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Working Group on Trade and Environment**

**Integrated Environmental Assessment of Trade
Agreements: Literature Review of International and
Domestic Experience and Their Application to
China's WTO Accession**

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Table of Contents

EXECUTIVE SUMMARY	I
1. BACKGROUND.....	1
2. A REVIEW OF THE ENVIRONMENTAL ASSESSMENT OF TRADE POLICIES OR AGREEMENTS IN OTHER COUNTRIES	2
2.1 AN OVERALL REVIEW	2
2.1.1 <i>Reference Manual for Integrated Assessment of Trade Related Policies (Draft)</i>	2
2.1.2 <i>Canadian Strategic Environmental Assessment – the 1999 Cabinet Directive on Environmental Assessment of Policy, Plan and Program Proposal and the Framework for Conducting Environmental Assessments of Trade Negotiations.....</i>	5
2.1.3 <i>The Environmental Assessment of the North American Free Trade Agreement (NAFTA) by Canada</i>	5
2.1.4 <i>U.S. Environmental Review of Trade Agreements - Guidelines for Implementation of Executive Order 13141</i>	6
2.1.5 <i>Draft Environmental Review of the Proposed Agreement on the Establishment of a Free Trade Area between U.S. and Jordan</i>	7
2.1.6 <i>EU Sustainability Impact Assessment of Proposed WTO New Round of Multilateral Trade Negotiations</i>	8
2.1.7 <i>Literature Review of Integrated Assessment of Trade Liberalization: Experiences from Developing Countries and Countries with Economies in Transition</i>	9
2.2 ANALYSIS AND DISCUSSION OF THE ENVIRONMENTAL ASSESSMENT OF TRADE POLICIES AND AGREEMENTS UNDERTAKEN BY OTHER COUNTRIES	14
2.2.1 <i>Assessment priorities and Criteria.....</i>	14
2.2.2 <i>Steps for Conducting Environmental Assessments</i>	17
2.2.3 <i>Approach Discussion.....</i>	18
3. LESSONS FROM INTERNATIONAL AND DOMESTIC EXPERIENCE FOR CHINA IN CONDUCTING ENVIRONMENTAL ASSESSMENT OF TRADE LIBERALIZATION	30
3.1. PROGRESS IN QUANTITATIVE ASSESSMENT OF TRADE LIBERALIZATION IN CHINA	30
3.1.1. <i>Assessing Environmental Impacts of Trade Liberalization's in the Cotton Sector in China</i>	30
3.1.2. <i>Assessing Impacts of Trade liberalization on China by the Development Research Center of the State Council</i>	32
3.1.3. <i>Assessing the Impacts of International Trade on Recyclable Plastics by Using the Life Circle Analysis</i>	33
3.2. CONCLUSION AND RECOMMENDATIONS	33
3.2.1 <i>Conclusion</i>	33
3.2.2 <i>Recommendations.....</i>	36
REFERENCES	42

Executive Summary

China's impending accession to the WTO will have substantial economic, social and environmental implications. Although relevant departments have conducted research on the economic and social impacts of China's WTO accession, impacts on the environment of the WTO entry and further trade liberalization have not been fully studied.

China has formulated many trade-related policies and regulations throughout different periods of development and has gained remarkable achievements in foreign economic cooperation and international trade. However, environmental considerations and sustainable development are not yet integrated into the process of making trade-related policies and regulations. Coordination between environmental policies and trade-related policies or agreements is also needed. On a larger scale, where international trade is coloured with environmental protectionism and China's foreign trade is moving towards intensive development, an analysis and assessment of China's trade-related policies and regulations is necessary to harmonize the relationship between foreign trade development and environmental protection and to pursue the integrity of economic, social and environmental benefits.

International experiences in integrated assessment of trade-related policies or agreements, especially the experiences in environmental assessment of trade liberalization agreements, will provide useful guidance for future assessment of the environmental impacts of China's accession to the WTO.

The Reference Manual for Integrated Assessment of Trade-Related Policies (draft), compiled by the United Nations Environment Programme following the Uruguay Round talks, provides solid references on methodologies and tools for policy-makers, government officials and other organizations as well as individual practitioners who undertake such integrated assessments.

Some pioneer countries and international organizations such as the U.S., Canada, OECD and UNEP have conducted integrated assessments of their trade policies or agreements and have acquired some experiences.

These international experiences have great significance for China in conducting environmental assessment of trade policies and agreements. With both technical and financial assistance from the China Council, the Canadian International Development Agency and the International Institute for Sustainable Development, our research team conducted a literature review of international and domestic experiences in integrated environmental assessment of trade agreements. During this review study, we tried to identify appropriate methodologies and analytical tools for conducting an integrated assessment of trade liberalization.

UNEP's Reference Manual and other case studies are reviewed in this report. The report also strives to analyze some of the integrated assessments undertaken in China in order to summarize useful references for conducting an integrated environmental assessment of China's

entry into WTO.

The report includes the following three parts:

The first part presents the background information about this project.

The second part reviews literature on integrated assessment, including:

- *The UNEP Reference Manual for Integrated Assessment of Trade-related Policies (draft)*,
- *Strategic Environmental Assessment—The 1999 Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposal*
- *Framework for Conducting Environmental Assessments of Trade Negotiations*
- *Canada's Environmental Assessment of the NAFTA*
- The Environmental Assessment of the Free Trade Agreement between the U.S. and Jordan (draft)
- The Sustainable Development Impact Assessment of the Millennium Round of WTO Negotiation
- *The Environmental Assessment of Trade Agreements—The Guiding Principles for Implementing the U.S. Presidential Order 13141*

The experiences in environmental assessment of trade-related policies or agreements and trade liberalization conducted at the regional level, country level and sectoral level are analyzed. Discussions are focused on priority selection, criteria, procedure, methodology and indicators. Meanwhile, five case studies conducted by developing countries under the guidance of UNEP are also reviewed.

Finally, we analyze domestic and foreign experiences in environmental assessment and its implications for China in conducting such an assessment of environmental consequences of trade liberalization. The quantitative approaches for assessing the environmental consequences of trade policies conducted by our Chinese colleagues are also reviewed. Noticeable among such efforts are the environmental assessment of the impacts of trade liberalization on China's cotton sector, which was conducted by the Nanjing Agricultural University and the impact of trade liberalization on China's economy conducted by the Development Research Center of the State Council.

Through this extensive literature review of environmental assessment of trade-related policies or agreements, particularly of domestic experiences, we summarized key conclusions and made proposals on how to conduct an environmental assessment of trade-related policies or agreements.

Some of the main conclusions made in this report include:

Many countries have recognized the importance of conducting integrated assessment of trade

liberalization to achieve win-win-win benefits (economic, social and environmental benefits). When undertaking integrated assessment of trade-related policies or international trade agreements, sectors that have significant impacts on the national economy or will be greatly influenced by trade liberalization with obvious environmental consequences, are usually selected for assessing environmental impacts.

In conducting environmental assessment of trade-related policies or agreements, public participation is widely encouraged and adopted by many countries. It is strongly recommended that the integrated assessments be conducted based on multi-stakeholder participation and cooperation with each other. For developing countries, undertaking integrated assessments of trade liberalization are conducive to coordination among economic development, social development and environmental protection. It is widely recognized that quantitative approaches in conducting integrated assessment faces many challenges.

The study also suggests that an integrated environmental assessment of China's entry into the WTO is required in order to have appropriate trade policies as well as environmental policies in place to maximize the benefits that China will gain in participating in the process of world trade liberalization, and to minimize the negative effects on the environment. The report recommends that a mechanism for implementing integrated assessment of trade-related policies or agreements should be established and integrated into the country's overall legal and institutional regimes.

1. Background

China has formulated many trade-related policies and regulations during different periods of development, while scoring remarkable achievements in foreign economic cooperation and international trade. However, in the process of formulating trade-related policies and regulations comprehensive consideration was not given to the environment and sustainable development. Coordination of environmental and trade policies or agreements was also desired. In the big picture, where international trade is laden with environmental protectionism and foreign trade in China is moving towards intensive development, an analysis and assessment of trade-related policies and regulations in China is necessary to coordinate the relationship between foreign trade development and the strengthening of environmental protection. China has conducted few assessments on trade-related policies at the national, sectional, corporate and product levels. Furthermore, most assessments were focused more on qualitative analysis while comprehensive and quantitative analysis (including assessment of economic, social and environmental impacts) was in short supply. As a result, a reliable scientific basis was often lacking in the formulation of trade policies or agreements.

The United Nations Environmental Program prepared the *Reference Manual for Integrated Assessment of Trade-Related Policies* to provide effective methodology and tools for decision-makers, governmental officials and organizations and persons who act as practitioners. The practice of environmental assessment on trade-related policies in foreign countries provides China with different methodologies and a range of transferable experiences.

The purpose of the manual is to provide technical support for the integrated assessment of trade-related policies. The Reference Manual provides methodologies for the integrated assessment of trade-related policies and therefore helps select the optimum solutions for decision-makers' reference. These solutions are worked out in appreciation of the resources available in a particular country, region or sector and are aimed at minimizing the consumption of resources and pollution while maximizing the economic and social benefits. Such an integrated assessment is based on qualitative and quantitative analysis and has reliable theoretic support. More desirable still, such an assessment facilitates international comparison and helps us to assess the gap between China and other countries (especially the developed countries.)

Countries and organizations as like the U.S., Canada and the OECD have already embarked on the integrated assessment of trade-related policies and have acquired experience from which we can draw.

China's impending accession to the WTO will have substantial economic, social and environmental implications. Although relevant departments have conducted the research of these implications, the impacts of the entry into WTO on China's environment have not been seriously studied. The overall assessment of foreign trade policies or agreements, especially the experience in assessing the environmental impact of trade liberalization agreements, will provide useful guidance for any future assessment of the environmental impact following

China's entry into the WTO.

2. A Review of the Environmental Assessment of Trade Policies or Agreements in Other Countries

2.1 An Overall Review

Since the beginning of the 1990s, some countries have begun to make environmental assessments of trade-related policies from the perspective of sustainable development. In doing so, it is hoped that adequate consideration will be given to the possible environmental consequences in the process of negotiating and implementing multilateral and bilateral trade agreements and in formulating domestic trade policies. The purpose of such assessments is to coordinate and harmonize the social, economic and environmental factors.

The following is a general review of the major assessment projects conducted by other countries.

2.1.1 Reference Manual for Integrated Assessment of Trade Related Policies (Draft)

The Reference Manual for Integrated Assessment of Trade Related Policies furnished by UNEP is a guiding framework document, designed to provide decision-makers, regulators and trade practitioners with a framework for undertaking integrated assessment. The manual offers a comprehensive exposition of the significance and functions of the assessment, the key factors in assessment, the general methodology, technical feasibility and the assessment indices system. It sums up the experiences of many countries in environmental assessment and suggests how improvements can be made. The assessment framework that the Manual suggests is of great referential value.

