Task Force on WTO and Environment – China Council for International Cooperation on Environment and Development

TRADE AND SUSTAINABILITY

CHALLENGES and OPPORTUNITIES for CHINA

as a WTO Member

Editors
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Foreword by
Zhenhua Xie
Minister
The State Environmental
Protection Administration
China

CCICED

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Published by the International Institute for Sustainable Development

Printed in Canada

ISBN 1-895536-68-5

This publication is printed on recycled paper.

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Internet: http://www.iisd.org

Designed by Donald Berg.

Printed by ePRINTit (www.eprintit.com), Winnipeg, Manitoba.

China Council for International Cooperation on Environment and Development

The China Council for International Cooperation on Environment and Development (CCICED), a high-level advisory body, was established by the State Council of China in 1992. Its stated purpose is "to further strengthen cooperation and exchange between China and the international community in the field of environment and development."

The CCICED is composed of about 40-50 high-profile Chinese and international members. It is chaired by a leader from China's State Council. China Council members are either of a ministerial or vice-ministerial level, or are experts, professors or environmentalists with impressive reputations in environment and development. International members have similar status and influence and all members participate in the CCICED in their personal capacity.

Based on China's priorities in environment and development, the CCICED has established expert working groups/task forces to conduct related studies. Six working groups were established in Phase I (1992–1996): Energy Strategies and Technologies; Monitoring, Information Analysis and Pollution Control; Scientific Research; Technological Development and Training; Resource Accounting and Pricing Policies; Protection of Biodiversity. In Phase II (1997–2001), eight working groups were set up on Pollution Control; Energy Strategies and Technologies; Environmental Economy; Biodiversity; Trade and Environment; Cleaner Industrial Production; Sustainable Agriculture; and Transportation and Environment. In addition, the Council also established two task forces to address China's environment and development priorities-Environment and Planning and Forest and Grasslands in Western China.

Expert working groups/task forces are jointly chaired and staffed by Chinese and international experts. At the CCICED Annual General Meeting (AGM), Council members hear and discuss reports and recommendations from the working groups and task forces. In the end, the reports are put together as recommendations from the China Council to the Chinese government. A senior Chinese leader receives the Council's Chinese and international members during the AGM. Meanwhile, the CCICED recommendations are forwarded to relevant departments of the State Council and provincial governments for their reference and implementation. The government departments and the provincial officials report on the implementation of the recommendations at the next year's AGM. The CCICED publishes its meeting proceedings in Chinese and English.

Based on the work of the first two phases of the China Council, Phase III (2002–2006) will provide more practical and flexible recommendations appropriate for China's context, to perform necessary policy and project demonstrations in priority areas. Along with changes in China's environment and development and the priority transfer of the China Council, Phase III will adopt the more flexible task force mechanism, with more defined objectives, to replace the working group mechanism. Phase III will be more focused on the implementation of the recommendations and follow-up.

Two secretariats have been established to facilitate the Council's work. The Secretariat Headquarters Office is set up in the State Environmental Protection Administration (SEPA) in Beijing. The Canadian Secretariat has been formed at the David See-Chai Lam Centre for International Communication at Simon Fraser University in Vancouver.

Canada's CIDA (Canadian International Development Agency) has been the lead donor, but the project is structured to encourage the involvement of other international organizations and agencies. To date, direct financial support has been contributed by British DFID, Norwegian NORAD, German GTZ, the Ford Foundation, the Rockefeller Foundation, the Netherlands' MEDC, Japanese GIFPRI, the EU, WWF, Shell Oil and others. In addition, other forms of support and collaboration have been received from the World Bank, UNDP, the Asian Development Bank and other organizations.

The CCICED has created a unique cooperative mechanism for bringing the best Chinese and international advice directly to the attention of the Chinese government. It has contributed significantly to many Chinese environmental achievements in the past. For more information on the CCICED, visit the China Council web sites at: http://www.cciced.org and http://www.harbour.sfu.ca/dlam/; or contact secretariat@cciced.org or cciced-info@sfu.ca.

Foreword

China officially became a member of the World Trade Organization in November 2001. WTO membership signifies that China is now more integrated into the world economy, and this will have far-reaching significance for China's social and economic development. The country's economic reform and open door policies have transformed China from a closed economy into a major trading power. China's foreign trade jumped to sixth place in 2001. Given its size and continuing reform, China will become an even more important player in the world economy in the 21st century.

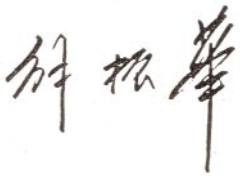
To comply with WTO rules and to honour its commitments, China has been working diligently to revise laws and rules by either the central or local governments. New laws enacted recently have incorporated the WTO rules. China has cut its average tariff level to 12 per cent with tariffs reduced on 5,332 items, and has opened markets in the service sector. China has been consulting with the WTO on its trade policies to improve transparency and has established a China-WTO Notification Enquiry Centre. China has also taken an active part in the new round of the WTO multilateral negotiations.

China's trade for the first seven months since it became a WTO member achieved an unexpected 12.3 per cent growth, reaching US$270.71 billion, Exports grew by 14.1 per cent and imports by 10.4 per cent. Actually realized foreign investment also increased 18.7 per cent.

To adapt to the new international trade environment and to the level of growth in the post-WTO accession era requires restructuring China's economy and the industrial structure. This will affect all of the basic productive elements including capital, labour, natural resources and the environment. These changes in society and the economy will be multifarious, and will inevitably have environmental consequences. Major environmental challenges China faces in the post-WTO accession era include greater environmental pressures in the light of further trade liberalization; positive or negative environmental impacts of foreign investment; imports of goods that may harm the environment; "green barriers" likely arising from foreign environmental measures; upgrading and improving Chinese environmental laws and regulations in line with the WTO rules, and promoting the development of the environmental industry.

The Working Group on Trade and Environment (now the Task Force on WTO and Environment) of the China Council for International Cooperation on Environment and Development, has done a great deal of work in the trade and environment area in the past seven years, addressing the most important trade and environmental issues for China. It put forward some useful recommendations to the China Council for International Cooperation on Environment and Development and the Chinese government. This book is based on the work of the group with an emphasis on China's accession to the WTO. It covers a broad range of trade and environment issues that may have implications for China as a WTO member, including some environmental provisions in the WTO agreements; environment and sustainable development issues in the new round of negotiations; issues related to integrated environmental assessment of trade liberalization; investment; technology transfer; the "precautionary principle"; environmental measures and market access; and strategies to address challenges in the post-WTO accession era.

This publication is very timely. It will support further in-depth research on trade and environment issues in China. And it will help policy-makers to understand the issues at the interface between trade and the environment and issues that may arise in the new round of multilateral negotiations. This work may lay a foundation for carrying on further discussions on environmental aspects of trade issues.



Zhenhua Xie
Minister
The State Environmental Protection Administration, China

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Trade, Environment and Sustainable Development: General Issues

WTO Membership: Trade and Environment Issues for China

by David Runnalls and Ruqiu Ye

The trade and environment agenda has matured remarkably over the past five years. At the beginning of the Second Phase of the China Council for International Cooperation on Environment and Development (CCICED), the establishment of a Working Group on Trade and Environment (WGTE)—now the Task Force on WTO and Environment—could seem like an unusual step. Five years later, in November 2001, the Doha Ministerial Meeting of the World Trade Organization (WTO)—the meeting at which China's accession to the WTO was consummated—put trade and environment issues firmly on the agenda. By now every major trade ministry has a group of officials whose primary concern is the environment; some have entire divisions devoted to the environment and sustainable development. Most environment ministries have taken up the trade agenda from their perspective. The opportunity now exists to move forward on these issues.

The work of the WGTE in the past and now underway has mapped out the broad range of issues that, by now, constitute the trade and environment agenda. The work has also identified a range of issues where China has particular interests and opportunities with its WTO membership. Many of the issues that have arisen will require the attention of the Chinese government. WTO accession highlights their importance and also provides a structure for addressing them together with other countries that are similarly affected. Consequently, it is important to understand these issues and then to develop appropriate negotiating strategies for them within the WTO context.

The Doha Ministerial Declaration provides the basic framework for this process. The environmental dimension of trade is raised by many of the Declaration's sections. Two paragraphs are devoted directly to the environment. Paragraph 31 identifies issues that are to be negotiated (the relationship between WTO rules and multilateral environmental agreements (MEAs); arrangements for regular information exchange between the WTO and MEA secretariats; and the reduction or elimination of tariff and non-tariff barriers on environmental goods and services). Paragraph 32 identifies further issues that merit special attention and may yet be included in negotiations (market access and the environment, environmental aspects of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and labelling for environmental purposes). This paragraph goes on to recognize the importance of technical assistance on trade and environment and the desirability for exchanges of experience in performing environmental reviews at the national level.

At least as important as the issues identified in Paragraphs 31 and 32 are the environmental issues that arise in relation to other negotiating areas. The reduction of fisheries subsidies is identified as an environmental issue. The relationship between TRIPS and the Convention on Biological Diversity is explicitly mentioned. Moreover, environmental issues are bound to be central to any negotiations on agriculture and will be important should negotiations on investment proceed as some members wish. Similarly, further elaboration of the General Agreement on Trade in Services (GATS) is bound to encounter a range of environmental concerns.

All of these issues and others with regard to environmental aspects of the WTO rules are set out in greater detail in the first section of this book. The negotiations launched at the Doha Ministerial have been called a "Development Round." They could just as soon have been called an "Environmental Round." If they are successful on both counts, the result will certainly be a "Sustainable Development Round."

The Doha Declaration also takes note of the efforts by WTO members to conduct national environmental assessments of trade policies on a voluntary basis,[1] and encourages members to share expertise and experience gained from national environmental assessments.[2] The first section of this book summarizes international and domestic experiences and lessons for undertaking integrated environmental assessments. It notes that China's accession to the WTO will have positive and negative economic, environmental and social effects. An integrated environmental assessment aimed at ensuring policy coherence in support of trade liberalization and sustainable development in line with the WTO rules will help China formulate integrated policies to address the negative effects and maximize the opportunities provided by WTO accession. Issues that need to be addressed for such an integrated environmental assessment are outlined.

Perhaps no issue is as potentially controversial in the WTO as investment. Over the years, several attempts to negotiate investment agreements have failed—including the Code of Conduct for Transnational Corporations (UNCTAD) and the Multilateral Agreement on Investment (OECD). Additional controversy has arisen over the investment provisions of the North American Free Trade Agreement (NAFTA). The Doha Ministerial took no final decision on whether to include investment in the final negotiating agenda, leaving that to the next Ministerial meeting, now scheduled for September 2003 in Mexico. These are matters of great concern to China because of the importance of foreign direct investment to its economic development process. Section I of this book discusses them independently of any particular negotiation, since these are matters that will require attention whether the WTO proceeds with investment negotiations or not.

Many countries have initiated efforts to assess the environmental effects of trade liberalization, as noted by the Doha Ministerial Declaration. Yet results have been difficult to interpret, in particular when attempts were made to undertake such assessments by means of a single model that integrated all sectors of the economy. Difficulties have arisen primarily because no environmental measurements exist that can be introduced into the highly aggregated general equilibrium models that are typically used to estimate the economic consequences of trade liberalization. In practice, a sectoral approach has frequently proven more productive since it is generally possible to generate some assessment of the major environmental impacts associated with changes in the distribution of production caused by changing patterns of trade. Section III of this book uses this approach to consider some of the issues arising from trade liberalization in general, and WTO accession in particular, in relation to a few sectors that are environmentally sensitive. These include agriculture, forestry, fisheries and environmental services. They do not nearly cover all the sectors that are environmentally sensitive, but the studies represent the first step in examining the environmental impacts of trade liberalization in these sectors. It appears difficult to predict precise environmental consequences from trade liberalization. At least nothing is possible that is as precise as projections of economic growth from trade liberalization. It is clear that major structural changes in the economy will lead to significant changes in how the economy interacts with the environment, on which it depends (as do the people of China). It is also possible to identify the kinds and general direction of environmental impacts that may be anticipated. Yet there is always the possibility that increased wealth and changes in production practices will mitigate some of the expected impacts. Consequently, the major recommendation to policy-makers is to carefully monitor the environmental consequences and to be prepared to act quickly to intervene if unacceptable changes appear to be occurring.

WTO membership will bring China more opportunities for technology transfer, which arguably is one of the most intractable issues of contemporary environment and development policies. Section IV includes two contributions to this subject. It is generally agreed that management of the environmental challenges arising from rapid economic growth will require access to advanced technologies. Most international environmental agreements recognize the need for technology transfer and seek to create processes that will promote this. Yet the results are very difficult to assess. At the same time, the processes of liberalization and economic growth themselves bring significant new investment and, associated with this investment, the prospects for the introduction of new technologies. The process of globalization itself generates a heightened awareness of technological developments in other countries and can, at the very least, act as a stimulus to technological development. This is particularly pronounced in areas such as climate change where technological innovation is still very much in flux.

The Doha Ministerial Declaration does not address the sometimes difficult international debate about the precautionary principle, discussed in Section V. The ministers evidently decided that the issue is not yet ripe for negotiation. Nevertheless, the underlying questions about the scientific basis of policy-making and the criteria that will apply when there is no clear scientific information about a perceived problem will not go away. Sooner or later governments will need to address this issue.

Somewhat related to the precautionary principle are the issues concerning trade in genetically modified organisms (GMOs). Recent rapid growth in the production and the use of GMOs produced through biotechnology has given rise to trade concerns and even trade disputes. While scientists generally agree that certain GMOs are safe for human and animal consumption, some consumers and environmental groups—particularly in the European Union—are lobbying their governments for more stringent regulatory procedures and measures for trade in GMOs. The scientific risk assessment requirement in the

WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) has also been seen as a potential conflict with the "precautionary principle" specified in the CBD's Cartagena Protocol on Biosafety. Other issues related to trade in GMOs are also discussed in Section V.

The maturing of the trade and environment agenda is illustrated by the fact that several of the issues that stood at the origins of the debate now have moved forward. This is particularly the case in the complex relationships between environmental standards and market access, covered in Section VI. It is clear that changing environmental standards can have a significant impact on market access, but it is also becoming evident that this impact is not as simple as was originally assumed. Those enterprises and producers that are not able to meet new standards find themselves at risk of losing market access. But, other enterprises and producers that are able to comply with these standards have correspondingly enhanced market access—and are frequently able to realize better prices that also cover any additional costs of compliance and, in some cases, even provide additional profits. It is consequently essential to monitor the development of standards in countries that are major trading partners and above all to ensure that the interests of China are taken into account at the very earliest stages of the regulatory process, no matter where it takes place.

This volume concludes with a chapter that looks at China's strategies to address trade and environmental challenges in the post-WTO accession era, and its role in the WTO. WTO membership brings real challenges and opportunities for China's social and economic development and will have certain consequent environmental effects. China needs to establish an integrated mechanism for trade and environmental coordination; to modify its environmental policies, laws and regulations in line with the WTO rules; to promote its environmental industry; and to address pollution problems through economic restructuring. It must also adequately address issues of "green barriers" and actively participate in the new Round of WTO negotiations.

We believe that this book will provide a balanced overview of the issues that have arisen as China has sought to confront the trade and environment agenda—an agenda that has become larger and more complex over the past few years. It will be of vital importance to ensure that trade and environmental officials work closely together to identify China's essential interests in this area and to develop constructive ways to ensure that these interests are taken into account in international negotiations in the WTO and in MEAs.

Endnotes

1 Paragraph 6 of the Doha Declaration.

2 Paragraph 33 of the Doha Declaration.

Environmental Provisions in the WTO Agreements and Their Implications for China as a Member

by Wanhua Yang

I Introduction

The environment was not a primary concern of economic integration at the time the international trading system, the General Agreement on Tariffs and Trade (GATT), was established in 1947. It was not until the early 1990s when a series of contentious environment-related trade disputes arose—especially the "tuna-dolphin" dispute between Mexico and the United States—that the environment was perceived as a trade-related issue.

Although the relationships among trade, environment and sustainable development were not discussed in detail in the negotiations in the Uruguay Round, some attention was drawn to trade-related environmental issues. As a result, the preamble to the Marrakech Agreement Establishing the World Trade Organization refers to the importance of sustainable development. In addition, a number of WTO agreements include provisions dealing with environmental concerns.

At the 2001 WTO Ministerial Meeting in Doha, members of the WTO agreed to launch a new round of multilateral trade negotiations. The Doha Ministerial Declaration contains far more content regarding the environment than anybody could have predicted. The environment has, for the first time, been included in the formal negotiation agenda. The Doha Declaration lists trade and environment as one of the negotiating agenda items, specifying the issues to be negotiated and the issues that need more discussion. The launch of negotiations on the environment in the new WTO round opens the door to better integration of trade and environment objectives and will be of interest to developed and developing countries.

Trade liberalization can affect the environment directly and indirectly through scale, technology and structural and regulatory effects. China's entry into the WTO, and the radical economic structural changes likely to accompany it, may have some environmental impacts along with significant economic and social impacts. China needs to take adequate measures to address these. WTO membership requires China to participate in the new Round's trade and environment negotiations. It will also have to deal with environment-related trade disputes that may occur after it becomes a member. Understanding the environment-related provisions in the WTO agreements and what they mean to China as a WTO member will assist China in its efforts to implement the WTO rules, integrate environmental concerns into its trade policies, elaborate rules that support both trade and sustainable development, and deal with trade disputes under the WTO rules in the future.

This chapter outlines the environment-related provisions in the WTO agreements, how these environmental provisions are interpreted in WTO jurisprudence, and what are the implications for China as a member.

II Major environment-related provisions in the WTO agreements

The WTO has no specific agreement dealing with the environment. However, provisions dealing with the environment are embodied in many WTO agreements and other related documents. The preamble states that WTO members recognize:

> "… that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development."

In Marrakech in 1994, ministers also signed the Decision on Trade and Environment, which established a Committee on Trade and Environment to address trade-related environmental issues institutionally. The Decision on Trade and Environment states that the aim of the work of the committee is to

make "international trade and environmental policies mutually supportive." The committee has been asked to identify the relationship between trade measures and environmental measures, in order to promote sustainable development and to make appropriate recommendations on whether any modifications of the provisions of the multilateral trading system are required, compatible with the open, equitable and non-discriminatory nature of the system.

In addition to the preamble language and the Decision on Trade and Environment, a number of the WTO agreements resulting from the Uruguay Round contain provisions that deal with environmental concerns. These agreements include GATT, the Agreement on Technical Barriers to Trade (TBT), the Agreement on Application of Sanitary and Phytosanitary Measures (SPS), the Agreement on Agriculture (AOA), the Subsidies and Countervailing Measures (SCM) Agreement, the Agreement on Government Procurement (GPA), the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), and the General Agreement on Trade in Services (GATS).

GATT 1947/1994

GATT 1994 is virtually identical to its predecessor, GATT 1947. It consists of the original text of the GATT as modified over the years, along with the tariff concessions, protocols of accession, waivers and the decisions made by the parties of the original GATT, as well as a number of understandings. Article XX of GATT 1947/1994 contains environment-related provisions which have aroused considerable attention in recent years.

GATT Article XX sets out limited and conditional exceptions for measures that are otherwise inconsistent with its main non-discrimination principle. Non-discrimination has two components—most-favoured nation (MFN) treatment and national treatment. GATT Article I says a WTO member cannot treat a like product of another country more favourably than the products of other WTO members. GATT Article III stipulates that once goods have entered a market, they must be treated no less favourably than equivalent domestically-produced goods.

However, GATT allows countries to use exemptions from the normal trading rules. These include two sets of circumstances for environmental protection. Article XX states that:

> "Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:
>
> … b) necessary to protect human, animal or plant life or health;
>
> … g) relating to conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption; …"

Countries using the environmental exceptions in Article XX have to meet certain requirements. The opening paragraph (the "chapeau") of Article XX requiring countries to show that the measure in question is necessary for environmental protection, does not contravene the GATT core principles (most-favoured nation and national treatment), and represents the least trade-restrictive measure. The chapeau requires that the measure be not arbitrarily or unjustifiably discriminatory, or constitute disguised protectionism. This matter has been interpreted through several dispute panels and Appellate Body reports (see below).

The Agreement on Technical Barriers to Trade (TBT)

The TBT Agreement covers all mandatory technical regulations and standards as well as voluntary standards for products including testing and certification procedures. It seeks to ensure that these technical measures do not create unnecessary obstacles to trade.

The TBT Agreement allows member states to adopt measures to the extent they consider appropriate, including to protect human, animal and plant life or health, or the environment, as exceptions to its general rules (the principle of most-favoured nation treatment and national treatment). The preamble recognizes that:

> "No country should be prevented from taking measures necessary to ensure the quality of its exports, or for the protection of human, animal or plant life or health, of the environment, or for the prevention of deceptive practices, at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade."

Other important provisions under TBT related to the environment include:

- non-discrimination in the preparation, adoption and application of technical regulations, standards, and conformity assessment procedures;[1]
- avoiding unnecessary obstacles to trade, requiring that technical regulations not be more trade-restrictive than necessary to achieve their legitimate objective;[2]
- adopting international standards as far as possible;[3] and
- the transparency of these measures, through government notification to the WTO Secretariat and establishing national enquiry points.[4]

The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)

The SPS Agreement defines the rights and obligations of members with respect to the development and application of sanitary and phytosanitary measures. These include measures that ensure safety of human, animal and plant life and health.[5]

The SPS Agreement clearly states that members retain their sovereign right to determine their appropriate levels of protection against sanitary and phytosanitary risks.[6] It requires that the measures adopted by members to achieve these levels of protection be based on scientific principles[7] and more specifically on an assessment of risk.[8]

The SPS Agreement complements the TBT Agreement. It has requirements similar to the TBT—non-discrimination, non-disguised restriction on international trade, international standards and transparency. Article 2.3 requires that members shall ensure that their sanitary and phytosanitary measures do not arbitrarily or unjustifiably discriminate between members where identical or similar conditions prevail. It also states that these measures shall not be applied in a manner which would constitute a disguised restriction on international trade. Article 3.2 encourages members to use international standards, and Article 7 requires that members notify changes in their sanitary or phytosanitary measures and provide information on these measures in accordance with the provisions of Annex B.

The Agreement on Agriculture (AOA)

The AOA resulting from the Uruguay Round set the rules for international trade in agricultural products. It has three pillar components:

1. to improve market access through conversion of non-tariff barriers to tariffs, and gradual tariff reductions;
2. to encourage export competition through gradual reductions in export subsidies and in certain domestic support programs that are production- and trade-distorting; and
3. to exempt domestic support/subsidies with no, or minimal, effects on trade from reduction commitments or from the threat of countervail.

From an environmental point of view, there are two important implications in agriculture. Firstly, the reduction and the elimination of the export subsidies would reduce subsidies in support of environmentally detrimental activities. Secondly, the exemptions of environmental programs from reductions in subsidies would support sustainable agriculture.

In its preamble, the AOA reiterates its members' commitment to reform agriculture in a manner that protects the environment.

Under the agreement, members are allowed to adopt domestic support measures with minimal impact on trade, known as "green box" policy, such as exemptions from reduction commitments. The "green box" measures include funding for environmental initiatives, direct payments to producers and government participation in income insurance and safety net programs that meet the prescribed criteria specified in Annex II Paragraph 12 which specifies that some trade-distorting support can be justified as meeting environmental goals, provided that they meet certain conditions.

In recent years, some OECD countries have adopted environmental programs that are exempt from reduction commitments meeting the Annex 2 criteria of the AOA. For example, Canada announced the National Soil and Water Conservation Program in 1997. Canadian processors and producer groups received $10 million through adaptation councils for the protection and enhancement of soil and water resources used in agriculture during 1997–98 and 1998–99. Agriculture and Agri-Food Canada and the Canadian Pork Council also launched the Hog Environmental Management Strategy aimed to find effective and affordable solutions to environmental issues related to hog production. Future trends indicated from the proposals submitted by WTO members would likely be the expansion of permissible "green box" support measures by WTO members.

However, it is not clear to what extent trade distortion is legitimate under the existing AOA provisions.

The current debate at the Committee on Agriculture on the environment focuses mainly on this issue. Some countries propose to review AOA Annex II Paragraph 12 to determine whether environmental concerns are sufficiently addressed.

Negotiations on agriculture were built into the agenda of the Uruguay agreement. Negotiations are currently underway and have now been included in the overall single-taking negotiations by the Doha Ministerial Declaration.

The Subsidies and Countervailing Measures Agreement

Subsidies can contribute positively or negatively to the environment. They may be beneficial when they encourage producers to take action that is beneficial to the environment. However, subsidies can also be harmful to the environment if they unduly support unsustainable production activities, for example, by encouraging the overuse of water, soil, forests, fish stocks or other natural resources. Subsidies for agriculture and energy, in particular, are widely considered to distort trade, and in some instances to cause environmental degradation. Advocates have suggested that multilateral trade rules should be more flexible so that subsidies can be used to encourage environmentally beneficial activities or technologies.

During the Uruguay Round, both the positive and negative contribution of subsidies to the environment were discussed and considered. This led to new disciplines on subsidies as a whole. The Subsidies and Countervailing Measures Agreement, that is, the Agreement on the Implementation of Article VI of the GATT 1994, made some substantial changes to the original Agreement on Subsidies and Countervailing Measures.[9] The most important for the environment was the creation of a non-actionable category of subsidies. These so-called "green light" subsidies include assistance to promote adaptation of existing facilities to new environmental requirements. More specifically, it allows subsidies of up to 20 per cent of a firm's costs for adapting to new environmental laws. These provisions expired five years after entry into force of the WTO Agreement and are consequently no longer in effect.

The Doha Ministerial Declaration, adopted at the Fourth WTO Ministerial Conference in Doha November 2001, specifies to negotiate on clarifying and improving WTO disciplines on fisheries subsidies "in the context of negotiations on WTO Rules (e.g., anti-damping, subsidies and regional trade agreements)."[10] Fisheries subsidies have also been considered a trade and environment issue. In the Trade and Environmental section (Para. 31) of the Doha Declaration, reference is also made to negotiations on fisheries subsidies. Fisheries subsidies are now being discussed as a sub-item under the general "subsidies" topic in the Group on Rules, established as one of seven negotiating bodies after the Fourth WTO Ministerial Conference.

The Agreement on Government Procurement

The Agreement on Government Procurement (GPA) provides for exceptions similar to the list of exceptions in GATT Article XX, including measures "necessary to protect public morals, order or safety, human, animal or plant life or health," but not including exceptions "relating to conservation of exhaustible natural resources."[11] However, it does not include measures related to "conservation of exhaustible natural resources" as GATT Article XX(g). GPA is a "plurilateral" agreement, which means that members of the WTO do not automatically become members of GPA unless they opt in. Like GATS, the agreement only applies to jurisdictions and products explicitly listed by each member state in a number of annexes.

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)

Intellectual property rights under the TRIPS Agreement include four major categories: patents and copyrights; brand names; trademarks; and geographical designations. The provision most directly relevant to the environment is Article 27, which allows governments to refuse to issue patents that threaten human, animal or plant life or health, or risk serious damage to the environment.

Members "… may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law."[12]

Members "… may also exclude from patentability… plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, members shall provide for the protection of invented plant varieties either by patents or by an effective *sui generis* system or by any combination thereof."[13]

However, in the past few years, a number of issues that have arisen within the TRIPS Agreement are important from the perspective of the environment and sustainable development.

First, from a point of view of technology owners/innovators, strong protection of intellectual property rights may encourage the development and transfer of environmentally friendly technologies. But, from the perspective of technology recipients, intellectual property rights may hinder access and transfer of environmentally-friendly technologies.

Secondly, there is concern about the compatibility of the TRIPS Agreement and the Convention on Biodiversity. The CBD's objectives are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of the genetic resources (Article 1). It also acknowledges members' sovereign rights over their biological resources (Article 3). It specifically obliges members to take necessary measures to share in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with members providing such resources (Article 15). The WTO's TRIPS Agreement contains no provisions allowing members to enforce its national rules for fair and equitable sharing of benefits from patenting of their own genetic resources by other countries, nor provisions ensuring the prior informed consent of the owners of biological resources and traditional knowledge used in the invention.

There is also an issue of biodiversity conservation concerning the patenting of animal and plant varieties and the protection of traditional knowledge. The biggest concern from developing countries is that it is not possible to patent something that does not represent individual efforts at innovation, such as plant or animal varieties that grow naturally. But the modification of an existing variety, either by breeding or by technological means, is an innovation. Consequently, knowledge that is communal in nature cannot be patented, e.g., indigenous knowledge of plant and animal varieties.

Another important issue is the protection of biotechnology inventions. The TRIPS Agreement is not very clear on this issue. Countries have high expectations for the WTO Committee on Trade and Environment to address the related issues that might arise from the Agreement.

The General Agreement on Trade in Services (GATS)

GATS establishes a framework of general obligations for trade in services. The provision most obviously relevant to environmental protection is Article XIV. Like GATT Article XX, GATS exempts policies affecting trade in services for the protection of human, animal, or plant life or health from the normal GATS disciplines of most-favoured nation, national treatment and market access. In Article XIV (b), it stipulates that:

> "Nothing in this Agreement shall be construed to prevent the adoption or enforcement by any Member of Measures… necessary to protect human, animal or plant life or health;…"

Other GATS provisions also have environmental implications. For example, the preamble recognizes the right of governments to regulate the supply of services in order to meet national policy objectives, including environmental protection. Article VII on recognition requirements related to authorization, licensing or certification of service suppliers, would permit mutual recognition of standards or criteria reflecting more stringent requirements related to environmental protection.

However, the environmental concern of trade liberalization in services goes beyond these provisions. Some internationally-traded services including transportation, construction and consulting have the potential to affect the environment. During the 1986–94 Uruguay Round negotiations, a few delegations proposed that GATS include exceptions allowing governments to restrict services trade in order to address the environmental impacts and the conservation of exhaustible natural resources. Negotiators were unable to reach agreement on these special aspects at the completion of the Uruguay Round. As a result, the ministers adopted the Decision on Trade in Services and the Environment, which reflects the fact that the environmental issues would be revisited in the post-Uruguay era. The ministers asked the Committee on Trade and Environment to examine the relationship between trade in services and the environment (including sustainable development) and to make any appropriate recommendations on whether there is a need to provide for more than what is contained in Article XIV (b).[14]

The CTE has so far not identified any environmental measures that members would apply to services trade for environmental purposes that would not be covered adequately by GATS provisions, in particular Article XIV (b).

The issue of trade in services and the environment will be further addressed in the current and upcoming negotiations. The Doha Ministerial Declaration has placed the elimination of tariff and non-tariff barriers on environmental goods and services on the upcoming negotiation agenda. For this purpose, there is a need to define environmental goods and services.

III Environmental provisions in WTO jurisprudence

As the previous section indicates, environment-related provisions are embodied in many of the most used WTO agreements. They have provided the basic ground for environmental policy in terms of interaction with trade rules. The Uruguay Round rules seem to promote the more efficient allocation and use of resources and, therefore, will contribute to an increase in production and income and to a lessening of demands on the environment. WTO jurisprudence over the past several years represents the legal interpretation of major and most-used environmental provisions in the WTO agreements:

1 Application of preambular language

The preamble language concerning sustainable development in the Marrakech Agreement Establishing the World Trade Organization has been used in recent environmental disputes and has exerted influence on WTO rulings.

In the 1998 legal ruling, the U.S.-Shrimp/Turtle Appellate Body's report on the dispute that India, Malaysia, Pakistan and Thailand brought against the United States, the Appellate Body stated that:

> "As this preambular language reflects the intentions of negotiators of the WTO Agreement, we believe it must add colour, texture and shading to our interpretation of the agreements annexed to the WTO Agreement."[15]

In 2001 the Appellate Body, reviewing the compliance panel report on the U.S.-Shrimp/Turtle case also relied on the preamble language in its legal analysis in determining whether the U.S., by imposing the shrimp import ban, abused or misused the Article XX right under the chapeau (the introduction paragraph) of the Article. To make judgment on whether the revised measure of the U.S. constitutes "arbitrary or unjustifiable discrimination," the Appellate Body applied this language to assess the objectives and purpose of GATT, in order to strike a proper balance between environmental objectives and the rights of members under other provisions of GATT. The AB noted that in interpreting the terms of the chapeau, it must be kept in mind that sustainable development is one of the objectives of the WTO Agreement.[16]

These rulings suggest that the preamble language referring to sustainable development has played an important role in WTO jurisprudence.

2 Interpretation of GATT Article XX

Throughout the GATT and WTO jurisprudence, the most disputed trade and environmental issues are under what conditions and to what extent WTO members can use Article XX to implement their environmental objectives. Although this article allows members to use exemptions from the WTO major obligations necessary for the protection of human, animal and plant life or health and conservation of exhaustible natural resources, the precise application of these rules may not always be clear.

Several GATT/WTO environment-related trade disputes involved GATT Article XX (b) and (g). These include the first "tuna-dolphin" dispute between Mexico and the U.S. (U.S.-Tuna/Dolphin), the "reformulated gasoline" dispute between Venezuela and the U.S. (U.S.-Gasoline), the second "tuna-dolphin" dispute, the "shrimp-turtle" dispute between the U.S. and India, Malaysia, Pakistan and Thailand (U.S.-Shrimp/Turtle), the asbestos dispute between France and Canada (EU-Asbestos), and the U.S.-Shrimp/Turtle Compliance case between the U.S. and Malaysia.

The WTO Dispute Resolution Body (DRB) faces a number of issues in interpreting GATT Article XX. These include: process and production methods (PPMs), necessity and the chapeau, and unilateral measures vs. multilateral measures.

PPMs

Lying at the heart of many of the GATT Article XX environmental disputes is "like product" and its relationship to PPMs. In judging whether a member's measure violates the WTO rules, a panel has to consider whether it applies to an imported product and to the like domestic product under Article III:4 which requires that national laws, regulations and measures provide national treatment to imported goods.

In the early WTO DRB rulings in environmental disputes, GATT had been interpreted to forbid discrimination among like products based on non-product-related PPMs.[17] For example, In the first tuna-dolphin dispute that challenged the U.S. ban on importation of tuna if caught using dolphin-

unfriendly nets, the GATT panel concluded that the GATT does not permit states to take measures affecting trade if they distinguish among products based on their processes or production methods.[18] This interpretation has caused a great deal of concern in the environmental community.

Recently, some scholars have asserted that the distinction between PPM-based standards and product-based standards is not based in GATT text nor in GATT negotiating history.[19] Professor Robert Howse and Professor Donald Regan of the University of Michigan Law School argue that the distinction between PPM-based standards and product-based standards has no basis in the GATT text or in GATT jurisprudence. They point out that GATT Article III does not distinguish between process-based measures and product-based measures, nor does GATT jurisprudence support the process/product distinction.[20]

In the Shrimp-Turtle case, the Appellate Body did not have problems with the application of the PPM-based measure (turtle-excluder devices) taken by the U.S. but ruled that the measures was applied in a manner that was arbitrary and unjustifiable, and constituted a disguised barrier to trade.[21]

Most recently, the Appellate Body in the EU-Asbestos case breaks new ground in determining "like products." Canada challenged the French government's 1996 prohibition on the manufacture, sale and import of all forms of asbestos and products containing asbestos, and its limited exceptions to the ban for chrysotile asbestos (also called white asbestos) fibres which favours domestic producers. France argued its ban on the grounds that asbestos is a known carcinogen estimated to kill more than 2,000 people per year. Canada maintained that the French import ban which exempted chrysotile asbestos fibres was an attempt to protect domestic producers of asbestos substitutes rather than a legitimate public health measure.

