industrialization instead.

The sharp decline in the area remaining as marshes and tidal waste has been attributed not only to land reclamation to develop industrial estates such as the Jurong Industrial Estate in the western part of the island, but also the need to develop more sources of water supply. This has been accommodated through the damming of rivers and creation of reservoirs in low-lying areas, many previously occupied by swamps.

4. Discussion

The rate of growth of Singapore's trade and investment has clearly not been greatly affected by the openness of its market to imports and investments from foreign investors and traders. Growth in GDP has been robust in spite of recession periods and the volume of trade has been growing since 1960. More importantly, there has been robust growth with accompanying success, relatively speaking, in managing the environmental impact of rapid industrialization and urbanization.

Economic growth more likely than not spurred on the development of environmental management systems and strategies together with the necessary infrastructure to monitor environmental impact and compliance with the environmental standards for air and water quality. Both economic and environmental considerations went hand in hand in government economic development strategies. Robust growth has also accompanied the growing stringency of environmental standards. Strict enforcement, together with reviews of legislation, have also been key features of the success with managing much of the impact on the environment of rapid economic growth rates for the last three decades or so. Throughout this period, the market has remained open and so has the drive to attract and retain foreign investors.

TABULAR ANNEX

Table 1
Singapore's National Emission Standards for Air Pollutants

Pollutant	Standard Applicable To	Standard
Smoke	All stationary fuel-burning sources	Ringelmann No 2 or equivalent opacity. (Not to exceed more than 5 mins in any period of one hour)
Solid particles	Any trade, industry, process, industrial plant or fuel burning equipment	0.2 gm/Nm ³ (Corrected to 12 percent CO ₂)
Sulphuric acid mist or sulphur trioxide	Any trade, industry, or process (other than combustion processes and plants for the manufacture of sulphuric acid)	0.10 gm/Nm ³ as sulphur trioxide
Acid gases	Any trade, industry, or process in which sulphuric acid is manufactured	3.0 gm/Nm ³ as sulphur trioxide
Fluorine compounds	Any trade, industry, or process in the operation of which fluorine, hydrofluoric acid or any inorganic fluorine compounds are emitted	0.10 gm/Nm ³ as hydrofluoric acid
Hydrogen chloride	Any trade, industry or process	0.2 gm/Nm ³ as hydrogen chloride
Chlorine	Any trade, industry, or process	0.10 gm/Nm ³ as chlorine
Hydrogen sulphide	Any trade, industry or process	5 ppm as hydrogen sulphide gas
Nitric acid or oxides of nitrogen	Any trade, industry or process in which the manufacture of nitric acid is carried out	2.0 gm/Nm ³ as nitrogen dioxide
Nitric acid or oxide of nitrogen	Any trade, industry, or process other than nitric acid plants	1.0 gm/Nm ³ as nitrogen dioxide
Carbon monoxide	Any trade, industry or process	1.0 gm/Nm ³ as carbon monoxide
Copper and its compounds	Any trade, industry, or process	0.02 gm/Nm ³ as copper
Lead and its compounds	Any trade, industry, or process	0.02 gm/Nm ³ as lead
Arsenic and its compounds	Any trade, industry, or process	0.02 gm/Nm ³ as arsenic
Antimony and its compounds	Any trade, industry, or process	0.01 gm/Nm ³ as antimony
Cadmium and its compounds	Any trade, industry, or process	0.01 gm/Nm ³ as cadmium
Mercury and its compounds	Any trade, industry, or process	0.01 gm/Nm ³ as mercury

Table 1 (Continued)
Allowable limits for trade effluent discharge to sewer/watercourse/controlled watercourse

No	Item Of Analysis	Sewer	Watercourse	Controlled Watercourse
1	Temperature of discharge	45 degrees	45 degrees	45 degrees
2	Colour	-	7 Lovibond units	7 Lovibond units
3	pH Value	6 - 9	6 – 9	6 – 9
4	BOD (5 days at 20)	400	50	20
5	COD	600	100	60
6	Total Suspended Solids	400	50	30
7	Total Dissolved Solids	3000	2000	1000
8	Chloride (as chloride ion)	1000	600	400
9	Sulphate (as SO ₄)	1000	500	200
10	Sulphide (as sulphur)	1	0.2	0.2
11	Cyanide (as CN)	2	0.1	0.1
12	Detergents (linear alkylate suphonate as methylene blue active substances)	30	15	5
13	Grease and Oil	60	10	5
14	Arsenic	5	1	0.05
15	Barium	10	5	5
16	Tin	10	10	5
17	Iron (as Fe)	50	20	1
18	Beryllium	5	0.5	0.5
19	Boron	5	5	0.5
20	Manganese	10	5	0.5
21	Phenolic Compounds (expressed as phenol)	0.5	0.2	Nil
22	*Cadmium	1	0.1	0.01
23	*Chromium (trivalent & hexavalent)	5	1	0.05
24	*Copper	5	0.1	0.1
25	*Lead	5	0.1	0.1
26	*Mercury	0.5	0.05	0.001
27	*Nickel	10	1	0.1
28	*Selenium	10	0.5	0.01
29	*Silver	5	0.1	0.1
30	*Zinc	10	1	0.5
31	*Metals in Totals	10	1	0.5
32	Chlorine (Free)	-	1	1
33	Phosphate (as PO ₄)	-	5	2
34	Calcium (as Ca)	-	200	150
35	Magnesium (as Mg)	-	200	150
36	Nitrate (as NO ₃)	-	-	20