2.1.1.1 The Significance and Function of Undertaking the Integrated Environmental Assessment

In the era of economic globalization, trade and trade policies have had increasing impacts on the global environment as they have on the social and economic development. Data from the World Resources Institute (WRI) in 1999 suggests that intensive agricultural production took its toll on six million acres of arable land and resulted in the loss of 20 per cent of its productive force. Despite the rise in world trade, up to 1.3 billion people still eke out their subsistence living on \$1 per day or less, which suggests that 30 per cent of the world population is still living in poverty (World Bank, 1998). World trade needs to expand further to meet the needs of the humanity. The massive and extensive repercussions generated by trade and trade policies requires prompt integrated assessment to enable the decision-makers to observe the society, economy and environment from a sustainable development perspective and seek for opportunities and approaches which will serve the benefits of the trio.

2.1.1.2 Key Elements of an Integrated Assessment

In order to put the integrated assessment into effective use and secure more accurate reliable assessment results, several elements merit our attention in designing the assessment. Such elements include appropriate timing, participation of relevant interests groups and the extent of their participation, the subjects undertaking the assessment and the openness and transparency of the assessments.

A. Timing

Three options are available regarding the timing of the assessment: *ex-ante* assessments – conducting integrated assessment prior to the implementation of trade policies or agreements; concurrent assessments - in conjunction with the implementation of trade policies or agreements; *ex-post*-assessment, the assessment conducted after the implementation of trade policies or agreements. Assessments can also run through each of the above-mentioned stages and cover the entire decision-making process. Each of the three options has its advantages and disadvantages.

B. Access to information

The acquisition and communication of accurate, relevant and timely information is the basis for carrying out the integrated assessment and ensuring public participation. If the purpose of the assessment is, among other things, to promote the transparency of decision-making among government departments or between the government and non-government sectors, the acquisition and communication of information is critically important. To secure an open and transparent assessment, efforts must be made to ensure that all concerned individuals and interest groups that have a stake in the economic, environmental and developmental issues get access to adequate information. By doing this, we can appreciate the purpose and scope of the assessment and understand the nature of related issues.

C. Public participation

In a standard decision-making scenario, a successful integrated assessment should be effected through the communication and cooperation of various societal participants, namely government departments, the general public, scholars and policy executors. Mechanisms that ensure extensive and committed public participation mechanisms are therefore needed to safeguard the legitimacy, reliability and independence of the integrated assessment.

D. The undertakers of the integrated assessment

Assessments are usually initiated by policy-making authorities, i.e. the government departments responsible for formulating trade policies or by those departments initiating trade liberalization agreements. In cases where the assessment project is initiated by the national government, it is usually conducted by one of the departments in charge of trade, environment or development. Other departments also play an important role in the process. Such cross-departmental cooperation not only facilitates integrated decision-making, but also enables the outcome of the assessment to be expressed as policy initiatives.

E. Institutional issues and capacity building

Capacity building plays an important role in the integrated assessment in three aspects: first, capacity building is one of the goals of this decision-making process and therefore becomes one of criteria for conducting the integrated assessment. Second, capacity building is one of the key elements of the integrated assessment. Third, to make the integrated assessment effective and useful, capacity building is one of the prerequisites of the process.

The issue of capacity touches on various sectors, including government departments, the public, research institutes and the private sector. It stretches to all levels, ranging from regional and national to global levels. It also runs through all stages of the assessment, including analysis, decision-making, participation and implementation

2.1.1.3 Methodologies for Integrated Assessment

Like many other assessments, the integrated assessment is based on cost-benefit analysis. With the advent of the concept of the social cost of economic development in the 1960s, the cost-benefit analysis gave way to the social cost-benefit analysis. As a result, such assessment methods as shadow pricing, evaluation and discounting were developed. With environmental issues being taken into consideration, there appeared the method of environmental consequence assessment. Assessments come in various kinds based on different policy goals, geographic and sector scope. However, they can be broadly categorized into quantitative and qualitative assessments or, a combination of both. However, the large number of uncertain factors poses difficulty for quantitative assessment of trade policies or agreements, which is still being explored and researched by various parties.

The Manual introduces a number of methods such as macroeconomic modeling, industry analysis, multi-standard analysis, ecological system assessment and product chain assessment, etc.

2.1.1.4 Indicators for Integrated Assessment

Because social backgrounds vary among countries, as do geographic conditions with different regions and different industries, it is highly unlikely that a uniform assessment method will be applicable to all countries, regions and industries. In making assessments, we should select the indicator system that can best reflect the characteristics of different countries, regions and industries.

The United Nations Commission for Sustainable Development (UNCSD) approved a set of indices for measuring the sustainability of development at the national level. This set of indices covers social, economic, environmental and organizational areas. Besides UNCSD, other organizations such as the OECD, the European Environment Bureau and the British Farm Ministry also established similar sets of index systems that provide reference to governments and organizations for selecting appropriate indices.

2.1.2 Canadian Strategic Environmental Assessment – the 1999 Cabinet Directive on Environmental Assessment of Policy, Plan and Program Proposal and the Framework for Conducting Environmental Assessments of Trade Negotiations

In 1999, the Canadian government issued a Cabinet directive on strategic environmental assessment of the government policies, plans and proposals aimed at achieving sustainable development. As indicated by the directive, strategic environmental assessments are required under two circumstances: first, when policies are formulated by ministers or the cabinet alone; and second, when the policies have potential significant environmental consequences, either positive or negative. The purpose of undertaking strategic environmental assessment is to give full consideration to all potential negative consequences in the process of decision-making and to minimize these consequences.

In line with the cabinet directive, Canada promulgated the guideline for the implementation of the Directive, which defined the principles, applicability, and procedure for conducting strategic assessment, public participation and the role and responsibilities of the participating parties. On the basis of the Directive, Canada developed *the Framework for Conducting Environmental Assessment of Trade Negotiation*. The Framework was drafted and issued under the auspice of the Department of Foreign Affairs and International Trade (DFAIT).

The environmental assessment of trade negotiations is one of the important ways of promoting the harmonized social, economic and ecological development. The undertaking of such assessment enables the government, the public, and the private and non-governmental sectors to participate in the decision-making process and makes the process more transparent. Broadly speaking, the purpose of carrying the environmental assessment of trade negotiations is twofold: one is to consider environmental factors in trade negotiations, alerting the negotiators to the potential impacts of trade agreements on the environment, therefore promoting the accord between trade and environmental policies. The other purpose is to demonstrate to the public how environmental factors are being considered in the course of trade negotiations.

The Framework puts forth the challenges facing the environmental assessment of trade negotiations, describes the assessment procedures and the analysis framework. It provides a basis and guidance for conducting such kind of assessment.

2.1.3 The Environmental Assessment of the North American Free Trade Agreement (NAFTA) by Canada

NAFTA is the first trade agreement that underwent environmental assessment. Because the Canadian assessment was done in the course of trade negotiations, it is regarded as a concurrent assessment. The assessment is expected to promote the consciousness of the potential consequences that trade policies or agreements might have while working out a framework of solutions to environmental problems. The Canadian assessment of NAFTA is mainly concerned with the potential environmental impacts on Canada. As far as America and Mexico are concerned, it only considers the cross-border issues. The assessment is undertaken by a

cross-departmental working group – the Environmental Assessment Committee for Trade Negotiations, which consists of representatives from the following departments: Foreign Affairs, International Trade, Agricultural, Energy, Mining, Environment, Finance, Fisheries and Oceans, Forestry, Industry and Technology and Transportation. A group of specialists organized by the Environment Department offers technical assistance to the Committee.

The primary objective of the Environmental Assessment Committee was to ensure that environmental factors be given full consideration in the course of negotiations and to analyze the potential impacts of NAFTA on Canada's environment. Such an assessment helped direct attention to environment issues that merit consideration and suggest negotiation strategies that can most effectively resolve the environmental problems. The government officials participating in the negotiations, provincial representatives and environmental organizations provide the information necessary for analysis during the assessment. A massive consultation mechanism involving various interests groups established by the Federal Government for the sake of formulating trade policies or agreements also provided environmental information for the NAFTA negotiations and for the environmental assessment.

The Environmental Assessment Committee considers the potential impacts of NAFTA in the following four areas:

- **The environmental clauses.** Assessment is to be conducted on the impacts of environment-related NAFTA clauses;
- **The environment screening** □ Evaluates the potential impacts on Canada's environment;
- **The migration of industry.** Explores the prospect of large-sized Canadian firms moving out of Canada to take advantage of the legal environment abroad which are more accommodating;
- **The follow-up mechanism.** Ensures continued cooperation between the trade and environmental departments in solving environmental problems resulting from the implementation of NAFTA.

2.1.4 U.S. Environmental Review of Trade Agreements - Guidelines for Implementation of Executive Order 13141

Under the U. S. Presidential Executive Order 13141, *the Environmental Assessment of Trade Agreements*, the Council for Environmental Quality (CEQ) and the U.S. Trade Representative (USTR) issued guiding principles on the environmental assessment of trade agreements. The purpose of these principles is to execute the presidential order, ensure adequate consideration of both positive and negative environmental impacts of trade agreements and highlight the complementarity between trade and environmental goals.

The focal point of the Order and the Guiding Principles is the assessment procedure of major trade agreements, which is subject to the written ERs. The Order has affirmed that the major objectives of sustainable development are yet to be drawn up. The drafting of these objectives

shall be carried out through the ongoing reprisal and assessment efforts administered by the Federal Government and requires public participation.

The order mandates environmental assessment of the following three kinds of trade agreements in light of their potential environmental impacts:

- Comprehensive multilateral round trade negotiations
- Trade liberalization agreements involving two or more parties.
- New trade liberalization agreements in major natural resources sectors.

In order to better implement the assessment, the guiding principles make unequivocal and detailed stipulations on the launching, scope, analytical content, public participation, documentation of the assessment process and administrative responsibilities of the assessments.

The environmental assessment of the trade liberalization agreements between the U.S. and Jordan and the assessment of the millennium round of trade talks both apply these principles.

2.1.5. Draft Environmental Review of the Proposed Agreement on the Establishment of a Free Trade Area between U.S. and Jordan

The U.S. Trade Representative, through the Environment and Natural Resources Subcommittee of its Trade Policy Advising Committee, proposed, in compliance with *the Presidential Order 13141*, the *Draft Environmental Review of the Proposed Agreement on the Establishment of a Free Trade Area Between the Government of the United States and the Government of the Hashemite Kingdom of Jordan*.

On June 6, 2000, the U.S. and Jordan negotiated a bilateral Free Trade Area. The U.S. hoped to preserve peace and promote economic development in the Middle East by supporting Jordan's economic reform. As an emerging market in the Middle East, Jordan launched a market reform and trade liberalization campaign despite the political instability in this region and joined the World Trade Organization in April 2000. Through the trade liberalization agreement, tariff and other trade barriers on products of the U.S. and Jordan origin were reduced. The agreement also covers such areas as trade in services, intellectual property protection, security, e-commerce, balance of payments, country of origin rules, trade and environment, trade and labour, escape clause and dispute settlement mechanisms. It does not, however, cover investment.

Through qualitative analysis of the 16 sectors based on trade volume and industrial input and through quantitative analysis of the three categories of American exports to Jordan, the U.S. International Trade Commission (USITC) concluded that the proposed free trade area had no measurable effects on the aggregate import, export, output and unemployment. The 16 sectors being examined are: animals, animal fat and vegetable oil, cereals (wheat, rice and corn), electronics, chemical fertilizer, fruits and beverages, steel products, jewellery, machinery and transport equipment, petroleum, medicine, potassium carbonate, phosphates, textiles and vegetables. The three categories are cereals (excluding wheat), machinery and transport

equipment. The above conclusion may well be justified by the fact that trade between Jordan and the U.S. accounts for only a negligible proportion.