The Asbestos Panel ruled that the import ban violated GATT Article III:4, which requires equal treatment for like products, but was justified under GATT Article XX (b), which allows some exemptions from the GATT obligations when they are necessary to protect human, animal or plant health. Although the panel decision marked the first time that the human health exemption was found to justify an environment-related trade measure, it raised serious concerns about the panel's "like product" determination. It failed to consider the health risk associated with chrysotile asbestos fibres as part of its examination of a like product under Article III:4 of GATT 1994.[22]

The Appellate Body reversed the panel's finding and held that health risk constituted a legitimate factor in determining whether products were like and thus subject to GATT Article III:4 obligations to be treated equally. However, it upheld the panel's finding that the EU had demonstrated that its measure is necessary to protect human life or health under Article XX(b).[23]

Although the EU-Asbestos ruling is of an issue of non-process-based "like product," rather than that of a PPM-based "like product," yet it may have potential influence in subsequent WTO jurisprudence. This breakthrough in the determination of "likeness" based on "health risk" opens the door for the interpretation of "like products" based on PPMs as well.

This breakthrough in the determination of "likeness" based on PPMs is welcome in the environmental community. But it should be noted that allowing discrimination based on PPMs might create other difficulties. It could give governments greater latitude to protect their industries against foreign competition. Many developing countries may be concerned that PPM-based discrimination on environmental grounds would force them to implement standards that might not be appropriate for them because their priorities differ from those of developed countries. They also fear an onslaught of "green protectionism."

One way to deal with this issue may be for WTO members to enhance the existing rules on transparency in the standard- and rule-making process, on mutual recognition and equivalence and consideration by developed countries of the special needs of developing countries in the preparation of new measures (such as providing technical assistance to developing countries). Another way may be to consider the development of a set of rules governing the use of PPMs by importing countries. Although developing countries are adamantly opposed to the adoption of such rules, they may eventually conclude that a clear set of enforceable rules gives their goods better protection than the chaotic set of measures that are now arising in the developed markets.

Necessity and the chapeau

The WTO dispute settlement body has become more and more sensitive to the need for protecting the environment and human health. In recent panel rulings, members' rights to protect human life or health and the environment and to conserve exhaustible natural resources were consistently upheld.[24]

In finding the justifying protection under Article XX, the panels usually engage in the analysis based on two

steps. The first is to determine whether the measure in question falls within the scope of Article XX(b) or (g) and is necessary. If it does, the measure has provisional justification under the article. The second step is to consider whether it satisfies the conditions of the Article XX chapeau. Such an approach has been used by the panels of the U.S.-Gasoline, U.S.-Shrimp/Turtle, EU-Asbestos cases and by the compliance panel deciding on the U.S. implementation of the U.S.-Shrimp/Turtle Panel recommendations.

In determining whether the measure falls within the scope of the article, the country invoking this provision must first prove that "… the policy in respect of the measures falls within the range of policies designed to protect human life or health;…"[25] and that such a measure is necessary to fulfill the policy objective.

In the U.S.-Shrimp/Turtle dispute, India, Malaysia, Pakistan and Thailand filed a complaint regarding a prohibition imposed by the United States on the importation of certain shrimp and shrimp products by Section 609 of the U.S. Public Law 101-162 Relating to the Protection of Sea Turtles in Shrimp Trawl Fishing Operations (1989) and related regulations and judicial rulings. The Appellate Body Report found that the United States measure at issue qualified for provisional justification under Article XX(g), but that it failed to meet the requirements of the chapeau of Article XX, as it was applied in a manner that constituted arbitrary and unjustifiable discrimination. In its analysis, the Appellate Body first found that the sea turtles in question constitute "exhaustible natural resources" for purposes of Article XX(g).[26] It went on to examine the relationship between the general structure and the design of the measure. It found that the U.S. prohibition of shrimp caught by non-turtle excluding methods is not disproportionately wide in its scope and reach in relation to the policy objective of protection and conservation of the sea turtle species. The means are, in principle, reasonably related to the ends. The Appellate Body, therefore, concluded that the U.S. measure is effective in conjunction with the restriction on domestic shrimp harvesting as required by Article XX(g).

Measures that meet the terms of Article XX(b) or (g) have to meet the test of the chapeau of this article, which requires that measures be not arbitrarily or unjustifiably discriminatory, or constitute disguised restrictions to international trade. The discrimination standard of the chapeau defined by WTO panels and appellate bodies is stricter than that of the article itself.[27]

The approach that the WTO panels and appellate bodies have taken is to first determine whether the measure is a "means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail; and second, to examine whether the measure is a… disguised restriction on international trade."[28]

In the EU-Asbestos case, the panel found from the design, architecture and revealing structure of the asbestos ban that there was nothing to indicate that the measure had protectionist objectives. It concluded that the measure satisfied the condition of the Article XX chapeau and, therefore, was justified under Article XX.[29]

The Article XX chapeau seems to be defined to prohibit national measures that have both a discriminatory effect (against exporting members) and a discriminatory intent.[30] A measure could be found to fall within the scope of Article XX(b) or (g), but violate the Article XX chapeau because of discriminatory intent.

Multilateral vs. unilateral solutions

Some commentators assert that the WTO dispute settlement body upholds international consensus on environmental protection by upholding the right of the United States to restrict imports of shrimp caught in ways that threaten species of sea turtles protected by the Convention on International Trade in Endangered Species (CITES).[31] However, WTO jurisprudence seems to prefer multilateral solutions to unilateral solutions.

In its reasoning, the U.S.-Shrimp/Turtle Compliance Appellate Body established to consider whether the U.S. revision to its shrimp ban complied with the original panel recommendations, cited the preamble language in the Marrakech Decision on Trade and Environment. The preamble provides that:

> "There should not be, nor need be, any policy contradiction between upholding and safeguarding an open, non-discriminatory and equitable multilateral trading system on the one hand and acting for the protection of the environment and promotion of sustainable development on the other."

The Compliance Appellate Body indicated that these terms imply that recourse to trade-related measures not based on international consensus is generally not the most appropriate means of enforcing environmental measures, since it leads to the imposition of unwanted constraints on the multilateral trading system and may affect sustainable development.[32] It

found that, since sea turtles are a highly migratory species whose protection is of concern to all States, the protection of such migratory species is best achieved through international cooperation. The Compliance Appellate Body ruled that the U.S. measure adopted to comply with the recommendations and rules of the Dispute Resolution Body is justified under Article XX of the GATT, given that, in particular, the U.S. showed ongoing efforts to seek a multilateral agreement.[33] However, the Compliance Appellate Body reaffirmed the original Panel Report in its concluding remarks, stating that:

> "The best way for the parties to this dispute to contribute effectively to the protection of sea turtles in a manner consistent with WTO objectives, including sustainable development, would be to reach cooperative agreements on integrated conservation strategies covering, *inter alia*, the design, implementation and use of TEDs [turtle-excluding devices] while taking into account the specific conditions in the different geographical areas concerned."[34]

3 Science and the precautionary principle

According to the WTO panel rulings, the SPS requires that members take GATT Article XX qualified measures based on scientific evidence and risk assessment. However, due to the complexity of environmental issues, limited understanding of the ecological system and reversibility of environmental changes, governments often make law in the absence of full scientific certainty.

In the 1997 EU-Hormones case, the panel concluded that the EU, by maintaining sanitary measures which were not based on a risk assessment, contravened Article 5.1 of the SPS. The Appellate Body confirmed that the lack of a risk assessment which reasonably supports or warrants the EU's beef hormones import prohibition is inconsistent with the requirement of SPS Article 5.1.

The EU argued that the precautionary principle (which allows states to take precautionary measures in absence of full scientific certainty) is a customary rule of international law or at least a general principle of law. But the Appellate Body agreed with the panel that the precautionary principle has not been written into the SPS agreement as a ground for justifying SPS measures. The Appellate Body reasoned that although the precautionary principle indeed finds reflection in Article 5.7 of the SPS Agreement,[35] the principle does not relieve a panel from the duty of applying the normal principles of the SPS agreement.[36]

Since the EU-Hormones and other related cases (including Australia-Salmon[37]), the past two years has seen clear recognition of the precautionary principle. In the 2000 Cartagena Protocol on Biosafety, the precautionary principle was, for the first time, formally written into an international agreement. Nevertheless, there is great controversy over how it will be applied. The EU-Hormones Appellate Body pointed out that "the precautionary principle… still awaits authoritative formulation" and was reluctant to pass authoritative judgment on it.[38]

IV Implications for China as a member

As a member of the WTO, China enjoys all the rights specified in the WTO rules, and bears the obligations of the WTO agreements. China needs to take adequate measures to address the issue of environmental impacts brought about by further trade liberalization in the post-WTO era. As the environment has been included in the new round of multilateral trade negotiations, China needs to participate in the process of making rules related to trade and the environment that will promote sustainable trade of Chinese exports and also support its domestic and global efforts to protect the environment.

Right to adopt environmental measures as It deems appropriate

WTO membership allows China to retain its right to develop and implement its environmental policy. It can choose the appropriate level it deems necessary to protect its environment and natural resources. This has been repeatedly affirmed by the WTO Dispute Resolution Body's (DRB) rulings.

According to the WTO DRB rulings, countries can take measures to protect human health and the domestic environment as long as they meet with the requirements of the WTO agreements. They can also adopt certain unilateral measures to protect the global environment under certain conditions. Although such measures were not historically allowed in WTO jurisprudence, in the U.S.-Shrimp/Turtle case, the U.S. was permitted to embargo shrimp caught without sea turtle excluding devices in order to effect an environmental policy objective outside its jurisdiction. This was permitted under the condition that the U.S. had taken action earnestly seeking an international agreement on measures to protect sea turtles.

China's rapid economic development and expansion of exports requires further efforts to protect its environment and to use its natural resources sustainably. Strengthening environmental laws and regulations

and environment-related trade rules is a necessity in its further trade liberalization process. It will contribute to more efficient allocation and use of resources and, therefore, to an increase in production and income with less pressure on the environment.

Over the past years, China has established a comprehensive set of laws for environmental protection, ranging from the constitutional provisions concerning the environment, the basic environmental protection law and laws concerning air, water, solid waste pollution control, land, forest, wildlife and marine protection to various administrative regulations, standards and guidelines implementing these laws. These laws and regulations contain a range of command-and-control measures as well as some economic incentives (such as pollution charges) and a network for administering, monitoring and enforcing environmental policy.

Further economic development and trade liberalization will require more efforts to improve and upgrade its environmental legislation, to strengthen its environmental standard-setting, to strengthen environment-related trade rules including better control of hazardous chemicals and wastes imports, and management of genetically modified products (GMOs), imports, etc. The WTO rules have provided the basic ground on which China can formulate its environmental policy at a level it deems appropriate.

WTO obligations

In improving its environmental policies and formulating environment-related trade policies and measures, China must make certain that its current and future environmental regulations meet the WTO obligations under various provisions in the WTO agreements.

These obligations are outlined in the discussion of environmental provisions and the legal interpretations by the WTO DRB in the previous sections. In sum, measures taken by governments under the WTO agreements have to: (1) fall into the scope of Article XX and be necessary for environmental protection; (2) not contravene the GATT core principles of most-favoured nation and national treatment, and be the least trade-restrictive measure; (3) meet the requirements of the chapeau, which requires a measure not be arbitrarily or unjustifiably discriminatory, or constitute a disguised restriction on trade; (4) be transparent in rule-making; (5) adopt international standards as much as possible; and (6) be based on scientific evidence and risk assessment. This means any new environmental rules formulated in the future have to meet these criteria.

China also needs to review its existing environmental laws and regulations in line with the above WTO principles. China has realized the challenges it faces as a WTO member—the Chinese State Environmental Protection Administration has started an overall review of Chinese environmental policy and regulations aimed at identifying and correcting any WTO inconsistency,[39] a proper step in honouring its commitments to the WTO. Any laws and regulations found inconsistent with the WTO rules need to be rectified.

Transparency in rule-making is one of the most important requirements under WTO rules. China promised in its protocol of accession to the WTO to publish its laws and regulations and to provide a reasonable commentary period before such measures are implemented. This includes environmental laws and regulations, trade laws and regulations, environmental standards and other technical standards as well as sanitary and phytosanitary measures that aim to protect the life and health of humans, plants and animals. To fulfill China's WTO obligation on transparency, China established an official China-WTO Notification and Information Enquiry Centre under the Ministry of Foreign Trade and Economic Cooperation on December 11, 2001, when it became a member of the WTO. It also issued the Measures Concerning Notification and Information Enquiry effective as of January 14, 2002. The Centre aims to provide information on Chinese laws, regulations and measures concerning trade in goods and services, customs and foreign exchange, etc.

However, some existing Chinese rules seem to raise the concern of transparency and notification. The recent U.S.-China trade conflict concerning Chinese genetically-modified organisms regulations demonstrates the importance of transparency and prior notification in environmental rule-making. China announced in July 2001 that it would impose new regulations on genetically-modified organisms to be implemented on 20 March 2002. The rules require sellers of GMOs to get official permits, and GMO products to be labelled. Importers will be required to get governmental approval by providing proper documentation.[40] This approval procedure can take up to 270 days.

The U.S. has expressed its concerns regarding vague language in the regulations, the lengthy approval process and an unclear implementation date.[41] Chinese buyers ceased entering into future contracts with U.S. exporters for fear of running afoul of the rules. The U.S. is now pushing for the delay of Chinese GMO rules and demanding a public notice as soon as possible that these biotechnology imple-

menting regulations will not be promulgated until after a period of notice and consultation. Interestingly, the U.S. is not challenging the substance of the Chinese GMO rules, but the transparency of the rule-making process.

In response to the U.S. complaint, China issued an interim regulation. The interim arrangements allow overseas firms that export GMO food products to China to apply for an "interim certificate" from the Agricultural GMO Administration Office under the Ministry of Agriculture with the valid evaluation documents issued by the competent authorities of the exporting countries or a third country. The MOA will issue the interim certificate within 30 days if the documents are verified. China will maintain this procedure until December 20, 2002.[42] This interim measure will give U.S. companies enough time to learn how to successfully use China's GMO approval system.

Adapting to the changing international markets

The international market is changing rapidly. One noticeable trend is that consumers increasingly demand sustainable products, and governments increasingly adopt environmental policies that meet their needs. This has led to more stringent environmental standards and the use of an array of eco-labels, boycotts, discriminatory government purchasing policies and the like. It could also provide an opportunity for protectionist forces to use these policies for their own purposes. China's WTO accession will provide China with tremendous opportunities to expand its exports, including exports of sustainable products. However, some of its major exporting sectors such as textiles, toys, leather and other light industry products may face challenges from green consumers in developed countries.

It should be noted that, because the WTO allows members to retain their right in taking measures they deem appropriate to protect the environment, many such measures taken by other governments are WTO consistent.

Under such circumstances, China needs an adaptive strategy. China needs to strengthen environmental regulations and standards in its major export sectors, bringing Chinese standards in line with internationally accepted ones. Efforts should also be made to help enterprises enhance their competitive position in the international market, including research and development of more environmentally-friendly products, substitutes for banned materials and the creation of economic incentives to encourage such products; active promotion of clean production and strengthening environmental management; and wide application of various voluntary environmental measures including ISO 14000 and eco-labelling. Efforts should also be made to establish an information exchange mechanism within China and with foreign countries on environmental standards and requirements, and to strengthen international cooperation on mutual recognition of technical standards, ISO 14000 certification and eco-labelling. Although a centre for providing Chinese information on laws and regulations has been established, yet the centre should also provide foreign information on environmental and health measures taken by other countries to domestic companies to help them acquire the information on foreign environmental measures that might affect their exports.

China started an eco-labelling programs in 1993, but it is rarely known to other countries. An ISO 14000 certification system has also been developed in China. However, international cooperation on mutual recognition of these programs is lacking.

China will need to work with other WTO members to consider the development of a set of rules preventing the use of environmental measures as trade protective measures and minimizing trade barriers to exports, particularly from developing countries. Some provisions already existing in the WTO TBT and SPS texts may be useful to minimize trade difficulties for developing countries. These include:

- the WTO Secretariat should draw attention to any notifications related to standards for products of particular interest to developing countries;
- developed countries are required to take account of the special needs of developing countries in the preparation of new measures;
- adequate time should be allowed between the publication and entry into force of proposed measures;
- the notification procedures for proposed measures should provide developing countries with the possibility of identifying where they may have potential problems meeting new requirements, and the opportunity to request a phased introduction of the proposed measures; and
- where substantial investments are required for an exporting developing country to fulfill the SPS

and technical requirement of an importing country, the latter shall consider providing technical assistance to permit the developing country to maintain and expand market access opportunities for the product involved.

Dispute settlement mechanism

The WTO dispute settlement mechanism will provide China with a tool to protect its trade and environment interests. Over the past few years, there were a number of trade conflicts between China and other countries related to environmental measures. Non-WTO membership prevented China from bringing its disputes to the WTO dispute settlement system. China's WTO membership will provide a channel for bringing trade conflicts to the WTO for a fair settlement which could safeguard China's trade and environment interests.

With its rapid economic development, China needs to strengthen its environmental regulations and it is inevitable that WTO members will likely challenge these new regulations under the WTO DRB, if they don't meet the WTO principles discussed above "WTO Obligations." WTO membership also means that China can play an active role in formulating rules governing trade and environment relationships in the WTO. At the 2001 WTO Ministerial Meeting in Doha, Qatar, members of the WTO agreed to launch a new round of multilateral trade negotiations. The Doha Ministerial Declaration lists trade and environment as one of the negotiating agenda items. The launch of negotiations on the environment in the new WTO round opens the door to better integration of trade and environment objectives, to develop rules governing trade and environmental relationship. This will help avoid trade disputes from arising, and China can play a significant role in the development of these rules.

Actively participating in the new round negotiations on the environment

As a member of the WTO, China will participate in a new Round of trade negotiations and the establishment of international trade rules. With its economic size, its dimensions of trade, its status as the principal recipient of investment among developing countries, China is likely to become one of the most important key players in the WTO regime, with input on all the important issues. The launch of the new Round of multilateral negotiations will include an environmental agenda; however, developed and developing countries are divided in the debate concerning trade, environment and development. Developing countries reject any inclusion of environmental or labour issues and call for full implementation of the Uruguay Round Agreements, while a growing number of developed countries in Europe and North America call for strong environmental measures and support an environmental review of trade agreements.

The history of negotiations has shown that work at national levels may be even more important. In the Uruguay Round, in the absence of identification of issues and interests at the national level, developing countries' positions were largely defined by the delegations in response to international discussions, rather than by national governments in response to national pressures. Smaller countries followed the leadership of the major developing countries. China has now started its preparation for the WTO negotiations. It proposes that the objective for the new round negotiations should be to establish a fair and rational international economic order, balancing the interests of developed countries and developing countries. On the trade and environment front, a coordinating group has been established, which is comprised of officials from the Ministry of Foreign Trade and Economic Cooperation, the State Environmental Protection Administration and other departments. The purpose of this group is to coordinate the relevant departments and to form an integrated negotiating position.

China needs to acquire a national capacity for trade policy and trade negotiations, giving its delegation a clear mandate from its government. This will require knowledge and thorough understanding of WTO agreements, issues related to trade and the environment, as well as the rights and obligations as a WTO member by governmental officials in the relevant departments responsible for trade and the environment at national and sub-national levels, and by policy researchers who are likely to influence policy-makers. This can be accomplished through a great deal of research and extensive training programs.

China also needs to identify its interests in the environment and sustainable development in the new Round of negotiations. In recent years, China has transformed from an inward-orientated to an outward-orientated economy. As a major exporter of manufactured goods, its interests may be different from those of other developing countries. Its export-led growth means that only clear rules can prevent unnecessary trade obstacles in promoting its exports. Thus, clear environmental rules may promote efficiency and remove constraints on development.

It is crucial that China develops a forward-looking position and plays a major role in discussions on the issues of trade, environment and sustainable development.

V Conclusions

A number of WTO agreements contain certain environmental provisions. WTO jurisprudence has increasingly been sensitive to the need to protect the global environment. As a WTO member, China has the right to develop and implement its environmental policies and measures as it deems necessary. However, in implementing its environmental laws and measures, China needs to fulfill the WTO obligations, ensuring its environmental measures are transparent, based on certain scientific evidence and are least trade restrictive. Although China's WTO accession will provide China with tremendous opportunities to expand its exports, China needs to adopt an adaptive strategy to cope with the rapidly changing international market in response to consumers' preference for environmentally friendly goods and services. As an increasingly emerging economy and the largest developing country in the world, China can play a significant role in the new Round of multilateral trade negotiations and in the development of the WTO rules governing the relationship of trade and the environment, balancing the interests of developed and developing countries and promoting trade liberalization that also supports sustainable development. It is in China's interest to protect its environment, improve global sustainability, and promote its exports in accordance with clearer rules (and avoid disputes from arising due to ambiguous rules). China should seize the opportunity.

Endnotes

1 Agreement on Technical Barriers to Trade (TBT) Article 2.

2 TBT Article 2.2.

3 TBT Article 2.4.

4 TBT Article 2.9 (2.9.1-2.9.4).

5 TBT Annex A.1 lists four categories of SPS measures eligible for the application.

6 The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), Article 2.1.

7 SPS, Article 2.2.

8 SPS, Article 5.

9 WTO web site at <http://www.wto.org>.

10 Paragraph 28, Doha Declaration.

11 Article XXIII(2), the Agreement on Government Procurement (1994).

12 Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), Article 27.2.

13 TRIPS, Article 27.3(b).

14 WTO Secretariat, Introduction: Environmental Issues in the WTO, http://www.wto.org/english/tratop_e/envir_e.htm.

15 The Appellate Body Report on U.S. – Import Prohibition of Certain Shrimp and Shrimp Products (WT/DS58/AB/R).

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17 Both Tuna-Dolphin I and II rulings reached such conclusions.

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20 *Ibid*.

21 The Appellate Body Report on United States – Import Prohibition of Certain Shrimp and Shrimp Products, para. 186, WT/DS58/AB/R, November 6, 1998.

22 The Panel Report on European Communities - Measures Affecting Asbestos and Asbestos-Containing Products, WT/DS135/R, September 28, 2000.

23 The Appellate Body Report on European Communities – Measures Affecting Asbestos and Asbestos-Containing Products, paras. 169–175, WT/DS135/AB/R, March 12, 2001.

24 These rulings include U.S.-Gasoline (WT/DS2-4/R, May 20, 1996), *U.S.-Shrimp/Turtle (WT/DS58/AB/R, November 6, 1998)*, *EU-Asbestos (WT/DS135/AB/R, April 5, 2001)*, and the 2001 *U.S.-Shrimp/Turtle Compliance Case (WT/DS58/RW, June 15, 2001)*.

25 See *U.S.-Gasoline (WT/DS2/DS4/R, May 20, 1996)*, *U.S.-Shrimp/Turtle (WT/DS58/R, November 6, 1998)*; and *EU-Asbestos (WT/DS135/AB/R, April 5, 2001)*.

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27 See Note 23.

28 *Ibid.*

29 The EU-Asbestos Panel Report, para. 8. 237–239, WT/DS/135/R, September 28. 2000.

30 World Trade Law, *Dispute Settlement Commentary (DSC) on the EU-Asbestos Panel Report*, http://www.worldtradelaw.net.

31 Peter Morici, *Reconciling Trade and the Environment in the WTO*, a study released by the Economic Strategy Institute in Washington, DC in January 2002 – http://www.econstrat.org/reconciling_in_the_WTO.htm.

32 The *U.S.-Shrimp/Turtle* Compliance Appellate Body Report, WT/DS58/RW, June 15, 2001.

33 *Ibid.* Para. 5.87.

34 The Panel Report on U.S. – Import Prohibition of Certain Shrimp and Shrimp Products, para. 9.1, WT/DS58/R, May 15, 1998.

35 The precautionary principle is implicitly incorporated in the SPS agreement by allowing Member States to adopt provisional measures on the basis of available pertinent information. Article 5.7 provides that "In case where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information…"

36 European Communities – Measures Concerning Meat and Meat Products (Hormones), para. 124, WT/DS48/AB/R, January 16, 1998.

37 Australia – Measures Affecting Importation of Salmon, WT/DS18/R, June 12, 1998 and WT/DS18/AB/R, October 20, 1998.

38 See Note 49, para. 123.

39 China Environment News, Interview with Minister Xie Zhenhua on WTO Accession, p. 1, November 27, 2001.

40 *Administrative Measures Concerning Importation of Agriculture GMOs and Their Safety*, adopted by China's Ministry of Agriculture, July 21, 2001.

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Environment and Sustainable Development in the Doha Round

by Konrad von Moltke

China's accession to the World Trade Organization (WTO) is a major step both for China and for the WTO. It is widely expected that WTO accession, specifically the bilateral agreements between China and many WTO members that preceded accession and the adjustment of the Chinese economy to the requirements of the WTO agreements, will have a significant impact on the Chinese economy.

As the environment has become an integral part of the Doha Round, China will need to address the full range of environmental issues identified in the Doha Ministerial Declaration. As with most issues on the WTO agenda, successful negotiations will depend on forging alliances between developed and developing countries around a common agenda. China can play an important role in this area. It is an opportunity to strengthen environmental protection and to promote sustainable development. It is important to keep in mind that some of the most important negotiations from the perspective of environment and sustainable development will occur in areas that have not been explicitly identified as forming part of the environmental agenda.

Environmental and sustainable development aspects are embodied in the entire Doha Ministerial Declaration. These include environmental issues for negotiations (para. 31); issues being considered for negotiations (para. 32); other negotiation issues that are significant for environment and sustainable development; sustainable development dimensions of new issues; and the need for technical assistance and capacity building (para. 33). The paper outlines these elements and also stresses the importance of a "sustainable development agenda" for the WTO.

1 Environmental issues for negotiation (Para. 31)

There are several mentions of the environment in the negotiating agenda of the Ministerial Declaration. Some concern issues for negotiation; some the negotiation process itself.

The negotiation items form part of the "single undertaking," meaning that nothing will be considered finalized in the negotiations unless everything has been agreed, including the environmental items.

1.1 Multilateral Environmental Agreements (MEAs). The most specific negotiating mandate on trade and environment in the Doha Ministerial Declaration concerns the relationship between the multilateral trading regime and MEAs. It includes two elements: negotiations to clarify the relationship between "existing WTO rules and specific trade obligations set out in MEAs…" and "procedures for regular information exchange between MEA Secretariats and the relevant WTO committees, and the criteria for granting observer status."

The first part of this mandate is closely limited to exclude the problem of countries that are members of the WTO but not of the MEAs, most significantly the United States. It contains a clause protective of U.S. rights under the WTO in relation to the action of MEAs. There exists a significant risk that such negotiations will actually limit the scope of current interpretation of WTO rules, following the Appellate Body report on the shrimp-turtle dispute. On the basis of this report, it could be assumed that actions based on the decisions of parties to MEAs will enjoy the protections of GATT Art. XX (that provides exceptions to the principle of non-discrimination), and thus can be applied to WTO members who are not party to the MEA in question.

Since the ability to create both positive and negative economic incentives for non-parties to join or to at least respect MEAs can be an important part of their effectiveness, such negotiations give rise to some environmental concerns if they are not properly balanced. China will need to ensure that the WTO does not release members from their joint and differentiated responsibility for international environmental issues.

1.2 Environmental Goods and Services. Paragraph 31 of the Doha Declaration also envisages negotiations on "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services." This goal is the result of searching for "win-win" solutions for trade and for the environment. It seems like a natural goal but it is worth underlining that no group of products and services has been thus

singled out before. It remains to be seen whether any significant commercial interests in some countries are affected negatively and thus may attempt to derail this process. In terms of the negotiation itself—and its impact on China—the most important decisions will occur in determining what are in fact "environmental goods and services." Many such goods and services are closely integrated with other goods and services in ways that may make it difficult to develop sufficiently precise distinctions that can broken down in the customs classification system. There will probably be a debate about whether products that have been produced in an environmentally sound or sustainable manner qualify under the mandate.

1.3 Fisheries. The Doha Ministerial Conference saw the emergence of novel alliances within the WTO trading system. The landmark decision on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and public health was initially promoted by an alliance of southern governments and northern non-governmental organizations, an alliance that proved able to overcome the strong resistance to such a decision from many pharmaceutical companies and the countries where they are based. Similarly the inclusion of fisheries subsidies as a subject for negotiation can be seen as the result of an alliance between a group of developed and developing countries and some large northern environmental organizations. Like the decision on environmental goods and services it represents the fruit of a search for "win-win" solutions, where trade measures would both contribute to liberalization (by removing distorting subsides) and to environmental conservation (by protecting fish stocks, including some endangered species). The fisheries negotiations will be of concern to countries that have large fish stocks or that fish in regions with severely depleted fish stocks. China is affected from both points of view.

Negotiations on fisheries subsides are mentioned in paragraph 31, but the actual mandate is lodged in the section on rules. It is widely assumed that the negotiations on fisheries subsidies will not occur in the negotiating committees established to address the environmental issues but rather in the rules segment. This links them to some of the most controversial aspects of the Doha negotiations, namely the application of anti-dumping rules. It suggests that success or failure of the fisheries negotiations will be closely linked to success or failure on other issues that have the potential to become the focus of the final stages of negotiation at high levels.

1.4 TRIPS Art. 27.3(b) and the Convention on Biodiversity (CBD). For several years, concern about the relationship between TRIPS and CBD has been an important part of the environmental agenda of developing countries. The inclusion of this item on the Doha agenda (as part of the TRIPS negotiations rather than within the environment section) represents a success for developing countries and illustrates that the concern for trade and environment is no longer just a northern issue.

At issue is the need to ensure that plant varieties essential for the maintenance of biodiversity and traditional knowledge associated with plants that have commercially useful properties are appropriately protected within the TRIPS system. The difficulty lies in that such plants and knowledge are typically found in developing countries while the ability to commercialize them is often to be found in developed countries.

The resulting rules have the potential to be of particular significance for systems of medicine, such a traditional Chinese medicine, that rely on plant and animal parts and socially evolved knowledge concerning their most effective uses for purposes of human health.

1.5 Process Issues. In addition to identifying the particular needs to ensure communication between MEA Secretariats and the appropriate WTO committees, the Doha Declaration includes some striking provisions concerning the role of the Committee on Trade and Environment (CTE) and the Committee on Trade and Development (CTD). The penultimate paragraph (51) of the Declaration specifies that the CTE and the CTD are to "act as a forum to identify and debate developmental and environmental aspects of the negotiations, in order to help achieve the objective of having sustainable development appropriately reflected." This is a procedure without precedent so it is impossible to predict its impact. In principle, the CTE and the CTD are being given a mandate to review the entire negotiation, without any limit, so as to ensure that the result reflects the objective of sustainable development. This unusual provision is justified by the fact that sustainable development is included in the Marrakech Agreement establishing the WTO as the only substantive criterion for the work of the organization. Its impact is, of course, mitigated by the fact that the CTE and the CTD, like virtually all other organs of the WTO, are only committees of the whole of the General Council. It assumes that the members will be able to review their own work critically through this mechanism. Nevertheless, it expresses an unusually clear commitment to sustainable development as an underlying principle of the negotiations, giving practical sub-

stance to the otherwise declaratory language on sustainable development in the opening sections of the Declaration. The existence of such implementing provisions lends additional weight to the preambular language. Moreover, the special role of the CTE gives greater significance to the provisions in paragraph 31 concerning communication with Secretariats of MEAs.

It is worth underlining that this innovative option exists only when the CTE and the CTD are able to work together. It puts a premium on focusing on sustainable development rather than just environment (or development) and creates interesting options for developed and developing countries alike.

2 Items that are being considered for negotiation (Para. 32)

In addition to identifying a number of issues that are to become part of the single undertaking, the Doha Ministerial Declaration also listed further issues of environmental concern that call for additional consideration to determine whether the basis for productive negotiations exists.

2.1 Environmental Measures and Market Access. Market access is the most important outcome of trade liberalization for countries that have comparative advantage for certain goods and services. (For countries that provide market access, the outcome is an increase in welfare by increasing the purchasing power of consumers). For developing countries in particular, the relationship of environment and market access has been of vital concern as there was continuing fear of protectionist capture of the environmental agenda, in which case market access would be limited rather than enhanced. The resulting debate has been vigorous and rendered more difficult by three factors.

Distinguishing legitimate environmental measures from protectionist ones is very difficult. This requires a degree of environmental expertise combined with specific trade expertise that is not generally available. Experience with a number of important WTO disputes, notably shrimp-turtle and asbestos, indicates how difficult these questions are.

Equally important is the difficulty in assessing the full economic impact of legitimate environmental measures. These result in structural economic change, as does trade liberalization, so it can prove difficult to identify the effect of either policy area on the other. Moreover, environmental measures can shift the balance of comparative advantage not only between countries but also within countries. In other words, some exporting firms may be disadvantaged but other exporting firms may benefit and situations may exist where there are net gains yet the disadvantaged firms may make it difficult to recognize these.

Finally, the economic concerns with environmental measures may have more to do with the ability to recover additional costs from markets rather than just with market access. Changes in environmental measures may be desirable if the importing country markets provide the necessary resources to protect the environment of the exporting country. In that case, there is economic and welfare gain in the exporting country. On the other hand, if costs rise but markets do not provide the necessary resources there will be welfare loss.

The stakes are particularly high for developing countries that depend on the export of commodities. Commodity markets exhibit fewer rents than markets for specialty products, for example those protected by intellectual property rights. Producers must be concerned about any measures that increase production costs without offsetting price increases. On the other hand, if solutions can be found that permit funding environmental protection expenditures connected to commodity production without changing relative market position, the potential gains for developing countries would be significant.

These questions are difficult to address and appear not to be sufficiently understood to permit actual negotiations to take place. Because of their potential significance, it is just as important not to make mistakes through the outcome of negotiations as it is to negotiate to change current rules.

2.2 Other TRIPS Issues. In addition to its affirmative language on negotiations concerning TRIPS and CBD, paragraph 32 of the Doha Declaration instructs the CTE to give special attention to "the relevant provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)." The CTE considered this issue on the basis of a working paper prepared by the Secretariat in 1995. It appears unlikely that this topic will be ready for active consideration in the negotiations.

2.2.1 Labelling. Labelling has been one of the most difficult issues facing the Committee on Trade and Environment. Labels—or "eco-labels"—provide product information to the user who unpacks them. Labels are not able to convey complex analytical information but must respect a highly formalized presentation to ensure that a maximum of information is imparted—and to avoid labels that can give

rise to misunderstandings. Labels are typically designed to provide information on hazards associated with a product and with basic information relating to the product's consumption, for example the kinds of fibre employed in manufacture or the nutrients contained in food.

"Eco-labels" are designed to provide environmental information to consumers. They have been controversial because the information they can include is inevitably partial relative to complex environmental considerations. Life-cycle analysis of a product can involve hundreds of factors. A description of the environmental conditions of production can be no less complex. Yet labels attempt to encapsulate all this information in a few synthetic values and expressions—and how these are selected can have dramatic impacts on the competitiveness of products. It is possible to have an eco-label for paper that emphasizes the raw materials that have been used (for example virgin or recycled), the energy that was used (for example fossil fuels or renewables), or the bleaching process (with or without chlorine). These factors are quite diverse and it is not possible to express them in a single product designation. Yet labels that contain too much information are known to confuse consumers. There is consequently a significant level of conflict surrounding the formulation and use of eco-labels.