Notes: * Concentration of Toxic Metal shall not exceed the limits as shown, individually or in total.

“Controlled Watercourse” means a watercourse from which potable water supplied by PUB under the Public Utilities Act is obtained but does not include a watercourse from which water is pumped into a main of the PUB.

Source: Hui (1998)

**Table 2
Ambient air quality standards**

POLLUTANTS	AVERAGING TIME	USEPA PRIMARY AIR QUALITY STANDARDS		WHO LONG TERM GOALS	
		Concentration	Method	Concentration	Method
GASEOUS POLLUTANTS					
Sulphur Dioxide	Annual Mean 24 Hours	80 mg/m ³ 365 mg/m ³	Pararosaniline Pulsed Fluorescence	-	-
Carbon Dioxide	8 Hours 1 Hour	9 ppm 35 ppm	Non-dispersive Infrared Spectrometry	9 ppm 35 ppm	Non-dispersive Infrared Spectrometry
Nitrogen Dioxide	1) Annual Mean 2) 1 Hour not to be exceeded more than once a month	1) 100 mg/m ³	Chemiluminescence	2) 0.1 - 0.17 ppm	-
Ozone	1 Hour 8 Hours	12 pphm	Ultraviolet Photometry	6 pphm 3 pphm	Neutral Potassium Iodide
PARTICULATE POLLUTANTS					
Smoke	Annual Mean	-	-	40 mg/m ³ (98 percent of observation below this limit)	British Standard Procedure (BS 1747 Pt 2, 1964)
Total Suspended Particulates	Annual Mean 24 Hours	75 mg/m ³ 260 mg/m ³	High Volume Sampling	-	-
Lead	3 Months	1.5 mg/m ³	Atomic Absorption Spectroscopy	-	-

Table 3
List of toxic industrial wastes controlled under the Environmental public health
(toxic industrial waste) regulations