The U.S. government did not think the free trade area with Jordan would have any serious environmental repercussions. Nor could it prove any environmental hazards of regional or sectional nature. As to the transnational and global environmental impacts, the American government's consideration focuses on the potential consequences of the agreement on rules and regulations, water resources and water quality, air pollution, the green house effect, trade in endangered species, the migration of birds of passage and the natural reserves. Because both the U.S. and Jordan are signatories to multilateral environmental conventions, violation on either part is unlikely. It concludes that the environmental quality would not deteriorate and that the environmental goals would be strengthened. Further environmental technical cooperation is possible.

2.1.6 EU Sustainability Impact Assessment of Proposed WTO New Round of Multilateral Trade Negotiations

The second-phase report of the sustainability assessment of the millennium round of negotiations conducted by EU covers the following subjects:

- Measures that may be taken by the New Round of Negotiations.
- Analysis of possible consequences of each measure. These consequences fall into three scenarios: the basic scenario, where the new agreement is not reached; the intermediary scenario, i.e. the EU's position on each measure; the trade liberalization scenario, which refers to trade more liberalized than the present status.
- Grouping of countries and regions. Countries are grouped into the European Union, developing countries and the whole world.
- Indices and criteria used for sustainability assessment. The selection and determination of the indices should be objective-driven and in compliance with the principle of continuity and practicality (the efficacy of the quantitative and qualitative information).
- Specification of methodologies, the consultation procedure and sources of information.

The sustainability impact assessment of the proposed WTO new round of multilateral trade negotiations is similar to other assessments of trade policies or agreements. In terms of the procedure, the first step should be to define the scope of the assessment, i.e. to identify the trade-related policies and the implementation process that are to be assessed. Next is a decision on the assessment framework, i.e. to determine the relationship among different variants. The third step is to describe the potential impact of the new round of negotiation on the sustainable development.

Efforts were taken to screen the 15 trade-related measures of the millennium round of negotiations with the conclusion that it is necessary to make sustainability assessments of all 15 measures because they each have the potential to generate important social, economic and environmental impacts. The 15 trade-related measures cover the following areas: agriculture, service, investment, competition, trade facilitation, non-farm tariff, trade and environment,

intellectual property, government procurement, technical barriers of trade, consumer health, trade security measures, the new round and development, trade and the core labour standard and other measures like the tariff-free treatment for the underdeveloped countries, the dispute settlement mechanism, the coordination between the WTO and other organizations, e-commerce, etc.

After securing the quantitative and qualitative assessment results, both reinforcing and mitigating schemes that serve to maximize the positive effects of the new round of negotiations on sustainable development by strengthening the positive elements and mitigating the negative ones must be formulated. The determination of the schemes is based on the principles of sustainable development, coordinated management, development, etc. The consideration behind these principles is to have the new round of negotiations proceed with harmonized social, economic and environmental development, ensuring that the internal and external policies, different economic regimes and economic and trade developments are well coordinated.

2.1.7 Literature Review of Integrated Assessment of Trade Liberalization: Experiences from Developing Countries and Countries with Economies in Transition

In recent years, the potential negative impacts of trade liberalization on the environment and natural resources have been extending, especially in those developing countries with increasing trade volume and countries in transition. With special concerns for these issues, the UNEP initiated two rounds of country studies. These projects were technically assisted by UNEP, under the guidance of the *Reference Manual of Integrated Assessment of Trade Related Policies* by UNEP. This study reviews the five countries in the UNEP's first round of country studies.

2.1.7.1 *The Shrimp Farming Industry in Bangladesh*

Shrimp aquaculture in Bangladesh is a major export-oriented economic activity. Shrimp exports in 1998 were US\$ 260 million – a 70 per cent increase from 1980. The policy initiatives and the incentives were implemented under the Structural Adjustment Programs (SAP) in Bangladesh during the mid and late 1980s. The principal policy instruments included cutbacks in public expenditures, reduction of an anti-export bias in the tax structure, tariff rationalization and overall trade liberalization, incorporation of flexibility into the exchange and interest rates, privatization, price de-control and de-subsidization.

There is a strong linkage between the reforms implemented under the SAP in Bangladesh and emerging incentives for shrimp culture activity in the country. The shrimp farming industry was able to take advantage of the policy changes encouraged by the SAP. The export-oriented policies and measures, such as zero-tariff access to imports, fiscal incentives for direct and deemed exports, income tax rebates and subsidized credit created a policy environment which stimulated private investments in shrimp culture, shrimp processing and shrimp exports. These policies and measures actively promoted development and export trade of the shrimp farming industry in Bangladesh.

The economic success of trade liberalization is widely recognized, but there is strong criticism of the negative impacts. Environmental problems caused by the shrimp farming in Bangladesh included land degradation, human health damage and mangrove destruction.

Partial cost-benefit analysis (CBA) was applied in the case study to analyze the environmental impacts of trade liberalization in the shrimp farming industry. The reference year in this study is 1994. The cost and benefit components considered in the study respectively included:

Benefit components:

Income, employment, linking industries (i.e. transport), human capital development and improvement in female status;

Cost components:

Direct costs:

Losses of agricultural productivity, livestock, vegetables and plants caused by land degradation; increased morbidity and mortality caused by water pollution; loss of wood and non-wood products as well as loss of tourism caused by mangrove destruction;

Indirect costs:

Ecological imbalance due to biodiversity loss; increased frequency and severity of flood caused by changes in the hydrology of watersheds; social impacts, such as violence, migrations and dislocation.

The benefits of trade liberalization in the shrimp farming industry and the loss of environmental degradation and social impacts were discovered based on the CBA. It shows that the cost is 21 to 30 per cent of the total benefit.

The study also shows that cost-benefit analysis of all environmental problems and economic benefits arising from shrimp cultivation is clearly impossible because of a lack of data or comprehensive methodology. The steps taken in this study were based on many critical assumptions on tentative data. The results are therefore, provisional, and refer to the order of magnitude of the macroeconomic effects.

The following solutions were recommended:

- A land use tax;
- Effluent charge on pollutants of water;
- A soil conservation fund;
- Mixed rice-shrimp farming and clear land zoning;
- Licensing of shrimp farms
- Mandatory mangrove development;
- A ban on shrimp catch by trawlers;
- Strengthening of property rights; and
- Rationalizing of current laws.

2.1.7.2 Chile's Mining Sector

The study analyzed major environmental impacts of trade liberalization policies in Chile, especially the impacts on Chile's mining sector and their environmental consequences.

In 1995, Chile's total exports generated US\$16 billion. Copper mining in Chile accounted for 41 per cent of the total exports in 1995. US\$7.85 billion came from the mining sector, of which US\$6.487 billion was generated by copper exports alone. The mining sector in Chile has played an important strategic role in the economy. Coupled with the country's development of trade liberalization, the mining sector in Chile now includes state-owned enterprises, private enterprises and foreign investment enterprises. FDI reached US\$3 billion in 1995, an increase of 20 per cent compared with that in 1993.

The mining resources are non-renewable resources. With the expansion of extraction, the environmental consequences are increasingly striking. In that project, the scale, structural and sectoral effects, technology, product-related, regulatory and policy effects as a result of trade liberalization and the effects on environmental media from negative and positive points of view are analyzed. The study showed: i) trade liberalization in Chile promoted the exploitation of mining resources and the growth of economy and export of mining resources; ii) increased trade resulted in structural changes in the mining sector as well as changes in a shift in production patterns and in the type of products exported; iii) the scale effects of trade liberalization resulted in increasing environmental pressure which is a significant concern in terms of waste disposal, more abandoned sites, water scarcity and threats to the social, environmental and economic sustainability; iv) external factors played significant roles in environmental management in the Chilean mining sector and have influenced the manner in which these impacts were perceived and dealt with and spurred the government to set in place a regulatory framework to address environmental impacts; v) trade liberalization encouraged the transfer of more environmentally effective management practices and technologies to deal with the emerging environmental impacts. The study clearly showed that trade liberalization had important negative environmental impacts, however, those countervailing forces, also directly linked to the liberalization process, are contributing to their mitigation.

As for the methodologies used in the analysis, the study considered the Trade and Environmental Equilibrium Analysis model developed by OECD as well as the experiences in integrated assessment of trade liberalization conducted by the U.S., Canada and Mexico when they became members of NAFTA. The study adopted scenario analysis and addressed three policy scenarios. The first scenario imposes taxes on pollutants; the second considers gradual trade liberalization accompanied by a modest improvement in terms of trade; the third combines the first two, analyzing coordinated trade and environmental reforms. Finally, the study offered policy recommendations for a sustainable mining sector.

2.1.7.3 The Automotive Industry in India

The project was conducted to examine the environmental impacts of structural and sectoral adjustment programmes that have occurred in the automotive industry in India since 1991. The automobile sector in India has a combined turnover of US\$10 billion. From 1992 to 1997, the compound annual growth rate of the sector was 18 per cent. The case study focuses on the automobile sector in the capital, New Delhi, where, since liberalization was introduced, the number of registered motor vehicles has increased by 136 per cent to 3 million. The city is also a major centre of air pollution, 67 per cent of which is caused by motor vehicles.

The objective of this project was to examine increases in urban air pollution in India resulting from trade liberalization policies and their effect on the India transport sector, including the following contents:

- Reviewing the historical development of trade liberalization in India;
- Analyzing the economic effects of globalization and national trade liberalization policies on automobile manufacturing and sales;
- Estimating the environmental impacts of increased automobile use in Delhi; and
- Set forth directions for future policy to integrate environmental concerns and trade objectives for the automotive industry.

The methodology applied sought to identify the quantitative relationship between the increased automobile uses and the urban air quality in Delhi. To estimate incremental sales for different types of motor vehicles as a result of SAP, this project used historical data of vehicle sales (1977-1997) and applied a linear time trend to project vehicle sales from 1998-2005. As an alternative to this approach, the study also econometrically derived a vehicle sales equation for each vehicle type. In order to examine the environmental effects of the SAP in the context of the automobile sector, incremental vehicle emissions in Delhi due to the SAP were computed by multiplying future vehicle populations by an average vehicle emission factor. Two kinds of policy instruments – command & control and market-based instruments for vehicular pollution abatement are analyzed in the study.

The report proposes two broad sets of policies – for new vehicles and for in-use vehicles. The main policy recommended reductions in new vehicles emissions through the environmental excise duty, which is in lieu of the current emphasis on mandatory emission standards. For in-use vehicles, the study recommends the use of inspection and maintenance programs to cost-effectively reduce emissions.

2.1.7.4 The Philippines' Forestry Sector

The project focuses on the proper pricing of natural resources. The Makiling Forest Reserve (MFR) was chosen as the site for a national feasibility project on the development of examined included water resources, recreation and eco-tourism resources, farm/land resources and non-timber forest products. Makiling Forest Reserve is located in Laguna, some 100 kilometres

south of Manila. Half of its total area of 4,244 hectares is covered with forests. The major environmental problems in the area include soil erosion, loss of biodiversity, watershed depletion, deforestation and land-use conflicts.