Within the WTO the questions begin with consideration of which WTO Agreement applies. Several developed country delegations have argued that the TBT and its relatively permissive procedural requirements apply. These are designed to deal with more technical matters and are not certain to be sufficiently open and flexible to cover the needs of eco-labelling.

Developing countries have been concerned about the openness and cost of certification required for some eco-labels.

This is an issue that is unlikely to go away. If there are no negotiations on it within the Doha framework it is likely that there will be negotiations when the next round of trade talks is launched.

3 Other negotiation issues that are significant for environment and sustainable development

Some of the most important sustainable development issues will arise in relation to negotiations that have not explicitly been identified as "environmental."

3.1 Agriculture. It is hard to overstate the importance of agriculture for sustainable development. But it is also increasingly hard to overstate the importance of environment and sustainable development for agricultural negotiations. The stark reality is that agriculture is not possible in many developed countries without subsidies, and that the opposite of over-supply induced by subsidies is famine caused by market fluctuation. These two realities have long made agricultural trade negotiations different from any others.

There is no longer any doubt that the subsidies that have been put in place by the wealthiest countries—the United States and the European Union in particular—cause enormous damage to the people and economies of many developing countries. These subsidies, in particular export subsidies of all kinds, have to be changed. Yet the need for some subsidies remains very strong in many developed countries. Thus the debate is slowly shifting away from an attempt to eliminate all subsidies to a debate about which subsidies are most harmful. In this context, subsidies designed to support conservation in the rural environment, and subsidies that stabilize rural populations and communities—in other words subsidies for sustainable rural development—are emerging as one area where important social objectives can be achieved even while stabilizing international agricultural markets.

China is bound to become a key actor in the agricultural negotiations. As discussed above, some of the most important impacts from WTO accession are expected in agricultural markets. As production intensifies, China will confront the same issues of rural conservation that had to be addressed in developed countries. And China has an overriding interest in sustainable development of rural communities as an alternative to uncontrolled urban expansion. In these respects, China's interests are different from, but not necessarily contrary to, those of the European Union or developed countries in Asia.

The Uruguay Round Agreements included the Agreement on Agriculture (AoA), which for the first time brought agriculture under the GATT rules. The preceding years had been dominated by the debate about the need to include agriculture in the GATT. Since the end of the Uruguay Round, the WTO debate has focused on the need to eliminate subsidies, and the Doha Declaration contains language that for the first time envisages "reductions of, with a view to phasing out, all forms of export subsidies." It is likely that the debate will increasingly shift to the equally difficult and complex subjects identified as the long-term objective of the AoA, namely "to establish a fair

and market-oriented trading system through a program of fundamental reform encompassing strengthened rules and specific commitments on support and protection in order to correct and prevent restrictions and distortions in world agricultural markets." This is a task that will take many years to accomplish, one that is of central concern from the perspective of sustainable development, and one in which China has a very large stake.

3.2 General Agreement on Trade in Services. The General Agreement on Trade in Services (GATS) was also one of the major achievements of the Uruguay Round. The GATS is constructed as a "bottom up" agreement, meaning that only those services that are covered country by country are those that countries have specifically listed as included. This renders any general statements about the relationship of the GATS to sustainable development very problematic.

There is no doubt that many services are of crucial significance for sustainable development including, but not limited to, banking and insurance, transportation, tourism and environmental services. As always, liberalization can be expected to have complex environmental and sustainability consequences. While closed or otherwise distorted service markets are unlikely to contribute to sustainable development it is not obvious either that liberalization will bring only benefits. These are matters that need a good deal of further analysis.

GATS negotiators have been addressing issues related to the regulation of services, such as training, certification and licensing. These are areas that provide fairly obvious opportunities for the creation of a variety of barriers to market entry so the concern for these regulations is understandable. Yet any negotiations that seek to establish general principles for domestic regulation are potentially significant from the perspective of sustainable development.

The distributional effects of liberalizing services are not well understood. While the principle of comparative advantage applies to services, market position is often determined by factors other than price. Moreover, many service industries require training, certification and licensing, all of which can impact on the distribution of benefits that may be generated by liberalization. Indeed, thus far it has not been possible to model the growth impetus from services liberalization in the same manner as has occurred for trade in goods.

In light of the numerous uncertainties that continue to exist in the area of trade in services, it is difficult to identify the interests of China and developing countries. In general, developed countries have been making a transition towards economies in which services have become a vital source of growth and wealth creation. The economies of many developed countries are by now dominated by service industries. No developing country has made a comparable transition, so it must be assumed that developed countries will be exporters of services and developing countries importers. The advantages to exporters of services are fairly obvious. Yet the welfare gains by developing countries are not as clear-cut. On the one hand, many of the services that are exported are fundamental to the development of an internationally competitive economy so that access to these services is almost a condition of development. On the other hand, the provision of these services gives a significant measure of influence, not to say control, over the domestic economic affairs of the country concerned. It is consequently essential to ensure that service providers also act in the interests of their hosts.

It has often been remarked that it is difficult for developing countries to assess the advantages and disadvantages of complex trade negotiations. This observation is particularly true for services where the stakes are high yet analytical support for particular negotiating positions can be difficult to come by. It is critical to ensure that the GATS negotiations reflect an appropriate balance between the interests of service providers and host countries.

3.3 Trade-Related Aspects of Intellectual Property Rights (Implementation and Geographical Designations). Intellectual property rights are important wherever innovation represents a significant factor of development, and where it is important to protect goods that incorporate social investments, such as certain wines or traditional knowledge. The TRIPS Agreement represented an initial compromise among the countries that were contracting parties to the GATT at the time of the Uruguay Round. New members of the WTO have accepted this compromise as a condition of membership. Nevertheless, the balance between benefits and costs of an international intellectual property regime is bound to be dynamic and may shift in light of experience with the existing TRIPS Agreement. The Declaration on the TRIPS Agreement and Public Health, adopted at the Doha Ministerial Conference, is an example of this learning process. It also illustrates the manner in which the TRIPS Agreement can become entwined with the pursuit of major policy objectives, such as public health—or sustainable development.

4 Sustainable development dimensions of new issues

Ministers in Doha agreed that negotiations will take place on several issues on the basis of a decision to be taken at the Fifth Session of the Ministerial Conference. The status of these issues within the negotiations initiated at Doha remains ambiguous. The language used to describe the prospect of negotiations is identical for all four issues: "Recognizing the case for a multilateral framework [for investment, competition, government procurement, trade facilitation], and the need for enhanced technical assistance and capacity-building in this area…, we agree that negotiations will take place after the Fifth Session of the Ministerial Conference on the basis of a decision to be taken, by explicit consensus, at that Session on modalities of negotiations." On the face of it, this language agrees to negotiations but leaves the definition of modalities to the next Ministerial. Yet different interpretations abound, ranging from insistence that nothing has been decided to insistence that nothing remains to be decided.

All four issues can be of great importance to achieving sustainable development.

4.1 Investment. The stakes in an investment agreement are very high. The future of every economy depends on investment. Only through investment will it be possible to move from a less sustainable to a more sustainable economy. Many developing countries depend on foreign investment to augment an inadequate domestic stock of capital. At the same time, foreign investors may exert undue influence on these countries or may not contribute adequately to their domestic development priorities. The prospect of negotiations on investment presents both risks and opportunities from the perspective of development.

The Uruguay Round set out some initial markers for an investment agreement in the WTO through the investment provisions of the General Agreement on Trade in Services (GATS) and the Agreement on Trade-Related Investment Measures (TRIMS). Following conclusion of the Uruguay Round, negotiations were launched within the OECD for a Multilateral Agreement on Investment (MAI). The MAI was modelled on the investment provisions of the North American Free Trade Agreement (NAFTA)—at that time the most recent and most highly developed multilateral investment agreement.

The MAI included provisions designed to ensure non-discrimination (most-favoured-nation treatment and national treatment), prohibitions against certain "performance requirements," rules on minimum international standards of treatment and expropriation, and an investor-state dispute settlement procedure that utilized existing commercial arbitration institutions (ICSID and UNCITRAL). The MAI attracted unexpected attention, triggered by environmental concerns. As public unease increased, so did the realization among negotiators that the stakes were higher than anticipated. The number of exceptions grew very large. The MAI negotiations were abandoned when France withdrew, largely because of its desire to shield its cultural institutions.

All the above agreements and processes focused on the rights of the foreign investor and the obligations of the host state. There have also been attempts to develop international agreement on the obligations of foreign investors, but these have not been linked to the investment agreements in a binding way. The UN Centre on Transnational Corporations (UNCTNC) spent several years negotiating a code for transnational corporations but had to abandon the effort in light of unremitting opposition from developed country enterprises. The OECD has a set of Guidelines for Multinational Enterprises that were recently revised.

Since the collapse of the MAI negotiations, there has been some uncertainty about how to proceed, with most advocates of a multilateral agreement assuming that the WTO was the appropriate forum for negotiations on investment. Resistance to such negotiations has come from a small group of developing countries.

It remains unclear what a WTO agreement on investment would look like. A list of the primary tasks to address this issue by the Working Group on the Relationship between Trade and Investment,[1] appears to exclude some of the more controversial elements of the NAFTA/MAI approach, most notably the inclusion of portfolio investment and the investor-state dispute settlement process. Yet there is no guarantee that the process of negotiation will not lead right back into the quagmires of the MAI and NAFTA. For example, one would anticipate rules on expropriation to be included, as they are in almost all other investment agreements, even though this is not expressly stated. It is widely assumed that the lessons from the MAI failure and the ongoing NAFTA controversies will be learned—but what the lessons are still depends on whom you talk to.

There has not been much discussion about the purposes of an investment agreement. It is assumed that a non-discriminatory regime will lead to better allocation of scarce capital and that a reduction of political risks will permit investment at lower rates of

return. But there is little empirical evidence that the existing investment agreements have made any difference, let alone promoted more efficient use of capital. The available evidence supports the prohibition of performance requirements as economically inefficient instruments, but not much more.

Yet the consequences of an effective investment agreement are potentially enormous. They differ dramatically between developed and developing countries. An international agreement must interact with domestic institutions to balance investor rights and public goods. In most developed countries, these institutions involve highly developed procedures for the administrative review of projects and for regulatory or policy decisions impacting investments, followed by several layers of judicial review in cases of disputes. If an international regime is to involve itself in these sensitive matters, it will require more sophisticated international institutions than have been envisaged in most investment agreements. In developing countries, the task is to develop the institutional capability to properly assess, regulate and work constructively with investment projects in light of the public interest and the protected private rights. Ideally, an international agreement should promote the development of domestic capability, not preempt it.

Investment negotiations in the WTO are still at an early stage but the decisions that are taken in the coming months to frame those negotiations will largely determine the direction that they will take in the future. An investment regime that promotes sustainable development would be very welcome—but one that fails to do so can give rise to significant levels of conflict. Because the issues for an investment agreement have not been clearly articulated, many developing countries have not been able to consider what is in their best interests. Many have tended to respond to the expression of interest, in particular on the part of the European Union, rather than determine their own approach to these matters.

4.2 Competition Policy. The Doha Agenda proposes further trade and investment liberalization with a continued process for reducing non-tariff barriers to trade and opening domestic markets to foreign investment and service providers. The continued trend towards liberalization places increased pressures on monitoring and preventing anti-competitive practices that distort—and may even reverse—the intended benefits of liberalization.

The competition dossier looks remarkably like the investment one: it requires extraordinarily sophisticated domestic institutions and appropriate international cooperation. Replacing these by an international regime makes little sense—except for those specific cases where the markets that are being cartelized are international in nature. But even then, perhaps the response should be cooperation between competition authorities rather than a new WTO agreement.

Varying degrees of competition principles and rules already exist in certain WTO agreements such as the Anti-dumping Agreement, in the North American Free Trade Agreement (NAFTA), and in the Canada-Chile Free Trade Agreement (CCFTA). In addition, the OECD has produced a number of non-binding instruments dealing with hard-core cartels, cooperation and pre-merger notification and reporting of mergers. Competition authorities around the world are increasingly involved in formal and informal cooperation with foreign counterparts to address the impacts of globalization on competition at a global level. International negotiations on anti-competitive behaviour would internationalize competition policy enforcement to ensure cooperation among competition authorities and to prevent jurisdictional conflicts.

It is a complex agenda. The Working Group on the Interaction between Trade and Competition Policy set up in Doha will focus on clarifying

> "core principles, including transparency, non-discrimination and procedural fairness, and provisions on hardcore cartels; modalities for voluntary cooperation; and support for progressive reinforcement of competition institutions in developing countries and least-developed country participants and appropriate flexibility provided to address them."

The objectives and goals of competition law, like investment, are actually very different from trade law. The competition legal agenda concerns protecting open competition processes, not defending wronged individual competitors. Many competition authorities are highly independent and have the power to directly review, investigate or sue private corporations. As such, rather than negotiating a comprehensive multilateral agreement on competition policy in the WTO, there is a push for a TRIPS-style agreement, with consensus on core elements or provisions to establish baseline operating conditions. An agreement on anti-trust law (or TRAMS, Trade-Related Aspects of Anti-Competitive Measures) would probably only contain basic principles and procedural safeguards. For procedures, some countries have also

proposed support mechanisms such as a peer review process (or Competition Review Mechanism modeled on the Trade Policy Review Mechanism), which could provide countries with an objective review of their compliance and enforcement records while also fostering transparency. Some of these mechanisms might be possible without launching an ambitious program of negotiations.

The impact of an international agreement on competition policy on sustainable development remains difficult to assess, since the impacts of economic development or developing countries is also not known. Obviously anti-competitive behaviour causes economic harm and corporations that have acquired excessive market power are presumably more difficult to discipline from the perspective of sustainable development. Yet the restraint of such behaviour does not deliver obvious benefits from the perspective of environment and sustainable development, and enterprises have been quick to argue that they are unable to comply with environmental requirements because of the pressures of competition. In light of these uncertainties, few developing countries have strongly articulated positions on the issue of competition policy.

4.3 Government Procurement. The Agreement on Government Procurement (1994) contains extensive provisions governing government procurement, including tendering procedures, selection procedures, submission, receipt and opening of tenders and awarding of contracts, as well as negotiating procedures. It has three essential characteristics:

1. the core principle, like GATT, is non-discrimination achieved by most favoured nation treatment, national treatment, transparency and dispute settlement, but with some differences among the formulations of these principles;
2. it applies only to jurisdictions and products explicitly listed by each country in a series of Annexes; and
3. it is a "plurilateral" agreement. Members of the WTO do not automatically become members of the GPA.

Governments have not been environmentally conscious consumers. Even while public entities typically represent 10–15 per cent of the domestic markets of most countries, there are actually very few instances where government agencies have been path-breaking purchasers of environmentally-sound goods and services. Governments have largely avoided using environmental characteristics to distinguish between suppliers, precisely because this represents an effective screen and entails the risk of a challenge from suppliers who have been implicitly excluded. Moreover, the articulation of environmental criteria will sometimes entail the "risk" of favouring non-domestic suppliers over domestic ones.

There is a clear case to be made for governments to articulate strong environmental requirements when purchasing goods and services. The government procurement market is sufficiently large to impact the overall market for certain goods and services. Yet governments are unlikely to engage in the development of environmental standards for their procurement needs—in other words, they would need to utilize standards that are already available. Internationally agreed standards would be preferable since there are obvious chances that voluntary standards developed by domestic suppliers will contain protectionist elements. Even international standards may face questions over legitimacy, given the lack of developing country input in their development.

There are two key questions facing developing countries in relation to the GPA: first, should they accede to the Agreement?; and second, are there elements of an Agreement, or policies at the national level, for which they should be pushing even if they do not choose to accede?

On the first question: given that the GPA is a plurilateral, the question whether or not to accede must be answered in large measure by a mercantilist assessment of national interest: will accession benefit domestic producers more than foreign ones? It is likely that the answer for most developing countries is "no," but the final answer in each case will have to await an assessment that will involve at least some measure of private sector consultation.

Whether signatories to the agreement or not, developing countries' exports will be affected by it to the extent that they are competing for sales to signatory governments. So they have a stake in ensuring that the rules push for specification of standards that are non-discriminatory. International environmental standards tend to be less suspect on this score than those—such as domestic ecolabel schemes—developed at the national level. In the area of domestic policy, the ability and increasing inclination of OECD governments to include environmental criteria when purchasing gives exporting governments more reason to pursue an industrial strategy that facilitates the export of "greener" products.

4.4 Trade Facilitation. Trade facilitation (TF) is defined by the WTO as "the simplification and harmonization of trade procedures, with trade procedures being the activities, practices and formalities involved in collecting, presenting, communicating and processing data required for the movement of goods in international trade."

Developing countries, while not opposing the concept of trade facilitation, generally oppose the negotiation of legally binding rules subject to dispute resolution in this new area. The issue in WTO terms, therefore, is whether such an agreement will be forthcoming, and what it might look like if it is. The issue in a sustainable development context is whether increased attention to trade facilitation would be supportive of a development and sustainability agenda for trade policy.

Several international organizations have been considering TF issues, including the United Nations Economic Commission for Europe, UNCTAD, the World Bank, OECD and APEC. APEC has integrated developed and developing country interests in TF into a single, but voluntary process by identifying several principles for focusing capacity building activities and regulatory reform initiatives associated with TF. These include:

- Transparency;
- Communications and Consultations;
- Simplification, Practicability and Efficiency;
- Non-discrimination;
- Consistency and Predictability (includes integrity);
- Harmonization, Standardization and (Mutual) Recognition (of Standards);
- Modernization and Use of New Technology;
- Due Process; and
- Cooperation.

The APEC, WTO and UN processes all recognize that implementation of such principles will require national policy and capacity development as well as international cooperation. However, developing countries continue to be extremely concerned with the assumption of new legally binding requirements linked to the dispute resolution mechanism when many developed countries have been unable to meet existing requirements, and even unable to develop a sound understanding of all their obligations. In addition, some developing countries remain skeptical about the potential benefits of a broad TF program, especially in the context of their own development priorities. A broad TF agreement raises questions as to the scope of realistic mutual benefits. With the reduction in tariffs, the movement of goods through borders has become a more poignant issue. If an agreement on TF is made legally binding and subject to dispute settlement with its attendant potential consequences of punitive tariff measures, the extent to which a capacity-building component can override this priority-setting question is, at best, unclear.

To the extent that addressing TF issues in a concerted way would force participants to address corruption related issues, this would also be a positive development benefit.

If addressing TF issues were to have the magnet effect for investments that its proponents suggest, this could help spread investment and improve utilization of resources in a more sustainable way. However, at least two potentially negative relationships may be noted. First, the TF-related focus on harmonization of standards should not intrude upon the guarantees for the setting of national standards already set out in the TBT and SPS Agreements. TF should not reduce the scope for appropriate environmental, human health, and other public welfare legislation and regulation. Second, it must be recognized that many multilateral environmental agreements, as well as agreements relating to illicit drugs, organized crime activities, etc. rely upon measures at the border to detect and prevent illegal activities. In the environment context, this includes such critical agreements as the Basel Convention on hazardous wastes, the Montreal Protocol on ozone depleting substances, and others. TF issues should not become a barrier to the effective implementation and further development of such agreements.

5 Need for technical assistance and capacity building (Para. 33)

The need for technical assistance is repeated over and over again in the Doha Ministerial Declaration. In many ways this represents the most tangible development dimension of the Declaration, since all other issues of concern to developing countries and to sustainable development are left to the negotiation process. The term "technical assistance" is used 21 times and the term "capacity building" 18 times.

The concern for technical assistance and capacity building reflect several considerations. Important

among them is the realization that the multilateral trading system has become very complex and that a growing number of countries are overwhelmed by the task of meeting its requirements, let alone participating in negotiations to modify them. The lack of capacity has become a threat to the credibility of the system.

There is also growing realization that significant investments in infrastructure and the capacity to operate it efficiently are required if a country is to benefit economically from the process of trade liberalization. This reflects a certain degree of uneasiness with the results of the Uruguay Round and the growing evidence that more developing countries than initially anticipated failed to realize significant benefits from it. It has been argued that the lack of effective institutions has contributed materially to this unwelcome result, so that capacity building is seen as a necessary adjunct to the process of liberalization.

Despite the extraordinary emphasis on technical assistance and capacity building in the Doha Declaration, there has not been a vigorous public debate about the goals of this effort and the methods by which these goals may be achieved. The WTO is not an organization that has experience with capacity building, other than providing courses on how to fulfill the requirements of the Agreements and how to better manage the trade process—essentially trade facilitation. In fact, technical assistance and capacity building are complex processes, closely linked to the education and training system of a country, and it does not appear likely that anything short of a concerted, long-term investment in these activities will generate the kinds of benefits that are sought.

6 The importance of a "sustainable development agenda" for the WTO

"Sustainable development" is more than "development." The WTO has embraced the agenda of sustainable development but it is not clear exactly what this will entail. That is not surprising: sustainable development is a remarkably ambitious goal and the task of operationalizing it is one that will require generations rather than just years. Sustainable development clearly includes the macroeconomic policy goals that have been pursued by the Bretton Woods institutions and that have been central to the work of the GATT and now the WTO. As has been emphasized several times in this paper, amcroeconomic instability not only does not promote sustainability, it is an obstacle to its achievement. Yet the converse is not true: macroeconomic stability in no way guarantees sustainable development. This difference is at the heart of the WTO environment and sustainable development agenda.

There are several elements of a "sustainable development agenda":

i. *The "Development" Round.* The negotiations that are to follow the Doha Ministerial declaration have often been called a "Development Round." This appellation is more an aspiration than a specific set of negotiating objectives. It also recognizes the problems that have been encountered in ensuring that the benefits of trade liberalization are widely spread. Too many developing countries have not benefited sufficiently from the Uruguay Round Agreement. Characterizing the Doha negotiations as a "Development Round" is one way to indicate awareness of this particular issue.

From the perspective of development objectives, achieving growth of GDP in developing countries is the most basic of objectives. The question remains how that growth is distributed, who benefits and to what extent it is utilized to ensure longer-term growth through prudent investment. While these are not matters for negotiation within the WTO, they nevertheless are of great significance to the perception of citizens everywhere as to the equity of the outcomes of such negotiations.

Thus far the goal of development is primarily reflected in a massive declaratory commitment to technical assistance and capacity building. While this commitment is certainly a precondition for moving towards the goal of development for the poorest countries, it is also unlikely to be a sufficient response. Just as "sustainable development" remains an unclear objective for the WTO, "development" is hard to bring into focus in the kind of process that is characteristic of the organization. It will take the concerted effort of developing countries in alliance with those interests in developed countries that are committed to more development and greater equity to work out practical steps to move the outcome of the Doha negotiations in the direction of development, let alone sustainable development.

ii. *Implementation Issues*. Implementation issues played an important role in the preparations for the Doha Ministerial. These were issues raised by developing countries in the process of implementing the Uruguay Round Agreements. They included a request for derogations from certain obligations or for extended implementation

deadlines. In some instances they also sought the acceleration of implementation on the part of developed countries, in particular in the area of textiles.

These issues were only partly resolved before the Doha Ministerial and are a critical part of the current process at the WTO. The challenge is to rebalance an agreement as complex as the Uruguay Round Agreements. Yet this process is vital in showing that the WTO is capable of learning from past experience and adjusting obligations to achieve greater equity of outcomes.

One of the difficulties that exist in this area, as in relation to the principle of special and differential (S&D) treatment for developing countries, concerns the difficulty in determining which changes will actually promote economic growth or greater welfare in developing countries. After all, the theoretical basis of the entire WTO process is that liberalization generates economic benefits while limiting liberalization reduces them. Yet both the implementation and the S&D discussions are aimed precisely at agreeing exceptions to rules that are widely viewed as beneficial. The result is a very difficult process of analysis and action that promises to become much more central as the complexity of WTO agreements increases. It is also a matter of great concern with respect to sustainable development, which is after all even more demanding than the traditional processes of trade liberalization.

iii. *Institutional Development*. One of the more surprising areas of convergence between the traditional WTO agenda and the demands of sustainable development is the need for institutional development. Institutional development is vital both from the perspective of the current and future agreements that are negotiated within the WTO and from the perspective of sustainable development. This applies equally to international and national institutions. In the case of sustainable development, the need extends to the local and regional level within many countries. Without adequate institutions it will be equally impossible to implement the existing WTO Agreements or to identify and implement the steps that are required to shift the economy to a more sustainable pathway.

To achieve a successful "development round" will require extensive cooperation between developed countries and developing countries to develop the agenda. China can play a significant role in this process. China needs to identify its sustainable development interest and help integrate developed and developing country interests and actively participate in the development of the WTO rules governing trade, environment and sustainable development.

Endnote

1 This list includes: the definition of an investment and an investor; transparency of government activity and minimum standards of treatment for foreign investors; non-discrimination; market access for investment; special provisions for developing countries; exceptions and balance-of-payments safeguards; and consultation and the settlement of disputes between Members.

Issues for Conducting an Environmental Assessment of China's Accession to the WTO

by Lulian Cheng, Weiyan Sun, Xiaoyue Shen
Xin Zhou and Hong Dong

1 Background

An environmental assessment of trade agreements and trade policy has become an important decision-making tool for promoting sustainable development. Countries such as Canada and the United States, and some inter-governmental organizations such as the EU and the North American Commission for Environmental Protection, have already undertaken integrated environmental or sustainability assessments of trade-related policies and acquired useful experience in this area. Some developing countries have also adopted such a practice. The WTO Ministerial Declaration released at the Fourth WTO Ministerial Conference in Doha in November 2001 also notes that members have conducted national environmental assessments of trade policies and trade agreements on a voluntary basis. It encourages them to undertake such assessments at the national level and share expertise and experience with members wishing to perform environmental assessments. The United Nations Environment Programme has developed a handbook discussing various approaches to undertaking environmental assessments of trade policies.

China's entry into the WTO will have substantial economic, social and environmental implications. Although relevant departments have conducted studies on the research of these implications, the impacts of the entry into WTO on China's environment have not been seriously studied. An overall integrated environmental assessment of China's accession to the WTO will provide useful guidance for Chinese policy-makers in better understanding the relationship between the changes in economic development after accession and their environmental consequences. It will also formulate policies and measures to enhance trade promotion and minimize environmental impacts.

This chapter is based on a literature review of international and domestic experiences in assessing environmental impacts of trade agreements and trade policies, undertaken by the Working Group on Trade and Environment of the China Council for International Cooperation on Environment and Development. It discusses these experiences and the lessons that can be learned from them, and puts forth recommendations for undertaking an environmental assessment of China's accession to the WTO and establishing a systematic mechanism for conducting strategic environmental assessment of Chinese policies.

2 International and domestic experiences in conducting environmental assessment of trade policies and agreements

International experiences

Since the beginning of the 1990s, many countries have begun to conduct environmental assessments of trade agreements or trade liberalization from a sustainable development perspective. In doing so, it is believed 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 social, economic and environmental factors. International experiences have shown that assessing environmental impacts of trade agreements or trade liberalization, despite certain methodological problems, is a useful tool in better understanding the relationship between economy, society and the environment and in identifying solutions and opportunities to adjust environmental policy to the new realities.

Canadian environmental assessment of the North American Free Trade Agreement (NAFTA)

NAFTA is possibly the first trade agreement that underwent environmental assessment by Canada in 1994. Because the Canadian assessment was done in the course of trade negotiations, it is regarded as a concurrent assessment (CEC NAFTA, 1999). Several agreements have also been assessed, most recently the Canada-Chile Free Trade Agreement.

U.S. environmental review of trade agreements

Under the U.S. Presidential Executive Order 13141, The Environmental Assessment of Trade Agreements, three kinds of trade agreements are mandated in undertaking an environmental assessment: 1) comprehensive multilateral trade rounds; 2) bilateral or multilateral free trade agreements; and 3) new trade liberalization agreements in natural resource sectors. Accordingly, the Council for Environmental Quality (CEQ) and the U.S. Trade Representative (USTR) issued the 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 complementarities between trade and environmental goals. (Office of the United States Trade Representative and Council on Environmental Quality, 2000). Several agreements have already been assessed, most recently the U.S.-Jordan Free Trade Agreement.

On June 6, 2000, the United States and Jordan negotiated a bilateral Free Trade Agreement. Through a qualitative analysis of 16 sectors based on trade volume and industrial input and a quantitative analysis of the three categories of American exports to Jordan, the U.S. International Trade Commission (USITC) concluded that the proposed Free Trade Agreement had no measurable environmental effects because there would be very little change in aggregate import, export, output and unemployment. (Office of the United States Trade Representative, 2000).

EU sustainability impact assessment of the proposed new WTO round of multilateral trade negotiations

The sustainability impact assessment of the proposed WTO new round of multilateral trade negotiations is similar to other assessments of trade policies or agreements. (EU's Communication to the Council and European Parliament, 1999) The Action-Impact-Matrix (AIM) and scenarios analysis were adopted in the assessment.

UNEP Manual for Integrated Assessment of Trade-Related Policies

UNEP published a Reference Manual for Integrated Assessment of Trade-Related Policies in 2000. 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 presents a comprehensive review of major methods that can be used for the integrated assessment of trade related policies.

Integrated assessment of trade liberalization: experiences from developing countries and countries with economies in transition

In recent years, the potential negative impact of trade liberalization on the environment and natural resources has been growing, especially in developing countries and countries in transition with increasing trade volume. With special concerns for these issues, UNEP initiated two rounds of country studies, including integrated assessments of the shrimp farming industry in Bangladesh, Chile's mining sector, the automotive industry in India, the Philippines' forestry sector and Romania's water resources (UNEP, 1999). These projects were technically assisted by UNEP with the use of the assessment methods summarized in the UNEP Reference Manual of Integrated Assessment of Trade-Related Policies. In some other countries similar methodologies were adopted for the assessment of environmental effects of trade liberalization according to their research capability and data availability. 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.

Domestic experiences in quantitative assessment of effects of trade liberalization in China

In 1996, the Development and Research Centre of the State Council conducted a study on the assessment of impacts of trade liberalization on China's economic structure and sustainable development using a quantitative method of analysis. The centre set up a dynamic recurrent economy-environment computable general equilibrium (CGE) model, which added environmental modules to the standard economic CGE model's framework to depict at length the environmental impact of economic activities. (Wang Huijiong *et al.*, 1999)

In 1997, the Institute for Environmental Studies (IVM) of the Netherlands and the Policy Research Centre for Environment and Economy of the State Environmental Protection Administration undertook an integrated assessment of environmental impacts of international trade on recyclable plastics using the life-cycle analysis method.

With the support and guidance of UNEP, Nanjing Agricultural University undertook a study on the impacts of trade liberalization on the Chinese cotton sector. The project team adopted the JAPA model developed by Nanjing Agricultural University. A scenario analysis of the impact of agricultural export increases using the JAPA model then followed. Social, economic and environmental impacts of trade liberalization were evaluated by conducting a cost-benefit analysis.

3 Methodology

Recently UNEP published a Reference Manual for Integrated Assessment of Trade-Related Policies (UNEP, 2000). 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 presents a comprehensive review of methods that can be used in integrated assessment of trade-related policies. The methods widely used by the environmental assessments of trade agreements and other trade-related policies described in the manual are classified as macroeconomic models, sectoral and other approaches. All three are well documented in the UNEP manual.

Macroeconomic models include the computable general equilibrium (CGE) models, capital-based and scenario approaches. Sectoral approaches are preferable in the integrated analysis of a specific sector. Either qualitative or quantitative methods can be adopted. To undertake a quantitative approach, partial equilibrium (PE) models hold some promise. In contrast to CGE models, PE models are often more feasible, in practice, for implementation because they focus on a single industry or sector. This helps overcome some of the data and cost limitations associated with economy-wide CGE modelling. Other approaches include multi-criteria analysis (MCA), ecosystem and commodity chain approach.

Because social backgrounds vary among countries, as do geographic conditions of 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 best reflects 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. Other organizations such as the OECD, the European Environment Bureau and the British Farm Ministry also established similar sets of index systems.

4 Lessons learned from international and domestic experiences and issues for undertaking an integrated environmental assessment related to China's WTO accession

Through a literature review and analysis of a large quantity of materials and documents abroad and at home, our study concludes that there are some general lessons that can be learned from international and domestic experience in conducting environmental assessments of trade agreements and trade-related policies.

- Although undertaking such an assessment is a relatively new area globally, many countries recognize that there is an urgent need to conduct this type of assessment, considering the broad and tremendous impact of trade on the economy, society and the environment. This will enable policy-makers in various countries to coordinate the relationship between society, the economy and the environment from a sustainable development perspective and seek opportunities for a win-win-win approach.
- In conducting an integrated assessment of trade policies or agreements, many countries usually select sectors that have significant impact on the national economy and are likely to be affected by trade liberalization and trade policies and also have outstanding trade and environment issues (for example, agriculture, energy, forestry, fisheries and the manufacturing sector). Currently, no country in the world has undertaken overall assessments covering all its economic sectors. The policies assessed, particularly 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 wide public participation in the process. They encourage multi-stakeholder participation, including governments, the public, academia, non-governmental organizations, communities and policy practitioners in order to communicate and cooperate with each other throughout the entire process.

They also stress the importance of information acquisition and exchange.

- It is widely recognized that there are some difficulties in undertaking quantitative assessments, mainly because no methods are currently available to accurately measure and describe the impacts. In addition, the availability of information and data is a problem. However, many countries have made efforts in this field. The assessment methods adopted are mostly a combination of qualitative and quantitative analyses. The combined qualitative analysis methods include sectoral analysis with partial balance, cost-benefit analysis method, scenario analysis and product-chain analysis.
- From the limited experiences of developing countries in undertaking environmental assessments of trade liberalization, our study finds that developing countries can benefit from trade liberalization, yet the process of trade liberalization causes environmental and ecological damage. Even though undertaking such an assessment is still a sensitive subject for developing countries, the study concludes that it will be important for developing countries to undertake such integrated environmental assessments 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.

There are also some specific lessons that can be learned for undertaking an integrated environmental assessment of China's accession to the WTO. Because the impacts of China's entry into the WTO will affect all aspects of the economy, it is 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 the environment.

However, it is complicated to conduct an overall assessment of the environmental consequences of China's WTO accession. Such an assessment involves many sectors and must take into account many factors. The current situation still poses great difficulties in undertaking an overall integrated assessment of the environmental consequences of trade liberalization after entry into the WTO. Such difficulties may include:

- the capacity to undertake an overall integrated assessment of China's accession to the WTO 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 the time to begin sample collection to obtain actual data. However, doing so is very costly and the current financial capacity of China can hardly support it; and
- researchers in China may lack experience in undertaking large-scale quantified research.

Given the above difficulties, the study recommends that the integrated assessment of WTO accession start from the sectoral or even product levels in selected key regions, for the following reasons:

- data for regional, sectoral and product assessments are easy to get. Even if they are not currently available, such data can be found through sample collection and analysis;
- quantitative analysis will be relatively simple; and it is easy to adjust the models within a short period of time in order to yield the best simulation results; and
- undertaking such integrated assessments will nurture a team of experts that can engage long-term research on trade policies and agreements.