List of Toxic Wastes	
<p>Acids</p> <ol style="list-style-type: none"> 1) Spent inorganic acids e.g., hydrochloric, sulphuric,, nitric, phosphoric, hydrofluoric, boric, and pickling acids. 2) Spent organic acid; e.g., acetic, formic, benzoic and sulphonic acids. <p>Alkali</p> <ol style="list-style-type: none"> 1) Spent alkaline solutions 2) Spent ammoniacal solutions 3) Metal hydroxide and oxide sludges <p>Antimony</p> <ol style="list-style-type: none"> 1) Spent antimony potassium tartrate <p>Arsenic and its Compounds</p> <ol style="list-style-type: none"> 1) Timber preservative residues containing arsenic 2) Wastes containing gallium arsenide <p>Asbestos</p> <ol style="list-style-type: none"> 1) Asbestos wastes from asbestos/cement manufacturing processes 2) Empty sacks/bags which have contained loose asbestos fibre <p>Cadmium and Its Compounds</p> <ol style="list-style-type: none"> 1) Plating effluent and residues containing cadmium 2) Wastes containing cadmium from Ni/Cd battery manufacturing <p>Chromium Compounds</p> <ol style="list-style-type: none"> 1) Plating effluent and residues containing chromium 2) Timber preservative residues containing chromium 3) Spent and aqueous solutions containing chromic compounds. 4) Tannery effluent and residues containing chromium <p>Copper Compounds</p> <ol style="list-style-type: none"> 1) Plating effluent and residues containing copper 2) Spent etching solutions containing copper from printed board circuit board manufacturing 3) Timber preservative residues containing copper. <p>Cyanides</p> <ol style="list-style-type: none"> 1) Plating effluent and residues containing cyanides 2) Heat treatment residues containing cyanides 3) Spent quenching oils containing cyanides 4) Spent processing solutions containing cyanides from photographic processing 	<p>Fluoride Compounds</p> <ol style="list-style-type: none"> 1) Timber preservative residues containing fluorides 2) 2. Spent ammonium bi-flouride <p>Pathogenic Wastes</p> <ol style="list-style-type: none"> 1) Pathogenic wastes from hospitals <p>Phenolic Compounds</p> <ol style="list-style-type: none"> 1) Sludges/ residues from paint stripping using chemicals containing phenols 2) Residues containing unreacted phenol and formaldehyde from adhesive industry <p>Polychlorinated Bi-phenyl (PCB) including Polychlorinated Ter-phenyl (PCT)</p> <ol style="list-style-type: none"> 1) Spent transformer oil containing containing PCB and/or PCT 2) Retrofilled transformer contaminated with PCB and/or PCT 3) Electrical equipment and parts containing or contaminated with PCB and/or PCT; e. g., capacitors and transformers 4) Containers and all waste materials contaminated with PCB and/or PCT. <p>Polyvinyl Chloride (PVC)</p> <ol style="list-style-type: none"> 1) All waste materials containing PVC; e.g., PVC insulated wires, PVC pipes and trunking, PVC parts, PVC upholstery and PVC resins. <p>Silver Compounds</p> <ol style="list-style-type: none"> 1) Spent processing solutions containing silver from photographic processing. <p>Used, Contaminated Oil</p> <ol style="list-style-type: none"> 1) Used mineral, lubricating and hydraulic oil from machine cylinders, turbines, switch gears and transformer 2) Spent motor oils from petrol and diesel engines 3) Spent quenching oil from metal hardening 4) Oil recovered from solvent degreasers 5) Spent oil water emulsions. 6) Eg. spent coolants from metal working industries 7) Oil water mixtures (mainly oil) ;e.g. oily ballast water from ship tankers 8) Oil and sludge from oil interceptors 9) Tanker sludges and oil sludges/residues from storage tanks 10) Oil sludges containing acid from recovery and recycling

Table 3 (continued)

List of Toxic Industrial Wastes	
<p>Zinc Compounds 1) Plating effluent and residues containing zinc</p> <p>Isocyanates 1) Spent di-isocyanates eg toluene di-isocyanate (TDI) and methylene di-isocyanate (MDI) from polyurethane foam-making process</p> <p>Laboratory Wastes 1) Obsolete laboratory chemicals 2) Toxic chemical wastes from chemical analysis</p> <p>Lead Compounds 1) Sludges containing lead oxide/sulphate 2) Spent organo-lead compounds. 3) Eg Tetraethyllead (TEL) and tetramethyllead (TML)</p> <p>Mercury and its Compounds 1) Effluent, residues or sludges containing mercury from chlor-alkali industry 2) Wastes containing mercury from equipment manufacturing involving the use of metal mercury 3) Spent catalyst from chemical processes containing mercury 4) Spent organo-mercury compounds</p> <p>Metal Catalysts 1) Spent metal catalysts from chemical processes and petroleum refining. e.g., Catalyst containing chromium cobalt</p> <p>Nickel Compounds 1) Plating effluent and residues containing nickel</p>	<p>Organic Compounds containing Halogen 1) Spent halogenated organic solvents. 2) Eg. trichloroethylene, 111-trichloroethane, perchloroethylene, methylene chloride, tetra-chloromethane and 112-trichloro-122-trifluoroethane 3) Residues from recovery of halogenated organic solvents 4) Packaging materials or residues containing chlorobenzenes and/or chlorophenols and their salts.</p> <p>Organic Compounds not containing Halogen 1) Spent non-halogenated organic solvents. 2) Eg. Benzene, toluene, xylene, turpentine, petroleum, thinner, kerosene, methanol, ethanol, isobutanol, isopropanol, methyl ethyl ketone, methyl isobutyl ketone, isopropyl ethyl, diethyl ether, hexane, dimethyl sulphide and dimethyl sulphoxide 3) Residue from recovery of non-halogenated organic solvents</p> <p>Other Wastes 1) Obsolete/abandoned chemicals and pesticides from storage, manufacturing and trading activities 2) Used containers, bags and process equipment contaminated by chemicals and pesticides from storage, manufacturing and trading activities 3) Wastes/residues containing unreacted monomers. Eg vinyl chloride and styrene monomers, from polymer manufacturing processes 4) Tar residues from distilling and tarry materials from refining</p>

Source: Hui (1998)