The study adopted a combination of on-spot surveys, consultations, research and analysis on the protection of forest resources, water resources and watershed. Market-based instruments recommended in the study are: national park user fees, watershed protection fees, transferable water use rights, transferable forest harvest quotas and land taxes.

For recreation and eco-tourism, willingness to pay (WTP) was introduced in the form of interview with visitors of the Botanical Garden. Specific recommendations advanced by consultations include: i) the pricing of domestic visitors should be consistent and not fluctuate; ii) accurate visitor statistics should be maintained; iii) in eco-tourism/forest recreation, differential pricing should be adopted in favour of local, i.e., Filipino, visitors.

The study conducted a wide survey on the use of land resources. Comparison and analysis of the current use and costs of land resources and the true income from land-use were also observed. Recommendations for land-use management under the principle of sustainable development and the introduction of tax instead of land use renting were proposed.

Non-timber minor forest products (NTFP), which include fruits and nuts, are important income sources of local residents. Many NTFPs are gathered for domestic use. Recommendations proposed by the report include: i) an up to date user charge should be levied per product depending on its type, size, volume or end use; ii) the activities of permit holders should be monitored; iii) sanctions should be applied to wrongdoers; iv) collection of NTFPs should be confined to those areas where extraction will not harm MFR's biodiversity.

The project also provided some recommendations for an institutional framework for implementation and institutional arrangements.

The model used in the study is to test market-based instruments determining the NTFP prices in the area. The model is effective in defining the proper prices of resources. Contingent valuation methods were employed. The quantitative analysis mainly includes frequency, mean and range of the target object.

2.1.7.5 Romania's Water Sector

The objectives of this project were to identify the impacts of recent structural adjustment programmes on the water sector, and to identify policies that can be used to ensure sustainable use of water resources, including the following contents:

- Examining the impacts on the water sector resulting from recent structural adjustment policies and associated trade liberalization;
- Reviewing existing economic instruments in the sector and examine economic

- instruments to promote full-cost pricing of water; and
- Identifying policy options for sustainable water resource management and conservation.
- Analysis of Romania’s water sector shows that current prices are based on demand-side allocation although the legal and institutional systems for full cost recovery are already in place. Between 1950 and 1990, demand for water in Romania increased, demand for water in Romania increased fifteen-fold, making reform urgent.

A Marginal Opportunity Cost approach was used to analyze the full cost of water in a selected river basin. Results showed that even under the 1998 legal and pricing arrangements the national raw water price is only 25 per cent of the full economic price. Willingness to pay in an urban setting showed that 90 per cent of respondents said that water should be priced to cover service and administration costs plus the value of water as “a natural resource”. However, only 2 per cent saw privatization of water as the best solution. The impact of higher water prices on industrial production, export and trade competitiveness was analyzed and it was concluded that until water prices better reflect the value of the resource to society, there will be over-use of public water supplies and incentives for technological and management improvements will be delayed. Tradable rights could help find a solution for water pricing and for pollution management.

The literature review in developing countries and countries in transition showed that similar methodologies were selected in the assessment of trade liberalization according to data availability and research capability. Quantitative analysis is usually combined with qualitative analysis.

2.2 Analysis and Discussion of the Environmental Assessment of Trade Policies and Agreements Undertaken by Other Countries

2.2.1 Assessment priorities and Criteria

When undertaking an assessment, determining the priorities and criteria forms the basis of assessment and is also a key component of the assessment process. The priorities of the integrated assessment should be determined at the outset of the project. In selecting priority sectors, consideration is generally given to specific trade-related policies and agreements before it is extended to environment-related issues. However, in some circumstances, it may be necessary to first decide on the priority issues crucial to sustainable development, determining whether the proposed trade policies and agreements will affect the priority issues. The integrated assessment can go a step further in assessing the most closely related sectors, regions and time framework. The UNEP Manual provides authoritative suggestions on determining assessment priorities and on selecting priority sectors.

A. Assessment Priorities

The priorities of the integrated assessment of trade policies or agreements mainly cover trade

measures and rules, trade liberalization agreements and trade-related policies. Below is more specific explanation:

Trade Measures and Rules

An integrated assessment can be applied to national trade rules. This might include examining the effects on a country of changes related to, *inter alia*, the following measures: tariffs and related measures, technical barriers to trade and other non-tariff measures, trade related subsidies, changes affecting goods/services once imported, changes affecting “like products”, competition, Trade Related Intellectual Property Rights (TRIPS), Trade Related Investment Measures (TRIMS) and Government procurement.

Trade Liberalization Agreements

An integrated assessment might also be applied to trade liberalization agreements, commodity agreements, preferential trade agreements or sectoral trade agreements between two or more countries.

Trade-Related Policies

The scope of an integrated assessment for trade-related policies may be limited to examining trade-related policies within a specific country or region. A number of domestic trade-related macro and micro-economic policies affecting economic performance and change might be considered for inclusion in an integrated assessment at the national level including the following:

- Policies affecting growth, production, demand, consumption, income, prices, inflation, credit, savings rates and fiscal policy.
- Policies affecting banking and credit systems, interest rates, systems for banking and credit, the size and concentration of firms in an industry, and changes in factor prices.
- Policies affecting exchange rates and current account balances.
- Policies related to private investment including the removal of restrictions on foreign exchange and the liberalization of capital flows affecting finance and portfolio investment.

Based on the focus of integrated assessment, the UNEP Manual provides criteria for selecting priority trade-related policies, sustainable development priorities, sectors and policy response options for assessments that have a great authority for providing guidelines to assessment practices.

B. Criteria for Selecting Priority Trade-Related Policies for Assessment

The following issues should be considered for inclusion in an integrated assessment:

- Is the policy likely to give rise to significant sustainability impact?
- Is there a strong connection to trade?
- Are the areas likely to be affected by a trade-related policy already under economic, social or environmental stress?
- Will the policy cause significant economic, social or environmental consequences

- (positive or negative)?
- Is useful data and information available to undertake the analysis?
 - Are the existing regulatory, institutional and financial capacities in the affected areas sufficient to implement appropriate policy option?

C. Criteria for Selecting Sustainable Development Priorities for Assessment

Although most environmental assessments begin by assessing the economic changes likely to be induced by trade liberalization of a product, a sector or within an economy-wide level (CEC 1999a, OECD 1994, WWF 1999a), an integrated assessment might also focus on a specific geographic region, social issue or important environmental ecosystem. Criteria for selecting sustainable development priorities for assessment are as follows:

- The issue relates directly to major environmental media, natural resources, vulnerable areas and communities, or poverty and social exclusion;
- The issue is significant from an environmental or social perspective;
- An analysis of the issue contributes to an understanding of other issues of importance in the region;
- The issue is one where one might expect, *a priori*, that there are important linkages to trade-related policies.

D. Criteria for Selecting Priority Sectors

A sectoral approach is considered to offer the most effective opportunities for the collection of empirical data and a better understanding of the various trade-environment and development linkages. A number of organizations and institutions have adopted a sectoral approach to environmental assessment, such as the EU, the North American Commission for Environmental Cooperation (CEC), OECD and WWF. The UNEP Manual offers the criteria for selecting priority sectors for assessment:

- The sector is important to the national economy and in particular in its contribution to export revenues.
- The sector relates directly to major environmental media and natural resources.
- The sector relates directly to important issues of equity and social well-being.
- The sector has been the subject of changes in the economic rules induced by trade-related policies.
- The sector is one with significant trade flows in both volume and financial aspects and is experiencing changes in trade flows.
- The sector is one where one might expect, *a priori*, that there are important affects attributable to trade-related policies.

Although a sectoral approach may be a practical and feasible method of conducting an integrated assessment, it runs the risk of ignoring important impacts between sectors (OECD, 1999a, WWF 1999a). This risk can be minimized by allowing for upstream (sectors or products) and downstream (sectors or products) impacts to be included within a sectoral

analysis (CEC 1999). For example, in an environmental assessment of the impacts of NAFTA on cattle feedlots in the U.S., the CEC extended its analysis back to the feed-grain sector, and forward to the beef-processing sector (CEC 1999).

E. Criteria for selecting appropriate policy response options

If the purpose of an integrated assessment is to identify effects so that the positive ones can be enhanced and negative effects mitigated through appropriate policy action, the scope of the exercise should extend to allow for policy recommendations and follow-up mechanisms.

Selection of the most appropriate policy in response to the findings generated is essential in conducting an effective assessment. Selection of appropriate policy response options should consider several factors, such as sustainable development priorities, regulatory consistency, policy co-ordination and available resources. That is, policy options that may maximize positive impacts and minimize negative impacts should initially consider promoting sustainable development. Throughout, policy options should be practical and consistent with domestic and international legal regimes. Options should be designed to avoid duplication and to be consistent with other proposed measures. Options should be cost effective and should be prioritized, depending on the available resources.

2.2.2 Steps for Conducting Environmental Assessments

Although the steps for conducting environmental assessments vary according to different objectives, the basic idea and thinking for conducting assessments are quite similar.

A. Steps for Conducting Environmental Assessments of Trade Negotiations

Generally, conducting environmental assessments (EA) of trade negotiations will involve four steps:

- Notice of intent to conduct an EA (announced when trade negotiation announced);
- Preparation of an Initial EA (released in advance of negotiation);
- Preparation of a Draft EA (released at the start of negotiation); and
- Preparation of a Final EA Report (released after negotiation concludes).

Steps for conducting an environmental assessment for the WTO New Round of Multilateral Trade Negotiations are similar to the above-mentioned steps. It involves three steps: 1) screening those trade agreements with significant environmental impacts and defining the assessment scope; 2) identify the measures in the agreements that need undergo the assessment; and 3) selecting the methodology and then undertaking pre-assessment and assessment and defining mitigation policy options.

B. Steps for conducting environmental assessment for trade agreements

The *Guidelines for Implementing the Cabinet Directive*, prepared by the Canadian Environmental Assessment Agency, provided a guideline for taking steps to conduct environmental assessments. It suggested that the steps should refer to preliminary screening, analyzing environmental effects and appropriate efforts.