It should also be 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 major economic sectors will be needed for work based on initial regional, sectoral and product assessments.

5 Recommendations

Our study puts forwards the following recommendations:

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 aimed at ensuring policy coherence in support of trade liberalization and sustainable development in line with the WTO entry is related to the implementation of China's strategy for sustainable development. It is also helpful in 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.

Such an assessment should be jointly undertaken by trade and environmental authorities. Alternatively, the trade authority can be responsible for undertaking this assessment in consultation with the environmental authority. The assessment should be guided by the principle of coordinated development of economy, society and environment.

Considering the complexity of the assessment and the limitation of current analytic capacity, it is important to properly define the assessment scope. It is recommended that those key regions, sectors or products that have an important role in the national economy and foreign trade and are closely linked with the environment and have relevance to sustainable development be selected for assessment. For example, the priority sectors for assessment could be agriculture, the textile industry, the energy sector, the auto industry, fishery, forestry and the environmental industry. Such an assessment should involve experts and people from various fields such as trade, environment, industry and academia. In terms of a region, we should choose the one most open to outside information.

It is also useful to adopt a quantitative/qualitative analysis approach in conducting an assessment of regional, sectoral or product-based trade policies or agreements in question, based on international and domestic experiences reviewed by our study. This will also greatly advance the research level in China. Meanwhile, when this assessment is undertaken, a more scientific and rational decision-making foundation will be provided to the decision-makers.

Considering the current needs, it may be appropriate to choose the partial equilibrium model in circumstances where there is no better model for the time being. 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. Also, Chinese assessments undertaken to date on trade liberalization policies have primarily used the partial equilibrium model.

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

It is also important to establish the indicators that can most accurately 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.

Ensure environmental impact assessments of trade policies or trade agreements will be carried out systematically and integrated into the national regulatory system.

While learning from international experience in undertaking an environmental impact assessment of trade agreements and trade policies, mechanisms should be established to ensure the implementation of environmental impact assessments of trade policies and trade agreements in China. These include gradual establishment of a regulatory system for assessing the environmental impacts of significant international trade agreements and domestic trade policies; formulating the guidelines for environmental impact assessments of trade agreements and trade policies; establishing an institutional system and implementing procedures for this purpose.

Many Chinese policies in the past years have been formulated by considering sustainable development and have proven conducive to promoting the coordinated development of economy, society and environment. However, no EIA has ever been done for Chinese policies prior to and after their promulgation. Consequently, damage has been done to the environment and the ecological system due to insufficient environmental consideration during the policy

implementation process. Considering that trade policies are closely linked to the environment, it is necessary to ensure that environmental impact assessments are done in accordance with the pre-set institutional procedures, technical guidelines and by competent agencies. Currently, the National People's Congress (NPC) is working on a Law of Environmental Impact Assessment. The EIA of trade policies or agreements should be included in the Law of Environmental Impact Assessment being drafted by the NPC. The lack of a legal basis is the major reason for not considering the environmental impacts of the current Chinese trade policies or international or regional trade agreements that China is negotiating.

To ensure the assessment is reliable and scientifically-based, Chinese trade and environment authorities should jointly formulate guidelines for conducting environmental impact assessments of major trade agreements and policies. 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, and methodology and policy options.

It is also necessary to establish the institutional system for undertaking environmental assessments of important trade policies. This means that environmental assessments should be incorporated into the trade policy-making process and with environmental assessment as an essential step in negotiating a trade agreement prior to the negotiations taking place.

A set of complete, efficient and simple procedures for undertaking the assessment should be established to ensure that the assessment will proceed smoothly and the results will be presented to the decision-makers in a timely manner. It is recommended that a Committee or Group for EIA of Trade Policies, which involves governments, academia and relevant stakeholders, be established to review the results of assessments and present the reviewed results to the relevant government departments for decision-making.

The study also puts forward a few other relevant policy recommendations. These include:

Provide a legal basis for the implementation of China's national 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 goals in this document were mandated to be reached by 2000. China's Agenda 21 sets a framework for sustainable development in China, however, only a few ministries and commissions under the State Council have formulated their own Agenda 21 since 1994. The departments responsible for economic affairs have not completed this task, primarily because China has not established a sound legal basis and adequate policies to ensure the implementation.

In Canada, the amendments to the Canadian Auditor General Act adopted in 1995 include provisions concerning environment and sustainable development. These amendments require that the minister of each government department formulate the sustainable development strategy for that department. These strategies for sustainable development are to be revised once every three years. The amendment also requires that all departments regularly present a progress report for the implementation of their strategies.

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, provide a legal basis for the implementation of the revised Chinese Agenda 21, making it legally binding for central government departments and local governments in China to implement sustainable development policies. These central government departments and local governments 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.

Such a legally-binding mandate would greatly facilitate the implementation of environmental and sustainability assessments of trade agreements and trade policies.

Improve information accessibility

One of main gaps between China and developed countries in undertaking policy assessment is the accessibility of relevant information, including the means and speed of obtaining information as well as some unnecessary restraints created to block information acquisition and sharing, such as the limitations imposed by some government departments and agencies on 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 the use of legal tools.

Nurture public participation

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 developing gradually. For example, Beijing has begun to collect public comments and opinions on master urban development plans through newspapers and the internet. This indicates that a bottom-up approach has been developed for a transparent decision-making process and public participation in this process.

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Section II
Investment and Sustainable Development

Foreign Direct Investment, Environment and Sustainable Development

by Konrad von Moltke

Recent controversies surrounding international investment agreements—The Multilateral Agreement on Investment (MAI) at the Organization for Economic Cooperation and Development (OECD), Chapter 11 of the North American Free Trade Agreement (NAFTA), and the repeated attempts to insert investment into the WTO agenda leading to the Doha Ministerial Declaration—might lead one to think that international investment law is brand new. This is not the case. Rather, it has been developing as an increasingly specialized area of international law for over half a century. Rooted in the philosophy that aliens and their property were subject to the protection of their sovereign states under international law, cases on expropriation began to appear in the 1930s and saw significant growth between the 1950s and 1970s.[1]

The broad debate surrounding international investment agreements is of great significance to China for several reasons:

- China has attracted large amounts of foreign direct investment while signing fewer bilateral investment agreements with OECD countries than many other developing countries. It must consider whether these bilateral agreements offer significant advantages or whether their drawbacks outweigh their benefits;
- China is not party to any of the existing multilateral investment agreements but it will find itself increasingly involved in multilateral negotiations that concern investment; and
- as a member of the WTO, China must determine where it wishes to place the emphasis when it comes to investment negotiations within the WTO.

Since its early roots, investment law has grown in scope. NAFTA's Chapter 11 provides the model of the key elements that have now found their way into a growing number of investment agreements:[2]

- protection from direct and indirect expropriation;
- rights to establish an investment;
- rights to national and most-favoured nation treatment;
- guaranteed minimum international standards of treatment for foreign investors;
- special protections against performance and personnel requirements; and
- rights to repatriate all monies.

In addition to this move to broad investment rights, the ability to enforce these rights has also expanded. Where such enforcement used to take place only between states, and was thus very rare, foreign investors now have the ability to enforce their international rights themselves through an "investor-state" arbitration process. This development reflects the reality that states do not invest in foreign countries, so that international investment law deals with individual investor rights in relation to public authorities of the host country. Accompanying this dispute settlement process are "choice of forum" provisions allowing an investor to choose international remedies *in place of* host country domestic remedies.

As the rights and remedies have expanded, so has the willingness of foreign investors to use these tools. Where state-to-state remedies used to be a last resort to enforce an investor's rights, investor-state arbitration can now become a preferred venue.[3]

International investment agreements are also of great importance for environment and sustainable development. Investment is not only a central economic activity, it largely determines the direction and possibilities for an economy to grow, to change and to become more sustainable. Any international investment agreement is liable to impact on the manner in which the countries party to such an agreement address private investor rights against public goods such as the environment.

Protecting the environment and promoting sustainable development typically require government action. They also entail a high degree of uncertainty concerning the most effective path of action and consequently involve a significant exercise of discretion on the part of public authorities. In many developed countries, environmental law has become the largest

body of law. In all countries, implementation of environmental mandates is subject to controversy and litigation as societies seek to balance the need for environmental protection and the reduction of poverty against the prospects for enterprises to grow and for individuals to prosper. All of these areas of public law are potentially affected by international investment agreements. It is hardly surprising that the environment has become the focus for the broader public debate about the impact of expanded international investment law. This debate has advanced rapidly from the consideration of specific environmental issues to a discussion of investment and sustainable development to a reconsideration of some of the premises of international investment law.

The international debate about investment agreements has increasingly focused on three themes:

1. the impact on promoting sustainable development;
2. the impact on the ability of governments to make necessary and effective policy decisions, including but going beyond sustainability issues; and
3. the appropriateness of the institutional framework of the investment agreements, and of the dispute settlement process in particular.

Discussion of the first theme begins with the recognition that investment is vital to promoting more sustainable development. But it revolves around a critical assessment of the foundations of current international investment law, which are largely derived from trade liberalization theory and practice. The second theme has two streams: the case law that has developed under bilateral and multilateral investment agreements and the impacts on the investor-state process as a model for international dispute resolution. The third dimension considers whether the institutional framework of dispute settlement provisions are adequate to undertake a legitimate balancing of investor rights and public goods.

The benefits of economic liberalization appear so obvious that negotiations are sometimes launched without much analysis. In part this is due to the difficulties that are always encountered when new negotiations are launched; the struggle to construct an agenda acceptable to all overrides discussion of whether the agenda that emerges is the "right" one by some agreed standard. China has emerged on the international economic scene—within the WTO and without—at a time when it appears necessary to ask the rarely posed question: what objectives should we be pursuing in constructing investment agreements?

What rationale underlies the broadening of international investment law—a broadening that began over 50 years ago and has culminated in NAFTA[4] and the attempt to negotiate the MAI? The question is especially salient given the history of the linkages between trade liberalization and investment liberalization. Both were part of the initial efforts to establish the International Trade Organization as part of the reordering of international economic institutions launched at the 1944 Bretton Woods Conference. The Havana Charter that followed in 1948 never entered into force for want of ratification. That left only the trade liberalization process of the GATT in place.[5]

As tariff barriers were removed under successive rounds of GATT negotiation, trade negotiators came to focus their efforts on other possible barriers to trade. In doing so, they found themselves drawn deeper and deeper into the details of domestic regulation. In turn their remit broadened to include all manner of new issues, from intellectual property rights to trade in services, and from investment to protection of the environment. This has been done through a new combination of traditional negative rules—states shall not discriminate or impose quotas—joined to a much deeper and broader set of positive obligations, requiring government measures to conform to disciplines that define how, and often when, governments may regulate.

Given this broader scope of impact, we have now moved beyond the point where the promotion of public welfare associated with liberalization theory can be taken as a given. The dilemma is clearly identified by some trade theorists:

> "Under the assumption that markets are competitive, economic theory suggests that the reduction of border barriers such as tariffs will benefit both the importing and the exporting nation. Accordingly traditional trade agreements can be presumed to be win-win. But theory does not suggest that this will necessarily be the case for deeper agreements that deal with behind-the-border policies. Indeed, such agreements could well be win-lose. For example, an international agreement to enforce intellectual property rights could on balance harm a country that has little or no domestic innovation and has previously simply copied foreign innovations."[6]

The unquestioned extension of the rationale for trade liberalization to other areas of international economic

governance must be examined critically. For 50 years, trade negotiators have fought the battle against special interests and the bastions of hidden protectionism. Covered by the principle of comparative advantage, they comfortably assumed that their every effort promoted the public good, even when this inflicted hardship on some constituency. The assumption, in its most simplified form, was: imposing rules that prevent barriers to achieving market efficiency is a good thing to do. Gradually, this reasoning was extended from tariff to non-tariff issues, and into other areas such as intellectual property rights, services and investment.

Today, this reasoning has been extended to support the expansion of foreign investors' rights from protection of an investment after it is made to include the right to make investments ("right of establishment") and rights precluding the imposition of national economic policies (such as local purchasing or hiring requirements) to the operation of the investment. These issues have nothing to do with "comparative advantage." They are linked to some of the most difficult decisions of public policy that must be taken by governments everywhere, liberalization or not.

Faced with increasing proposals to liberalize international markets that implicate significant behind-the-border policies, negotiators will have to justify their actions in terms of the broad public welfare that is being promoted. Their global as well as their differential impact on different countries must be assessed carefully so as to avoid win-lose situations, let alone lose-lose ones. For China this means a careful assessment of the purposes of international investment agreements and a precise identification of the benefits that are being sought.

The public welfare justification to expand traditional international investment law protections to private investment rights has yet to be provided. What ultimately tripped up the Multilateral Agreement on Investment was not just environmental opposition but the cumulative defects that emerged as the draft was submitted to broader public scrutiny as well as the fact that the public welfare benefits to be expected from the agreement were never properly articulated, if indeed they existed.

Insofar as a public welfare justification has been made in OECD countries, it has focused on the role of the protection of investors under international law as a means to expand and diversify foreign investment into more states, especially developing states. Whether this objective has ever been achieved is, however, open to some doubt.[7] The empirical evidence that does exist suggests that the risk reduction element associated with traditional investment protection is at best a marginal factor in business decision-making on FDI. For lasting changes in the risk perceptions of investors a number of factors must come together. Strong domestic institutions rank high, as do resources in all areas that significantly affect an investment, and access to markets for the goods produced. Risk perception will deeply influence the rates of return that an investor requires, but risk itself is a many-faceted phenomenon and the creation of an international framework for investment will not by itself change investment flows.[8]

Mexico has seen significant growth in foreign direct investment since NAFTA came into force in 1994. But the additional investment flows to Mexico following NAFTA are the result of the entire agreement, including the critical rules of origin provisions that allow market access to the United States, together with supporting domestic measures and institutional changes in Mexico. It is impossible to determine whether NAFTA Chapter 11 had a positive role in promoting investment into Mexico, just as it is impossible to determine the opposite. There is evidence that investment into Mexico has grown faster from non-NAFTA countries than from its two NAFTA partners where investors benefit from the agreement's investment provisions. Because of the complexities surrounding investment decisions, the easy generalizations that have supported trade liberalization do not apply to investment agreements.

Investment law initially developed to provide an international law route to obtain redress for egregious governmental actions relating to foreign property. The basic rationale was to overcome deficiencies in national legal regimes as they relate to foreign private capital by *supplementing* domestic regimes with an international law backstop. This rationale was established in the context of developed country investors and developing country host states during an era when nationalization was occurring in many countries, in particular former colonies or dependent territories. Recent investment agreements have expanded far beyond this limited purpose and can now impact on any regulatory decisions that investors may consider undesirable.

In addition, the supplemental role of investment agreements has now become one of *substitution*: investors can choose one forum and set of rules over the other, as circumstances suit them. Moreover, investor protections have, as already noted, been

expanded to include rights of establishment and to restrict locally-imposed performance requirements, even those applicable to domestic investors. Thus, investment agreements now create a series of international law economic rights for private actors, enforceable as a matter of international law under international processes. Again, these new rights seek to overcome domestic law deficiencies or to actually override domestic law barriers, now substituting the domestic regime completely with international law rules.

These newer international investment rights, combined with ongoing unilateral investment liberalization policies in many countries, do create new investment opportunities. Indeed, China has been able to attract very large investment flows through unilateral liberalization without ceding any element of its sovereignty through investment agreements.

Promoters of investment agreements argue that the deals do not give license to ignore local laws, so international protections are not necessary. To some extent this proposition is even questionable given the possible scope of certain provisions in investment agreements.

Studies by the World Bank and others are now documenting the results of the expansion of private economic rights and the exclusion of public welfare protections. They are beginning to identify trends towards net economic losses to host countries as a result of poorly controlled development sparked by investment liberalization in the absence of appropriate public welfare management regimes and processes.

Environmental authorities need to be careful in this area. We now know that "pollution havens"—in the conventional sense of jurisdictions that actively seek to attract investment by offering low environmental standards—have not developed to the extent many feared. Investment decisions involve numerous factors, and environmental factors are rarely dominant for productive investments that do not rely directly on the environment for their product—even in the handful of industries, essentially petrochemicals, where environmental protection now represents as much as 10 per cent of total investment.[9] At the same time, however, there is a growing body of literature and empirical evidence that demonstrates a "stuck at the bottom" phenomenon for environmental protection: low levels of environmental protection and enforcement are not increased as needs increase.[10] This observation is based on several case studies in highly liberalized developing countries. It clearly shows the risk of leading to a situation where short-term economic growth has been transformed into medium- or long-term net losses due to the environmental and human costs of environmental mismanagement. In short, investment liberalization in countries with lower environmental standards may dissipate any economic gains through insufficient attention to the sustainable development dimension of economic growth.

In addition to the growing environmental concern, there are several other problems in the current pattern of investment from the international and public welfare perspectives. Some countries that desperately need investment are unable to attract it in significant amounts. Some sectors that require investment to promote public welfare, environmental protection among them, do not get additional investment at the level that is required. Yet there is nothing in existing investment agreements to suggest that they are designed to rectify such imbalances. They either assume that the act of liberalizing international markets for investment will somehow automatically contribute to solving these problems, or they assume that addressing such problems is beyond their remit.

The above is not to argue that there is no international agenda for investment. Rather, it represents a powerful argument that a different international agenda for investment must be set. There are certain areas of public policy—environment and sustainable development most prominent among them—that require private investments to achieve well-identified public goods. Governments have long recognized the need to promote such investments, providing subsidies and many other incentives to influence investment decisions. The reduction of risk is one tool among others to support private investments that promote public goods and it has the advantage of not creating distortions that become so internalized into expectations that they cannot be removed.

It is still not entirely clear where the proposed WTO negotiations on investment will fit in this legal landscape. Those countries that are deeply enmeshed in the structure of bilateral and multilateral investment agreements may wish to seek some form of harmonization, resulting in an approach comparable to the MAI, which tried to do just this. Other countries may wish to avoid the kinds of obligations that the existing international investment agreements impose on them. They will be seeking a WTO agreement that is essentially a framework agreement that identifies the issues of concern in relation to investment, many of which have been identified in this paper, and leaves the process of developing solutions to a separate and

subsequent negotiations, in the WTO or elsewhere. In either case it will be essential to ensure that the concerns of environment and sustainable development are properly integrated.

Endnotes

1 M. Sornajah, *The International Law on Foreign Investment*, Cambridge University Press, 1994.

2 By the end of 2001, the number of bilateral or multilateral investment agreements exceeded 2000.

3 Luke Eric Peterson, "Changing Investment Litigation, BIT by BIT", Bridges Between Trade and Sustainable Development, May 2001, Year 5, No. 4, pp. 11–12

4 For more on the full breadth of Chapter 11 of NAFTA see Howard Mann and Konrad von Moltke, *NAFTA's Chapter 11 and the Environment: Addressing the Impacts of the Investor-State Process on the Environment*, International Institute for Sustainable Development, Working Paper, 1999. Hereinafter, Mann and von Moltke, 1999. Available at www.iisd.org/trade.

5 Konrad von Moltke, *An International Investment Regime? Issues of Sustainability*, International Institute for Sustainable Development, 2000, pp. 9–10. Available at www.iisd.org/trade.

6 Nancy Birdsall and Robert Z. Lawrence, "Deep Integration and Trade Agreements: Good for Developing Countries?" in: Inge Kaul, *et al.*, eds., *Global Public Goods. International Cooperation in the 21st Century*. New York: Oxford University Press, 1999, p. 147.

7 K. Scott Gudgeon, "United States Bilateral Investment Treaties: Comments on their Origin, Purposes and General Treatment Standards" *International Tax and Business Lawyer*, Vol. 4, 1986, at pp. 111–112; Thomas Walde and Stephen Dow, "Treaties and Regulatory Risk in Infrastructure Investment," 34 *Journal of World Trade*, Vol. 2, (2000); A. Perry, "Effective Legal Systems and Foreign Direct Investment: In Search of the Evidence", *International and Comparative Law Quarterly*, Vol. 49, pp. 779–799, 2000.

8 Factors such as available resources, educated workforce, market potential in the host country/region, political stability, banking, administrative and physical infrastructures, etc., play a much larger role in these decisions. Indeed, up until the beginning of the Chapter 11 litigation, few investors appear to have even known of the web of bilateral agreements in this field. This appears to be confirmed in recent UNECLAC an UNCTAD studies, where risk management is clearly identified as one, but only one, investment factor. While lawyers focus their advice on risk and remedies, this does not make it the principal focus of the business investor itself. *Foreign Investment Flows in Latin America*, 1999, United Nations Economic Commission for Latin America and the Caribbean, Santiago, 2000; *World Investment Report 2000*, United Nations Conference on Trade and Development, Geneva, 2000.

9 The evidence against pollution haven investment patterns is compelling for major global corporations that generate and use state of the art technologies. The evidence is less empirically clear, however, in relation to smaller foreign investors, where data simply is less complete. The evidence of sustainable performance in relation to renewable resource industries such as forestry and fisheries is deeply disturbing. See for example the series of World Bank evaluation reports of forest regimes: Uma Lele, *et al.*, *The World Bank Forestry Strategy. Striking the Right Balance*. Washington, D.C. The World Bank, 2000 (World Bank Operations Evaluation Department. B. Essama-Nash and James J. Gockowski, *Cameroon. Forest Sector Development in a Difficult Political Economy*. (Evaluation Country Case Study Series). Washington, D.C.: The World Bank, 2000. (World Bank Operations Evaluation Department). Nigel Sizer and Dominiek Plouvier, *Increased Investment and Trade by Transnational Logging Companies in Africa, the Caribbean and the Pacific: Implications for the Sustainable Management and Conservation of Tropical Forests*. Brussels: World Wide Fund for Nature, 2000.

10 *Ibid*, and see Gareth Porter, "Trade Competition and Pollution Standards: "Race to the Bottom" or "Stuck at the Bottom"?, *Journal of Environment and Development*, Vol. 8, pp. 133–150, 1999; Luba Zarsky, "Havens, Halos, and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment" In *Foreign Direct Investment and the Environment*. Organization for Economic and Cooperation and Development, Paris: OECD, 1999; Thomas, V. et al., The Quality of Growth. Washington, DC: World Bank and Oxford University Press, 2000; Per Fredriksson, ed., *Trade, Global Policy, and the Environment*, Washington, DC: World Bank, 1999.

International Investment Rules and Sustainable Development: A Chinese Perspective

by Weiyan Sun and Youfu Xia[1]

1 Foreign direct investment and sustainable development

In recent years, foreign direct investment (FDI), along with the development of economic globalization and integration, has been increasing at a rapid speed. According to the World Investment Report 2001, global flows of FDI soared by 18 per cent in 2000 to a record US$1.3 trillion. Developed countries are still the main forces of outflow and inflow of FDI, with one or two exceptions from the developing world (China and Hong Kong, China).

The expansion of international production would not have been possible if it were not for the ongoing liberalization of FDI regimes. For example, over the period 1991–1997, 94 per cent of the 750 changes in the regulatory FDI regimes of countries were in the direction of liberalization. Bilateral investment treaties for the protection and promotion of investment are also moving towards liberalization. By now there are more than 2,000 such treaties in the world, involving 162 countries. Around 180 such treaties were concluded in 1996. Regional and multilateral agreements are also involved in investment liberalization. The EU, NAFTA, APEC, WTO, OECD and ASEAN are adopting many measures in this field. The trend towards investment liberalization is likely to be strengthened in the near future, and FDI will experience an even greater escalation.

Investment liberalization has both positive and negative impacts on sustainable development. Some investors have made contributions to environmental protection of host countries through the transfer of cleaner technology and equipment, using advanced environmental management systems and measures and adopting higher environmental standard in the production process. Some foreign-invested projects have become good examples of sustainable development, however, some foreign investors transfer pollution-intensive industries (PIIs), hazardous wastes, technology and equipment to developing countries through FDI. Therefore, it is important to ensure coordination between FDI and sustainable development in developing countries.

Many transnational corporations (TNCs) do not pay enough attention to environmental protection in developing countries. This is demonstrated in the practice of dual environment standards (home country standards and host country standards). For example, among TNCs in Thailand's pesticides industry, only 25 per cent adopt the environmental standards of the home country and over 50 per cent apply host country standards. This sets maximization of profits as the priority, thus giving inadequate attention to problems like safety and pollution in the process of production and hesitating to invest in techniques and facilities of pollution prevention. Parent companies of many enterprises in Korea are totally indifferent to pollution control equipment, and although some TNCs have appointed persons responsible for environment protection, many are not as responsive and proficient as required. Because of the vast amount of investment by TNCs, complicated manufacturing processes, techniques and technologies, poor environmental awareness, weak environmental management, low environmental standards, imperfect laws and regulations, and poor enforcement, there is potential for the activities of TNCs in pollution-intensive industries to result in serious pollution to developing countries' environment.[2]

There are some cases where the environment in a developing country is affected, and the safety and health of the people is harmed by occasional accidents, injuries and deaths. For example, in Bhopal, India in December 1984, an accident resulted in the death of 2,500 persons. Two hundred thousand people were injured and terrible environmental pollution occurred. Some Japanese TNCs invested in Southeast Asian countries fell and process trees, which leads to serious destruction of local forests.

The main shortcoming of the present theories of international trade and investment is that the economic comparative advantages are viewed in a narrow sense, but the social and economic efficiency are neglected in a broad sense. In fact, the actual environmental costs may be much higher than the economic benefits. We can find the shortcomings in the theory of comparative advantage in the theory of product cycle and Kiyoshi Kojima's thesis of the Japanese model of FDI.[3]

Recently, concerns have been raised about the imperfection of current multilateral environment, trade and investment agreements. There is no special agreement governing the relationship between investment and sustainable development.

In the Multilateral Agreement on Investment (MAI), which the OECD attempted to negotiate a few years ago, there were three parts involving environmental protection, but the provisions were not in line with the high degree of public environmental awareness. There is no mention of investment and sustainable development. MAI emphasized national treatment of GATT to foreign investors. It sought to forbid host countries to lower environmental standards to attract foreign investment, but did not require investors to adopt higher environmental standards (such as parent country's standards) to protect the global and host countries' environment. This meant tacit consent of the "double environmental standards." It specifically exempted investors', the multinational corporations' environmental responsibility and did not prohibit transfer of pollution-intensive industries through FDI to hosting countries, nor did it transfer developed countries' domestically prohibited products, technology or equipment to developing countries. The agreement did not clearly restrict multinational companies' business practices in terms of environmental protection and sustainable development. The OECD Guidelines for Multinational Enterprises are only a joint statement. The document has no legally-binding effect and is only observed on a voluntary basis.

The WTO formulates international rules on trade in goods (GATT) and in service (GATS), but there is only the Agreement on Investment-Related Trade Measures for Investment.

2 FDI and sustainable development in China

Rapid development of FDI

Since 1979, China has made great progress in absorbing FDI. Since July 2000 there have been more than 350,000 foreign-invested enterprises established in China with a contractual investment totalling US$ 641.7 billion and an actual investment of over US$ 327.7 billion. According to a newly released World Development Report by the World Bank, China has attracted 6 per cent of the world foreign direct investment (FDI) and has become the largest recipient of FDI among developing countries since 1993.[4] Foreign investment now accounts for more then 20 per cent of the fixed assets of the entire nation.

The primary method of FDI is equity joint ventures, while wholly foreign-owned enterprises are growing very fast. Judging from the development in the 1990s, there is a decline in the proportion of joint ventures, but a rise of wholly foreign-owned enterprises (WFOEs).

Small- and medium-sized enterprises (SMEs) from Hong Kong, Macao and Taiwan have dominated FDI in China for many years. Since 1992 more and more world famous TNCs are optimistic about the Chinese market. According to incomplete data, 300 of world's largest TNCs have their investment in China. But SMEs still play a very important role in making investment in China.

The main field of FDI is in the secondary industries, while new investment fields are being opened up gradually. Up to the end of 1998, the primary industry has taken up 2.70 per cent of the number of enterprises and 1.63 per cent of contractual foreign investment and for secondary industry the figures are 75.67 per cent and 62.18 per cent respectively, and 21.63 per cent and 36.19 per cent for the tertiary industry. Recently, infrastructure such as transportation and communications and energy, has attracted more and more attention from foreign investors, but its proportion is not very large. New fields, such as financial services, insurance, aviation, freight forwarding, domestic and foreign trade, law services and public accounts have been on pilot or opened gradually.

In recent years, investment from Hong Kong and Macao has been decreasing, and investment from the United States and Japan is increasing. Until the end of 1997, the coastal region accounted for 82.09 per cent of the projects, 88.49 per cent of the contractual foreign investment and 87.95 per cent of the actual foreign investment; Guangdong Province accounted for 23.83 per cent, 28.00 per cent and 28.50 per cent; Jiangsu Province 11.21 per cent, 11.53 per cent and 11.09 per cent, respectively. China's vast middle and western regions only accounted for 17.91 per cent, 11.51 per cent and 12.05 per cent respectively.[5]

An open, multi-tier structure, covering a wide range of areas and regions, has been formed. Since Guangdong and Fujian provinces were granted special policies in 1979 to now: five special economic zones (Shenzhen, Zhuhai, Xiamen, Shantou and Hainan), the Shanghai Pudong New District, 32 state-level economic and technological development zones, 14 boned zones, 53 high and new technology development zones, 14 border economic cooperation zones and 11 travel resorts were established. Some coastal economic open regions were also named in Zhujiang Delta, Changjiang Delta,

Minjiang Delta and other coastal regions. The Three Gorge economic open area was also established. Six port cities along Changjiang River were opened up as were 13 inland border cities, such as Hunchun of Jilin Province. All provincial capitals were approved as open cities as well. Open areas sharing inclined policies have covered coastal, riverside, border and inland areas, altogether 359 cities and countries, 550,000 square kilometres and 330 million people. There are also many economic development zones at the provincial level. These zones and regions become the key areas of China's opening to the outside world and growth point of the national economy.

Impacts of FDI on China's economic development

FDI is a very important engine for promoting China's national economic development. In 1997, the gross industrial output value of 42,881 foreign-invested enterprises (FIEs) reached 1,424.3 billion RMB yuan, accounting for 20.84 per cent of the national total. It is estimated that FIEs contributed approximately two per cent of China's Annual GDP growth. The impacts of FDI on China's economic development can be seen in the following:

- *Offsetting the shortage of capital formation*. Foreign investment now accounts for more then 20 per cent of the fixed assets of the entire nation. FIEs also become an important source of state revenue. In 1997 alone, the taxes (not including tariffs) levied reached 99.3 billion yuan RMB and accounted for 13.16 per cent of the national total.
- *Transforming and upgrading industrial structures through the transfer of advanced technologies, equipment and management experiences*. Foreign investment has played a very important role in some industries' development. Sectors in which industrial added values of FIEs are over 30 per cent of the national total include: electronic and telecommunications equipment (58.82 per cent), furs and leather, down and related products (51.23 per cent), garments and other fibre products (50.02 per cent) and cultural, educational and sports goods (40.56 per cent).
- *Creating many job opportunities and decreasing the shortage of experienced managerial personnel*. The development of enterprises with foreign investment, especially those subsidiaries or branches of TNCs, has driven employee-training programs at all levels, a phenomenon which has never been experienced before in China. The programs have cultivated many technical experts, skilled labourers and a large number of advanced managerial workers who will help create a new generation of entrepreneurs in China in the very near future.
- *Contributing to China's foreign trade development*. In 1998, FIEs' exports and imports reached US$ 157.68 billion, 48.68 per cent of the total national exports and imports: US$80.96 billion were their exports, 44.06 per cent of the total exports; US$76.72 billion were their imports, 54.73 per cent of the total imports. The development of FIEs promotes the internationalization of the Chinese economy.

FIEs promote regional economic development. FDI is a very important engine of coastal economic development. In 1997, FIEs' gross industrial output value in 15 provinces and municipalities accounted for over 10 per cent of the total; six of them over 20 per cent, five of them over 30 per cent, four of them over 40 per cent (Fujian 57.61 per cent, Guangdong 55.71 per cent, Tianjin 44.13 per cent and Shanghai 40 per cent). The economic development of the middle and western part of China also obtains benefit from FDI, but the percentage is not very high, only three of them reached about 10 per cent (Shaanxi 11.49 per cent, Ningxia 10.11 per cent and Chongqing 9.97 per cent).

Development of FIEs speeds up the transformation of China's economic regime from planned economy to market economy, strengthens the construction of China's legal system and further promotes reform and opening to the outside world. It is one of most effective ways to renovate the state-owned enterprises through cooperation with foreign capital.

Impacts of FDI on the environment

Many foreign investors have introduced advanced technology to China, including technology in pollution prevention, advanced environmental management systems and awareness, and have played a positive role in protecting the environment in China.

- Over 90 enterprises have obtained certification of ISO14000, which has been operating since 1996 in China, two-thirds of them are FIEs.
- China has implemented its Environmental Labelling since 1994. Until now, 90 enterprises and approximately 360 products have obtained the certification; about half of them are FIEs.
- Some enterprises with foreign investment have made considerable achievements in carrying out clean production activities.

- More foreign businessmen have been making investment in environmental protection industries, organic foods, clean energy and other environmentally-sound industries.
- The development of FDI promotes open areas to create the sustainable development strategy. Xiamen in Fujian Province, Shenzhen and Zhuhai in Guangdong Province, Dalian in Liaoning Province, Weihai in Shandong Province and Zhangjiagang in Jiangsu Province have been chosen as model cities of environmental protection.

Although the contribution made by foreign investors to China's sustainable development are highly valued, it is undeniable that some investors have transferred pollution-intensive or high-pollution industries into China. Some FIEs are having a seriously negative impact on China's ecological environment.

3 Current situation of transfer of pollution-intensive industries and its impacts

Pollution-intensive industries (PIIs) refer to those industries engaged in activities that involve directly or indirectly the introduction of hazardous wastes into the environment, that are harmful to human health, plant or animal life. PIIs also include those industrial activities that affect worker safety as a direct result (in whole or in part) of exposure to a work environment where potentially hazardous substances or processes are in use. These industries are the focus of many environmental policies and regulations. It is difficult and costly to control and treat pollution discharged by these industries.

Depending on the actual impacts on China's environment, PIIs in this study include the following: coal mining and processing; petroleum extracting, refining and coking; petrochemicals; mining, dressing, smelting and pressing of ferrous and nonferrous metals; various non-metal minerals, sugar refining and vegetable oil; cannery, vinegar, soya sauce, Vesu, etc.; wines and spirits; printing and dyeing; shoe-making (not including cloth shoes); leather, fur, down and related products; pulp and paper-making; thermal power generating; raw chemical materials and chemical products; medical and pharmaceutical products; chemical fibres; rubber products; and various plastics and electrical and electronic products.

According to data from the third national industrial census in 1995, there were 16,998 foreign-invested enterprises with gross industrial output value of 415.3 billion yuan Renminbi and 2.955 million employees involved in activities defined as PIIs. They accounted for about 30 per cent of the corresponding indicators of all foreign-invested industrial enterprises (FIIEs). The data provided by the Independent Accounting Industrial Enterprises above the township level also revealed that foreign investment in PIIs involved 14,189 enterprises with gross industrial output value of 379.3 billion yuan, and 2.187 million employees, representing 2.78 per cent, 6.90 per cent and 2.55 per cent of national totals, and also 30 per cent of FIIE counterparts. Most of FIIEs in PIIs are SMEs, mainly from Hong Kong, Taiwan Province, Macao, South Korea, southeastern Asian countries, Japan as well as some from the United States and European Union countries.