Table 4
Singapore Noise Emission Standards for Motor Vehicles*

Motor-Vehicles	New Registration¹ Max Noise Levels (dBA)	Secondhand Motor Vehicles² Max Noise Levels (dBA)
Motor-Cycles	83	
Motor-Cars	82	
Light Goods Vehicles	86	94
Heavy Goods Vehicles and Buses <= 10,000 cc	90	
Heavy Goods Vehicles and Buses > 10,000cc	92	

Note :

- 1) Noise Test will be conducted on one prototype of every new model imported by agents. When passed, all subsequent vehicles of the same model will be allowed in without testing.
- 2) Noise Test will be conducted for every in-use vehicle during the periodic vehicle inspection. Noise test will also be conducted for every vehicle imported into Singapore for the first time before they are registered.

* Reproduced from Report of Workgroup 6 on Noise

Source: Foo *et al*, 1998.

Table 5
**The Environmental Public Health (Control Of
Noise From Construction Sites) Regulations, 1990***

S/N	Type of Building Affected	7am-7pm dBA		7pm-7am dBA	
		5 min	12 hr	5 min	12 hr
(a)	Hospitals, schools, institutions of higher learning, homes for the aged sick, etc	75	60	55	50
(b)	Buildings other than the above	90	75	70	65

Notes :

Measurements to be taken at:

- 1) 50 metres from the boundary of the construction site if there is any building located within 50 metres of that boundary.
- 2) 1 metre away from the outside of the affected building if the affected building is more than 50 metres from the boundary of the construction site and there is no building located within 50 metres of that boundary.

* Reproduced from Report of Workgroup 6 on Noise

Source: Foo *et al*, 1998

References

- Castleman, B.I., (1987), "Workplace health standards and multinational corporations", in Pearson, C.S., (ed.), *Multinational Corporations, Environment and the Third World*, Durham: Duke University Press.
- Chia, S.Y., (1989), "The character and progress of industrialisation", pp. 250-279 in K.S. Sandhu and P. Wheatley, (eds), *The Management of Success in Modern Singapore - the Moulding of Modern Singapore*, Singapore: Institute of Southeast Asian Studies.
- Department of Statistics (1995), "Foreign Equity Investment in Singapore 1992", *Occasional Paper on Financial Statistics*, March, Singapore.
- Department of Statistics (1995a), *Foreign Equity Investment in Singapore 1987-1994*, Singapore.
- Department of Statistics, (1996), *Yearbook of Statistics*, Singapore.
- Foo, K.B., Lye, L.H. and Koh, K.L., (1998), "Environmental protection: the legal framework", in *Environment and the City - Sharing Singapore's Experience and Future Challenges*, Singapore: Institute of Policy Studies and Times Academic Press.
- Hui, J., (1998), "Environmental policy and green planning", in Ooi, G.L., (ed.), *op. cit.*
- Jasanoff, S., (1985), "Remedies against hazardous exports: compensation, products liability and criminal sanctions", in Ives, J.H., (ed.), *The Export of Hazard: Transnational Corporations and Environmental Control Issues*, Boston: Routledge and Kegan Paul.
- Leonard, H.J., (1985), "Confronting industrial pollution in rapidly industrialising economies: myths, pitfalls and opportunities", *Ecology Law Quarterly*, Vol. 12.
- Lee, J.K. and Lim, G.K., (1983), "Environmental policies in developing economies: a case of international movements of polluting industries", *Journal of Development Economics*, Vol. 13.
- Lepkowski, W., (1987), "The disaster of Bhopal - chemical safety in the Third World", in Pearson, C.S., (ed.), *op. cit.*
- Ministry of Trade and Industry, (1990), *Economic Survey of Singapore*, Singapore.
- Ministry of Trade and Industry, (1995), *Economic Survey of Singapore*, Singapore.
- Pearson, C. S., (1987), "Environmental standards, industrial relocation and pollution havens", in Pearson, C.S. (ed.), *op. cit.*
- Pimenta, J.C. P., (1987), "Multinational corporations and industrial pollution control in Sao Paulo", in Pearson, C.S. (ed.), *op. cit.*
- Tan, A.H.H. (1984), "Changing patterns of Singapore's foreign trade and investment since 1960", in You, P.S. and Lim, C.Y., (eds), *Singapore: Twenty-Five Years of Development*, Singapore: Nan Yang Xing Zhou Lianhe Zaobao.
- Tyabji, A., (1993), "Industry and environment in Singapore", in Koomsup, P. (ed.), *Economic Development and the Environment in ASEAN economies*, The Economic Society of Thailand.