Once it is determined that an environmental assessments will be conducted on a trade agreement to be negotiated, specific stages for assessment should be identified. There are four stages in the analytical framework:

- Stage 1. Identification of the economic effect of the negotiation
- Stage 2. Identification of the likely environmental impacts of such changes
- Stage 3. Assessment of the significance of the identified likely environmental impacts
- Stage 4. Identification of enhancement/mitigation options to inform the negotiations

2.2.3 Approach Discussion

Many practices of environmental assessments for trade agreements have been done in some countries, such as Canada, the U.S. and OECD. Some parts of the practical works for using different types of assessment methods are listed as follows:

- The Commission of the European Communities, (1990) Task Force Report on the Environment and the Internal Market – “1992” *The Environmental Dimension*
- The Government of Canada, (October 1992) “North American Free Trade Agreement” – *Canadian Environmental Review*, Ottawa.
- The Government of the United States of America, (May 1993) *Environmental Review of NAFTA*, Washington
- The Government of Canada, (April 1994) *Uruguay Round of Multilateral Trade Negotiations: Canadian Environmental Review*, Ottawa
- The Government of the United States of America, (August 1994) *The GATT Uruguay Round Agreements: Report on Environmental Issues*, Washington, DC
- The European Commission (1994), *Potential Benefits of Integration of Environmental and Economic Policies: An Incentive-Based Approach to Policy Integration*, Luxembourg
- The Commission for Environmental Cooperation, (June 1999) *Final Analytical Framework for Assessing the Environmental Effects of the North American Free Trade Agreement (NAFTA)*, Montreal

Methods of responding to agreement-specific concerns vary according to the nature of concerns expressed and content of the trade agreement described. Often, assessment rarely relies on one approach, but is a combination of a variety of approaches. Methods used in practices of environmental assessment by governments or intergovernmental bodies are summarized as the following five types:

- Approach One: Identifying and Responding to Public Concern
Approach Two: Examining Hypotheses about Trade-Environment links
Approach Three: Bridging Trade Theory and Economic Models with Environmental Models and Indicators
Approach Four: Economic Sectors and Environmental Effects
Approach Five: Estimating Environmental Media Effects

2.2.3.1 Identifying and Responding to Public Concerns

Issues that concern the public in general are the negative impacts that may be created by the foreign environmental regulations and standards that are formulated to implement the new trade rules and the adverse impacts of these measures on the environmental quality. The presentation and response to public concerns represents perhaps the single most important approach. Methods of responding to public concerns obviously vary, depending on the type of concerns expressed. However, if the statement of public concerns concentrates on the negative impacts of a trade rule on domestic environmental regulations or standards, then the method may involve three steps: (a) describe the objectives of the agreement or rules in question; (b) describe any relevant environmental provisions contained in the trade rule, (c) consider hypothetical scenarios in which environmental regulations might be inconsistent with the trade rules.

Several reviews devote considerable attention to an agreement-by-agreement description of provisions and their likely relationship to environmental policy.

2.2.3.2 Examining Hypotheses about Trade-Environment Links

To identify the relationship between trade liberalization and the environment, trade-environment hypotheses should be established based on empirical analysis. The hypotheses examination should be based either on observed data correlations or presumed outcomes based on existing trade theory. Some of hypotheses were examined in assessment practices between 1992 and 1994, such as the Environmental Kuznets Curve (EKC) hypothesis and the hypothesis of assumed industry migration (pollution haven) related to differentials in domestic policies coupled with increased market access.

The Environmental Kuznets Curve hypothesis suggests a positive correlation between growth in per capita GDP and selective environmental indicators. Different assessments make reference to different aspects and supporting literature of the theory. For instance, the U.S. NAFTA (1993) report draws on the EKC hypothesis to support the view on various positive effects of NAFTA. It shows that in the lower income countries, the faster the country's per capita income rises, the sooner and more effectively it can deal with its environmental problems.

Many assessments or reviews refer to the hypothesis of environment-related industry

migration. Canada's (1992) NAFTA review, the U.S. reports on NAFTA, the U.S. Review of the Uruguay Round and the CEC reports all refer to the hypothesis that lower domestic environmental regulations or domestic enforcement regimes may alter patterns of foreign investment in those industrial sectors that face relatively high pollution abatement or other environmental costs.

2.2.3.3 Bridging Trade Theory and Economic Models with Environmental Models and Indicators

The key component of trade-related policy assessment is the establishment of the relationship between trade theory and economic models as well as environmental models. To link economic data with environmental impacts, two key problems need to be identified. One is what kind of economic data and instruments such as trade flow; investment and economic models are conducive to predict future environmental impacts. The other is the relationship between the rate of economic growth and the change of environmental quality. To answer these two questions one should first consider the economic impact of trade agreement, establish economic models and link economic models with environmental models to make an assessment on future environmental impacts. These works are currently under development and no complete set of methodologies is available to apply. Many assessments hold that it is difficult to quantify the environmental impacts of trade-related policies because there are many uncertainties among trade, economy and the environment and in many cases environmental data are not available.

A□ Macroeconomic Models

A number of assessment approaches refer to the utility of the application of econometric modeling for generating quantitative findings in specific areas. In principle, a model can be quantitative or qualitative and empirical or conceptual. It is very important to start an assessment exercise with a discussion of the conceptual model. The "Action-Impact-Matrix (AIM)" is the flowchart of the key relationships to be explored. A simple example is shown below:

Activity and Policy	Main objective	Matrix of impacts			
		Land degradation	Air pollution	Vulnerability	Equity
Policies	Growth	1. Positive effects due to elimination of perverse subsidies 2. Negative effects due to scale and investment			
Trade policies	Improve trade balance and stimulate growth	-H	?	-H: marginal and fragile areas exploited	-M: worsening of income distribution
Energy policies	Improve energy efficiency	-M high energy prices induce shift to fuel wood	+M	-M: energy security threatened	-H: increase in energy prices
Flanking Measures	Specific local improvements	Enhance positive impacts and minimise negative impacts of policy changes			
MBIs	Remove -re social and environmental impacts		+M pollution tax		
Regulatory instruments		+M: land use planning			+L:
Institutional policies		+M property rights strengthened	+M Public sector accountability	+H: Community Development	+M: livelihoods programs

H – high impacts; M – moderate impacts; L – low impacts.

The flowchart can represent general equilibrium as well as partial equilibrium relationships. In other words, it can be drawn on to examine either a single sector or the entire economy. On the other hand, the AIM is typically a general equilibrium representation, since it purports to give an overview of all the key interactions in the economy. While the pictorial representation and the AIM provide the basis for a qualitative analysis, integrated assessments often use models that are amenable to econometric analysis. Broadly speaking, economic trade models are divided into general equilibrium and partial equilibrium models (PE). As mentioned earlier, general equilibrium models seek to assess the impact of an intervention on the entire economy, while partial equilibrium models focus on a subset of the economy and assume other variables to be stationary. An important class of general equilibrium models are the computable general equilibrium models (CGE). In CGE models, supply and demand for all goods is treated simultaneously in all sectors and countries under analysis. Each has limitations. CGE models are attractive in principle, for their ability to account for a number of factors and impacts. In particular, because computable models are supported by statistical data, there are inevitably data and cost limitations.

a) Equilibrium Approaches

Typically, this approach involves three elements: a) a model of the economy to track changes; b) a methodology for the estimation of costs and benefits resulting from the changes; c) a definition of welfare that can enable the various costs and benefits to be integrated into a single measure for comparative purposes.

i) Economic Models

The first step in the analysis is to specify a descriptive model of the economy. There is a broad range of models. Some look at partial equilibrium impacts on key sectors - e.g. those in which major agreements have taken place - or key components – such as labour. Others formalize a general equilibrium model, in which the impact of the policy change is traced through the entire economy.

It should not be assumed that general equilibrium models possess an intrinsic superiority over partial models. All models simplify the real world in order to make it comprehensible. Partial equilibrium models enable an in-depth focus on a single sector or subset of the economy, while CGE models provide an overview. The structure and assumptions of the models often determine the outcomes.

Environmental impacts can be traced through a procedure using two stages of modeling, where income or demand (either aggregate or sectoral) plays an intermediary role between the initial policy change and an ultimate environmental impact. In the first stage, the impact of trade liberalization or other policy intervention on aggregate or sectoral demand is assessed from historical data on trade flows, policies and incomes. The second stage consists of a model of the relationship between economic activity and selected environmental and social variables. In the literature that was temporarily quite influential, the empirical relationships in the second stage were estimated from cross-country data. This literature is referred to as the Environmental Kuznets Curve (EKC).

ii) Costs and Benefits

The roots of the integrated assessment of economy-wide policies go back to cost-benefit analysis methodologies. The questions to be addressed by the analyst in this area pertain mainly to valuation issues and the discount rate.

Considerable research has been done on the valuation of non-market environmental costs and benefits. A menu of valuation techniques can be divided in the following broad categories: direct effects valued in conventional markets, shadow prices or potential expenditure valued in conventional markets, valuation using implicit markets, contingent valuation and the discount rate. In general, the use of these techniques in a particular case study depends on the availability of good quality data and other resources at the disposal of researchers. In many cases, a combination of techniques is used to complement and crosscheck each other.

iii) Welfare

Finally, the estimated costs and benefits are integrated into a simplified measure using a model of aggregate social welfare. Often the welfare measures include a mechanism to aggregate the income of various classes of people – urban/rural, male/female, labour/non-labour, and high income/low income. By allowing different weights to be placed on different classes of income distribution, they can be factored directly into welfare measures.

In summary, the equilibrium approaches tend to be static, short-term and aggregative. They ignore dynamic and self-sustaining spirals. Their predictability for the long-term is often quite limited. And they do not have the capacity to examine details of changes in specific sectors, locations, communities and ecosystems. Their treatment of uncertainty is in the form of risk – i.e. where the probabilities of the uncertain outcomes are known from past experiences. Finally, their policy prescriptions revolve around market-based instruments and regulation. The main advantage of the equilibrium approach is that it provides an outer perimeter of changes, within which internal details can be filled out.

b) Capital-based approaches

A second approach to integrated assessment focuses directly on the potential for sustainable development. In this approach, sustainable development is defined in terms of an aggregate stock of capital. In recent years, the literature has identified four different types of capital - physical or human-made, natural, human and social. Sustainable development is then defined in terms of the conservation or enhancement of a composite stock of capital.

In summary, the capital-based approach examines the issues from the perspective of the prospects for sustainable development. While many of these approaches trickle down to investment options – and thus traditional investment incentives – others concentrate on the capacity for sustainable development, and thus prescribe institutional strengthening and capacity building. Their treatment of uncertainty is also more nuanced, and includes situations in which the probabilities of future outcomes cannot be determined from empirical regularities.

However, these approaches often tend to be win-win in nature and are not particularly useful in identifying the trade-offs between various alternatives or in bringing out the detailed impacts on communities or ecosystems. In this regard, they need to be complemented with the other approaches.

c) Scenarios

A third technique available for integrated assessment is longer term in its approach, consisting of the construction of future scenarios. A scenario is a story, told in words and numbers, concerning the manner in which future events could unfold and offering lessons on how to direct the flow of events towards desirable pathways and away from undesirable ones.

Like the equilibrium models, the main advantage of the scenarios approach is its ability to provide a broad assessment of trends in order to ensure that the detailed studies do not suffer from the fallacy of composition. A second advantage is their accessibility to potential users, particularly in tracing the impacts of changes in assumptions thereby assisting policy makers and other stakeholders to make alternative assumptions. Many assessment practitioners have applied scenario analysis.

Scenarios are also used in the U.S. (1993) NAFTA report: anticipated environmental quality

with *NAFTA* and projected environmental quality effects *without NAFTA*. To illustrate, alternative scenarios are used to assess pre- and post- *NAFTA* air quality effects in the Sister City area (San Diego and El Paso).

The EC (1994) report uses scenarios in conjunction with economic and environmental models, to present a range of environmental outcomes based on differing environmental policy assumptions. The three scenarios are:

- a) *Scenario One*: assumes the continuation of EC policy, as it existed in 1993. Referred to as the reference or REF scenario;
- b) *Scenario Two*: assumes the adoption of specific environmental policies that were under consideration. Policies include a carbon and energy tax. This is referred to as a “policy-in-the-pipeline or PIP scenario;
- c) *Scenario Three*: assumes the integration into sectoral policies of a range of mainly fiscal measures, including increases in energy taxes and increases in water charges. In this scenario, efforts have been made to establish some relationship between the levels of environmental damage and the levels of tax or charge rates applied, on the assumption that higher environment-related fiscal measures can help support efforts towards cost internalization. This scenario is referred to as INT.