When compared with the related indicators of all FIIEs and all FIIEs in PIIs, they accounted for 25.64 per cent and 72.34 per cent in gross industrial output value, 22.07 per cent and 77.08 per cent in number of enterprises, 30.71 per cent and 78.54 per cent in actual amount of foreign investment, 25.83 per cent and 71.74 per cent of sales revenue, and 25.83 and 78 per cent of employees, respectively.

There are some notable aspects of transfer of PIIs to China through FDI:

- *Transferred ODS production, and specifically, consumption.* Our study reveals that foreign investment in ODS production and consumption has been substantial. From 1985 to 1996, US$2.18 billion flowed into this area and 1,004 enterprises have been initiated. Cleaning, refrigeration and foam are the industries in which foreign investment is concentrated. From 1985 to 1996, the three above-mentioned industries accounted for 95.7 per cent of foreign-invested enterprises and 98.03 per cent of foreign investment. Many of these FIEs sell their products in the domestic market. However, many of them also rely on international markets to sell their products and obtain their raw materials. A survey conducted in 1997 showed that CFC-11 and CFC-12 imports by Guangdong Province reached 1,800 tonnes in 1996.
- *Transfer of hazardous wastes through imports.* Based on incomplete data, primarily from the customs statistics yearbook, in 1990 China's import of wastes reached 0.99 million tonnes and amounted to US$0.26 billion, while in 1997 the corresponding figures were 10.78 million tonnes and US$2.95 billion. The hazardous wastes imported increased from 190,000 tonnes and US$13.92

million in 1990 to 920,000 tonnes and US$190 million in 1997. Some FIEs directly involved the importation, processing and disposal of hazardous wastes. For example, in 1991, there were 69 enterprises with foreign investment totalling US$53.81 million in importation, processing and disposal of wastes.

- *Importation of hazardous wastes burdens China's environment.* Jinagxi Hualong Chemical Co. Ltd. imported 30,000 tonnes of biological hazardous wastes, which polluted 20 hectares of cultivated land and damaged residents' health.[6]
- *Transfer of foreign hazardous technology, equipment and products, through FDI*. Some investors transfer techniques, machinery and products that are outdated, seriously harmful and prohibited in China, through their investment. Related investigations showed that 70 per cent of FIEs introduced middle-to-low levels of technology. A sino-joint venture introduced an outdated production process technique which resulted in mercury discharges 20 times higher than the national standard permitted.
- *Failure to introduce matched environmental-protection facilities and production-protection facilities by investors*. Some also introduced environmental protection facilities but left them idle or only for inspection purposes. The seriousness of such practice has begun to be exposed, in that poisoning and labour disputes occur occasionally. An investigation of 600 foreign-invested enterprises in Guangdong shows that 70 per cent of FIEs have not introduced facilities of environmental protection.
- *FDI in GMOs and their impacts on China's environment*. In recent years, much progress has been made in the field of biological technologies, especially in genetic engineering, which is now having revolutionary impacts on transforming agriculture, chemistry and pharmaceuticals. Genetic technology can improve agricultural plants and livestock, increase output tremendously; shortening span of growth, and making them withstand pests and drought more readily. Genetic technology can also play a positive role in environmental protection, sustainable utilization of biological resources and preservation of biodiversity. But development of GMOs may challenge bio-safety. The impacts may include: deteriorating the immune system of plants and animals, possibly even of humans, thus threatening their safety and survival; affecting the entire biological system by reducing biodiversity, destroying food chains and killing favourable insects and pesticides simultaneously; and because of its high-tech and closed system, misuse of GMOs may result in catastrophe, such as rampant insects and total crop failure.

Simply put, it is not correct to conclude that foreign investment in PIIs will only harm the environment, since FIEs in PIIs have introduced advanced technology, new products, new process and production crafts, new environmental management systems and methods which keep pollution at low levels. Some of these advancements have even been honoured as advanced environmental-protection units. However, generally speaking, according to China's 19 years of practice, it is true that many foreign investors, particularly medium- or small-size investors, transfer PIIs through FDI and exert a negative influence on China's environment. Therefore, it is necessary to take measures to control it.

4 China's laws and policies related to investment and environment

There are some current FDI laws, regulations and policies related to environmental protection. A list of the main regulations follows:

1. *Law on Foreign Trade (1994)*. Article 17 in Chapter 3 stipulates that the state prohibits importing or exporting products which may affect the health of human beings, destroy the ecosystem or pollute the environment.
2. *Law on Sino-Joint Ventures (1983)*, *The Law on Wholly Foreign-Owned Enterprises (1990)*, and the *Law on Contractual Joint Ventures (1995)*. All of them prohibit foreign invested projects which could result in environmental pollution.
3. *Interim Provisions on Guiding Direction for Foreign Investment (1995)*. Foreign investment projects are classified into four categories: encouraged, permitted, restricted and prohibited projects. Projects that are encouraged include: those using new agricultural technology and comprehensive agricultural development for construction in energy, transportation and key raw materials; those using new and high technology which can improve performance of products, save energy and raw materials and increase tech-economic efficiency of enterprises or produce new equipment or new materials meeting the demands of the market for which the domestic production capacity is defined; and those projects adopting new technology and equipment

for comprehensive utilization of resources and renewable resources and environmental protection. Prohibited projects include: those projects that endanger the safety of the State or damage social and public interests and projects that pollute the environment, destroy natural resources or impair the health of human beings.

4. *Catalogue for the Guidance of Foreign Investment Industries (revised in 1997 and effective in 1998)*, which encourage projects related to protection of environment and natural resources involving 11 industries and 30 specific projects; restricts projects involving five industries and seven specific projects; and prohibits projects involving six industries and eight specific projects.
5. *Regulations on Labour Management in Foreign-Invested Enterprises (1994)*. Article 31 provides that FIEs must ensure the safety and health of workers and bear legal obligations.
6. *Regulations on Contract Management to Technology Transfer (1985)*. Article 3 specifies that transferred technology must be advanced and appropriate, good at environmental protection, safe production and energy and materials saving.
7. *Bilateral investment treaties.* To date China has concluded 90 bilateral treaties, but no environmental-protection clauses have been included.

There are a number of environmental-protection laws, regulations and policies related to FDI. Major ones include:

1. Circular of Improving Environmental Planning of Coastal Open Cities and Their Economic and Technological Zones (1984).
2. Interim Provisions on Environmental Management of Open Economic Areas (1986). This affirms the principles of pollution prevention and environmental impact assessment, mandates environmental responsibilities of foreign investors, encourages higher environmental standards which are more stringent than Chinese standards and encourages the transfer of least polluting technologies.
3. Notice of Strengthening Environmental Protection of Construction Projects with Foreign Investment (1992). This law says that foreign investors must abide by related laws, regulations and policies preventing environmental pollution and ecological destruction, and that they be supervised and administered by related authorities.
4. Regulations on environmental protection to the imported wastes, including the Circular on Strict Control of the Transfer of Foreign Hazardous Wastes (1991); the Interim Provisions on Strict Control of the Importation of Wastes from EU (1994); the Interim Provisions on Environmental Protection to the Importation of Wastes (1996); the Supplementary Provisions to Provisional Regulations on Environmental Protection Control over Import Wastes (1996); the Regulations on Strengthening Control over Shipment of Import Wastes (1996); the Measures Governing the Management of Pre-shipping Inspection on Imported Waste Materials (trial implementation) (1996), the Notice for the Supplement to the List of Wastes Used as Raw Materials and Restricted to Import (1996).
5. Law on Air Pollution Prevention and Control (1995), Law on Solid Wastes Pollution Prevention and Control (1995) and the Law on Water Pollution Prevention and Control (1996).

Other regulations include the Regulations on Environmental Protection of the Building Materials Industry (1986); the Administration Provisions on Environmental Protection of the Chemical Industry (1990); the Administration Provisions on Prevention and Control of Pollution of Coastal Construction Projects to Marine Environment (1990); and the Administration Provisions on Prevention of Pollution of Disassembling of Old Ships (1988).

Although environmental concerns have been integrated into China's policies, laws and regulations for utilizing FDI, there are many problems in the implementation of these laws, regulations and policies. The Notice of Strengthening Environmental Protection of Construction Projects with Foreign Investment is the most comprehensive regulation in this field, but four problems exist in the document: 1) the criteria for approving projects is based on the investment amount instead of environmental impacts; 2) contradictions exist between power being transferred to a lower level and the examination and approval capabilities of the authorities; 3) there is no effective supervision mechanism; and 4) there are no adequate measures to punish violations.

In addition, there are many problems in the implementation and enforcement of these laws and regulations. In some regions, in order to attract more foreign investment, local authorities lower their environmental standards to foreign investors and create double stan-

dards. Some senior officials emphasize the importance of protecting the urban environment, while at the same time neglect the environmental problems in rural areas by allowing the transfer of pollutants from urban to rural areas. Some foreign-invested projects are arbitrarily located in rural areas.

In 1997, the State Environmental Protection Administration (SEPA) and the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) jointly examined the implementation of environmental laws and regulations by foreign-invested enterprises (FIEs) with foreign investment lower than US$5 million in six provinces (Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi) and three municipalities (Tianjin, Shanghai, Chongqin). There were 86,481 FIEs examined. The results showed the implementation rate of environmental impact assessment reports reached 61.4 per cent, the performance rate of "three simultaneousness" in construction projects reached 83.5 per cent. On average, FIEs' performance rate of environmental assessments is 18.4 per cent lower than those of domestic construction projects; the performance rate of "three simultaneousness" was 11.4 per cent lower. This examination shows that environmental management and supervision of FIEs should be strengthened.

5 Conclusion and recommendations

The study concludes that, in general, many foreign investors have adopted an active attitude towards environmental protection and have been making contributions to sustainable development in host countries. But negative impacts of liberalization of FDI on sustainable development in host countries should not be neglected. Some investors consider developing host countries to be pollution havens, transferring PIIs through FDI and causing serious environmental pollution through production. It is very important to formulate international investment rules concerning sustainable development. From China's perspective, foreign-invested enterprises have made obvious contributions to China's economic development, many of them, especially some well-known TNCs are environmentally responsible through their introduction of advanced technology and environmental facilities and adoption of advanced environmental management systems. However, about 30 per cent of the foreign-invested enterprises involved in PIIs activities have led to serious pollution of China's environment. Coordinated development between FDI and sustainable development should be reached through adopting appropriate measures.

The study puts forward the following recommendations:

To establish new sustainable development strategy for utilizing FDI

Opening to the outside world (trade and investment liberalization) and environmental protection are the two important basic national policies in China. Establishing a new sustainable investment strategy is a useful means in coordinating these two basic national policies. The new sustainable investment strategy should include the following:

- *Formulating new guidance in utilizing FDI.* The existing development strategy utilizing FDI focuses on high growth rate and quantity of FDI, but pays less attention to quality and efficiency, especially environmental efficiency. As an important and integrated part of the State's fundamental policy of opening to the outside world, utilization of FDI must consider environmental protection and serve China's sustainable development needs. This is a very important aspect of increasing the level of FDI utilization. The scale, growth rate and quantity of FDI must coordinate with environmental protection. FDI and environmental protection should be promoted mutually. The improvement of environmental quality should be regarded as a very important component of improving the investment environment and attracting FDI.
- *Increasing environmental awareness among officials and businessmen involving FDI through various means.* The concepts of sustainable development and environmental morality should be brought before people involved in FDI.
- *Amending industrial and regional guidance for FDI and other relevant policies*. Measures should be taken to prevent transfer of PIIs from cities to the countryside—from the eastern region to the middle and western regions.
- *Encouraging TNCs to take measures to promote sustainable development*. TNCs should be encouraged to: use advanced environmental technology and equipment; establish advanced environmental management systems; to adopt cleaner production; to apply environmental standards higher than that of China, e.g., the environmental standards for their parent companies; to publish annual environmental reports for public information; and to require their suppliers, contractors, carriers and distributors to increase the capacity for environmental protection.

To transform selected state-level economic and technological development zones into demonstration areas of sustainable development

Since 1979, when Guangdong and Fujian Provinces were given special policies, a multi-tier structure of open areas with wide geographic coverage and special emphasis has been formed in China. It is recommended that some special economic zones, state-level economic and technological development zones and high, new technological zones be chosen as pilot projects of demonstration zones of sustainable development. The environmental standards of the pilot areas should keep in line with international advanced level, and projects in PIIs should be restricted. Projects without pollution, low consumption of energy and raw materials and high content of technology should be encouraged. The pilot areas themselves should apply for certification of ISO14000 and certification of model zone with clean production.

To formulate the regulations on environmental management of foreign-invested projects

On the basis of the Notice of Strengthening Environmental Management of Foreign-Invested Construction Projects (1992), the State Council should formulate the Regulation on Environmental Management of Foreign-Invested Projects. The pre-establishment examination and approval should be strengthened.

- *Upgrading the Catalogue of the Industrial Guidance for Foreign Investment* according to the impacts on the environment and organizing foreign investment flows into categories: encouraged, permitted, restricted and prohibited projects.
- *Establishing a system of phasing out backward technology and equipment which causes serious environmental pollution*. The State Economic and Trade Commission and the State Environmental Protection Administration should publish a list of timely technology and products that should be eliminated or phased-out (produced, sold, imported and used) by setting a timeframe.
- *Considering environmental concerns while screening and approving foreign-invested projects.* Approval of foreign-invested project should be based on the environmental consequences rather than on the value of FDI. A system of appraisal of technology and equipment introduced by foreign investors should be established to prevent transfer of hazardous and foreign-abolished or prohibited technology and equipment.
- *Strengthening environmental management in the process of construction and production of foreign-invested projects*. An annual environmental reporting system for foreign-funded enterprises should be established and published. Legal consequences should be imposed for violations.

To strengthen coordination among related departments and policies, laws and regulations

An administrative mechanism should be set up to organize and co-ordinate all related governmental organizations. Laws, regulations and policies should integrate FDI into sustainable development. The role of industrial associations should be brought into full play in the field of environmental protection of foreign-invested enterprises, since the government organizations are changing their functions.

To establish special PIIs Control Zones

Special Control Zones for PIIs could be set up for industries that are essential to the national economy and for pollutants that can be controlled. Such zones will be useful in terms of the concentration of pollution treatment and control. These zones should be established by sectors, such as printing and dyeing, papermaking, leather making, electro-plating, etc. From limited foreign and domestic experiences and lessons, these zones can be run in four models.

1. Directly by government environment authorities, which are responsible for the construction of pollution prevention and control facilities;
2. By large enterprises under the guidance of environment authorities by establishing specific types of zones, For example, China National Import & Export Co. can set up the Town of Printing and Dyeing in Heyuan County, Guangdong Province. This enterprise is in charge of attracting FDI to this zone and constructing pollutant treatment facilities;
3. Using industrial associations to coordinate among foreign-invested enterprises and establish special zone financing by the enterprises, such as "Xumu Special Control Zone of Leather-making" in Anhai, Jinjiang County, Fujian; and
4. By a foreign-invested pollution treatment company that will be in charge of the treatment of pollutants discharged by foreign-invested enter-

prises in PIIs in a certain region. This is suitable for enterprises scattered in different parts of the region. Environmental authorities examine, approve and supervise its work.

To strengthen the international investment regulatory regime for sustainable development

Since investment is so important to economic development world-wide and has a direct link to global sustainable development, it is important to establish a World Investment Organization (WIO). In order to establish international investment rules, under the WIO, a General Agreement on Investment (GAI) should be developed. Within this framework, a special agreement of investment and sustainable development must be concluded. The main contents of the agreement may include the following:

- The principle of non-discrimination, particularly national treatment, should embody the consideration of sustainable development. On the one hand, hosting countries should not lower their environmental standards to encourage FDI. On the other hand, investors are encouraged to adopt higher environmental standards than host countries to promote global sustainable development;
- Host countries can adopt policies to encourage, restrict and prohibit certain investments for reasons of environmental protection. Preferential policies can be offered to foreign investors who invest in green industries and products like clean technology and production processes. Those industries, technologies, production processes, products, hazardous wastes and equipment that are domestically restricted or prohibited should be also be restricted or prohibited in the transfer through FDI. Investors, especially the transnational corporations, must bear environmental responsibility for promoting sustainable development in host countries and around the world. The Conduct Code of TNCs must be revised and upgraded, restricting business practices and measures detrimental to sustainable development;
- Considering the polluter pays principle, environmental cost internalization should be mandated to avoid the distortion of international trade and investment;
- Host countries may establish technical barriers of investment (TBI). No country should be prevented from taking investment measures necessary for the protection of human, animal or plant life or health, of the environment, at the levels it considers appropriate—subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or there is a disguised restriction on international investment. The environmentally-related investment measures should not be more investment-restrictive than necessary to fulfill a legitimate objective;
- All countries should uphold and safeguard an open, non-discriminatory and equitable international economic system, which promotes trade, investment and sustainable development; and
- Special treatment and interests of developing countries must be considered.

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Pollution Havens and Ozone Depletion: Substances Control in China Relating to Foreign Investment[1]

by Weiyan Sun, Youfu Xia, Ruqiu Ye and Lulian Cheng

1 Introduction

The Montreal Protocol on the Control of Substances that Deplete the Ozone Layer sets out timetables for phasing out the production and consumption of ozone-depleting substances (ODS) in developed countries with a 10-year grace period for developing countries. It is one of the multilateral environmental agreements that contains trade measures. Trade measures can be used to restrict ODS trade between parties and non-parties and to prevent non-parties from gaining a competitive trade advantage over parties. In addition, there are other trade measures not mandated by the Protocol but undertaken voluntarily by some parties in their control schedules to restrict ODS trade between parties. These include industry agreements to restrict imports, labelling requirements, import licences, permit trading systems for import allowance, quantitative import restrictions and import taxes on ODS.

An early report from the Chairman of the Scientific and Technical Committee of the Montreal Protocol (UNEP, 1995) concluded that although overall progress was being made in developed countries in the phase-out of controlled substances, considerable challenges existed in addressing developing country issues. The report provides some preliminary evidence that developed countries have used FDI as means of meeting legal obligations related to the phase-out of ODS, by shifting production towards Article 5 countries.[2] Analysis by UNCTAD confirms the possible creation of pollution havens in developing countries as a means of circumventing the spirit of the Protocol. One of the findings of UNCTAD's 18 country case studies is the need for more detailed and rigorous analysis of this issue.

Meanwhile, the western media have repeatedly reported smuggling of ODS into the EU countries and the United States. The International Environmental Reporter reveals that there may be 30,000 tonnes of CFCs annually entering the illegal market world-wide, and somewhere between 10,000 and 20,000 tonnes per year are being illegally smuggled into the United States.[3]

This paper contains the results of a study undertaken by the Working Group on Trade and Environment of the China Council for International Cooperation on Environment and Development. It examines the trend of foreign direct investment (FDI) in China related to production and consumption of ODS and examines whether or not there exists a tendency of ODS production and consumption shifting to China through FDI. It also reviews China's existing policies, regulations and measures, assesses whether they are adequate in tackling this problem and provides recommendations to the government to effectively prevent the transfer of production and consumption of ODS through FDI.

2 Trends in foreign direct investment to China related to ODS production and consumption

The study examines 42,380 foreign funded enterprises (FFEs) and finds that 957 are related to production and especially consumption of ODS. The total foreign investment value of these 957 FFEs totals US$1.45 billion.

The study shows that the growth rate of foreign direct investment (FDI) in industries related to production and consumption of ODS is very high, especially during the 1987–1988 and 1991–1992 periods. The number of FFEs increased by 21.88 per cent between 1987 and 1988, with an increase in investment of 162.73 per cent. In 1992, FFEs increased by 231.14 per cent, and investment was 377.07 per cent higher than in 1991.

The research indicates that 96 per cent of the examined FFEs are in the solvent, refrigeration/air conditioning and foam industries, accounting for 97 per cent of the total investment. Compared to 1987, FFEs in the solvent industry increased by 13.4 per cent while investment was 4.1 times higher than in 1992; in the refrigeration/AC industry, the number of FFEs increased by 8.2 times and investment by five times; and in the foam industry, 61.8 times and 84.8 times respectively. Not many foreign businessmen have invested in aerosols and fire extinguishing industries, but the study finds many FFEs produce foam agents, aerosol propellants, refrigerants, halon extinguishants and cleaning reagents.

The majority of FDI flows to the coastal regions of China. Guangdong Province absorbs about one fourth of the total FDI in China. Jiangsu, Shanghai, Shandong, Liaoning, Beijing, Fujian and Zhejiang also have a high percentage of investment. FDI in the middle and western part of China is still not high, but in recent years, more and more FDI has flowed to the inner part of China, in particular, Hubei and Henan Provinces.

The study also reveals the sources of FDI in China related to production and consumption of ODS. Foreign investors are primarily from 25 countries and regions—12 are OECD countries; eight are newly industrialized countries (NICs) and regions. FFEs from Hong Kong account for 64.58 per cent of the total enterprises examined with a total investment of 50.33 per cent. The United States, Japan and the Netherlands are also the major investors in the production and consumption of ODS in China through FDI. Many transnational corporations (TNCs) establish their subsidiaries or branches in Hong Kong and then invest in China in the name of their Hong Kong companies.

There is also a great difference in the scale of FFEs. The average investment of these FFEs is US$1,520,000, with some totalling over US$50 million and some over US$100 million. However, many of them are below US$500,000 with some even less than US$100,000. The study found only one enterprise with a US$10,000 investment. In recent years, the investment amount has been gradually increasing. More and more TNCs invest in China and some of them set up branches in different parts of China to produce various products using ODS as raw materials.

The majority of foreign investors prefer joint ventures to wholly-owned subsidiaries. Their registered production period of time has increased in recent years. Before 1992, the registered production period of time of most FFEs was between 10 and 20 years (this means that many FFEs will stop production around or before 2010). However, in recent years, more and more FFEs registered their production period of time over 20 years, 50 years and some even up to 99 years. For example, eight of 21 FFEs in 1993 registered their production period of time for over 25 years, four for over 50 years, and one for 99 years. Fifteen FFEs registered for production of over 20 years and eight for over 50 years.

Many of these FFEs sell their products on the domestic market. Yet, many of them rely on international markets to sell their products and obtain their raw materials. These FFEs import their raw materials mainly from the OECD countries and NICs. According to statistics from Guangzhou Customs, 34,000 tonnes of ODS were imported in the first half of 1992.[4] In recent years, as developed countries phase out production of ODS, the prices of ODS produced in China have decreased rapidly, more and more FFEs use the domestically produced ODS.

3 Evaluation of China's existing policies, regulations and measures

As a party to the Montreal Protocol and its amendments, the Chinese government has been serious in fulfilling its international obligations in controlling and gradually phasing out ODS. China has established an institutional framework and a technical support system. China's Leading Group for Ozone Layer Protection was established in July 1991 and a Technical Information Clearinghouse and a Project Management Office were also set up for supervision on data collection, information exchange, proposal submission, program coordination and project implementation.

China has formulated a policy and regulatory system for the control and phase-out of ODS. It has developed its Country Program, specifying a policy framework and formulated strategies for phasing out OD for nine of the ten related industrial sectors. A number of sector regulations have also been jointly adopted by the National Environmental Protection Agency and related ministries. For example, the Circular on Enhancing Management of Production of CFCs and Alternatives specifies that no new project involving the production of CFCs shall be approved. And a licence system was set up for CFC production in 1998.[5]

Other sector regulations include the Circular on Suspension of Reallocation of Halon-based Fire Extinguishers at Unnecessary Place, the Circular on Control of Development and Use of Aerosol Products, and the Circular on Suspension of Construction of New Fire-Trucks and Fire-Extinguishers.[6]

China has planned to phase out ODS production and consumption by 2005 (five years earlier than what is mandated by the Montreal Protocol) under the condition that China receives additional financial assistance and adequate technology transfer. China issued a complete ban of the use of CFC in the aerosol sector by the end of 1997 (except the use for medical purpose).[7]

However, there are some shortcomings in the existing regulations and policies:

1. The importance of the shift of ODS production and consumption to China through FDI has not been fully understood by China's Country Program for the Phasing Out of Ozone Depleting Substances. The present Country Program indicates that in the industrial/commercial refrigeration industry, there are approximately 300 enterprises in the refrigeration and air-conditioning industry, about 130 of them are direct users of CFCs. They consist of 70 per cent state-owned enterprises, 29 per cent collectively-owned and township and village enterprises (TVEs), and only two per cent of joint-venture enterprises. In the aerosol industry, over 100 enterprises produce aerosols, 70 per cent of which are state-owned, the rest, excluding five joint-ventures, are collectively-owned and TVEs. This study points out that CP (the Country Program) has not fully considered the entire situation of FDI in the production and consumption of ODS in China.
2. Current environmental laws (e.g., the Law on Air Pollution Prevention and Control) and policies do not include requirements for ODS control. There are no specific stipulations in controlling FDI in ODS production and consumption in China's current guiding policies for the use of FDI in China.
3. China's present policy of phasing-out ODS production and consumption is for foreign investors to take responsibility for their own share (their equity in FFEs)—the Chinese government is only responsible for the Chinese portions (such as in a joint ventures). It is very difficult for small- and medium-size FFEs, especially small- and medium-sized enterprises (SMEs) from Hong Kong, Taiwan Province and Macao, to carry out this policy.

The shift in production and consumption of ODS through FDI will have two serious consequences if it is not fully taken into consideration:

1. The schedule for phasing out the production and consumption of ODS will be seriously affected; and
2. As China gradually limits, and eventually bans, the imports of ODS, and in particular, as developed countries gradually phase out ODS production and consumption and their related products, many of these transferred FFEs, which rely on international markets for their raw materials and final products will run into difficulties in finding markets.

The study also shows that although the Montreal Protocol provides a longer grace period for developing countries, it does not take any measures to prevent non Article 5 parties from transferring ODS production and consumption to Article 5 parties through FDI. Nor have effective legal measures been adopted by non Article 5 countries to limit and punish enterprises that shift ODS production and consumption to Article 5 countries through FDI.

4 Results from field investigations

Investigation in Beijing

The research team of the first phase of the study visited the Beijing Yifeng Foam Rubber Products Co. Ltd., Beijing Matsushita Colour CRT Co. Ltd. (BMCC) and Capital Steel & NEC Electronic Co. Ltd. Some small- and medium-size FFEs were also surveyed through telephone inquiries. This phase of the investigation led to four conclusions:

1. Some newly established joint ventures of large transnational corporations have paid a good deal of attention to the protection of the ozone layer, and they have tried to use ODS substitutes. For example, Capital Steel & NEC Electronics Co. Ltd. is a joint venture of Capital Steel Co. with NEC Co. The total investment in this venture is 38 billion Japanese yen. NEC's equity is 51 per cent. The main products of the venture are the large-scale integrated circuits which are exported to Japan, Hong Kong, Singapore and Thailand. Its export value in 1995 reached US$18,690,000. The venture uses H_2SO_4, H_2O_2 and two other substitutes for traditional cleaning reagents.
2. Some early established joint ventures of well-known transnational corporations used controlled substances at the beginning, but later switched to substitutes, as the result of the international agreement, especially under the pressure of foreign importers requiring the use of substitutes. They have even developed new substitutes. BMCC is a joint venture of Matsushita Electric Industrial Co. Ltd. and Matsushita Electronics Co. with four Chinese operations. Established in 1987, BMCC's total investment amounts to US$339.652 million with equal share between the two sides. It produces tubes for colour TV and CRT using 60 tonnes of CFC-113 as cleaning reagents and exports of US$66.303 million to Japan and the United States. Because of the influence of the Montreal Protocol and the pres-

sure of its major importers, as well as the Japanese willingness to be a good example of FFEs in China, BMCC has been developing substitutes since 1994 and invented a new type of water-based cleaning reagent which has the advantages of low cost (only 60 per cent of the cost of the original one) and higher efficiency. BMCC is now applying for a patent. Since December 1995, all the controlled substances formally used have been replaced by new cleaning reagents.

3. Some medium-size joint ventures are seeking funds from the Multilateral Fund in order to phase out ODS. For example, Beijing Yifeng Foam Rubber Products Co. Ltd. is a joint venture of a Hong Kong enterprise, which produces foam rubber products such as cushions and shoulder pads. Its exports of shoulder pads to European countries are worth US$50,000. The total investment in the venture in 1988 was US$2.26 million with foreign equity of 33 per cent. It used 62 tonnes of ODS in 1995 and would use 110 tonnes in 2005. CFC-11 used to be imported but it is now purchased from the domestic market because of the price. In May 1994, it learned that the ODS must be replaced and that it could get support from the Multilateral Fund. Its board of directors decided immediately to contact related organizations and apply for funds. In November 1995, it received a notification that it could receive US$204,600 of support from the Multilateral Fund. It plans to use methylene dichloride as the main substitute to replace 110 tonnes of ODS in 2005.

4. Many small- and medium-size FFEs, especially those from Hong Kong, Taiwan and Macao, have not adopted any measures to protect the ozone layer for three reasons: 1) many small- and medium-size FFEs, especially Chinese, do not understand the need to protect the ozone layer because of inadequate information; 2) some SMEs are too small to use the substitutes; and 3) there are some problems for them in using the Multilateral Fund. For example, the procedures and formalities for applying and reviewing are too complicated for medium and small enterprises to understand and are not suitable for them. The period of time from the application to the actual receipt of funds and the installation of facilities is too long. The prolonged procedure for applying funds from the Multilateral Fund would inevitably have a negative effect on the initiative of those enterprises that want to find substitutes for ODS. The one-to-one requirement for local expenses do not suit China's situation. It is very difficult for SMEs to pay extra money for ODS substitutes if there are no obvious economic benefits. The Multilateral Fund relies primarily on foreign equipment, technology, substitutes and experts. As a result, the actual situation of Chinese enterprises cannot be fully considered. The initiative of Chinese enterprises and experts cannot be brought into full play. China's policy that foreign cooperators should bear their share of the cost of ODS control is not practicable for SMEs, especially for those from Hong Kong, Taiwan and Macao.

The study also indicates that in using any substitutes, many factors, such as their negative environmental impacts, should be carefully examined. For example, methylene dichloride is harmful to the health of workers (it may cause cancer) and may result in another form of air pollution when discharged. Also, using cleaning facilities may cause noise pollution. Costs may increase when using the substitutes, thus the competitiveness of enterprises will be affected. Although the price of methylene dichloride is the same as that of a CFC-11, using the substitute requires a closed production process and additional facilities such as ventilating equipment must be added, energy consumption must be increased and working conditions must be measured. All these factors will affect the cost of the final products.

Investigation in Guangdong

Guangdong Province is one of the major areas in China where ODS have been increasingly used in recent years. The research team of the second phase of the study, headed by Ruqiu Ye of the National Environmental Protection Agency and Lulian Cheng of the Policy Research Centre for Environment and Economy, focuses on a survey of FDI ventures in foam and cleaning sectors in this province. The study was undertaken with funding from UNEP. The research team had a great deal of help from related ministries, commissions and local departments.

The investigation was aimed at discovering whether foreign enterprises were transferring ODS to China, to obtain actual data on ODS production and consumption of FFEs, and to analyze the current situation and the trends of FFEs in ODS control and phase-out.

With the assistance of the Guangdong Environmental Protection Bureau and the Guangdong Foreign Trade and Economy

Commission, the research team obtained some very useful information on FFEs in foam and cleaning sectors in some parts of Guangdong Province.

The study also found that Guangdong is the major importer of ODS in China. Statistics from Guangdong Customs Administration shows that about 1,800 tonnes of CFC-11 and CFC-12 were imported in 1996, mainly to Shenzhen, Chaozhou, Shantou, Jieyang and Dongguan. According to the information from the customs, imported CFC in Chaozhou is used mainly as a coolant and imported CFC in Jieyang is used as a foaming agent but it is difficult to identify end uses for the CFCs imported to Shantou. The imported CFC in Shenzhen is used in the cooling, cleaning and foaming sectors.

Management and technical personnel from Guangdong Dongguan and Huizhou Environmental Bureaus participated in the first field survey. Information from the University of International Economics and Trade and Guangdong Foreign Trade and Economy Commission provided details of FFEs in the foam and cleaning sectors in Guangdong and information from the Guangdong Customs Administration gave details of enterprises that import CFC in Guangdong Province, including categories and quantities of CFC imported. Based on these numbers, the research team asked relevant local environmental departments to provide information on the business operation of these enterprises. Five enterprises in the foam and cleaning sectors in Dongguan and Huizhou were selected according to all the available information and were investigated. Those studied include a factory for polystyrene foam materials, a factory making soft polyurethane foam materials, a factory for polyolefine foam materials, a factory with a cleaning process for circuit boards and a factory with a cleaning process for the magnetic heads of recorders.

From the information obtained in its preliminary survey in Guangdong, the research team found it difficult to grasp the entire situation of Guangdong in the production and consumption of ODS. In a small area of 2,465 km^2, Dongguan has as many as 15,000 FFEs. Because of inadequate funds and time, it is almost impossible to investigate all of them, not to mention the entire Guangdong Province. Nevertheless, the investigation reached a number of tentative conclusions:

1. ODS control has not been considered in the approval of FFEs and imports of ODS, nor in the customs' examination.

   Although NEPA has adopted some detailed policies and measures for controlling ODS, it has not coordinated fully with the Ministry of Foreign Trade and Economic Cooperation and the General Administration of Customs in implementing them.

2. Local institutional coordination among relevant governmental agencies needs to be strengthened.

   According to China's institutional system, the approval of FFEs in Guangdong is the responsibility of Guangdong's foreign trade commission. The registration of foreign enterprises goes to the industrial and commercial bureau. Guangdong's customs controls imports and exports of ODS, while Guangdong's environmental protection bureau implements environmental laws and policies for ODS control and phase-out. A set of mutually supporting policies to provide necessary policy and institutional coordination among these institutions in ODS control is needed. Institutional coordination is also necessary for a thorough investigation of FFEs related to ODS production and consumption in Guangdong province.

3. Large enterprises are more active in ODS control.

   Some high-level technicians in FFEs know about policies, technology and methods for ODS control. In order to meet the market demand in developed countries and ensure their international competitiveness, many export-oriented foreign enterprises which import their raw materials and export their products to international markets, have used ODS substitutes and mark their products with the CFC-free label or the three-arrow recycling label. Some enterprises are looking for technologies that are completely safe for the ozone layer and are planning to expand production using such technologies. Products of some factories have even obtained the CFC-free certificate issued by related institutions in Hong Kong before going to international markets.

4. Employees in grassroots agencies lack ODS knowledge.

   Some employees in environmental departments in some cities and counties of Guangdong Province do not know much about global ODS control activities. Before the research team started the investigation, Guangdong Provincial Environmental Protection Bureau issued an

order to five cities requiring a list of FFEs in the foam and cleaning sectors using ODS. Some of them simply reported that "no such enterprises exist according to their survey." Yet, the investigation found that it was just those cities who reported "no such enterprises" that imported the largest quantity of ODS, and had a relatively large numbers of such FFEs. This illustrates that local environmental protection bureaus are not aware of the ODS issue yet officials of these grassroots environmental protection bureaus are the contact point for a better understanding of the actual situation of ODS production and consumption and better implementation of the country's policies and regulations for controlling and phasing out ODS. Therefore, steps must be taken to raise their awareness and build their capacity in this respect.