Chinese Taipei Report on Linkage between Trade and Environment

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1. Background on Chinese Taipei's Trade and Environment Regime

Motivations

Chinese Taipei's concern about the linkage between trade and environment is motivated by the general public's consensus over the following facts:

- While trade is one of the most important sources of economic growth in Chinese Taipei, environmental quality is even more important for domestic sustainable development.
- Cases of dispute over trade and environment continue to increase worldwide. The lessons from the Pelly Amendment against Chinese Taipei in 1994 undoubtedly led the authorities to recognize the importance of the linkage between trade sanctions and wild life preservation. Now it is believed that reconciliation between trade and environment is crucial for stable growth and international cooperation.
- The linkage is an important subject in the WTO and several multilateral agreements. The potential impacts of trade-related environmental measures and environment-related trade measures are particularly of great concern.

Public Statements

The authorities in Chinese Taipei have repeatedly stated their position and attitude toward trade and environmental policies in the future. The following statements illustrate the underlying philosophies.

- Whenever there is a conflict between economic growth and environmental protection, the latter deserves social preference.
- The "polluter pays" principle and "beneficiary pays" principle are recognized by the international community and should not be violated by Chinese Taipei's environmental and natural resource policies in the future.
- The structure of the economy should ideally be determined by the market mechanism. Trade and environmental policies should not lead to distortion of the mechanism in any form.
- Participation in the WTO and commitments to free trade are crucial for better national well being; at the same time, distributional issues should not be ignored.

Prevailing Policies

Since the early 1990s, Chinese Taipei has made substantial efforts to reform trade, industrial and environmental policies. Many of the reforms have been motivated by rapid GNP growth in Chinese Taipei and the need to prepare for WTO membership. Chinese Taipei's commitments to and lessons from such international conventions as the Montreal Protocol, CITES, the Framework Convention on Climate Change, and the Basel Convention have also served to accelerate the reforms.

Environmental policies

Although administrative and legal systems were established in the early 1970s, the underlying policies and environmental measures were incapable of preventing environmental degradation. To meet the people's demand for higher quality of life and to move toward sustainable development, various statutes were amended in early 1990s, including the Air Pollution Control Act (APC), the Water Pollution Control Act (WPC) and the Energy Management Law (EML). These measures were followed in the mid-1990s by the amendment of the Waste Clean and Disposal Act (WCD). Furthermore, several important initiatives are now under contemplation, such as a Soil Pollution Control Act, an Environmental Impact Assessment Act, and others.

The prevailing environmental policies based on the above amendments may be characterized as follows:

- (a) Application of the "polluter pays" principle: For example, the Waste Clean and Disposal Act requires that all relevant entities (including domestic manufacturers and importers of designated commodities such as tires, containers, cars, batteries, etc.) be fully responsible for the collection and proper disposal of their own solid wastes. Households are also required to pay garbage disposal fee based on the full cost recovery principle. The Air Pollution Control Act and the Water Pollution Control Act stipulate that all polluters are liable for emission (effluent) charges in accordance with quantity and quality of their pollutants.
- (b) Adoption of economic policy instruments: Economic instruments not only complement conventional command-and-control policies, but also significantly enhance the efficiency and effectiveness of environmental regulations. Many economic instruments have been implemented since the start of the reforms, including emission charges, deposit-refund system, and financial support for R&D related to energy saving as well as waste recycling. Furthermore, the stipulation of emission permits and mass control in the amendments has laid the ground for a tradable permit system in the future.
- (c) Stricter standards and penalties: Both air and water emission standards are not only much stricter than ever before, they have been extended to several global as well as local pollutants that were never under control before the reform. For example, the National Energy Conference held in May of 1998 reached a conclusion that new development projects should be subject to carbon dioxide assessment. As for penalties, fines for emission violations are ten times higher than before. Moreover, penalties such as operation suspension, business shutdown, and jail sentence have become possible for serious violations.

It is worth noting that the above environmental policy reform is not directly trade-related since the measures have no intention to affect patterns of trade or terms of trade. Nevertheless, some indirect effects on trade were observed since the new environmental measures did negatively affect domestic economic growth, terms of trade, trade balance, price level, and employment. The impacts were, however, industry-specific. In general, firms that pollute more incur higher pollution control costs than others and, therefore, are affected more significantly. The impact on the economy as a whole, however, is mild.

As a small open economy, Chinese Taipei is quite concerned about the hypothesis that business will flee jurisdictions with strong environmental protection. So far, however, consistent with most findings in the literature, there is little evidence to support the hypothesis.

Finally, it should be noted that the nature and extent of consequences depend on the environmental measures. Stricter environmental standards are expected to generate greater impact. In particular, the short-run effect always outweighs the long-run effect.