The three scenarios – REF, PIP and INT – were run to estimate different environmental outcomes for climate change, acidification, toxic substances, nature and bio-diversity, water quality, water resources, solid and hazardous waste, urban environment and coastal zones. In addition, the following economic sectors and their probable links to changes in environmental quality were examined in relation to the three scenarios used: the energy sector, the transport sector, the manufacturing sector, the agriculture sector and the tourism sector.

B. Other Approaches

a) Multi criteria analysis (MCA)

The first step of this approach is to expand the assessment objectives towards non-economic goals. A major criticism of the economic model is that they assess welfare primarily in economic terms. Its purpose is to render explicitly the logical thought process that is used implicitly by a person when coming to a decision.

The advantage of the MCA is that it can explicitly accommodate alternative points of view. This is in sharp contrast to economic models, which base the entire analysis upon a single point of view. However, the openness of the participatory process and the looseness of the method of aggregation of criteria and rankings mean that a wide range of outcomes is plausible. Moreover, the assumption is that the stakeholders express their preferences, namely their assessment criteria without the benefit of empirical study or analysis.

b) Sustainable livelihoods approach

The aim of the sustainable livelihoods approach is to assess interventions on the basis of their impact on poverty. The purpose is twofold: first, to introduce a pro-poor perspective in order to ensure that the interventions help rather than hinder the actions that the poor undertake themselves; and second, to divert the object of the interventions from charity toward capacity.

In this regard, this approach also defines poverty differently - not in terms of deficiency, but that of vulnerability to unanticipated shocks. This ensures that poverty is seen in dynamic terms and that the variability of the intervention does not become even more problematic than the unpredictability faced by the poor without the intervention.

Policy prescriptions that derive from a sustainable livelihoods approach pertain to the trade policies themselves – namely, ensuring that the policy changes do not undermine the assets of the poor communities – as well as ancillary policies, which are aimed at enabling the poor to take advantage of emerging opportunities and protecting themselves against adverse impacts. In principle, these actions need to be taken prior to the change itself, rather than as a corrective exercise once the adverse impacts have already manifested themselves.

The main advantage of the livelihoods approach lies in its treatment of poverty and its ability to trace the impact of any policy on the lives and livelihoods of the poor. It can complement scenarios as well as sectoral analyses. In fact, the latter two can be used as a basis for starting the process of a participatory livelihoods assessment. On the other hand, the main insights of the livelihoods approach can inform the construction of scenarios and other analyses as well.

c) Ecosystem approach

The genesis of the ecosystem approach is the dissatisfaction with traditional cost-benefit analyses. These analyses did not have sufficient exposure to environmental concerns or natural resource uses, possibilities, hazards and cycles. An alternative approach focuses not on a community, but on the ecosystem itself. It looks at a different set of interactions, which is between ecological variables in an ecosystem.

d) Commodity chain approach

The commodity chain approach is a localized approach. Instead of focusing on a discrete geographical area and thus a specific human or ecological system, the commodity chain approach looks at the production process from cradle to grave. A commodity chain is the description of the entire production process from raw material production and processing to the retail marketing of finished products.

The main advantage of this approach is its capacity to focus on distributional and technological dimensions. It can be used in conjunction with a scenarios approach, which will demonstrate the overall evolution of the sector. On the other hand, it can also be used in conjunction with a

livelihoods approach that focuses on a specific community. In appropriate cases, it can be used in conjunction with an ecosystems analysis, which can focus on, for example, the impact of change on a selected area.

2.2.3.4 Sectoral Approaches

If a decision is made to focus on integrated analysis of a specific sector, there is experience in both qualitative and quantitative analyses. In some cases both approaches are used to compliment one another.

A. Qualitative Approach

The analysis that follows should identify and assess the main ways in which trade, environment and development are related in the context of the sector under consideration. A number of methodologies have identified a series of issues that can be examined in an analysis to categorize the impacts of trade related policies and trade liberalization in a way that allows a relationship to be traced from economic impacts of trade through to environmental and/or social impacts. The list of impacts includes the following: product impacts, technology impacts, production, management and technology impacts, scale impacts, structural impacts, physical infrastructure impacts, regulatory and policy impacts and social organization impacts.

B. Quantitative Approach

To undertake a quantitative approach to integrated assessment, focusing on a specific sector, partial equilibrium models hold out some promise, particularly as a supplement to a qualitative approach. In contrast to CGE models, partial equilibrium (PE) models are often more feasible to implement in practice as they focus on a single industry or sector. This helps overcome some of the data and cost limitations associated with economy-wide CGE modeling. However, connections with other sectors are omitted in the interest of a more detailed analysis, and analysis of economy-wide effects is lost.

Despite the limitations of current modeling techniques in their application to integrated assessment, a sectoral approach has proved useful in identifying specific impacts within sectors, while economy-wide studies undertaken using quantitative techniques show interactions and changes across sectors at the expense of detailed treatment of sectors and indicators (beyond air and water) making site specific, sustainability impacts difficult to identify and specific policy options difficult to derive. In addition, even given the success of sectoral modeling techniques in their application to environmental assessment, their extension into the realm of the social well being necessary for undertaking an integrated assessment has not been shown. This reinforces the need for a combined approach even within a sector, relying on quantitative and qualitative techniques.

In many assessments, agriculture, energy and transportation sector have been selected as typical sectors.

2.2.3.5 Estimating Environmental Media Effects

The CEC (1999) report notes the importance of measuring environmental impacts. Based on indicators developed by both national and international scientific bodies, this report listed key environmental indicators for air, water, land and living things. Some principal environmental media needs to be examined in an assessment, including air quality and atmospheric issues, forests, parks and rangelands, water quality and water quantity and biodiversity, etc.

2.2.4 Discussion of Assessment Indicators

One of the key procedures in an environmental assessment or integrated assessment is indicator selection. A set of indicators applied in environmental assessments of trade-related policies or agreement by international organizations are introduced in the literatures mentioned in this report, such as indicator sets established by OECD and UNCSD. UNCSD's indicator sets include sustainable development indicators as well as indicators from four different sectors, i.e. agriculture, fishery, service (transportation and tourism) and the textile and clothing sector. UNCSD's indicator sets are also categorized into four parts. They are social indicators, economic indicators, environmental indicators and institutional indicators. Sectoral level indicators include social indicators, economic indicators and environmental indicators.

Selection of appropriate indicators according to varied situations and scope is crucial for integrated assessment, which will determine whether integrated assessment could successfully proceed and results could be effective.

The recent experience of CSD in testing its indicator set has emphasised the importance of indicators being problem-oriented. This experience strengthens the view that indicators for tracking the impacts of trade-related policies should be based on specific issues and that the procedure for selecting indicators should be pragmatic and based on flexibility. The purpose should be to select the minimum number of representative indicators consistent with the impact "problem" (how best to track the impacts cost-effectively).

Indicator monitoring must be valid and able to consistently produce credible and defensible results over a designated period of time. The goal is to show that any changes are the result of the trade agreement or policy and not due to any other factor(s). This is not always an easy task. Governments should seek expert advice in the selection of indicators and the design of monitoring programmes. Any changes to the monitoring or measurement programme must be implemented so that the data outputs are consistent and can be jointly used.

An institutional framework is needed to:

- Manage the monitoring programme;
- Receive the evaluations of the data (provided by specialists) and recommendations for action;

- Accept, reject or amend the recommendations;
- Decide on a course of action (policy or other response). This may require approval by a higher institutional authority such as the national government; and
- Implement the necessary actions.

A. Core Indicators

The core indicators reflect current concerns and need to be revised periodically, perhaps every five years, to determine if amendments are needed. Such revisions should be based on consultations with key stakeholders and not made unilaterally.

There are two types of core indicators. First, it is possible to identify a small set of broadly defined indicators that may be used as a basis for selecting specific indicators by sub-dividing each broad indicator into more meaningful and useful individual indicators for monitoring (Type 1). The second type of core indicator (Type 2) consists of a set of specific indicators that are likely to be common to all assessment and monitoring contexts. A selection of indicators from the CSD list could constitute an example of this second type of indicator. If either of these approaches to core indicator identification is used, it is still necessary to select a specific set of indicators for each study.

B. Specific Indicators

Type 1 core indicators are not area, theme or sector specific and need to be "broken down" or disaggregated to provide an operational focus for tracking actual impacts. Methods for doing this include the following:

a) Pressure-State-Response Model

One approach is to use a "Pressure-State-Response" type model to indicator identification (could also be used in Type 2 situations). A variant of this approach; the "Driving Force – State – Response" model was used by the UNCSD to derive its core set of sustainable development indicators. Recent testing of these indicators has shown that this model is useful in selecting environmental indicators, but is less useful in identifying social, economic and institutional indicators.

b) Stakeholder Consultation

A second method for selecting specific indicators, appropriate to Types 1 and 2 is to develop checklists of indicators selected through stakeholder consultation. It would be possible for a group of stakeholders to be selected and given the task of devising a set of core and specific indicators for different policy assessments.

Checklists of indicators can be pre-determined to assist identification of indicators in the context of specific assessments. The manual also provided indicative sets of specific indicators for four sectors that are often affected by trade agreements and policies. They are intended as guides only, but can be used as a basis for selecting indicators in similar assessment contexts.

Supported by the World Bank, the Policy Research Center for Environment and Economy did research on sustainable development indicators in collaboration with Tsinghua University and Beijing University. This research showed that sustainable development indicators include four categories, i.e. social indicators, economic indicators, environmental indicators and institutional indicators. This set of indicators was used in a case study of measuring the sustainability of Sanming City, Fujian Province.

Based on the comparison of indicators applied domestically and overseas, we conclude that a combination of UNCSO's sustainable development indicators and China's research results on sustainable development indicators would be followed by an integrated assessment of trade-related policies and agreements at the regional, sectoral or product level. The selection of these indicators should be based on public participation and expert consultation.

3. Lessons from International and Domestic Experience for China in Conducting Environmental Assessment of Trade Liberalization

3.1. Progress in Quantitative Assessment of Trade Liberalization in China

With trade development and globalization, some Chinese researchers have increasingly been interested in potential environmental impacts of trade liberalization in China.

3.1.1. Assessing Environmental Impacts of Trade Liberalization's in the Cotton Sector in China

With the support and the guidance of UNEP, Nanjing Agricultural University undertook a study concerning the impacts of trade liberalization on the Chinese cotton sector. By using the UNEP *Reference Manual for Integrated Assessment of Trade Related Policies*, this project made some beneficial attempts at using quantitative methods to assess the impacts of China's entering WTO and trade liberalization on the cotton sector in social, economic and environmental aspects. Its results provide some useful lessons for conducting other similar research.