5 Conclusions and recommendations

Although the study as a whole indicates that there is an increase in the number of FFEs related to ODS production and consumption in recent years, it is still hard to say that the growth in the number of such enterprises has resulted in a significant increase of ODS production and consumption in China. While further, and more thorough, investigation should continue, the present study does reveal some major problems with the Montreal Protocol and the Multilateral Fund as well as some problems with a Chinese policy and institutional coordination and suggests that some measures should be taken immediately.

The Montreal Protocol provides a longer grace period for developing countries. It does not take any measures to prevent non Article 5 parties from transferring ODS production and consumption to Article 5 parties through FDI. Although some countries have taken some trade measures in their control schedules, these non-mandatory trade measures have not effectively prevented some countries from exporting ODS to Article 5 countries when ODS production and consumption have been controlled or phased out in their own countries.

The Multilateral Fund was established to support experimental technologies in developing countries. However, the complex application formalities, the prolonged procedures and the requirements for local costs as well as the requirements for the procurement of foreign goods and expertise are the major barriers to small and medium enterprises obtaining funds from the Multilateral Fund to support their initiatives to phase-out ODS.

China has adopted some detailed ODS control and phase-out policies and measures. However, there is a lack of policy coordination and institutional coordination. ODS control has not been incorporated into the approval of FDI projects. Relevant governmental agencies such as the State Planning Commission, NEPA and MOFETEC do not seem to coordinate effectively in the implementation of ODS control policies and measures.

The issue of the lack of ODS awareness was rather prominent throughout the entire research project. Many FFEs related to ODS production and consumption were approved and registered in the name of high-tech transfer. Some officials in local environmental bureaus are not aware of foreign enterprises in industries related to ODS production and consumption. This shows that people who are in charge of examining and approving FDI and people whose main responsibility is to implement environmental laws are not aware of the need to protect the ozone layer.

Despite these problems, there are positive aspects of FFEs in controlling production and consumption of ODS. There have been an increasing number of FFEs in China addressing the ODS issue in recent years. Among them, some enterprises have adopted ODS substitute technology because of the requirements of international markets or their parent companies. Some medium-size joint ventures have been actively seeking funds from the Multilateral Fund to replace ODS.

Yet some medium and small enterprises have taken no measures. Some are still importing ODS and using unidentified substances which are suspected to be ODS. This implies that some companies in developed countries still are transferring the controlled substances to Article 5 countries despite the control measures specified by the Montreal Protocol and its Amendments.

The Montreal Protocol provides a longer grace period for developing countries, arguing that it is in the best interest of developing countries. As the present study indicates, there is an argument to be made that the delay in implementing the Montreal Protocol will ultimately put industries in question at a disadvantage. This study clearly shows that larger enterprises get the message and medium-sized enterprises are getting the message. Small enterprises, however, neither get the message, nor even know what is going on.

To prevent ODS from flowing into China through FDI and to ensure that China implements the

Montreal Protocol effectively, certain steps should be taken immediately. The following are major recommendations that the research teams has put forward:

1. The implementation of the Montreal Protocol should be further strengthened and integrated policies and measures for ODS control and management should be formulated.

   ODS control should be integrated into the existing environmental legislation (e.g., the Law of Air Pollution Prevention and Control) and other environmental management policies (such as environmental impact assessment, the "three simultaneity" system, the permit system, pollution levying fees, etc.). Some economic instruments for ODS control should be adopted, including a consumption tax on ODS, preferential loans or tax deduction or exemption for enterprises that take measures to replace ODS.

   China's ODS control and phase-out plan should also be integrated in its related trade policies. China's guiding policies for the use of FDI should prohibit FDI projects related to production and consumption of ODS.

2. It is essential to establish an effective coordination mechanism among related governmental agencies and between the central and local governments, and set up a sound management system throughout the country;

   Environmental protection authorities should be included in the process of approving foreign investment projects. Without environmental protection authorities, it would be difficult for the trade authorities to understand the implications of the ODS production and consumption transfer through FDI for China's implementation of the Montreal Protocol.

   MOFTEC should fully participate in the international negotiation and domestic policy-making in this regard.

   In addition, a local ODS management office should be set up in each province to be in charge of ODS control and phase-out within its jurisdiction.

3. It is very important to strengthen public education and provide training to related personnel and enterprises.

   It is necessary to provide training for management personnel of related governmental agencies and local grassroots departments. NEPA should be responsible for organizing such training. The media should be encouraged to play a major role, including the daily newspaper of MOFTEC International Business and other major trade and environment journals.

4. It is necessary to provide enterprises with technical support.

   Efforts will be made to provide enterprises with information on substitution technologies that are mature and applicable in China, in particular, to provide them with reliable technical support to replace ODS. The state should make necessary appraisal of and test a foreign country substitution technologies and introduce them into China only after proving they are mature and applicable in China.

5. There is a need to further enhance international cooperation.

   China should continue to work with the other parties to further improve the Montreal Protocol, to include measures to prevent ODS production and consumption from being transferred from non Article 5 countries to Article 5 countries through FDI.

   The Multilateral Fund should be made more accessible to SMEs in developing countries. The Procedure for applying the funds should be simplified and the period from applying to actually receiving the funds should be shortened. In order to use the Fund more efficiently, flexibility should be given to enterprises based on the specific situation including purchasing domestic facilities and substitutes, encouraging them to undertake their own R & D on alternative technology and substitutes. Sharing of local expenses should be further discussed.

Other recommendations of the research teams are:

- China's Country Program should be further amended and the issue of the ODS transfer through FDI should be fully considered.
- A nation-wide survey of use of FDI in this field should be conducted to analyze the actual situation of FFEs in order to formulate necessary policies and measures to tackle the problem
- TNCs in China should be encouraged to take action to phase-out ODS production and consumption according to their parent countries' requirements. Their parent companies should

provide advanced technology, financial support to their subsidiaries or branch companies in China.

- In order to promote more enterprises to take action in protecting the ozone layer, the role of the industrial associations should be further strengthened.
- The government should encourage new enterprises including joint ventures to adopt suitable substitutes through establishing a special national fund, providing subsidies and preferential loans, and/or tax deductions or exemptions.
- Further study should be given to the environmentally negative impacts and industrial and intellectual property rights of the substitutes and their suitability for China.

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Endnotes

1 This paper is originally from two reports of a study undertaken under the auspices of the Working Group on Trade and Environment of CCICED. One report was written by Weiyan Sun and Youfu Xia of China University of International Business and Economics. The other report was written by Ruqiu Ye of the China State Environmental Protection Administration (SEPA) and Lulian Cheng of the Policy Research Centre for Environment and Economy. The final report was edited by David Runnalls and Wanhua Yang. The Working Group would like to express its thanks to UNEP for its financial support of the Phase II study.

2 An Article 5 Party is a developing country whose annual per capita consumption of Annex A and Annex B substances are below the limits set in Article 5 of the Montreal Protocol.

3 International Environment Reporter, October 30, 1996.

4 China Environment News, December 29, 1992.

5 Ozone Action in China, No. 1, March 1995.

6 *Ibid.*

7 *People's Daily*, June 17, 1998

Section III
Sectoral Issues

China: Timber Trade Forest Resources Protection

by Zhihai Zheng and Jijian Yang[1]

1 Overview of China's forest resources and timber market

China's forest resources and forest sector

Land used for forestry in China is 263.395 million hectares, of which forest area is 158.941 million hectares, ranking fifth in the world after Russia, Brazil, Canada and the United States. However, China's per capita forest area is only 0.128 hectares, about one fifth of the world average. China's forest coverage rate is 16.55 per cent, about 60 per cent of the world average.

During the period from 1989 to 1993, net increase in forest coverage rate is 1.43 per cent. Reserved areas for man-made forests are 46.667 million hectares, ranking first in the world. Man-made forest area has increased by 10.25 million hectares and with an average annual increase of 2.05 million hectares. Net increases of man-made forests accounted for 74.8 per cent of the net increase in forest area. Net increases in economic forests accounted for nearly 50 per cent of the net increase in man-made forests.

Categorized by function, timber forest area accounts for 77 per cent of the total forest area and 71 per cent of the forest stock. Shelter forests account for 17 per cent of the total forest area and 22 per cent of the forest stock. Fuel wood forests and special-purpose forests respectively account for three per cent of the total forest areas, and one and six per cent of the forest stock. Categorized by tree species, the proportion of coniferous trees to broadleaf trees is 52 to 48 in terms of forest area, and 56 to 44 in terms of forest stock.

In addition to deficient forest resources, China's forest resources are facing a number of problems. The first is uneven distribution of forest resources. About 43.3 per cent of the forest area and 52.4 per cent of forest stock exist in five provinces—Heilongjiang, Jilin, Inner Mongolia, Sichuan and Yunnan, while northwest provinces have very few forests, and forest coverage in some areas is less than one per cent.

The second problem is low quality, low stock per unit area and insufficient fellable resources. China's standing forest stock is 78.06 cubic metres per hectare, or 68.5 per cent of the world average.

The third issue is tremendous loss of forestland, increasing consumption and excessive logging. During 1993 and 1994, the interval between two national surveys, 10.81 million hectares of forestland were used for other purposes or turned into non-forest land, at an average rate of 2.163 million hectares per year, while net annual consumption of timber increased by 50.828 million cubic metres to reach 370.752 million cubic metres, 86.79 million cubic metres more than the quota set by the State Council.

In 2000, the total output value of the forestry sector increased by 11.5 per cent over the preceding year to RMB 355.55 billion yuan, accounting for one per cent of the GDP. The primary industry (mainly referring to afforestation industry), secondary industry (mainly referring to forest products) and tertiary industry (mainly referring to forest-related services including forest tourism, R&D and education) constituted 67.2, 29.1 and 3.7 per cent of the total output value respectively. Overall, the forestry sector has shown the following characteristics: growth momentum of the primary industry remained strong; output value of the secondary industry continued to increase; and the tertiary industry has grown slowly with declining shares.

Industrial enterprises in the forestry sector are generally very small. For example, the average size of man-made board enterprises is much smaller than those in the developed countries. The size of shaven board enterprises is only 15 per cent of the world average and the size of plywood enterprises is merely one third of the world average. The forestry sector faces a number of problems from bad assets to liability ratios, mounting debt loads, low liquidity ratio and irrational capital structure. For example, in 1999, total asset contribution rates of large and mid-size state-owned enterprises with independent accounting in the forestry sector was 4.2 per cent, with profitability on the low side; their profitability over costs and expenses was 1.2 per cent, and per capita labour productivity was RMB 9,183 yuan. Forest enterprises nation-wide generated net losses of RMB 610 million yuan and 68 per cent of the enterprises are in the red.

China's forest-related policies and laws

China's current forest policies have the components of protection of natural forest resources, turning steep slope farmland into woodlands or grasslands, ownership of forestland and trees, tax policy for the forestry sector and trade and investment, etc.

Major changes in China's forestry policies were witnessed in 1999. In the wake of the devastating floods in 1998, the Chinese government, as well as society at large, are more concerned with and pay greater attention to ecological and environmental protection. "Improving ecological environment is a long-term strategy concerning survival and development of the Chinese nation, as well as a fundamental measure to prevent natural disasters such as floods and draughts," noted the Decision of the CPC Central Committee on Some Major Issues Concerning Agriculture and Rural Work passed at the Third Plenary Session of the 15th Party Congress. "We should make great efforts to increase forest coverage rate and ensure basic rehabilitation of the areas which have suffered soil erosion and are suitable for rehabilitation." The National Program for Ecological Environmental Development issued by the State Council in 1998 set a target to basically rehabilitate the mountains and rivers countrywide in about 50 years. In the comprehensive rehabilitation measures introduced by the Chinese government in October 1998 for post-flood reconstruction and elimination of the root causes of floods, priority was given to blocking of mountains for afforestation and turning steep slope farmlands into woodlands or grasslands to recover their vegetation. A decision was made to implement a natural forest resources protection program.

Furthermore, by the end of 1999, China had passed and released the following major laws and regulations: Forest Law, Rules for the Implementation of the Forest Law, National People's Congress Decision on Launching a National Voluntary Tree-Planting Campaign, Measures for Implementation of the National Voluntary Tree-Planting Campaign issued by the State Council, Law on Protection of Wild Animals, Regulations for the Implementation of the Law on Protection of Terrestrial Wild Animals, Regulations for Forest Fire Prevention, Regulation for Prevention and Control of Forest Diseases and Insect Pests, Regulations for the Quarantine of Plants, Measures for the Regeneration and Management of Forest Logging, Measures for the Management of Natural Reserves for Forests and Wild Animals, Regulations for the Management of Seeds, Regulations for the Protection of Wild Plants, and others. Meanwhile, in line with laws and administrative decrees, the SFA has formulated more than 60 sector regulations, often working in conjunction with other departments under the State Council, dealing with many aspects of the forest sector. A new set of Regulations for the Implementation of the Forest Law was drafted in 1999 and submitted to the State Council for approval. In addition, the Rules for the Implementation of the Regulations for the Protection of New Plant Species (Forest Part) and the List of Key Wild Plants Protected by the State (First Group) were released.

On the whole, China's forestry policies have been well implemented in the last few years. A general approach to forest development has been further clarified. That is to follow ideas for forestry sector modernization, regard development of a sound forest ecological system and a well-developed forestry sector as a goal, give priority to improvement of the ecological environment and carry out and deepen reforms focused on operation by category in the forestry sector. Focus has been put on eight major tasks: implementing a natural forest resources protection program; strengthening key forest ecological engineering; tightening management of forest resources and forest administration; strengthening tenure target responsibility systems for leading government officials in protecting and developing forest resources; strengthening scientific and technological support to forest projects; carrying out reforms focused on forest operation by category; intensifying development of commercial forests; and tightening enforcement of laws and regulations concerning forestry.

However, because China's forestry sector is in a preliminary stage of development, some problems arose in the implementation of forest policies and are reflected in the following areas:

- Policies concerning protection of natural forest resources and turning steep slope farmland to woodlands or grasslands are still in the stage of experimentation and lacking in detail. There have been deviations in implementing the policies.
- Policies concerning forest resources and wildlife management have not been strongly enforced. Destruction of forest and wildlife resources remains a serious problem.
- No fundamental breakthroughs have been made in the reforms of China's forest operation and management systems, somewhat slowing the pace of marketization of the forest sector.

- Taxes and fees remain a heavy burden on the forestry sector and create disincentives to local authorities, enterprises, farmers and especially the private sector to invest in afforestation.

Supply and demand in the timber market

From 1949 to 1998, China's wood production was basically on the rise. Statistics from the SFA show that wood production in the period amounted to 2,161.58 million cubic metres, with annual production at an average of 44.11 million cubic metres. The portion of wood production included in SFA statistics is mainly commodity timber which constitutes effective supply in the market,[2] while the portion excluded in SFA statistics mainly refers to the timber consumed by farmers themselves and small quantities of small-sized timber.

Timber production in the areas involved in the natural forest protection program was reduced from 32.046 million cubic metres in 1997 to 29.283 million cubic metres in 1998 and then to 22.757 million cubic metres in 1999, and is expected to be reduced to 13.81 million cubic metres in 2000. The target is to cut timber production to 12.151 million cubic metres by 2003, a reduction of 19.895 million cubic metres as compared with 1997 prior to the implementation of the program. (See Figure 1).

China's current per capita timber consumption is 0.12 cubic metres. However, per capita consumption rises with economic and social development. An increase of 0.1 cubic metre of per capita timber consumption will raise the total demand by 130 million cubic metres. China's effective demand for timber by 2010 is projected to be 320 million cubic metres, exceeding supply by 70 million cubic metres. Judging by the imports of the 1990s, timber of large diameter and valuable species will account for about 10 to 30 per cent of the short supply. Therefore, given the significant demand for timber of large diameter and valuable species, it is necessary to develop fast growing, high yield forests and also import certain quantities in the future.

China's timber market has the following characteristics:

- Supply shortage is getting worse. Fast economic growth has boosted demand for timber. On the other hand, China's limited forest resources and recent forest protection programs have significantly reduced logging quotas. With the logging ban in place, domestic timber supply will continue to decline. China will reduce timber production by 10 per cent each year in the Tenth Five-Year Plan period. Annual timber supply is expected to decrease to less than 40 million cubic metres a year.
- Structural problems between supply and demand are becoming more conspicuous. China faces a prominent structural problem in the composition of its forest resources. As broadleaf trees grow slower than coniferous trees, a lot more coniferous trees than broadleaf trees have been planted in man-made forests. Consequently, reserve resources of broadleaf trees are likely to be insufficient in the coming years. Large and medium diameter timber accounts for 75.9 per cent of the market demand today, while demand for small diameter timber is 24.1 per cent. Domestically produced large- and medium-diameter timber, however, only makes up 59 per cent of the total production while the share of small diameter timber is as much as 41 per cent, causing an imbalance in supply and demand and insufficient supplies of large diameter, high quality broadleaf timber resources.
- Implementation of the natural forest protection program will put more pressure on the supply-demand balance over a number of years. Most of the trees covered by the program are valuable species and large diameter trees, thus further aggravating the supply gap and structural problems between supply and demand.
- On the whole, the price of domestic timber has been falling since 1994. The situation in supply and demand of timber affects its price. Timber price tends to rise as a result of short supply. But on the other hand, factors such as timber imports and substitution restrict price from rising.

2 The current status of China's timber trade and the implications of China's accession to the WTO

China's foreign trade in timber

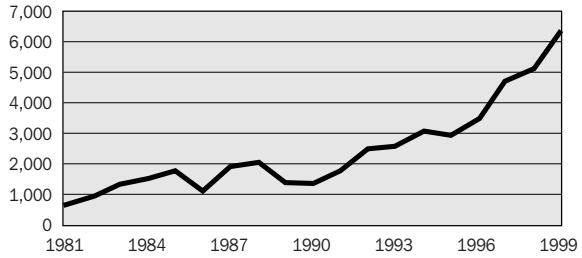
As its effective timber supply cannot meet its market demand, China has imported log and man-made board to meet domestic construction and consumer needs every year since 1981. In the period from 1981 to 1997, China imported 92.989 million cubic metres of log, with annual imports averaging 5.4699 million cubic metres and accounting for 9.43 per cent of the annual effective supply nationwide. Imports (including man-made board and converted timber) in the 1980s remained above eight per cent. The early 1990s saw a decline, but increased substantially since

the implementation of the Ninth Five-Year Plan and natural forest protection program. In 1999, imports of log and converted timber alone increased by six million cubic metres over 1998, topping all major bulk products imported by China.

Imports of timber help China mitigate the shortage of domestic timber supply. China has become the world's second largest importer of forest products after Japan. China now depends on imports of timber and forest products to a considerable extent. It will be difficult to continue with this trend due to global efforts at forest protection. As many countries have recognized the importance of protecting their own forest resources and taken actions like prohibition or reduction of log exports, there is insufficient supply elasticity in the international timber trade. It will become more and more difficult to get timber and forest products as needed.

While implementing the policy of giving priority to the ecological environment, China needs to vigorously speed up development of man-made forests and make great efforts to plant fast growing, high yield forests, so as to meet its needs through self-sufficiency combined with appropriate imports.

Figure 1. Timber Imports, in Log Equivalent, 1981–1999 (Unit: 10,000 cubic metres)



Source: Chinese Customs Statistics, 1993–1998

Major imports are paper (62.5 per cent of the total imports), log, man-made board (15.9 per cent) and veneer (11.6 per cent of the total imports), sawn timber, wooden products and furniture.

Major exports are furniture, wooden products, paper, man-made board, converted timber and log. Furniture takes up the largest share, or 36.7 per cent of the total wooden product exports.

China imports logs mainly from Russia. Malaysia comes second with a share at 19.7 per cent; followed by Gabon at 14.6 per cent; Germany at 9.0 per cent; Equatorial Guinea at 5.6 per cent; Indonesia at 5.6 per cent; and Papua New Guinea at 5.1 per cent. China imports converted timber mainly from Indonesia and Malaysia, which supply 41.9 per cent of China's total imports of converted timber, followed by the United States at 12.2 per cent, Germany at 11.8 per cent and New Zealand at 4.8 per cent.

In terms of exports of wood products excluding paper, the five largest trading partners are: the United States at 31.1 per cent, Japan at 24.7 per cent, Hong Kong, China at 17.2 per cent, Korea at 4.9 per cent, and Taiwan, China at 4.0 per cent.

China's trade policy concerning forest products

The new Catalogue of Products Subject to Import Quota issued on April 1, 1996, removed quota restriction for timber, wood pulp and ABS resin. The revised Catalogue of Products Subject to Import Quota issued on May 11, 1998, removed import quota restrictions for forest products. Today there is no non-tariff barrier for the import of timber and related products, although some trade restriction measures remain, such as timber export licensing, import registration, and import and export commodity inspection.

On December 1, 1998, MOFTEC removed the requirement of approved companies for timber import and opened the business to all import and export companies with foreign trade rights.

In order to gradually integrate into the international market and encourage import of timber and forest products, China has drastically cut tariff rates several times since April 1, 1996. On January 1, 1999, China cut tariffs again to bring the rate for 49 forest products including log, sleeper, common board and wood pulp from one to three per cent (eight to nine per cent for a few products) down to zero; import tariffs for high-grade board from six to nine per cent down to zero; and tariff for four other wooden products from 18 to 21 per cent down to 10 per cent. China's accession to the WTO is expected to bring even lower tariffs for timber and related products.

On January 1, 2001, MOFTEC released a new Catalogue of Products Subject to Export Licence that includes log, rosin and pine resin, and converted timber. The Catalogue of Products for Frontier Trade also lists converted timber and other 17 products being subject to state regulation.

In order to attract more foreign investors to China, the government revised the catalogue of industries and sectors open for foreign investment in December 1997. The government provides favourable policy

treatment and financial support to investors in these areas in terms of project approval, credit, taxation, production and distribution.

Under this document, foreign solely-owned venture is not allowed. Foreign investment is restricted in forest-related areas including: processing and export of valuable tree species; production of natural perfume; and processing of paper and cardboard (not allowed without measures to construct the raw material supply base).

China is confronted with insufficient total supply of timber with an imbalanced structure. This situation is not likely to change in the near future. China will rely heavily on the international market for supply of timber and related products. Since the logging ban on natural forests in 1998, China has lost the resource base for its traditional forest industry. Import is a major way to make up for the supply gap. As a result of short supply, price of domestic timber and wood products is rising. Import becomes a major instrument in stabilizing price.

There are a number of major issues for China to rely on international timber trade. These include: 1) larger trade deficit; 2) increasing supply shortage with rising price; 3) pressure on China's forest industry due to increasing imports; and 4) potential cause for deterioration of the forest resources in the exporting countries.

Implications of China's accession to the WTO for forest protection

After China's accession to the WTO, tariffs for timber and related products will go down, and non-tariff barriers will be phased out. At present, there are basically no non-tariff barriers for timber and wood products. The remaining trade restriction measures mainly consist of the timber imports licensing system, import registration, import and export commodity inspection and 50 per cent tariff reduction for small border trade transactions.

China's accession to the WTO will have a positive impact on its effort to protect forest resources. Increased imports of timber and wood products will help mitigate the supply shortage, avoid predatory exploitation of forests and facilitate protection and development of forest resources, in order to achieve a balance between consumption and growth of resources, given the slow growth of forests, accelerate the implementation of major forest programs and improve the ecological environment.

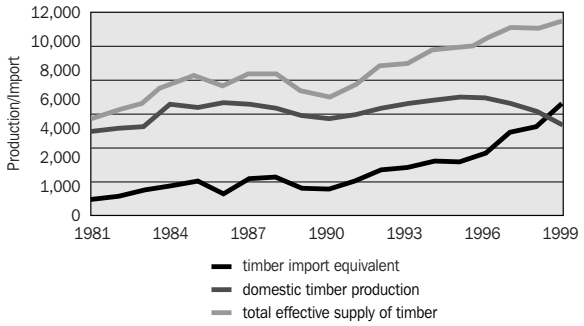
In addition, imports of some species and large quantities of logs and wood products as well as wooden packaging that comes with increased imports of goods, will put ever-greater pressure on China's inspection and quarantine work. It was reported by the inspection and quarantine agencies that more than 100 kinds of insects had been found in the logs and wooden packaging imported from about 20 countries and regions in the first half of 2001. Some insects already spread to some extent and harmed the crops. This is a negative impact on the protection of forest resources. China should study the issue as soon as possible and take appropriate policy measures.

3 Equilibrium analysis of China's domestic production and timber imports

Total timber supply means domestic timber production plus imports minus exports. Earlier analysis projects timber shortage in China by 2010 would be about 70 million cubic metres. This shortage can be made up in three ways: saving and substitution; development of man-made forests; and increasing imports.

Figure 2 shows the relationship between China's timber imports, domestic production and domestic effective supply of timber over the last two decades.

Figure 2. Timber Imports and Domestic production by China, 1981–1999 (Unit: 10,000 cubic metres)



Projection of wood saving and substitution

Wood saving and substitution are very important approaches to address timber supply shortage. New materials and technology have facilitated development of wood saving and substitution. Time series regression equations established for wood saving (sm) and substitution (dm) are:

sm=248.9355+10.83149t (R2=0.827767, F=67.28535)

dm=182.0728+73.21291t (R2=0.921833, F=165.1028)

Both of them passed (95 per cent) the significant test. Table 1 shows the projections of the quantities of wood saving and substitution from 2001 to 2010 made through the aforementioned regression.

Table 1. Projections of the Quantities of Wood Saving and Substitution for China (Unit: 10,000 cubic metres)

Year	Savings (sm)	Substitution (dm)
2001	476.3968	1719.544
2002	487.2283	1792.757
2003	498.0598	1865.97
2004	508.8913	1939.183
2005	519.7228	2012.396
2006	530.5542	2085.608
2007	541.3857	2158.821
2008	552.2172	2232.034
2009	563.0487	2305.247
2010	573.8802	2378.46

Progress in wood saving and substitution mainly depends on the price ratio between wood and other products. If the price of wood is higher, the progress of saving and substitution will be faster and vise versa. Currently, the overall price level of wood is falling, and, consequently, the progress in wood saving and substitution is slow.

Projection for development of man-made forests

In line with the principle of forest operation by categories and based on the species, types of forests, age structure and regional distribution of forest resources, it is estimated that China has six to eight million hectares east of the 400 millimetres isohyets that are suitable for the cultivation of fast-growing forests. Information from relevant national plans indicates that China has about 10 million hectares of land for development of fast-growing forests from 2000 to 2015, mostly in the Northeast forest area (including state-owned forest zones in eastern Inner Mongolia), lower- and middle-reaches of the Yellow River (including the Huai River basin) and collectively-owned forest zones in the south (including Simao Forest Zone in Yunnan Province). Please see Table 2. Production of fast growing forests is expected to reach 1,000 billion cubic metres by 2010.

Determination of the equilibrium of domestic production and import of timber

If timber output rate of fast-growing forests is 50per cent to 60 per cent, the newly planted fast-growing forests will increase effective supply by 50 to 60 million cubic metres, which, combined with savings and substitution of about 30 million cubic metres, will be sufficient to offset the supply shortage of 70 million cubic metres. On the basis of the above calculation, a balance between domestic timber supply and demand on the whole can be attained by 2010. However, attention needs to be paid to two points:

Development of fast-growing forests, from tree planting to harvesting, takes about five to 10 years. Therefore, effective supply cannot be achieved in the short term. China will still need to rely on imports for some time. With development of fast-growing forests and increased timber substitution, China will see a decline in imports of timber and wood products.

In terms of structure, China has little problem with the supply and demand of small- and medium-diameter timber, and its price is falling. But large-diameter and high quality timber is in short supply. The need for such timber is estimated at about three to five million cubic metres a year. Therefore, China's annual timber imports are expected to be in the range of three to five million cubic metres up to 2010. With targeted cultivation of man-made forests, the price of

Table 2. Projections of Distribution of Fast-Growing Forests and Productivity of China by 2010 (Unit: 10,000 cubic metres)

			Timber Production		
Region	Forestland	Live Standing Tree Stock	Total	Existing Forests	Fast-Growing Forests
Total	14494.0	552336.0	12239.7	2124.0	10115.7
Northeast	5775.0	362874.0	5488.0	1095.0	4393.0
Mid and lower reaches of the Yellow River	535.0	6800.0	1837.7	385.0	1452.7
Southern Collective Forest Farms	8184.0	182662.0	4914.0	644.0	4270.0

domestically produced large-diameter and high quality timber will become more competitive and imports are likely to go down.

4 Equilibrium analysis of China's wood product market and ecological protection

China supports the regions involved in natural forests protection programs through transfer payment and financial assistance. With the help of equilibrium analysis of the ecological and environmental benefits, we can compare the regions involved in natural forests protection programs and those regions without such programs to determine how much the government should subsidize other operators for the implementation of the programs to ensure equilibrium of the two. The natural forests protection programs were launched to limit the logging quantities and consequently have a negative impact on forest enterprises and other operators. To convince forest operators to implement the measures related to the natural forests protection programs, we have to ensure that their economic benefits are not less than the profits they can get from the logging of forest resources. This assumption can help us determine how to calculate the equilibrium point between ecological protection and economic benefits. Based on related economics principles, a quantitative model of benefits by diameter class for the natural forests protection programs can be established as follows:

$$Fcvi\ (t+1) = fvi(t+1)fci(t+1) \quad (1)$$

The matrix in formula (1) is:

$$Fcv\ (t+1) = fc(t+1)F(t+1) \quad (2)$$

Where:
Fcvi (t+1) represents the value of forest and wood of diameter class "i" at the time "t+1";
fcv(t+1) represents the forest value vector at the time "t+1";

And the total forest value at the time "t+1" is:

$$Tfv\ (t+1) = eTfcv(t+1) \quad (3)$$

(*The calculation process is omitted.*)

Take the Southeast Prefecture of Guizhou as a quantitative analysis example. The amount of state subsidies needed to reduce timber production during 2001 to 2009 is shown in Table 3.

Table 3. State Subsidization Need for the Southeast Prefecture of Guizhou (2001–2009) (Unit: RMB10,000 yuan)

Year	Subsidy
2001	4591.67
2002	3974.17
2003	3313.86
2004	2653.55
2005	2525.31
2006	2397.06
2007	2268.82
2008	2140.57
2009	2012.33

Forest area will increase by 0.488 million hectares from 1.435 million hectares in 2001 to 1.923 million hectares by 2009; and forest coverage should increase by 18 percentage points from 53 per cent in 2001 to 71 per cent by 2009.

Forest resources have both ecological and wood usage functions. The ecological function requires the existence of forest resources, while logging is the prerequisite for wood usage. Now the state seeks the ecological benefits, whereas the producers or operators look for direct economic benefits. Therefore, it is necessary to develop a direct transaction between them, i.e., the state subsidizes reduction or stop of logging by economic means, with a view to attaining an equilibrium point between wood market and ecological protection.

5 Policy recommendations

Timber development strategy

As the world's second largest importer of logs, China depends heavily on the international market. China is also a country with great potential for forest development. Therefore, China's timber trade and development strategy will be absolutely essential for sustainable development of the country's forestry sector and wood-related trade activities.

Prior to or even beyond 2010, China will continue to import wood and related products. This strategy will help China reduce the consumption of its own forest resources, gain breathing space for the forest sector, accumulate a resource base for sustainable forestry development, place social benefits before economic

benefits, and maintain a balance between the ecosystem and economic growth. However, China cannot forever depend on imports of wood and wood products to meet its total domestic demand, which would put China in an extremely passive position in terms of sources of imports, foreign exchange disbursements, inspection and quarantine and employment in the forest sector.

To meet market needs for timber, China needs to do the following:

- actively take measures to save and substitute wood with other materials;
- accelerate development of man-made forests and forest farms for industrial use. This will ensure domestic supplies on a sustainable basis. Development of man-made forests should be guided by market demand and based on consideration of the needs and trade structure for wood;
- fundamentally accelerate development of forest resources and increase effective supply of timber by expanding the scale of fast growing, high yield woods nationwide, strengthening development of fast growing woods on collective forest farms in south China where water and climate conditions are more favourable, enlarging areas of fast-growing woods and intensifying tendering of existing young and middle forests;
- enhance utilization rates of forest resources and comprehensive utilization of timber;
- vigorously develop forest industries that use man-made forests and remnants of forests as raw material; and
- actively seek access to international forest resources, timber and other forest product markets.

Adopting a flexible trade strategy

For many years, China has followed a one-sided export-oriented import and export strategy for wood and related products. China should adopt a open flexible trade strategy for wood products in accordance with domestic factors (e.g., the availability of domestic resources and processing capacities, trade systems and structure, supply and demand) and international factors (such as the pattern of international trade in wood, business cycle, price, exchange rate, trade barriers and movements of multinational corporations and economic integration organizations). At present, China's forestry sector is characteristic of processing imported resources. Consequently, China should adopt an open export strategy by importing a lot of wood resources through multiple channels and exporting a lot of its special forest products such as rosin, tung oil, tea and bamboo products. When the economy is good, China should adopt a strategy of importing resources and exporting products through the international market. When the economy is in recession, China should continue to import resources from abroad but sell its products mainly in the domestic market. This strategy will help China make full use of its existing production capacities.

Using state subsidies for forest resources protection

It is a feasible approach to use state subsidies, including subsidies by central and local governments, to exchange for protection of forest resources. Developed countries and some developing countries have adopted similar approaches and achieved good results. China's natural forests protection program is a wise policy option based on the experience from other countries. The government invests about RMB10 billion yuan each year in the protection of the forests in the aforementioned areas, which is still insufficient. The case of Guizhou is somewhat typical and useful for a study of national scope. Given the regional differences across the country and unavailability of detailed data, it is difficult to calculate the figures for the whole country.

Paying attention to potential negative impacts of the WTO accession

Potential direct negative impact of China's accession to the WTO will probably come from the insects and pests that are brought in by import of some species and large quantities of timber and wooden packaging. Therefore, China's inspection and quarantine agencies and other departments concerned should pay close attention to this issue, study it carefully and develop responsive policy and measures as soon as possible.

Endnotes

1 This study was assisted by Liu Can and Fei Yong of the State Forest Administration and Chen Jing and Wang Jian of the Chinese Academy of International Trade and Economic Cooperation.

2 Effective supply means the quantity of products supplied and accepted by the market, as distinguished from production.

Liberalization of China's Fishery Trade

by Zhihai Zheng and Yumin Zhao

I Introduction

China's fishery industry has witnessed marked growth since the country adopted reform and opened up to the outside world in 1978. For 12 consecutive years, it has been the biggest producer of aquatic resources, accounting for one-third of the world's total production. The reform over the past two decades has removed many barriers to China's integration into the world economy and improved the nation's competitiveness. Currently, China is the fourth largest exporter of aquatic resources in the world. China's entry into WTO calls for further market opening and deeper integration with the global economy and multilateral trading system. This means China will have to strengthen its capacity for sustainable fishery industry development with effective use of more external resources and markets and also confront more uncertainties, risks and the increase of readjustment costs in that sector's expansion. China's fishery industry will incur direct and indirect environmental effects as the country joins the WTO. The direct effects stem from the adaptation of domestic fishery policies and management of multilateral rules and regulations, while indirect effects come as a result of the changes in the production, consumption and trade of aquatic produce. This paper begins with a general review of the trade measures currently in place which affect trade in fishery products. It then analyzes the changes in production, consumption and trade following the WTO entry, and outlines the upcoming trends in development. It points to the major features of environmental change, based on meticulous research, and puts forward some policy considerations.