Currently there are some environmental measures that are considered to have direct impacts on trade and competitiveness. Two of these are:

- (a) The Management Code of the Permissible Vehicle Energy Exhaustion Standards (VEES). This code was promulgated on 20 August 1997. It sets explicit energy exhaust standards for motorcycles of various sizes. It is expected that this measure will result in energy savings as many as 18,000 kiloliters per annum. Its potential impact on trade flow of motorcycles has not yet been evaluated.
- (b) Industry Upgrading Enhancement Act. This Act establishes a legal basis for firms to receive financial support of various forms for pollution abatement. For example, tax credit allowance, the scheme most preferred by firms, may be as much as 20 percent of the expenditure on domestically produced pollution control equipment and 15 percent on imported equipment. Just as in many other economies, accelerated depreciation and low-interest loans are also available to the firm for its expenses on pollution abatement equipment. Empirical studies reveal that financial support helps firms to increase their competitiveness, profitability, reinvestment and abatement.

Trade Policies

A strong adherent to the principles of free trade, Chinese Taipei has made significant progress in moving towards a freer economy by modifying many trade measures, in particular through bilateral and multilateral trade negotiations with other economies in the past two years. Major trade measures adopted in 1997 are listed as follows:

- (a) Removal of restrictions on purchase to designated regions. The old Management Code of Commodity Importing stipulates that “whenever the purchasers (either government agencies or publicly owned enterprises) want to purchase machinery and equipment through international bidding, an import approval must be obtained in advance from the authorities as long as Japan or Korea is one of the bidders.” This restriction was removed as of 1 June 1997. More importantly, international bidding procedures are now obligatory for government agencies and publicly owned enterprises seeking to import commodities.

- (b) Removal of import permits. Import permits for importing several agricultural and industrial products from China have been no longer necessary since 1 January 1997. Thousands of items had been added to the list of imports for which import permits are no longer required.
- (c) Removal of export-oriented principle and the percentage restriction on sales to domestic market. One of the most important laws related to international trade, The Establishment and Management Act of the Processed Export Parks, was significantly revised and became effective on May 5 of 1997. According to the new amendments, the principle that the output of firms in the parks should be export-oriented is eliminated. So is the restriction that domestic sales of the output shall not exceed a given percentage of total sales.
- (d) Modifying the qualifications of import and export firms. The old Registration and Management Code of Export and Import Firms stipulated that, to qualify as an exporter or importer, a firm's registry capital must be no less than NT\$ 5 million. This quantity restriction was completely eliminated on September 10, 1997 to avoid any inconsistency with Article 11 of WTO. It is expected that the new revision will increase trade competition.
- (e) Reduction of tariff rates. Thousands of items have been added to the list of tariff-free imports. Meanwhile, the tariff rates of specific items are being reduced according to the schedules agreed by bilateral or multilateral negotiations with other economies.

The impact of trade liberalization on the economy was found to be industry-specific. Such industries as agriculture, textile, pulp and paper, etc. are likely to lose comparative advantage and be exposed to severe pressure. The economy as a whole, however, is expected to obtain net gains.

The above trade policies do not have any particular environmental purposes. Studies of freer trade on the environment have been very limited until recently. While research in this area is increasing rapidly, much of it is theoretically oriented. Empirical works remains scarce, partly because measurement of environmental quality is always difficult in practice and partly because insufficient funding is available for empirical study.

2. Regulatory Framework

This section reports on laws and regulations pertaining to trade-related environmental measures and environment-related trade measures.

Trade-Related Environmental Laws

- (a) The Air Pollution Control Act (APC) and the Water Pollution Control Act (WPC). Both the APC and WPC may generate indirect effects on trade due to the use of economic instruments, imposition of stricter standards, requirements for emission permits and operation permits, and severe penalties for violations.
- (b) Energy Management Law (EML) and Vehicle Energy Exhaustion Standards (VEES). Promoting energy efficiency is regarded as one of the “no regrets” policies. Various practical measures include: (1) accelerating the development of high-tech, high-value-added and low energy-consuming industries; (2) strengthening the efficiency of energy production and transportation in the energy sector; (3) formulating efficiency standards for various kinds of energy consuming equipment and devices as well as motor vehicles; and (4) implementing energy performance labeling systems.
- (c) Waste Clean and Disposal Act (WCD). Importers as well as domestic manufacturers of certain commodities are liable for clean and proper disposal of wastes by paying disposal fees to their affiliated Waste Recycling Foundations. The institutional structure of each Foundation has evolved over time. Prior to July 1998, each designated commodity was associated with one Foundation. Since then, all Foundations have been unified and administered by the Environmental Protection Agency (EPA).
- (d) Wild Life Preservation Act (WLP). The Wild Life Preservation Act, amended in 1995, contains explicit trade measures. It prohibits the import and export of any products made from globally or locally endangered species. Violators are subject to severe penalties. To effectively enforce the Act, growing budgets are allocated to local authorities for smuggling prevention, violation detection, wildlife restoration and preservation, etc. Sufficient evidence indicates that the Act has effectively reduced transactions involving the prohibited items.
- (e) Regulation Code of the Production and Use of Ozone Depleting Materials (RODM). RODM, which was enacted in response to the Montreal Protocol, contains trade and regulatory measures to restrict the production and application of ozone depleting materials (ODMs).