3.1.1.1. The target and main content of the project

China ranks as the largest cotton production and consumption country in the world as well as the largest textile producing and exporting country. The upcoming entry into WTO will provide the cotton sector with both an opportunity and a challenge. The increase in export and production will impel the Chinese cotton sector to re-adjust its structure, therefore having an impact on China's economy, society and the environment. This project aims to make clear what changes will take place in the cotton sector, what impacts the changes will bring to the Chinese economy, society and the environment, and what policies should be adopted to maximize benefits and minimize damages after trade liberalization. With this goal in mind, this project set up quantitative assessment methods based in Jiangsu Province and made a thorough investigation. The main contents include background introduction, the establishment of assessment models, integrated assessment of trade liberalization, assessment of the impacts of trade liberalization, and policy recommendations.

3.1.1.2. The assessment process and methods

To clearly identify the social, economic and environmental impacts of trade liberalization on the Chinese cotton sector, the project team adopted the following procedures.

The first step was to define the impacts of trade liberalization after China's entering the WTO on domestic cotton production. By using the JAPA model, 2001 was set as the datum line, which served as a basis of comprehensive comparison. A scenario analysis using the JAPA model of the impact of agricultural export increase then followed.

The second step was to conduct the scenario analysis of agricultural export increase and incorporated it in the assessment of the social, economic and environmental impacts of trade liberalization. To achieve this, researchers assessed the relationship between cotton output and input, such as that of fertilizer and pesticide amounts, under the present mode of production.

Thirdly, they made economic estimations and comprehensive assessment of social and environmental impacts.

The next step was to evaluate the social, economic and environmental impacts by conducting a cost-benefit analysis.

The last step was putting forward specific policy suggestions based on the above-mentioned cost-benefit analysis and its scope of execution.

The JAPA model is a comprehensive one composed of the econometrics model and the local equilibrium model, etc, in which the LA/AIDS (linear approximate/approximate ideal demand system) model is used to assess the consumption level of different products and the price elasticity of the main consumer goods.

To provide a fair comparison basis for the scenario analysis of trade liberalization's impacts, the following assumptions were adopted in the project design: simulating the perspective of the year 2001; population increasing and farmland decreasing at present rate; using the average production in 1999, which means the production increased due to technological improvements in the future will not be taken into account; neglecting the effect of natural calamity.

With the simulation of the JAPA model, the estimated sowing area and production of the main crops in Jiangsu Province was obtained and made the datum line for subsequent analysis.

The function of the local equilibrium model is to maximize the surplus of consumer and producer. This model chooses crops and animals in five areas in Jiangsu Province as the research objects. In simulation, the overall input and output serve as the supplier and the human consumption, industrial demand, provender, storage, losses, local transportation, international import and export act as the demander.

The JAPA model provides the policy-maker with scenario analysis to acquaint with the positive and negative impacts caused by changes in agricultural production and consumption policy. Scenario analysis of policy simulation is set up in this project.

The background of this project is the 1999 Sino-U.S. agricultural negotiations. China will have TRQ (tariff rate quota), namely, the minimum tariff rate (usually 1-3 per cent) imposed within a certain import amount limit and a high tariff rate imposed when exports exceed the quota. The research project simulated TRQ of wheat, corn and cotton imported to China and the export TRQ of Jiangsu at the time of entering WTO.

On the basis of model simulation, this project assessed the overall export costs and benefits of three crops (wheat, corn and cotton) in Jiangsu Province by using CBA (cost-benefit analysis) and finally defined the general influences of the export increase of three crops in Jiangsu after the carrying out of trade liberalization.

3.1.1.3. Lessons Learned

It is generally believed that it is difficult, sometimes even impossible, to make a quantitative assessment of trade policy. The main reason is that there exists indefiniteness in the relationship among trade, economy and environment. Also, it is not always easy to separate a specific policy (such as a new trade agreement) influence on the environment and the economy from other influences. In most cases it's almost impossible to do so. What's more, the reliable data and information that can be used as a basis of quantitative assessment are rather limited, which causes trouble to quantitative research. This project creatively used the local equilibrium model and provided reference for similar future assessments.

The JAPA model in this project is a relatively integrated and the practical policy evaluation model. In its process, it can be seen that this model has some advantages of being simple, clear in structure and reliable for trade assessment. After being improved, it can be used to assess the WTO's environmental impact on specific sectors.

However, there are still some drawbacks in the research project. For example, the cause-effect relationship between the cotton sector and the environmental influences was not made very clear. Also, the impacts of trade liberalization could have probably include, in addition to export increases in major agricultural products, the impacts of the use of advanced agricultural technology, particularly the use of bio-technology and the changes and impacts it would have made on the scale of the agricultural economy. Furthermore, environmental impacts should have included other pollution indicators such as groundwater and so on.

3.1.2. Assessing the Impacts of Trade liberalization on China by the Development Research Center of the State Council

The Organization for Economic Cooperation and Department (OECD) once analyzed a series of critical challenges of social, economic and environmental policies in the new globalization epoch by means of a LINKAGE model, with which the researchers simulated two prospects of world economy, namely, prospects of high growth and low growth. As indicated in its results, compared with low growth prospects, the high one will undergo more policy adjustments and more rapid technological changes.

In 1996, using OECD's research result as a reference, the Development and Research Center of the State Council analyzed China's economic structure and the issue of sustainable development by means of quantitative analysis. To make a quantitative analysis of the relationship between variations in industrial structures, pollutant emissions and the influences

of relevant policies, this centre set up a dynamic recurrent economy-environment countable general equilibrium (CGE) model of China, which adds environmental modules to the standard economic CGE model's framework to depict at length the environmental impact of economic activities.

This research simulated the scenario that China cuts back on tariffs step by step, supposing that tariff rates would decrease according to linear formula until reaching zero in 2010. The main purpose of this simulation is to watch how the environment will be affected by open policy, rather than estimating the welfare increase caused by trade liberalization.

The result of the simulation shows that trade liberalization can make the GNP increase by 0.17 per cent (actually overall 0.45 per cent), yet meanwhile the pollution will increase nearly at the same rate (0.31-0.60 per cent). The study concludes that Chinese trade liberalization will not make the environment deteriorate rapidly.

Still, there are some problems in this study. First, all the basic data used in the study are out-dated. Second, there are some limitations to the processing of the environmental factors and environmental data used in the model, because not all kinds of environmental statistics are available in China. Thirdly, the hypotheses made in this model are not in conformity with present conditions. Therefore, it is necessary to consider other new approaches and make necessary adjustments to conduct environmental assessment of trade liberalization.

In the end, the set-up of this model has laid a good foundation for us to analyze with CGE the impacts of China's entering the WTO or trade policies or agreements upon environment.

3.1.3. Assessing the Impacts of International Trade on Recyclable Plastics by Using the Life Circle Analysis

In 1997, Anantha Duraiappah of IVM, the Netherlands and Zhou Xin of the Policy Research Center for Environment and Economy of the State Environmental Protection Administration, undertook an integrated assessment of environmental impacts of international trade on recyclable plastics by using the life cycle analysis method. This study acquired some analytical experiences.

3.2. Conclusion and Recommendations

3.2.1 Conclusion

Through literature review and analysis of a large quantity of materials and documents aboard and home, this study comes to the following conclusions for undertaking environmental assessment of trade policy or agreement, in particular undertaking comprehensive assessment in China:

3.2.1.1 General Conclusion

Even though undertaking such an assessment is relatively a new area globally, it is still recognized by many countries that there is an urgent need to undertake this type of assessment, considering the broad and tremendous impacts of trade on the economy, society and the environment. This will enable policy makers of various countries to coordinate the relationship between society, the economy and the environment from the perspective of sustainable development and seek the opportunities of a win-win-win approach.

In conducting such an integrated assessment of trade policies or agreements, many countries usually select those sectors which have significant impacts on the national economy, which are likely affected by trade liberalization and trade policies as well as which have outstanding trade and environment related issues. For example, agriculture, energy, forestry, fishery and the manufacturing sector, etc. Currently, no country in the world has undertaken overall assessments covering all their economic sectors. The policies assessed, in particular national policies are mainly the ones that may have significant and apparent influences on society, the economy and the environment.

Many countries that have undertaken environmental assessments of trade policies or agreements generally recommend a wide public participation in the process. They encourage the multi-stakeholder participation, including governments, public, academia, non-governmental organizations, communities and policy practitioners in order to communicate and cooperate with each other throughout the whole process. They also stress the important role of information acquisition and exchange.

It is widely recognized that there are some difficulties in undertaking quantitative assessment. This is mainly because no methods are now available to accurately measure and describe the impacts. In addition, the availability of information and data is also a problem. However, many countries have made attempts and efforts in this field. The assessment methods adopted are mostly a combination of qualitative and quantitative analyses. These combined qualitative analysis method includes the sectoral analysis with partial balance, the cost-benefit analysis method, the scenario analysis and the product chain analysis.

By looking at the experience of developing countries in undertaking environmental assessments of trade liberalization, the study finds that developing countries can benefit from trade liberalization, yet the process of trade liberalization indeed causes environmental and ecological damages. Even though undertaking such an assessment is still a sensitive subject for developing countries, the study concludes that it will be important for development countries to undertake such an integrated environmental assessment in their important sectors guided by principles of sustainable development. This will result in policy options for prevention and solutions based on analysis of advantages and disadvantages of trade liberalization on the environment and will prove useful for the economy, society and sustainable development of developing countries.

3.2.1.2 Lessons Learned for Undertaking Environmental Assessment of China's WTO Accession

The impacts of China's entry into the WTO will be on all aspects of the economy. It is, therefore, very necessary to undertake an integrated comprehensive assessment of trade policies or agreements, including assessing the environmental consequences. The results of the assessment and the relevant policy recommendations will be used by policy makers as a basis for their policy making so as to maximize the positive aspects of trade liberalization while avoiding or minimizing the negative impacts on environment.

In our view, however, it is a very complicated matter to conduct an overall assessment of the environmental consequences of China's WTO accession. The reason is that the assessment involves many sectors and must take into account many factors. The current situation still poses great difficulty in undertaking an all-rounded integrated assessment of the environmental consequences of trade liberalization after the entry into WTO.

The reasons are:

- The capacity to undertake integrated assessments of trade liberalization and relevant trade policies is rather weak. There are no appropriate economic models available to date for conducting such a quantitative integrated assessment.
- The data available to date cannot support the large-scale quantitative simulation.
- Considering the uncertainty and practicability of the simulation results, the data needed cannot simply be replaced by the data from other countries while undertaking such an integrated assessment. Now is time to begin by sample collection to obtain actual data. However, doing so is very costly and the current financial capacity in China can hardly support it.
- Researchers in China may lack of experience in undertaking large-scale quantified research.

Taking account of the above difficulties, the study recommends that the integrated assessment of WTO accession start from the regional, sectoral or even product levels. This choice is made mainly due to:

- Data for regional, sectoral and product assessment are easy to get. Even if not available, Such data will be achievable even by sample collection and analysis, if not available;
- Quantitative analysis will be made relatively simple; and it is relatively easy to adjust the models within a short period of time in order to yield the best simulation results;
- Undertaking such integrated assessments will nurture a team of experts that can engage long-term research on trade policies and agreements.

It should be also recognized that in terms of macro-level policy support, regional, sectoral and product assessment may not necessarily meet the needs of decision-makers. In the long run, an overall macroscopic assessment of all the economic sectors will need to be done based on initial regional, sectoral and product assessments.