Measures currently in place to encourage trade

In recent years, in complying with the trends of economic globalization and trade liberalization and participating in international competition and cooperation according to the WTO rules, China has adopted a series of practical measures to liberalizing its trade including tariff and non-tariff measures, trade right, quarantine control and other measures to encourage aquatic exports.

Tariff

Since 1992, trade liberalization has gradually been implemented The average tariff rate has been cut down from 31.2 per cent in 1992 to 15 per cent in 1999 and the coverage of non-tariff barrier has been reduced from 50 per cent in 1992 to 17 per cent in 1999. China has committed to further cut in the line with the WTO rules. Import tariffs of aquatic products have been brought down by 40 per cent on average. There are about 16 varieties with a downward margin above 50 per cent, including those products that sell in large quantities, such as fresh frozen codfish, squid, cuttlefish and fan shell, oyster and mussels. Until 1999, the average tariff of aquatic products stood at 19 per cent. China has promised to reduce its aquatic tariff to 10 per cent in 2004 and below 5 per cent in 2007.

The aquatic sector is an area protected by tariff measures, with a tariff rate higher than the average of 17 per cent, even though it has lowered substantially in the past 10 years. The tariff rate imposed on aquatics varies in the extent of processed degrees; it's zero tariff for the aquatic seeding. Due to the high tariff, there is no foreign competition pressure on China's domestic aquatic products.

Non-tariff barriers

Meanwhile, China has also simplified its import procedure, lifted the control on currency exchange under the current account and given trade rights to a large number of production enterprises. China promised to gradually decentralize its foreign trade authorization in the first three years after it enters the WTO, and fully decentralize after 3 years. All these measures have contributed to the expansion of China's import and export and amplified the share Chinese products in the world trade.

Quarantine control

Like all other countries, China has also implemented its quarantine control system. Lowering of tariff rates will render protection to domestic aquatic products and will have a great impact on China's fishery sector. The WTO rules allow Member States to take necessary quarantine measures as they deem appropriate,

China must upgrade its quarantine system in line with the internationally accepted standards, take effective measures in the area of fishery imports that are comparable to the high standards implemented in industrialized countries. Measures must be taken to facilitate technological innovations in domestic enterprises and their products' quality, and meet the need for competition in international markets.

Other measures to encourage aquatic exports

Other measures taken by the Chinese government in assisting aquatic exports include: 1) financial support for the construction of fishing ports and seeding fields, such as preferential loans, and supportive funds from local governments; 2) direct fuel supply to fishing boats; and 3) quality promotion—such as the governmental subsidized quality promotion program for management standards applied by every aquatic processing enterprise.

II Impacts of WTO accession on China's fishery industry

Impacts on local aquatics consumption

China's fast growth in the fishery industry has been primarily spurred by domestic consumption, which consists of productive consumption and human consumption. The productive consumption involves fish feed and fishmeal. In recent years, however, the production of fishmeal underwent a fast pace of growth. WTO accession will provide a good opportunity for the domestic by-husbandry industry, the demand for fishmeal will continue to rise. Fish feed consumption relies heavily on marine cultivation. Over the past decade, China's sea water breeding area expanded at an annual rate of 11 per cent, the production of marine cultivation rose by 22 per cent. In recent years, a majority of consumers prefer more costly sea fish. This will lead to a faster growth of marine culture production and greater use of fish feed.

Household consumption and catering consumption are the two major forms of human consumption in China. The household consumption in the vast inland has been far less than that of the coastal river-side areas. Urban consumption is also higher that that of rural consumption. By using regression analysis, our study estimates that the demand of aquatic products in 2005 for urban and rural households at 4,700–5,100 thousand tonnes and 4,200–4,660 thousand tonnes respectively based on the income difference for 2005. The average urban per-capita income would be RMB 9088–RBM11000 and the rural average, RMB 3957–RMB4335. This implies that the total household demand of aquatic products would be between 8,900 and 9,760 thousand tonnes. However, aquatic consumption in China will primarily take place in the catering service industry. It is estimated that post-WTO consumption by the catering service industry will account for over half of the total domestic production, much higher than the household consumption in both urban and rural areas combined.

As urbanization gains momentum after the WTO entry, market competition in China will get fiercer than ever. The market of aquatic products may also be expanded by factors ranging from faster transportation service, improved packaging and processing to competitive price cuts, which will in turn, raise the proportion of aquatic products in domestic food consumption. Hence, after China joins the WTO, a greater consumer market for aquatic food will likely be initiated as more imports will keep down the local prices and the domestic fishery industry will operate more efficiently and economically with the help of abundant foreign capital and advanced technologies.

Impacts on fishery production

Chinese fishery production consists of capture fisheries and the farmed fisheries (aquaculture). In the last decade, fisheries output from capture fisheries has declined significantly due to the damaging effect on aquatic resources, especially ocean fisheries. At the moment, the capture fisheries intensity is maintained at a high level and when mixed with pollution has caused the offshore marine resources to deteriorate considerably. Outer water fishing farms have been depleting slowly since the signing and initiation of the Sino-Japan and Sino-Korea Fishing Agreements. In the future, development of marine fisheries will be more influenced by international bilateral, regional and multilateral agreements and greatly restricted by increasing concern for marine living environment.

Aquaculture

The key factors of growth in aquaculture are aquaculture area and quality. Between 1985 and 1999, the Chinese freshwater aquaculture area increased by 60 per cent, from 3,260 acres to 5,196 acres. The seawater aquaculture area expanded 2.5 times, from 243 acres to 1,095 acres. Meanwhile, the fisheries output increased by 3.5 times from 7.05 million to 41.22 million tonnes. The proportion of aquatic products increased from 43 per cent to 58 per cent. Currently, the inland aquaculture area, which is in use, accounts for 70 per cent of the total available aquaculture area

and the farming area of seawater aquaculture takes up 60 per cent of the total sea area. As the aquaculture development accelerates, the industry faces environmental constraints. Water bodies have been seriously contaminated by industrial, agricultural and aquacultural activities, which pose a direct threat to aquaculture. In the years to come, aquaculture will remain the main area for the fisheries sector development, despite the areas for aquaculture development on a large scale are on the decline. In addition, water pollution will seriously lower the utilization value of these areas.

Investment

Before 1980, the development of the fishery industry followed instructive planning and was greatly restricted by the scale of central government investment. After the opening of the aquatic product market in 1985, production picked up among governments at all levels, fishing enterprises and fishermen. Enterprises rely increasingly on themselves and raise funds for their own fishery investment. Meanwhile, foreign investors have also eyed the promising future prospects of the Chinese fishing industry, and increasing foreign investments flow into China. In recent years, the domestic aquatic processing industry has attracted most of foreign investment. A principal multidimensional investment pattern has gradually formed.

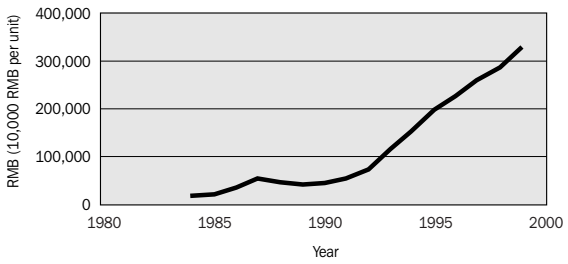
This kind of multi-dimension investment structure will not change after China's entry into the WTO. The financial channels will likely widen with the possibility of further reduction of state investment.

In order to predict the changing trend of Chinese aquatic products in the coming year after China's entry into the WTO, the study team made a preliminary prediction on the production in the five-year period of China's Tenth Five-Year Plan of National Economy And Social Development (2001–2005), which will be crucial for China's economic development and greater emphasis will be placed on fishery resources and environmental protection of fishery waters as well as active engagement in the development of aquaculture and ocean fisheries. The prediction was made by establishing a linear multiple regression model for the development of the Chinese fishery production in the past years. The regression model is based on a number of variations, including Chinese aggregate investment level, fishery resources (mainly seawater and fresh water aquaculture areas), and government procurement price index for aquatic products.

$$Y' = -547.3 = 1.425X1 + 62.547X2 - 0.263X3$$
$$(0.131) \quad (2.559) \quad (0.0315)$$
$$R = 0.997 \qquad F = 615.11$$
$$DW = 0.824 \qquad 1984–1999$$

Y shows the quantity of Chinese aquatic products with 10,000 tonnes per unit for those years. X1 indicates the Chinese aquatic product procurement price index based on the previous year. 1978 is chosen to be the base year. X2 shows the aggregate Chinese fishery investment in the period studied with a unit price of 100 million RMB. X3 indicates Chinese aquaculture area with 10,000 acres per unit. Y' is the fitted value of Y's mathematical model. The numbers in parentheses are the standard deviations of the respective coefficients.

Figure 1. Trend in Chinese Fishery Investment



From the estimated coefficients of the model, a one unit increase in the aquatic product procurement price index based on the year prior to the reported period (1978=100) or aggregate fishery investment increasing by 100 million, or aquaculture area increasing by 10,000 acres, the quantity of Chinese aquatic products will increase by 1.425 units (10,000 tonnes), 62.547 units (10,000 tonnes) and 0.263 unit (10,000 tonnes) respectively. Since 1984, the increase in aquatic products was explained by the aggregate fishery investment as the most significant contributing 56.2 per cent of the total increase in aquatic products. The increases in aquatic products were explained by the procurement price lagging the variable of aquatic price and aquaculture area on the whole quite considerably and taking 21.3 per cent and 21.5 per cent of the increase in aquatic products respectively. Error disturbance caused by the fitted model only explains one per cent of the increase in aquatic product output.

During the Tenth Five-Year Plan, China will start to fulfill its market opening commitment as it joins the

WTO, and as a result, the aquatic imports will accelerate on a larger scale. Under an intensified competitive environment, the aquatic product price in the domestic market will continue to grow at a low rate. Henceforth, we can assume that the lagging value of aquatic product procurement price index is equivalent to the moving average level of the previous three years.

As observed from the variations in the aggregate investment of the Chinese fishery, the scale of annual fishery investment increased by 19.5 per cent from 1984 to 1999. After China's accession into the WTO, the stability, transparency and predictability of China's economic environment will be enhanced and foreign investors will have greater interest in the potential of the Chinese market. Foreign capital that flows into the Chinese market will follow a rising trend. However, we surmise that as the base becomes bigger there will be increasing difficulty in the growth of fishery investment if the high rates were to be maintained for a long period of time. In the last three years, the annual aggregate fishery investment grew on an average of 13 per cent which is equivalent to two-thirds of the average annual growth rate in the period between 1984 and 1999. We can therefore assume that the annual growth rate of the fishery investment will decline progressively by one-third with respect to the previous year during the Tenth Five-Year Plan.

It can be seen from the expansion of the Chinese aquaculture area, that the increment of the aquaculture area fluctuated around four per cent on average between 1984 and 1999. However, we must also notice that the rate of progressive expansion of the aquaculture area has been around 3.4 per cent in the last three years, which is equivalent to an average annual decline of 15 per cent. This is mainly because of a gradual reduction in the aquaculture area available for exploitation and the government does not encourage blind expansion of the aquaculture area. Therefore, we can postulate that the annual expansion rate of the aquaculture area will decline by 15 per cent annually between 2000 and 2005.

Based on the assumptions above as well as the established mathematical model for the development of Chinese fishery production, we make predictions for the aggregate quantity of Chinese aquatic product for the period before 2005. The details of prediction results are as follows: under normal circumstances, the aggregate Chinese aquatic output will most likely reach 48 million tonnes in 2005. Therefore, the annual aggregate Chinese aquatic output will grow five per cent on average between 2000 and 2005.

The results above suggest that because of the constraints imposed by the resources and the market, the period of fast expansion for the Chinese fishery industry has come to an end. After China's entry into the WTO, the Chinese fishery industry will accelerate into a period of structural adjustment. The development of the fishery industry will shift from expansion of reproduction into core expansion. Fisheries production under the guidelines of sustainable development will attain stability and high quality.

Table 1. Prediction for the Aggregate Output of Chinese Aquatic Product, 2000–2005 (per 10,000 tonnes)

Year	Output
2000	4358.3
2001	4500.5
2002	4619.5
2003	4723.7
2004	4785.5
2005	4836.6

At the moment, Chinese fishery production is showing signs of a relative surplus. The causes are varied. It reflects the monotony of the current products, henceforth, the underdeveloped processing industry is unable to satisfy the market demand for high quality aquatic products. It also shows the incompleteness of the quality standard system of aquatic products and the system for circulation in the aquatic market. A combination of these factors creates a bottleneck of aquatic production and consumption. After joining the WTO, the establishment of a standard system and the formation of a market system will become more urgent. Resolution of these problems will enhance the future development of Chinese fisheries production.

Impacts on aquatics trade

While aquatic trade has yet to become a major driving force for the nation's development, it has played an increasingly significant role in local fishery production and consumption. The domestic aquaculture is also reputed as a sector with an internationally competitive edge with great potential for growth after China's WTO accession.

China's aquatic export registered a continued growth in volume from 1995 to 1999, with the average growth rate of 16.8 per cent. The imports rose to 24 per cent during the same period, exceeding the

exports by nearly 10 per cent. In recent years, the price of aquatic imports went up, whereas that of the exports posted a gradual downturn. Increased imports are due to Chinese consumers' increased affordability of aquatic imports and the growing competitiveness of local products over recent years. This should be attributed to the country's economic reform and development. Despite the tariff barriers imposed, imported aquatic goods have made deeper inroads into the local market. More and more high-quality and inexpensive imports will likely increase their market shares soon, given China's pledge to fulfill its tariff reduction targets by bringing down the average rate to 10 per cent in 2004 from the current 20 per cent. A quantitative study done by the Research and Development Centre under the State Council in 1999 by using the CGE Model predicted that the import value of aquatic goods will be increased to US$1.2 billion in the year 2005, up by 55.8 per cent from 1998.

Table 2. China's Aquatic Trade (per cent, US$100 million)

	Ex/output value	Im & ex/ output value	Trade difference
1985	6.6	7.6	2.4
1990	16	17.2	12.6
1995	10.2	13.2	14.9
1999	6.4	9.3	10.6

Source: China Customs Administration

In view of its huge aquatic farming capacity and improved technologies acquired through innovation and transfers, China's aquaculture industry is capable of supplying the international market with competitive products after WTO accession. But for all the advantages such as competitive prices and non-discriminatory multilateral treatment that China is eligible to enjoy post-WTO, the domestic industry will still face risks and difficulties along the road to development. To a great extent, these difficulties and risks will not arise from intense market competition, but from the attention paid to the safety of aquatic foods by the importing markets. While the Most-Favoured Nation Clause under the GATT calls for non-discriminatory treatment of imported commodities by all countries, the Exemption Clause allows measures for protecting the life and health of the nationals, animals and plants in importers' home countries; so long as they offer proof that no discriminatory measures are in practice. This exemption clause, which later forms the basis for SPS Agreement reached at the Uruguay Round, actually permits governments to set more restrictions against imports than local products. It is under this legal framework that all major importers have raised their criteria for the quality, safety and quarantine inspection of aquatic imports. From then on, China's aquatic exports have now and then failed to meet these national criteria, thus seriously affecting local aquatic export growth.

Therefore, China's aquatic export growth might be slower than that of imports after the WTO. Of the predicted US$4.04 billion worth of exports in 2005, the growth rate is only 6.1 per cent compared to 1998.

As China joins the WTO, it will grant foreign businesses the same national treatment as enjoyed by local companies. It will also provide a fair environment for competition for foreign companies coming into the Chinese market. This will facilitate the country's absorption of more foreign investment as well as better technologies and managerial skills that can narrow the gap between the local products and international market needs. Because of cheap labour costs, China's labour-intensive aquatic processing sector has broad development prospects and will increasingly become a major foreign exchange earner for the domestic fishery industry.

III Environmental impacts of trade liberalization of China's fishery industry

Major environmental issues of China's fishery industry

In the process of trade liberalization of the Chinese fishery industry, the market structure has changed dramatically and trade policies and administrative regulations are under constant adjustment and amendment. Because of imperfection of the socialist market economy system, there inevitably exists both market failure and policy failure, which cause some environmental problems. In recent years, the government has been fully aware of the seriousness in resource degradation and water pollution, leading to an unsustainable fishery development. Various steps have been taken, including taking control over the number of fishery boats and horsepower, off-season fishing, enforcement on the drain to sea and fee collection for the drain to prevent marine resources. The Blue Bohai Sea Action made a significant move in 2000, mobilizing various industries for its implementation to protect marine resources.

Degradation of natural population

Trade liberalization in the fishery industry further stimulated fishing production. China is now one of the world's biggest aquatic producers since rapid development after its reform and opening up policies 20 years ago. The fast growth of fishery development has also presented a severe impact on the country's resources and environment. Heavy fishing has given rise to the degradation of natural population.

Fishery resources have been in a declining trend in recent years as a result of over fishing operations, a decline not only in the freshwater species, but also in the sea areas. In the sea areas, many fish products are caught immature, not meeting the requirements for the length and age and relatively low quality. The capture declines in the number of good quality species as well. Many species mature earlier, a natural instinct to adapt to the environment and a sign of the resources decline.

A marine resource survey found only 74 species in Bohai Sea in 1992–1993, down from 85 species in 1982–1983, a 13 per cent decrease. The annual output of prawn is only about 500 tonnes, down from 40,000 tonnes in 1979.

Destruction of fish habitat

Sea farming has brought about a series of environmental problems as a result of serious pollution in coastal sea areas. The biggest problem is over development without planning, leading to irrational distribution, high aquacultural density and pollution. Mangrove woods along the South China coastline illustrate this situation. Mangrove has a role in preventing soil erosion and viruses and purifying sea water which are often sabotaged by those who are engaged in beach farming development. For example, between October 1999 and April 2000, a mangrove forest area over 30 hectares in Zhakou Town, Beihai City, was destroyed for beach development, plus dozens of hectares of forest destroyed in other places. A project with 760 hectares of beach development area in Maowei Hai, Qinzhou Bay, gives no consideration of protecting 200 hectares of mangrove woods. As a result, the development area will be severely polluted and will threaten the survival of four well-known species in this area: oyster, blue crab, prawn and grouper.

Along with the development of aquaculture in recent years, there were outbreaks of related diseases. In 1992–1994, prawn viruses took place and prevailed, and prawn aquaculture was severely damaged. In another case in North China, a virus occurred and caused the scallop output to decrease by more than 50 per cent.

One of the major reasons for the aquaculture diseases is the deterioration of the ecological environment, which leads to a widespread of viruses, causing the decline in disease resistance and immunity. Aquaculture water was seriously polluted as a result of an over density in aquaculture, exceeding the ecological capacity of water bodies.

Inorganic nitrogen and active phosphate are the main cause of pollution in the coast sea areas. The inorganic nitrogen and active phosphate are not only the inflow from rivers and urban drains, but also a result of fish farming in the areas. Take prawn farming as example. Even the best managed prawn field may leave as much as over 30 per cent of feeds untouched, which contains high nitrogen and phosphorus and cause not only pollution but also aquatic diseases. The aquaculture water was seriously polluted as a result of an over density in aquaculture, exceeding the ecological capacity of water bodies. This is mainly caused by remaining feeds and drains which heavily exist in the waters and thus result in eutrophication. It is estimated that the ratio between feeding delivery and actual needs is 7:1, one tonne of aquaculture fish or shrimp will need seven tonnes of feeds, causing serious organic pollution in the aquacultural water areas.

The number of sudden marine accidents annually is up to 60–80, with about 100–150 million RMB lost. The loss of aquatic products, caused by pollution in the natural and cultivated sea areas, may reach 240,000 tonnes; 1,200 million RMB, in the Yellow Sea and Bohai Sea; and 170,000 tonnes and 850 million RMB in the East China Sea. Red tides occurred as many as 20 times a year and the damage caused increased year by year. The polluted area in Bohai Sea is 100 per cent, and 70 per cent in Yellow Sea over 80 per cent in East China Sea and around 60 per cent in the South China Sea. The pollution is even more serious in the river mouth areas, shallows and inner bays along coastlines.

Deterioration of germ plasm resource

Since the natural germ plasm resources have decreased and no breakthrough for the man-cultivated seeding research and development has appeared, the market is short in high quality and healthy fry. As a result, some weak fries with viruses may be sold in the market which will do damage to the ecology as well as be a loss for the farmers. On the other hand, a single man-cultivated fry used for a long period of time in the same area may cause its deterioration.

Imbalance of ecological system of aquaculture water

The aquaculture structures in various areas are basically the same and they become the same again after a period of restructuring, so there are no resources advantages in various regions. As a result, the market is full of low-priced and low-quality aquatics but is short in new and high-quality aquatics, particularly those for export. In addition, the unlimited expansion of unitary aquatic resources may eventually break environmental capability and damage the ecological balance in aquaculture areas.

Impacts of environment-related trade measures and trade-related environmental measures

Under a trend of gradually decreasing tariff and non-tariff measures and abolishment in situations of broad trade liberalization, the technical barriers emerged with flexibility as the major measure of protecting the domestic market by limiting foreign imports. Technical barriers are conveniently adopted in the agricultural products, including aquatics.

Along with the APEC trade liberalization trend and its entry into WTO, China may enjoy non-discriminative and the most-favoured-nation treatments. However, China's products may not have smooth access into international markets, nor can China protect its domestic production and market with necessary technical measures if enforcement in the products' law and regulations, standardization, standards authorization and the quarantine control system are not improved.

Tariff and tariff structure on the environment

As mentioned above, tariffs for fish and fish products have dropped substantially over the past few years. Reduction of the tariffs has reduced the protection of the domestic market and domestic enterprises will face greater competitive pressures that have never been experienced before. Fish products account for a small amount of the total aquatic trade. This is due to inadequate capacity and inefficient processing techniques as well as tariff barriers in fish trade. In the majority of developed countries, tariffs on the unprocessed fish products are lower than semi-processed and fully-processed fish products. Under the differentiated tariffs, enterprises prefer to export more unprocessed products. Trade liberalization may likely result in two scenarios due to severe competition:

1. Enterprises may become more market oriented and more efficient by lowering costs and increasing proficiency. As foreign high value fish and value-added aquatic products will have potential in the Chinese market, it will create pressure on the domestic fishery production sector with the increase of the bulk of aquatic imports. However, it will benefit the protection of offshore resources and the environment and therefore relieve the growing aquacultural expansion; and
2. The export market might encounter low price competition, and since there will be more aquatics businesses involved in the international market as the domestic market matures and becomes over supplied with certain fish varieties, there will be disorder in the export market. If so, the enterprises may expand fishing and aquaculture operations to make up for their loss and further damage the environment. There is a case to interpret this phenomenon in the eel exports to Japan years ago. A large number of fishing boats poured to the Yangtze River mouth areas for eels as remarkable proficiency from eel export business, the eel operations resulted in an export disorder and a sharp decline in price, which enabled further eel expansion in order to make up the fishers' lost profit. In turn, an even worse situation in export environment and in resources decline developed.

Therefore, for the protection of export markets and resource environments, an active role should be played by government organizations, who should also play the role of intermediaries in providing coordination and regulation services during the process of decentralization.

"Green Barriers" to trade

With stronger environmental awareness, green food, green consumption and green industry have developed rapidly in foreign countries, in particular developed countries. Application of the WTO-consistent measures to protect markets is becoming popular and green measures are among the most popular ones. Green measures that include technical standards, environmental standards, packaging requirements, quarantine regulations are those measures that are basically established on the grounds of protection of the environment and human and animal health.

Japan, as an importer of 30 per cent of the world's annual aquatic trade, remains the largest market for China, accounting for roughly one-third of the country's exports. However, recent years saw China's aquatic exports confront the following challenges:

1) more rigorous hygienic standards for aquatic imports (the Japanese Ministry of Health and Welfare ordered a batch-by-batch test of antibiotic residues on eels and eel-related products entering Japan, which affects China the most, as China sells approximately 80 per cent of the world's eels annually); 2) more strict requirements for foreign aquatic breeding and processing enterprises (the Japanese government introduced a hygienic registration system in 1999 that examines and authenticates the production processes and product quality of foreign companies. This move only leaves qualified businesses to export their aquatic goods to the country); 3) increased use of labelling (the Japanese Ministry of Agriculture, Forestry and Fisheries has presented to the Japanese Parliament an amendment to its JAS Act, requiring labelling on all aquatic goods in the local market); and 4) conscientious consumers for "safe and healthy aquatic food." Great environmental awareness has been demonstrated among consumers in developed countries; green products represent a new trend of consumption that will put China's aquatic exports to a difficult test.

Green measures are usually designed unilaterally by importing countries or by international organizations without adequate considerations of the specific conditions and issues of developing countries. In practice, more often than not, these standards serve as green barriers to trade, especially to exports from developing countries.

China has not established well designed environmental standards and adequate inspection systems and tools, the competitiveness of its exports is rather weak and open markets will inevitably give foreign countries more opportunities to export their products in China. In order to survive, domestic enterprises will be forced to expand their production despite of high environmental costs.

Fishery subsidy on the environment

Government subsides to the local fishery industry have been one of the major concerns of the WTO in recent years. These subsidies, which are already in place across OECD member economies and in some developing countries, have distorted production costs and fair competition in international trade and harmed the interests of developing countries. To a great extent, they have also led to over fishing or left a big drain on aquatic resources. Doha Ministerial Declaration adopted at the Fourth WTO Ministerial Conference has included fishery subsidies included in the upcoming new Round of multilateral trade negotiations.

The existing multilateral trade rules have divided subsides into prohibited, actionable and non-actionable categories. The prohibited subsidies are those that are directly related to exports or those that are adopted against the use of imported products in the domestic market. The actionable subsidies counteract those adopted by other WTO Member States. The non-actionable subsidies are aid to research activities, regional development projects and the utilization of current facilities or equipment.

In the preparation leading to a new Round of WTO trade negotiations, many WTO members have proposed the inclusion of fisheries in the negotiation process. New Zealand reiterates the necessity for developing countries to develop their fishery production capacity, claiming that subsidies by rich nations have placed a curb on sustainable fishery development through competitive market prices. The United States points out that the elimination of fishery subsidies will create a win-win outcome for trade and the environment. Japan notes that considerations should be given to food security and to the multi-functionality of fisheries multi-functionality nature of as the means of livelihood for inhabitants in remote areas, while formulating trade rules concerning aquatic products.

China's fishery industry does not rely on subsidies. To support industry development, the government provided some preferential policies to the sector during the Ninth Five-Year Plan period (1996–2000). These include interest-free loans for purchasing fishing vessels, exemption from value-added tax, special farm taxes for companies engaging in deep-sea fishing, as well as fuel at a state-fixed price for fishermen at a time of too much price fluctuation. These measures are limited in use and are not linked to exports. They were only salvaged in the operation for fishermen and fishing companies against the adverse impacts of the changing external environment. They are different in nature from subsidies in the OECD member countries.

Some westerners regard China's official investment and financial aid to loss-making companies as the equivalent of fishery subsidies. In reality, the proportion of the official investment in the domestic industry has shrunk over the past years, from 45 per cent in 1985 to only six per cent in 1999. In the wake of diversified investments and rapid growth in this sector, management remains rather poor. Government investment has been put more into sectoral administration. In 1990, the sector only accounted for 3.5 per cent of the gross state investment; increased to 18 per

cent in 1999. During the same period, the combined tonnage of motor sailors with state-owned companies also dropped from 16 per cent of the national total to seven per cent in 1999. Meanwhile, state ownership has gradually given away to the growing private sector. As the country's total catch of marine fish between 1990 and 1999 rose by 11 per cent from 550,000 tonnes to 1.49 million tonnes, the accumulated amount caught by state enterprises was up only by 1.07 per cent from 852,000 tonnes to 908,000 tonnes.

Resources management from the supply side

On the supply side, the deregulation on aquatic production and sales since 1985 has brought enthusiastic fishermen and fishing companies into full play. Regrettably, due to the general lack of awareness of resources preservation, local fishery administration remained loose and ineffective. Industry management failed to play its role in protecting local resources and the environment, and this, rather than subsidies, accounts for current over-fishing in China.

IV Conclusions and recommendations

Conclusions

The demand/consumption analysis indicates that there is still room to increase the consumption and the production in China in the near future. Accession to the WTO may improve the efficiency of economic operations and provide a better chance of increasing people's income level, which will likely contribute to a rise in the consumption of aquatic products both in terms of quantity and quality. Wider opening of the market to foreign competition will also drive down the prices of aquatic products. This, combined with the effects of improvement of transportation, packaging and processing technology, will help to reduce the regional differences, expand the market and further enhance the share of aquatic products in the food composition. Imported products will enjoy a larger share in the Chinese market because of their quality and price competitiveness.

- Chinese aquatic production, which has enjoyed high growth over the last few decades, now suffers from resource constraints. Due to heavy fishing, resources in coastal areas are deteriorating; fishing areas in the outer seas become smaller due to the bilateral agreements with China's neighbouring countries such as Japan and Korea. Uncontrolled pollution brought about by industrial and agricultural activities and fish farming has damaging effects on aquaculture. The capacity for production has been weakened, and fish quality has come to an extent that certain varieties are no long accessible to some traditional importing markets of Chinese products. After accession to the WTO, both the Chinese fishing sector and the fish farming sector will experience a rapid adjustment. Emphasis should be shifted from extensive production to intensive production and from maximization of outputs to sustainable use of resources and the quality of products.
- Export orientation of the Chinese aquatic sector remains small despite the fact that China is the largest producer of aquatic products in the world. Yet the aquatic sector represents an important area with economic potential and international competitiveness in the post-WTO membership period. After two decades of market-orientated reform and economic development, the ability for Chinese consumers to pay for high-quality and high-priced import products and the competitiveness of Chinese aquatic products have greatly increased. Import and export trade of aquatic products will continue to grow on the assumption of reduced trade barriers, enhanced market access and security, transparency and predictability both inside and outside of China. With support of more foreign direct investment, the labour-intensive aquatic processing industry will play a more important role in promoting the export of Chinese aquatic products. However, Chinese exports may likely be hindered by higher product and environmental standards in major importing markets.
- After China's accession to the WTO, with removal of most tariff and non-tariff barriers, the market will play a central role in allocating resources, including those resources outside China, which will improve the efficiency of economic activity of the Chinese aquatic sector and will also benefit China in the sense of environmental protection. With intensified competition in the domestic market due to reduction and removal of various trade barriers, enterprises that previously depended heavily on the government loans and credits will find it hard to survive. Privatization in the aquatic sector will be further encouraged in the post-WTO membership period. Under intensified competition, Chinese enterprise will be eager to invest in high technology and high-efficiency production methods.

Recommendations

Shifting from resources development to resources management

Despite its remarkable success in development since the country adopted reform and opening to the outside world in 1978, China's fishery industry is confronted with a number of challenges. Speedy growth in production and structural change in the marketplace have resulted in an oversupply and steady price decrease of aquatic products in both domestic and overseas markets, seriously affecting local fishermen's living standards and the economic benefits of the industry as a whole. The practice of over-fishing and disorderly industry development have led to worsening environmental constraints, such as an impending drain on ocean resources, heavy pollution in sea waters, red tide, frequent breakout of epidemic disease and resource degradation.

Based on our analysis of both market and environmental restraints, we recommend that China's fishery industry shift from its old priority of resources development to resource management and formulate its plan on production (fishing and aquaculture), distribution and trade in line with the principle of sustainable development. As WTO membership will provide more opportunities for exports and further stimulate local fishing resources development, China will have adopt a full package of policies and measures to avoid or minimize threats to the environment while accelerating the growth of its fishing industry. These policies and measures may include the following:

1. Ocean fishing: Placing dual emphasis on resource development and ecological conservation
    - to cut down ocean fishing catch and frequency through firm control and reduction of the number of fishing vessels and their capacity targets and carry out quota fishing ;
    - to improve the practice of off-fishing by extending both the areas and seasonal periods and stick to this practice on a long-term basis; and
    - to impose stringent restrictions on any fishing operation that harms ocean resources.
2. Aquaculture: Keeping water pollution and the cause of epidemic disease under control
    - to make scientific assessments of the environmental capacity for marine culture and stay away from blindly developing uncultivated waters and beach; and
    - to keep a closer supervisory control over the pollution origin and the cause of epidemic disease in fishery production and cultivation.
3. Enforcement: Reinforcing control and management with intensified supervision.

Introducing new rules and regulations for the industry's development

In light of the requirements for sustainable development and the relevant WTO rules, China's fishery industry should modify its industry investment regimes, accommodate its stimulus and incentive mechanisms, improve the mode of management, formulate a new policy framework for development and adopt fresh policy instruments.

Focusing on capacity building and providing technical assistance to the decision-making process

For China's fishery industry, the strategic focus on management instead of development means increased demands for scientific decision-making, which is guaranteed on the basis of a mass strategic data pool as well as accurate assessment and good mastery of the numerous uncertainties and risks the industry faces. It is of vital importance, therefore, to establish and improve the systems of data collection, monitoring and evaluation for the domestic fishery industry and bring into full play their role in industry decision-making. A new system of targets, quotas and norms that fit in with the industry's sustainable development should also be drawn up against what has been or is being developed by international organizations and be made part of the basis for decision-making.

Building up the infrastructures and an industry support system

China's fishery industry is a major sector of the economy, providing 12.57 million jobs nationwide. With the market opening wider and the competition heating up more than ever, the top priority for the industry is to speed up the construction of the infrastructure facilities, set up safeguarding systems and enhance their respective functions. These facilities and systems may include fishing ports and education bases and systems for aquatic epidemic diseases prevention and cure, stock-breeding and technology transfer service.

Improving the quality of aquatic products

China, the largest producer of aquatic goods in the world, has experienced its imports exceeding its exports in recent years. The prices of its aquatic exports have been lower than those of the imports. This can be attributed be low quality of the local aquatic products. With China joining the WTO, the situation will become worse with tariff and non-tariff barriers being gradually phased out. To deal with this, the domestic fishery industry may take the following measures:

1. establish sound quality criteria that conforms to international standards;
2. reinforce quality monitoring and supervision and promote total quality control through the production and cultivation processes;
3. expand the coverage of stock breads;
4. improve the quality of local aquatic products by increasing capital and technology input and improving the conditions of fishing waters;
5. upgrade the backward technologies in preservation, processing, warehousing and shipping as well as packaging through technological innovation and import.

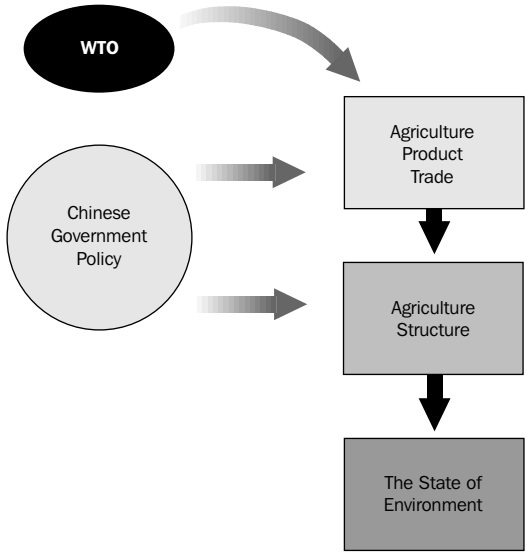
China's Accession to WTO and Environmental Impacts on Agriculture

by Tao Hu and Fanqiao Meng

1 Introduction

China is now a member of the WTO. The increased trade volume and changed trade structure will affect environmental quality through economy structural change. This paper analyzes the environmental impacts of agriculture sector by China joining WTO. The logic chain of the study is as below:

Agriculture product trade changing through WTO accession→agriculture structure changing→environmental impacts by the structure changing.