Environment-Related Trade Laws

Currently, trade laws do not for the most part contain explicit measures for environmental protection. For example, although cigarettes are considered hazardous to health, no environmental measures are specified in the relevant trade laws governing cigarettes. Smoking, however, is prohibited in many public areas, including airplanes, trains, buses, and many other designated areas.

International Agreements and Conventions

Because of special political status, Chinese Taipei is not signatory to the multilateral environmental agreements (MEAs). Nevertheless, Chinese Taipei is willing and has been preparing to accede to most of the major MEAs, including the Montreal Protocol, CITES, the Framework Convention on Climate Change, and the Basel Convention.

3. Transparency

Publicity of Trade and Environmental Measures

All of the documents governing trade and environmental measures can be obtained from the authorities in charge. The public, enterprises and foreign investors may consult with Bureau of Trade for trade-related regulations, the Bureau of Industrial Development for investment regulations, EPA for environmental regulations, and the Council of Agriculture for regulations on agricultural trade and wild life preservation.

Enhancement of Transparency

To enhance the transparency of trade-related measures and environment-related measures, Chinese Taipei has been pursuing various approaches, including the following:

- (a) Web sites to facilitate the accessibility of documents.
- (b) Translation of documents into English (one of the main problems limiting transparency currently is that many of the documents are not yet available in English.), publication of Policy White Books (e.g., industrial policy, environmental policy, energy policy, trade policy, water resource policy, agricultural policy, etc.), and preparation of National Communication Reports on Trade and Environment.
- (c) Organization of workshops and learning programs for enterprises to help them have better understanding about the relevant regulations.
- (d) Establishment of corresponding spots to facilitate communication with the rest of the world.
- (e) Sponsorship of various international conferences to enhance mutual understandings with other economies.

4. Impact of Environment and Trade Measures on Trade and the Environment

Theoretical Debates

The linkage between trade and environment has been extensively debated in international fora such as the WTO. Particular concerns have been expressed about the environmental effects of freer trade, either at the local or global level, and the impacts of environmental measures on trade. In fact, however, economic theory delivers ambiguous conjectures in this regard.

Theoretically speaking, the impact of freer trade on environment could be decomposed into five different categories, namely, terms-of-trade effect, structural effect, scale effect, technology diffusion effect, and regulatory effect. Each of them may be positive as well as negative to the environmental quality.

When considering the impact of trade liberalization, it is important to realize that trade barriers have an impact on the environment. In particular, trade barriers such as tariffs and quantitative restrictions support agricultural producers by raising domestic prices. Some studies say that these barriers may result in higher agrochemical use. Resources that are better suited for use in other forms of production are diverted into these protected agricultural sectors.

As for agricultural production, the link between protection levels and chemical use might not prove as straightforward in practice. The level of input use is highly dependent on additional factors, including climate, soil quality and production pattern. In addition, trade liberalization will often make farmers diversify into fertilizer-intensive products such as fruit and vegetables.

One of the main benefits of trade liberalization is that it promotes more efficient use of resources. Lowering trade barriers would be particularly beneficial to the environment as it would result in reduced price support to agricultural producers. This gives correct price signals and those that do not have a comparative advantage in agriculture will reduce production, thus relieving environmental pressure. By raising incomes, trade liberalization would generate new resources to tackle environmental problems and poverty, and reduce rates of population growth.

Trade liberalization may also have a number of negative effects on the environment. For instance, the expansion of agriculture production in regions that benefit from trade liberalization may result in new environmental pressures including deforestation, impact of agro-chemicals and livestock on soils and ground water, potential loss of biodiversity through transfer of natural ecological habitats to farm land. On the other hand, land abandonment that results from trade liberalization may cause such problems as soil erosion.