3.2.2 Recommendations

3.2.2.1 Carry Out an Integrated Assessment of Environmental Consequences of China's WTO Accession in order to Define Appropriate Policy Measures to Maximize Benefits and to Minimize Negative Impacts of China's Integration into the World Economy

China's entry into the WTO will yield significant impacts on various aspects of China's economy, society and environment. An integrated assessment of environmental impacts of the WTO entry is related to the implementation of China's strategy for sustainable development. It is also helpful for formulating China's position in international trade negotiations, relating trade and sustainable development, and for eliminating the negative impacts of trade liberalization that may be imposed on China's economy, trade development and environment. It is currently of practical significance to undertake such an integrated assessment of environmental impacts of China's entry into the WTO.

Considering the complexity of the assessment and the limitation of current analytic capacity, it is recommended that those key regions, sectors or products be selected for assessment which have important role in the national economy and foreign trade while being closely linked with the environment and have relevance to sustainable development. For example, the priority sectors for assessment could be agriculture, textile industry, energy sector, auto industry, fishery, forestry and the environmental industry. Such an assessment should involve the experts and the people from various fields such as trade, environment, industry and academia.

Through literature review of integrated environmental assessment or sustainability assessment of international trade policies and agreements, we are of the opinion that the opportunity is ripe for undertaking an integrated assessment of trade policies or agreements in some regions, sectors or products in China.

This will enable us to make a transition from the traditional qualitative analysis to the quantitative/qualitative analysis in undertaking a comprehensive assessment of regional, sectoral or product-based trade policies or agreements. This will also greatly advance the research level in China. Meanwhile, with this assessment undertaken, a more scientific and reasonable decision-making foundation will be provided to the decision-makers. This work has been strongly supported and assisted by international agencies, such as CIDA and IISD.

Based on the analysis, we recommend that an integrated assessment of trade policies or trade agreements be carried out on one specific region, or on a few sectors or product. Such an integrated assessment should be based on a perspective of sustainable development. According to relevant international experience, the following should be done for the assessment.

Defining the assessment scope

With reference to the criteria used for selecting the priority areas for assessment in this study, a relatively small region, or those sectors or products that have major impacts on China's trade and environment or are representative of the above, should be chosen for the assessment. In terms of a region, we should choose the one more open to outside information. In terms of a sector or product, we could consider choosing from the sectors such as agriculture, fishery, forestry, textile or light industry.

Selecting assessment methods – quantitative economic model vs. qualitative analysis

Considering the current needs, it is in our view that it may be appropriate to choose the partial equilibrium model in circumstances where there is no better model for the time being. The reasons are mainly:

- The partial equilibrium model is currently the most frequently used mathematical model in China and there is a technical team skilled in using this model.
- Current assessments undertaken to date in China on trade liberalization policies have mostly used the partial equilibrium model.
- In reviewing current work that has been done so far through this study, we have pretty much mastered the main characteristics of this model. We think some alternation can be made to the current model: that is, to combine the simulation results with the qualitative analysis, and to consult with relevant experts.

In addition, in accordance with the characteristics of the sector or product selected, we could also use the scenario analysis method, the product chain analysis method and the multi-guideline analysis method.

Determining indicators for assessment

It is important to choose those indicators that represent the economic, trade and environmental factors. Full consideration should also be given to the accessibility and reliability of data and information while selecting indicators.

3.2.2.2 Establish a Mechanism for Ensuring Environmental Impact Assessment of Trade Policies or Trade Agreements and Gradually Incorporate It into the Overall National Regulatory System

Establishing a mechanism for ensuring the environmental assessment of trade policies or trade agreements

While obtaining experience from undertaking an environmental impact assessment of China's entry into the WTO, a mechanism should be established for ensuring the implementation of environmental impact assessment of trade policies and trade agreements in China. This is intended to gradually establish a regular system for assessing the environmental consequences of significant international trade agreements and domestic trade policies.

The economic and social assessments of trade agreements must be made prior to the participation in international trade negotiations. At the same time, an assessment should also be made on the environmental impacts (both positive and negative) of those provisions in the agreements or those to be added to the agreements. This assessment should be jointly undertaken by the trade and environmental authorities. Alternatively, the trade authority can be responsible for undertaking this assessment by consulting with the environmental authority. The assessment should be guided by the principle of coordinated development of economy, society and environment.

Many Chinese policies in the past years have been formulated by taking considerations of sustainable development and proven conducive to promoting the coordinated development of economy, society and environment. However, a mechanism for assessing environmental consequences of governmental policies has yet to be established. Currently, no EIA has ever done for Chinese policies prior to and after their promulgation. Consequently, damages have been done to the environment and the ecological system during the policy implementation process, which is not favourable for the implementation of the strategy of sustainable development in China. Considering that the trade policies are very closely linked to the environment, it is necessary to ensure that environmental impact assessment is done in accordance with the pre-set institutional procedures, technical guidelines and by competent agencies. This will make assessments more scientific and reliable. Meanwhile a system needs to be established to ensure that environmental assessment of trade policies or trade agreements at the national and local levels. It is desirable that within three to five years, the system will be gradually established in the national legislation. Currently, the National People's Congress is drafting the Law of Environmental Impact Assessment. The EIA of trade policies or agreements should be also incorporated into this law.

The reason that most of the current Chinese trade policies or international or regional trade agreements of which China is negotiating have not considered the environmental impacts is mainly that the mechanism for ensuring such an assessment is not yet established. To improve this situation, China should ensure the following:

The Establishment of an Institutional System: It is necessary to establish the institutional system for undertaking environmental assessments of important trade policies. This means that the environmental assessment should be incorporated into the trade policy-making process and a procedure of environmental assessment is essential for negotiating a trade agreement prior to the negotiation.

The Establishment of the Implementation Procedures: A set of complete, highly efficient and simple procedures for undertaking the assessment should be established to ensure that the assessment will proceed smoothly and the results of assessment be presented to the decision-makers quickly. It is recommended that a Committee or Group for EIA of Trade Policies, which involves governments, academia and relevant stakeholders will be established to review the results of assessment and present the reviewed results to the relevant government

departments for decision-making.

Formulating Guidelines for Environmental Impact Assessment of Key Trade Policies

To ensure the assessment reliable and based on scientific basis, the trade and environmental authorities should jointly formulate the guidelines for environmental impact assessment of major trade policies in China. Similar to the manual of integrated environmental assessment by UNEP, the guidelines should include the guiding principles, a set of procedures, participatory mechanisms, criteria for defining the scope, selecting the regions for assessment, identifying indicators, methodology and policy options. The guidelines should become a guiding document for undertaking environmental impacts assessment of trade policies in China.

3.2.2.3 Other Relevant Recommendations

Establishing the legal status of China's strategy for sustainable development

China's Agenda 21, China's Strategy for Sustainable Development, was officially issued in 1994. It provided a guiding document for China to implement the strategy of sustainable development. Most of the objectives and content in this document should be met as required, before 2000. Judging from the implementation to date, we find some problems. For example, there is a great gap between China and developed countries in terms of establishment of national policies and legal systems for sustainable development and comprehensive decision-making and coordination mechanisms for promoting sustainable development.

From the literature review, we find that some countries such as Canada have established a legal status for the national sustainable development strategy.

The Amendments to the Canadian Auditor General Act adopted in 1995 include the provisions concerning environment and sustainable development. A provision was added into this law requiring the government to implement sustainable development strategies and to review their implementation regularly. This amendment requires all the Minister of each governmental department formulate the sustainable development strategy for that department. The first of such strategies were to be presented to the Parliament before December 1997. These strategies for sustainable development are to be revised once every three years. The amendment also requires that all the departments to regularly present a progress report for the implementation of their strategies.

China's Agenda 21 sets a framework of sustainable development for China, however, only a few ministries and commissions under the State Council have formulated their own Agenda 21 from 1994 until today. In particular, those departments responsible for economic affairs have not completed this task. The main reason for this is that China has not established the relevant legal status of the sustainable development strategy.

The Ministry of Science and Technology is now organizing the revision of China's Agenda 21.

It is recommended that the National People's Congress, the country's legislature, accord a legal status to the revised China's Agenda 21, making it legally binding to all the departments, institutions, enterprises and individuals in China. Meanwhile, we also recommend that all other relevant laws at the national level nurture and support the legal status of China's strategy for sustainable development. For example, various departments should be required to formulate their own strategies for sustainable development and regularly review them thereafter. A review and reporting system should be put in place for all the departments' concerned and comprehensive decision-making and coordinating institutions should be established for promoting the sustainable development strategy.

Implementing Environmental Assessment of Policies, Plans and Programs (Strategic Environmental Assessment) in China

In 1990, the Government of Canada issued the Federal Environment Assessment and Review Process. The process requires all the ministries and departments undertake strategic environmental assessment of the policies, plans, programs and recommendations they are implementing. The results of the assessment will be presented to the Cabinet for final consideration. The purpose is to incorporate social and environmental considerations into the federal programs, but to include it into the federal process of decision-making.

Most of the policies, plans and programs in China did not go through strategic environmental assessment, which resulted in serious environmental consequences in the process of implementation or after the implementation. This deserves our concern and attention. It is recommended that beginning now, China consider undertaking strategic environmental assessments of the policies, plans, programs or proposed action by various departments, similar to the Canadian practice. This practice of assessment will be legally established as a rule.

China has obtained some experience in conducting policy pre-assessment and in preparing strategic policies for negotiations. However, the assessment has mainly focused on the sectoral impacts or economic impacts while little consideration has been given to the environmental and social impacts in the pre-assessment. Consequently serious environmental problems resulted and only sectoral and economic interests have been taken into consideration for most of the pre-assessment and negotiation policy preparation. As the economic departments have increasingly been aware of significant environmental impacts the policy may bring about, the government has decided that strategic environmental assessments will be conducted for major macro-economic policies, sectoral policies, plans and programs prior to their implementation. This has become one of important components of the Law of Environmental Impact Assessment of the People's Republic of China, which is currently under review by the National People's Congress. It is expected that this law will be adopted and enacted in 2001. Currently, the State Environmental Protection Administration is working together with the Asian Development Bank on the guidelines for undertaking strategic environmental assessment. They include the procedures, methods, implementation and participatory mechanisms for undertaking environmental assessment. The environmental assessment for policies prior to its implementation will become a legal requirement; however, the experience in this field is

needed, such as the framework, methods and implementation procedures. Therefore the results of this study will be valuable for undertaking comprehensive assessment of trade policies and negotiations as well as strategic environmental assessment.

Information Accessibility

One of main gaps between China and developed countries in undertaking policy assessment is the accessibility of relevant information, including means and speed of obtaining information as well as various constraints such as some unnecessary restraints created by human to block information acquisition and sharing, such as limitation imposed by some governmental departments and agencies to public access to information. The restraints also include obstacles to information technology, hardware facilities and information transmission. To make the integrated assessment possible, it is necessary to improve information acquisition and sharing through legal tools.

Mechanism for Public Participation, Information Exchange and Coordination

The opportunity for intensive public participation is not mature at the current stage, including participation of public and interest groups, considering the current political system and the process of democratization. It will take some time to make the decision-making process transparent. However, the transparent decision-making process at the city and regional levels has been gradually developed. For example, Beijing has begun to collect public comments and views on master urban development plan through newspaper and Internet. This indicates that a bottom-up approach is developed for a transparent decision making process and public participation in this process.

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