The net effect on the environment depends on the sum of these positive and negative effects, and will vary substantially across commodities and countries. There is also likely to be a difference between the long run and short run effects. Trade liberalization should be part of a reform package that includes appropriate economic and environmental policies. An integrated policy approach such as this will ensure negative environmental effects of trade liberalization are minimized.

Empirical Findings

While the body of research related to trade and the environment is growing rapidly, many of the studies are theoretically oriented and empirical work remains scarce. In part this reflects the fact that measurement of environmental quality is always difficult in practice and in part because insufficient funding is available for empirical study. The environmental impact of trade liberalization, particularly in the area of agriculture and food, within the APEC region has not been empirically estimated. Moreover, there are no empirical studies concluding that trade liberalization has systematically harmed the environment.

Empirical findings in Chinese Taipei could be classified into four major categories:

- 1) impact of trade liberalization on the macro-economy and industries,
- 2) economic impact of environmental measures, including the effects on terms of trade and trade surplus,
- 3) impact of freer trade on the environment, and
- 4) integration of trade policy and environmental policy, including trade-environment dispute settlement, determination of optimal trade and environmental policies, etc

The literature in Chinese Taipei tends to focus more on the first and the second subjects, while the studies of freer trade on the environment have been very limited.

Empirical studies on the first subject are quite abundant in Chinese Taipei. As an example, with regard to the hog industry, Young (1997) showed that:

- Hog raisers' profit will decrease with freer trade at an increasing rate over time.
- The negative impact on smaller-scale producers will be greater than that on larger-scale producers.
- The negative impact on the integrated farms will be smaller than that on the specialized farms.

On the other hand, Huang (1995) found positive as well as negative effects of trade liberalization on the hog industry. He found that freer trade helps to enhance competition and comparative advantages. However, freer trade tends to reduce profitability and discourage pollution control.

Huang, Lee and Lee (1998) established a rational expectations model to evaluate the effect of freer rice trade on agricultural environmental quality, which is measured by chemical intensity. The results indicate that, in the short run, environmental quality is likely to degrade due to freer trade. Although not empirically analyzed in their paper, the long-run effect seems more optimistic.

Huang (1996) established a theoretical as well as an empirical linkage for several important policy variables to sustain socially efficient waste paper recycling. These include such variables as tariffs on imported waste paper and paper products, subsidies for paper mills and waste paper collectors, and advanced disposal fees on the consumer. He concluded that, as trade becomes more liberalized, the consideration of the interdependence between trade policy and environmental policy is indispensable for efficient policy making.

Huang and Mei (1996) showed that regardless of the market structure there exists a positive optimal tariff rate such that subsidy for pollution abatement may be socially desirable in the short run, but not in the long run.

As well, quite a few studies have tried to evaluate the impact of environmental regulations and trade liberalization on the macro-economy and specific industrial sectors by applying the computable general equilibrium (CGE) model and input-output analysis. One recent study by Huang, Hsu, and Lee (1998), using a CGE model with 160 sectors and 170 commodities, assessed the macroeconomic and industry-specific impacts of different measures (e.g., energy saving, carbon tax, market structure change, tariff reduction, etc.).

REFERENCES

- Huang, Chung-Huang (1996). "Economic Impact of WTO and Basel Convention on the Paper Industry", *Taiwan Quarterly Journal of Land Finance* 33(3): 13-16.
- Huang, Zuei-Chee (1995). "Adjustment Strategies in Response to WTO", *Taiwan Economics Research Monthly* 18(4): 53-59.
- Huang, Chung-Huang and Chia-Yuan Mei (1996), "The Optimal Environmental Policies in a Small Open Economy", *Academia Economic Papers* 24(2): 215-252.
- Huang, Chung-Huang, Shu-Shin Hsu and Pin-Cheng Li (1998), "Economic Impact Assessment of the Greenhouse Gases Reduction", Paper presented at the National Energy Conference, May 26-27, 1998, Taipei.
- Huang, Chung-Huang, Yuan-Ho Lee and Hueigin Lee (1998), "Impact of Freer Trade on Chemical Intensity of Rice Production: The Case of Taiwan", Paper presented at the International Conference on Agricultural Policy and Food Security in the 21st Century, April 16-18, 1998, Taipei.
- Young, Zheng-Shei (1997), "Impact of Trade Liberalization on the Hog Farms in Taiwan", *Taiwan Quarterly Journal of Land Finance* 34(1): 29-72.
- Wang, Tu-Far (1991), *Impact on Price, Production, Income and Employment of Pollution Abatement in Taiwan*, a report submitted to the National Science Council (NSC78-0301-H005-08Z).

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