2 China's current agriculture policy and agricultural trade policy

China is a country with 1.3 billion people. China's crop production is one of the biggest in the world, representing 22 per cent of global production. Under China's current agriculture policy system, food self-sufficiency policy is the core of the policy system, i.e., main agriculture products are usually not imported. Here the food self-sufficiency policy means grain or crop production taking place mainly in its own country. China's other agricultural policies—such as trade policy, pricing policy, subsidy policy, quotas policy, etc.—support the core policy. Just recently, China added a new target of agriculture as a supplement of the food self-sufficiency policy, i.e., increasing the income level of farmers.

Food self-sufficiency policy or grain self-sufficiency policy was the tradition of the country, under the independent and self-production national policy before so-called opening-up policy issued in 1979. At that time, producing enough food was the priority during the age of shortage economy. Food self-sufficiency was for national security and for saving scarce foreign exchanges for the development of industries, although some grains had to be imported to meet the shortage of food. Due to the rapid increased production cost of grain, China has been facing the challenge of importing grain during these years. After the report "Who will feed China?" by Lester Brown in late 1994, although there were still some arguments, food self-sufficiency has been clearly set up as a national strategy. During the Earth Summit on World Food Security organized by FAO in Rome November 1996, the former Premier Li Peng stated that to realize food self-sufficiency based on domestic resources is China's basic strategy of solving food problems. Politicians and the central government insist that China should feed itself and is capable of doing so. Now food self-sufficiency is the core policy of Chinese agriculture.

In the past, nobody doubted the food self-sufficiency policy, since the agriculture policy's impact on the political, social and economic environment were coordinated with each other. Environmental issues were almost ignored. Only during these years, as production costs of grain increased and environmental problems emerged, the political and social objectives conflict with economic and environmental objectives. Therefore, the question has been raised—why should China insist on a food self-sufficiency policy? Is it necessary that China feeds itself? The Chinese government clearly states that to realize food self-sufficiency based on domestic resources is China's basic strategy of solving food problems. Net import amount of grain will be limited at the level of five per cent of domestic consumption.

Trade policy is a key sub-policy to support food self-sufficiency policy. One one hand, trade policy sets up barriers to limit grains and others foods imported into China. On the other hand, trade policy encourages agricultural input materials—like chemical fertilizers, pesticides, agriculture used films and others—to be imported into China to support the production of food within China.

Compared with the world market, China's wheat prices are 30 per cent higher; maize 60 per cent higher; and rice 10 per cent higher. According to the principle of comparative advantage, China should import as much as is cost-effective. However, China's net importing amounts of grains are quite limited, lower than five per cent of total production—this is result of implementing the food self-sufficiency policy. Both tariff tax and non-tariff tax measures are used to implement the trade policy. In China, tariff tax for imported foods range between 40 and 220 per cent, depending on quality of goods, importers, exporters, etc. Also, importing quotas are used by the central government, which are only allocated to a few state-owned companies.

As a result of the tariff policy, China's importing amount of chemical fertilizers is ranked first in the world. Each year China spends about US$3 billion, taking over two per cent of total value of import, to import fertilizers.

3 Changes in agriculture structure and grain trade after joining WTO

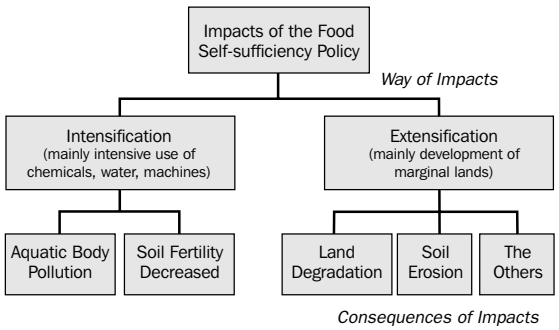
China's accession to the WTO will have a great impact on China's foreign trade in terms of volume and structure. Under the agreement between China and the United States, China's policy will have the following changes after it becomes a WTO member: average tariff reduction for agricultural products from 22.1 per cent to 17 per cent; elimination of all export subsidies; further opening of the market for agricultural products; implementation of a "tariff-rate quota" system for wheat, maize, rice and cotton; and phasing out state control over trade in soybean oil. According to the quantitative estimates by a CGE model by Li Shantong of the Development Research Centre of the State Council, when China fully fulfills its WTO commitments by 2005, by the year 2010, China will probably become the most important agro-product importing country after Japan.

The trade volume and structure changes of grains will lead to changes in agricultural structure. According to the calculation by Huang Jikun of the Chinese Agricultural Policy Centre, grain production would decrease substantially while livestock production and horticulture production would increase greatly.

4 Environmental impacts of the food self-sufficiency policy

In order to implement the strategy of food self-sufficiency, there are two basic ways: intensification—mainly intensive use of chemicals, energy and water— to increase products per capita; and extensification—mainly development of marginal land—to enlarge cultivable land. Therefore, the ways of impacts on environment are also through intensification and extensification. See the logic framework below.

The Analytical Framework of Environmental Impacts of China's Agriculture Policy



The consequences of impacts are very wide, including aquatic body pollution, decreased soil fertility, land degradation (grassland degradation, salinization, desertification), soil erosion, deforestation, wetland disappearance and others.

The cultivated areas under irrigation have been expanding since 1949. The usied amount of fertilizer has increased drastically which has caused water pollution in rural areas. Now non-point pollution from the agricultural sector has been one of the most important pollution sources of rivers, lakes as well as other water bodies.

The amount of fertilizer used and irrigation areas in recent years in China are shown below.

Table 1. Fertilizer Usage in Recent Years in China (convert to pure substance, unit: thousand tonne)

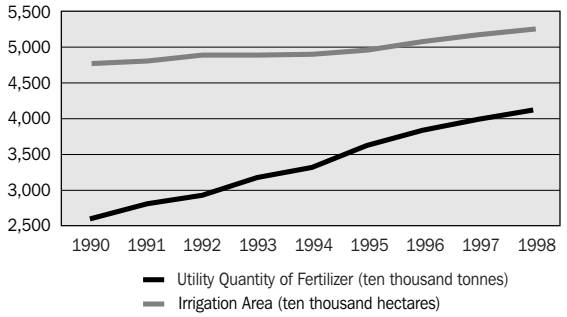
Year	Total amount	N	P_2O_5	K_2O	Compound fertilizer
1986	19306	13126	3598	774	1808
1987	19993	13268	3719	919	2087
1988	21415	14171	3821	1012	2412
1989	23571	15368	4189	1205	2809
1990	25903	16384	4624	1479	3412
1991	28051	17261	4996	1739	4055
1992	29302	17561	5157	1960	4624
1993	31519	18351	5751	2123	5294
1994	33179	18820	6007	2348	6006
1995	35937	20219	6324	2685	6708
1996	38279	21453	6584	2896	7347
1997	39807	21717	6891	3220	7981
1998	40856	22344	6828	3463	8222

Data Source: China statistical Yearbook.

According to the above data, fertilizer usage in China in 1995 was 1.86 times higher than 1986. The annual loss of nitrogen fertilizer for cropland in China is 33.3–73.6 per cent. The more fertilizer used, the more fertilizer leaks into water (including the surface water and the underground water), causing eutrophication in rivers and lakes. According to the environmental statistical data, 12.7 per cent of the mainstreams have been polluted in all the rivers and 55 per cent of the branches have been polluted (1997). The lakes near cities have eutrophicated, especially the Chao Lake, the Tai Lake and the Dianchi Lake.

From 1950 to 1985 in China, the output of grain only increased 1.86 times while fertilizer usage increased 8.29 times. Improving technologies of spreading fertilizer and irrigating could help to reduce non-point sources of pollution. However, it's one of the consequences of the food self-sufficiency policy. After WTO, there would be a reduction in the use of chemical fertilizers and pesticides and therefore a reduction of non-point source pollution (presumably, substantial domestic production of rice, wheat, maize and beans, etc. will be replaced by foreign exports due to price disadvantages).

Figure 1. Irrigation Areas and Fertilizer Usage in National Agriculture



Data Source: China statistic Yearbook.

China has suffered seriously from ecosystem degradation in decades, including soil erosion, wind erosion, grassland degradation, deforestation as well as desertification and other impacts.

Table 2. The components of desertified land by the natural processes leading to desertification

Type	Area (thousand km^2)	Area (per cent)
Wind erosion	1607	61.3
Water erosion	205	7.8
Salinization	233	13.8
Freeze-thaw erosion	363	8.9
Other factors	214	8.2
Total	2622	100

Data Source: CCICCD (1997).

According to land-use patterns in China there are about 77 thousand km^2 of degraded arable land or 40.1 per cent of total arable land in desertified regions; 1,052 thousand km^2 of degraded grassland or 56.6 per cent of the total grassland; and 1,000 km^2 of degraded woodland in these regions. The rest is the degraded land with sparse vegetation coverage (less than five per cent).

In conclusion, the food self-sufficiency policy has strong negative impacts on the environment. Agriculture is one of the most polluted industries in China.

Table 3. The components of desertified land by land-use patterns

Type	Area (thousand km^2)	Area (per cent)
Arable land	77	2.9
Grassland	1052	40.1
Woodland	1	0.1
Other types*	1492	56.9
Total	2622	100

Data Source: CCICCD (1997).

5 Potential rural environmental impacts of agriculture structure after joining WTO

Based on the above analysis, the environmental impacts of grain production after China's accession to WTO will change based on the agricultural structure.

After accession to the WTO, China could gradually increase its import of grains and to use both international and domestic markets to maintain food security for its 1.3 billion people. With WTO membership, average tariffs for agricultural products will be reduced within five years and a tariff-rate quota system will be applied for products such as wheat, rice and cotton. The import of these products (mainly land-intensive products) will greatly increase as they lose competitive advantages. Labour-intensive products like fruit, vegetables and livestock products could be developed faster given the comparative advantages of such products.

From the environmental protection perspective, the increased import of land-intensive agricultural products such as grain means reduction of land utilization, reduction of chemical fertilizer and pesticide use, reduction of agriculture plastic film pollution, and reduction of straw pollution caused by agricultural production. In this sense, after China's WTO accession, more agricultural products will rely on the international market. It will be conducive to addressing agricultural non-point source pollution, which is a daunting task at present. It could also make it possible to carry out reforestation and afforestation projects in remote and mountainous areas. This would apparently help China greatly reduce environmental pressure in rural areas and fundamentally halt the trend of ecological degradation resulting from economic development. Meanwhile, appropriately guided use of foreign investment would help carry out ecological reconstruction projects, if the Chinese government formulates appropriate incentive policies to encourage investment.

After WTO, farmland and farmers will be more and more urbanized and industrialized. The alternatives of land-intensive products would be labour-intensive products, such as fruit, horticulture, livestock, etc.

For animals, intensive large-scale fowl and livestock breeding will develop quickly. According to the statistical data, for example, in Shanghai there are 743 farms, including 433 pig farms with over 1,000 pigs each, five henneries with over 100,000 chook each (for meat purpose), 146 henneries with over 10,000 hens each (for egg purpose), and 149 cattle farms with over 100 cattle each (Liu Fang, 2000). One hundred per cent of the cattle and birds (for meat purpose), above 90 per cent of the pigs and about 85 per cent birds (for egg purpose) are intensively fed in the large-middle scale farms, collective farms and by professional farmers. Few of them are separately fed by the farmers. The daily pollution discharged by the fowl and livestock into water bodies is noted below.

Table 4. Daily Pollution Discharged by the Fowl and Livestock intoWater Bodies (g/day, one creature)

Animal type	COD	TN	TP
Cow	211.08	77.67	3.35
Pig	20.98	5.22	0.886
Chicken (for meat purpose)	0.0274	0.004	0.00114
Duck	1.313	0.3282	0.185
Chicken (for egg purpose)	1.1018	0.2763	0.1068

Source: The Reform Design of China Pollution Discharging Fee Gathering Procedure, written by Yang Jintian, et al., 1998

Total meat production was 51.5 million tonnes in 1997. If 40 per cent of livestock and 50 per cent of fowl were intensively fed, the estimate of total pollutant discharge of fowl and livestock breeding would be COD 3.2 million tonnes, TN 979 thousand tonnes, and TP 210 thousand tonnes. In which, COD would be 18.5 per cent of the total discharge amount of China.

After WTO, the livestock industry could be one of the most possible alternatives to grain production. Thus, there is likely to be an increase of point-source pollution with increases of livestock manure. However, comparing with non-point-source pollution in arable land by chemicals, the point-source pollution by livestock is easily controlled.

6 Conclusion

After China's WTO accession, there will be changes in agriculture: 1) the rural environmental pollution would be partly shifted from non-point source to point source, from grain production to livestock industry as well as fruit and vegetable production; and 2) the ecological pressure on marginal land would be less than before. So, after joining the WTO, Chinese agriculture is very significant for environmental improvement and could have less negative environmental impact.

WTO is a very good opportunity for China to adjust its economic structure with internalized environmental costs, in order to maximize the environmental benefits and solve the environmental problems, especially non-point-source pollution and ecological degradation problems.

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Strategies for Trade Liberalization in Environmental Services in China

by Fengzhong Cao, Xiaoyue Shen and Wanhua Yang

1 Trade liberalization in environmental services: global trends

Environmental services are those that generate revenues through fees related to activities that benefit the environment, including pollution control, monitoring, sewage treatment, clean-up of contaminated sites and waste handling services, and a wide range of other environmental services. Although they are relatively new and still take a very small share of total trade revenue, environmental services have become important and will continue to be so in the foreseeable future, as there is an increasing need for environmental services while human society is attempting to address global and local environmental problems.

The global environmental industry (including environmental goods and services) was estimated at US$453 billion in 1996, US$484 billion in 1998 and US$518 in 2000.[1] It is estimated that environmental goods and services world-wide are expected to expand rapidly in the future. The environmental market will grow from the current level to US$600 billion by the year 2010 and will continue to grow at an unprecedented rate throughout the 21st century.[2]

Trade liberalization in environmental services under the WTO GATS

The General Agreement on Trade in Services (GATS), negotiated in the Uruguay Round, is the first international agreement providing legally enforceable rules to govern international trade of all services. The GATS has three basic principles. The first principle is market access. GATS covers all services, except for those where Member governments wish to exercise their governmental authority. The other two principles are the national treatment principle (NT) and the most-favoured-nation (MFN) principle. Countries should not discriminate in favour of national providers, nor should they discriminate between other Members of GATS. Transparency is another important principle of GATS.

GATS allows room for exceptions from its three basic principles. Governments can choose sectors where they wish to have market access and national treatment commitments. They can limit the degree of market access and national treatment for the sectors they choose to open. They can even grant more favourable treatment to certain countries if they choose, but not for more than 10 years.

Accordingly, GATS includes individual countries' specific commitments to provide access to their markets and lists where countries are temporarily not applying the "most-favoured-nation" principle of non-discrimination. These commitments and lists—like tariff schedules under GATT—are an integral part of the agreement. Members are obliged to commit to progressive liberalization during further negotiations.

Individual countries' commitments have three levels—full bindings, limited bindings and no bindings. Of the existing members, 38 have made commitments in environmental services. The level of member commitment and individual sub-sectors commitment varies. Twenty-nine members have made commitments on sewage such as refuse disposal and other environmental services, 30 have made commitments on sanitation and similar services and much less on individual segments of other environmental services. Although a large number of Members have not made commitments on environmental services, those that have are major trading countries and their GDP has exceeded 86 per cent of all members.[3]

With ample flexibility to choose the level and degree of opening their market, members are obliged to gradually open their domestic market to other members' service suppliers. They are mandated to enter into successive rounds of negotiations to achieve a progressively higher level of liberalization. These negotiations aim to reduce or eliminate the adverse effects of measures on trade in services.

However, there is currently no consistent definition or classification for environmental services. The GATS W/120 classification list, which is used at the WTO, and the Environmental Goods and Services Industry Manual, developed by OECD and Eurostat, are very different. The GATS W/120 classification list was developed by the GATT Secretariat during the

Uruguay Round, and is largely based on the United Nations Provisional Central Product Classification (CPC). It reflects a traditional view of environmental services as largely public infrastructure services, i.e., services supplied to the general community, and focuses on water management and pollution control.

The OECD/Eurostat Manual represents an evolving, more integrated industry and identifies environmental services as those provided to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems.

Defining the sector of services becomes very important in light of recent efforts pushing for trade liberalization of this sector.

Recent efforts in trade liberalization of environmental services

Given the potential environmental and economic benefits that environmental services may bring, several international forums including OECE, UNCTAD, APEC and the WTO have paid a great deal of attention to the issue of trade liberalization in environmental services. The OECD is taking the lead in research on the environmental industry. It maintains an informal working group of national experts from OECD countries under the auspices of OECD and Eurostat (the Statistical Office of the European Communities). OECD/Eurostat has now developed the Environmental Goods and Services Industry Manual, which provides a common definition and classification of the environmental industry. UNCTAD is more focused on strengthening capacity in developing countries to expand their environmental services sector. A meeting of experts on this subject, held in July 1998, identified some specific business opportunities for developing countries, discussed the potential limitations and provided some useful recommendations on how to enhance developing countries' capacity in the environmental services sector. APEC has taken trade liberalization in the environmental sector one step further by starting to liberalize the environmental sector as one of the nine sectors in this scheme.

The WTO Committee on Trade and Environment (CTE) have put a special item about issues related to trade in services and the environment (Item 9) on their agenda. Early discussions of the CTE focused on the environmental effects of trade liberalization in services, whether GATS's general exceptions have adequately taken environmental concerns into consideration. The Doha Ministerial Declaration adopted at the Fourth WTO Ministerial Conference in 2001 clearly lists "reduction or elimination of tariff and non-tariff barriers to environmental goods and services" as an agenda item for negotiations on trade and environment issues in the new Round of multilateral trade negotiations. This could mean rapid growth of these goods and services in the future.

2 Environmental services in China

Environmental services are relatively new in China. As in many other countries, the environmental services sector has not become an independent sector, but is an integral part of the environmental industry. Therefore, environmental services have yet to be well defined.

Increased public awareness, global competition, better environmental legislation and enforcement and the Chinese government's recent toughening up of policies and measures have all promoted the development of the environmental industry (including environmental goods and services) in China. In 1998, actual environmental spending reached 72 billion yuan (approximately US$9 billion), surpassing 0.9 per cent of the country's GDP.[4] In the future, the central and local governments will further increase environmental investment to meet the country's environmental needs.

However, the development of the environmental service sector in China began rather late. According to a survey by the State Environmental Protection Administration, the total revenue generated by this sector accounted for only 12 per cent of the total output value of the environmental industry in 1997.

Until recently, public water works, sewage treatment plans and municipal waste treatment plants were all built and operated by local governments. Other environmental service suppliers are mainly governmental affiliated academic research institutes, universities and colleges and in-house technical personnel of large enterprises. Only recently did small and medium-size revenue-generating entities become part of the industry.

Environmental protection needs and environmental regulations have been the major driving force for the development of environmental technologies and services in China. China has now strengthened its environmental legislation and enforcement. In particular, recent efforts in pollution control of three rivers (Huaihe River, Haihe River and Liaohe River), three lakes (Taihu Lake, Caohu Lake and Dianchi Lake),

control zones for two air pollutants (SO_2 and acid rain), and one municipality (Beijing) have greatly spurred the development of environmental products and services. The current development of environmental products is tailored to satisfy the needs of the present market, concentrating on traditional pollution control equipment and related services.

With China's economic reform going forward, many changes have occurred to shift from the central planning economic system to the market system. In the area of environmental and scientific system reform, a recent national conference on environmental research institutional reform has defined the principles of turning government-affiliated environmental research institutes into environmental entrepreneurs or non-governmental organizations. Those that have the ability to develop new environmental technologies should be turned into technology enterprises to provide technology services. Those that have the ability to carry out environmental impact assessment and other environmental services should be transformed into service business entities. Those that have expertise that cannot be turned into profit should become non-governmental organizations.[5]

In the area of state-owned enterprise reform, the main practice is to separate the right of operation from state ownership, allowing individuals to run businesses independently and earn maximum profits. In the area of public utilities (such as sewage treatment plants), provinces such as Guangdong have begun to encourage private and foreign investment in the construction of sewage treatment plants. BOT (build-operate-transfer) is a new way of building and operating public utilities in China. Measures have also been taken to encourage enterprises to take on the operation of public facilities for fees, namely, separating the right of operation of public facilities from state ownership. These changes will create enormous opportunities for environmental services.

Trade in the environmental industry in China still occurs on a relatively small scale. The total value of exports of the industry, mainly environmental products, accounted for only 1.05 billion yuan in 1997. There were no exports of environmental services according to the 1998 SEPA survey. Nor were recorded imports of environmental services to China.

This doesn't mean that China does not import environmental services. Imports of foreign environmental technologies to China through direct purchasing and foreign investment have brought in some foreign environmental services. Another major source of imports of foreign environmental services is internationally financed environmental projects, particularly through international lending institutions such as the World Bank, the Asian Development Bank and other bilateral financing arrangements. These institutions usually insist that foreign consulting companies carry out international projects. This is because their standards require more sophisticated consulting services than the Chinese companies can provide.

According to sources, about 10–15 per cent of environmental funding in China comes from bilateral and multilateral lending sources. These internationally funded projects provide the biggest source of opportunity for foreign firms to enter the Chinese environmental market. Another 5–10 per cent of environmental financing is from foreign investors. Many joint ventures in China usually apply higher environmental standards, and in the case of major multinationals, they apply their own internal standards. These joint ventures also offer a large source of opportunity to foreign environmental services and equipment firms. However, no data has been collected thus far on how to calculate the amount of imports of environmental services these internationally financed projects and foreign investment projects have brought into China.

With recent efforts to liberalize service markets in China, foreign companies are allowed to establish offices in China. Many foreign consulting firms have established environmental services business in Beijing, Shanghai and Guangzhou. Some of them specialize in environmental services. Environmental Resources Management (ERM), a well-known international consulting firm, has established a joint venture corporation in China with offices located in Beijing, Shanghai and Guangzhou. It provides various environmental services, ranging from environmental impact assessment, EMS/ISO 14000 certification, compliance audit, risk management, pollution control and site remediation, hazardous waste management, clean technology, environmental regulatory and economics services and international development. In addition, there are many international consulting firms, large or small, that are also engaged in environmental services in China. Again, there are no accurate figures on these firms.

3 Impacts of trade liberalization in environmental services – opportunities and challenges

Opening up this sector illustrates the need for China's internal development and the need for China to integrate itself externally into the world economy. During its Tenth Five-Year Plan period (2000–2005), China will maintain a growth rate of no lower than seven per cent, and environmental protection will face serious challenges. This will require substantial development of environmental services to meet its domestic needs. Internationally, as the economic globalization process advances, the liberalization of the agenda trade, specifically because of the gradual liberalization in environmental services, in inevitable. At this critical time, opportunities and challenges coexist for the development of environmental services in China.

Considerable progress has been achieved in the development and opening of trade markets in China's environmental service sector with the guidance of relevant environmental and trade policies and regulations. The role of these policies and regulations is important for the development and opening up of services because they have provided necessary legal support and guarantees as well as rules of management and preferential financial measures. In particular, China has opened its environmental services in order to promote its involvement in the negotiations concerning trade in environmental services of the WTO. In 1995, the State Environmental Protection Administration and the Ministry of Foreign Trade and Economic Cooperation worked together to create a schedule of specific commitments for liberalizing trade in environmental services. According to this schedule, environmental services for all foreign-invested construction projects will be opened, and certified environmental service suppliers from other countries will be allowed to establish joint ventures of environmental services in China and to provide services there or through cross-border consulting services to users of environmental services in China.

During the early 21st century, the Chinese economy will continue to grow at an annual rate of seven per cent which will certainly bring huge pressure on environmental protection, for 2015 for Environmental Protection. The objectives set for the period of China's Tenth Five-Year Plan (2001–2005) and the Long-Term Programme for 2015 for Environmental Protection calls for support of environmental services and products. Therefore the industry of environmental services in China needs to develop quickly to meet the domestic needs of environmental services and eventually solve the environmental problems in China.

The analysis of the development of environmental services in China indicates that factors affecting the development and opening of environmental services in China are twofold: internal and external. The internal factors include the need to achieve environmental targets and environmental protection, the external factors include the development of environmental products and service markets at the global level, the trend of liberalization of trade in environmental services and China's participation in APEC and upcoming entry into the WTO. All of these internal and external factors combine to show that China needs to liberalize its environmental service sector.

Currently, the economic, financial and technical strength for development and environment management in China is inadequate. The analysis of supply and demand of environmental services in China shows that the supply of low-level services is excessive while there is a big demand for high-level environmental services. If China relies on its resources to develop the environmental service industry, it will be difficult to establish a system of environmental services with international competitiveness to meet the increasing needs for environmental protection within a short period of time. Therefore, it would be prudent for China to grasp the opportunity offered by the entry into WTO to open its market for environmental services to make best use of financing, advanced technologies and rich expertise from other countries to develop the environmental service industry in China.

Benefits China's environmental service industry may obtain from the opening of trade in environmental services include:

- accelerating industrial and product restructuring, including the environmental industry;
- accelerating regulatory construction for environmental industry markets and promoting sound development of environmental services;
- accelerating technological progress for environmental services and products;
- introducing a competitive system into the environmental services industry to adapt it to a market economy;
- speeding up the formation and expansion of the environmental capital market to provide adequate financing of environmental protection;

- promoting exports of Chinese environmental technologies and services and participating in the international competition in the field of environment; and
- promoting the development of various areas relating to the environmental services.

However, it should be noted that the development of the environmental services sector in China is still in its initial stage and the level of environmental services is very low, so it will undoubtedly face huge pressure while competing with strong environmental services from other countries. The main pressures include:

- closure of a considerable number of domestic environmental service companies and layoffs as a result of this;
- temporary monopoly of foreign capital in the environmental capital market;
- loss of talent to foreign services providers; and
- occupation by foreign companies of key technical areas and sectors for profits.

The pressures that China may be face in the environmental services sector are huge. The comparative analysis of opportunities and challenges faced by the environmental services sector indicates that in the short term the challenges will be the reduction in net profits and reduced employment. However, the development of the environmental industry in China and liberalization of trade in environmental services will be a gradual process. In terms of long-term benefits, the opening of environmental services will not only meet the needs of economic growth and environmental protection but will also accelerate the development of various sectors of environmental services, promote exports of Chinese environmental technologies and services and improve China's participation in international competition in the environmental field.

In conclusion, to further develop environmental services, China should gradually open its environmental services sector. However, prior to and in the process of opening, efforts should be made to remove as much as possible those barriers unfavourable for trade liberalization in this sector. Meanwhile, serious studies and analysis on the opening are needed and the priority areas for opening should be identified to enable the environmental services sector grow mature as soon as possible in the process of opening to the outside world and play its own role in environmental protection in China. To this end, we make the following policy recommendations.

4 Policy recommendations for trade liberalization in the environmental services sector in China

1 To develop an overall strategy for development and opening of the environmental service sector in China

Strategic considerations should be given to the development of environmental services and opening their trade market, clearly defining the direction and the objectives for development and formulating the short-term, mid-term and long-term plans for development and trade in environmental services. In addition, provisions concerning environmental services and their trade liberalization in environmental services should be integrated into relevant policies and regulations regarding the development of the tertiary industry and the environmental industry.

The Catalogue for the Development of the Environmental Protection Industry attached to the State Council's decisions concerning the development of the environmental industry should be revised to include the development of environmental services, or consider formulating a set of guiding strategies specifically for the development of environmental services, including a catalogue for the development of this sector. The following principles should be taken into consideration in formulating such policies:

- The opening of environmental services should be closely linked with the national targets of environmental protection and strategy for sustainable development. The development of environmental science and technology should be focused on technical cooperation of various forms with foreign companies with the goal of introducing and absorbing foreign advanced technologies and services for application in China and in providing technical support for the prevention and control of environmental pollution and ecological conservation. The development, introduction and transfer of environmental technologies and services must take into consideration the energy efficiency of these technologies, their compatibility in China and their technological level in the same category of equipment.
- The development of environmental services in China is closely linked with the opening to the outside world, so it must be undertaken in line

with the pace of the country's opening. Development, progress and benefits must be achieved in the process of opening. The principle of equality and mutual benefits must be observed while opening to the outside. Benefits should be shared with investors on an equal basis while protecting intellectual property and following international rules.

- While introducing foreign advanced technologies and services, attention should be given to overall coordination and connection with domestic development and research activities. The domestic capacity for technical innovation should be strengthened in undertaking technical cooperation with the purpose of fostering and developing domestic capacity for future development of the environmental service industry and effectively promoting the development of the environmental industry.

In creating the overall strategy for development and opening of the environmental services industry of China, key areas and modes of cooperation should be given proper consideration.

i Key areas of environmental services to be opened:

The key areas for opening environmental services should be focused on those most needed for environmental protection in China, or those areas where China wishes to undertake cooperation. Therefore, key areas of environmental services to be opened should be those related to key technical areas most needed by China, including:

- environmental technical consulting: environmental policy consulting and environmental pollution prevention and control technology consulting;
- environmental technical services: including operation of environmental pollution prevention and control facilities and transportation and disposal of industrial and municipal wastes; and
- other areas: construction and operation of renewable energy power stations (solar energy, wind energy, magnetic energy, thermal energy and tidal energy, etc.).

ii The mode for opening of environmental services:

A gradual approach should be adopted. Those areas with substantial market demands and potential will be chosen as the pioneer, including sole-foreign-invested companies, joint ventures and cooperatively-operated companies. Meanwhile, the weakest areas need a certain period of buffering and should be opened gradually. Specifically, all the key areas except for the operation of environmental pollution prevention and control facilities will be opened through various forms such as sole foreign investment, joint venture and cooperative operation. In addition, training, research and development activities as well as planning will be undertaken.

Joint ventures and cooperative operations are a good way of opening for those key areas, considering that the relevant regulatory system needs to be improved and the market mechanism for environmental impact assessment, operation of environmental pollution prevention and control facilities, environmental engineering design and construction and sales of environmental products have not yet been put in place. However, the opportunities for establishing solely-foreign-invested companies in these areas are not currently mature, so a period of buffering is needed in this area.

2 To establish and improve relevant policies and regulations as soon as possible to strengthen management of environmental services and to support trade liberalization

Currently, policies and regulations concerning the development of environmental services and their trade are inadequate or outdated. Efforts need to be taken to strengthen and upgrade them. In the meantime, management rules should be formulated to regulate business behaviour of foreign-invested companies engaged in environmental services in China, such as policies for codes of conduct for environmental services, involvement of foreign companies in environmental impact assessment, certification of environmental engineering design and operation of environmental facilities. With these rules in place, the opening of environmental services will be based on the rule of law.

3 To strengthen environmental laws and regulations and guarantee their effective implementation which will lay a foundation for fostering the environmental services market and promote its opening-up

Until now, China has issued hundreds of environmental laws and regulations and thousands of environmental standards and rules. Effective implementation of the laws and rules is very important, not only for the progress of pollution control and achievement

of environmental goals in China, but also for extending the demand of environmental services. Clearly, the environmental service sector was born under a powerful environmental policy and management system. Development of environmental services and its opening depend on implementation of environmental laws and regulations. Therefore, it should strengthen supervision and management in the implementation of various environmental regulations and apply the measures of closing, stopping, combining and shifting to the enterprises which could not meet the pollutant emission standards, thereby fostering China's environmental services markets.

4 To establish market mechanisms for the environmental service market and its management, to stimulate the development of the environmental service sector, foster its market and diversify the environmental capital market

Efforts need to be made in the following areas:

- To fully use the guiding role of the government. Facilitating the development of environmental services requires strong support from the government, in particular the government's role in planning and in comprehensive decision-making to guide and to regulate market behaviour.
- To expand fiscal investment of various levels of government to initiate and stimulate the environmental market. Various effective economic policies should be implemented to stimulate the development of environmental services and to foster the market for these services; to attract and encourage investment from home and abroad into environmental services; and to expand domestic and international markets for environmental services.
- To formulate market incentives to mobilize private investment in trade liberalization in environmental services to form the multi-dimension capital market for environmental protection.
- To introduce and strengthen competitive mechanisms, promote the effective deployment of resources and increase industrial productivity, private investment must be vigorously promoted and more effort given to the development of share-holding enterprises dominated by state-owned shares in the short term. These include companies engaged in environmental impact assessment for construction projects and various forms of share-holding service enterprises. This will allow such enterprises to issue securities or bonds on the stock market to attract private capital and individual savings. A new management structure will also be established in the state-owned service companies so that their productivity and competitiveness will be increased through restructuring.

5 To increase the competitiveness of environmental services in China and gradually expand exports of China's environmental services

With WTO accession, there needs to be a period of transition for foreign companies to engage in environmental services in China or have establishments in China. For domestic enterprises engaged in environmental services, this situation is undoubtedly a good opportunity for development. Domestic enterprises engaged in environmental services should grasp this opportunity to undertake industrial restructuring quickly, restructuring capital for merging strength according to mutual needs in order to increase the competitiveness and capacity to alleviate risks.

China should incorporate into its overall strategy an objective of gradual expansion of its exports of environmental services and regard it as its overall direction. Policies for encouraging foreign investment in environmental services should include specific requirements for gradually expanding exports of environmental services. We should take exports from foreign-invested companies as a breakthrough to stimulate exports from domestic companies.

6 To actively participate in discussion and negotiations in the WTO and other international fora on issues related to environmental services, to ensure trade liberalization in environmental services in China proceeds concurrently with the international process

As a WTO member, China needs to be kept up to date on the latest information concerning liberalization of global trade in environmental services. China also needs to elaborate its views and positions through active participation in these discussion and negotiations to ensure the international community understands its commitment to opening environmental services. At the same time, China should take the opportunities to learn about the trends and progress of global liberalization of trade in services and environmental services in order to adjust domestic direc-

tion and pace to enable simultaneous growth at the national and international levels.

Currently environmental services in China have not yet been clearly defined and statistics do not include data on environmental services. China should establish a classification and statistics system of environmental services in accordance with international classification and statistics systems, drawing upon the experiences of other countries.

Endnotes

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3 See Note 1, WTO Secretariat Note.

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Section IV
Technology Transfer

Technology Transfer: WTO Rules and Multilateral Environmental Agreements

by Konrad von Moltke

A number of issues have become central to the WTO debate about development in general and about sustainable development in particular. The need for institutional development and capacity building, the concept of "special and differential treatment," and the proposal to introduce a "development box" into the Agreement on Agriculture are among the most important. A parallel development has taken place in the major international environmental agreements. There the key concepts are "common but differentiated" responsibility between developed and developing countries, capacity building and technology transfer. All of these topics are inter-related. It will be difficult to make progress on one of them without making progress on all. They all carry responsibilities for the parties to the WTO and the environmental agreements well beyond the classic agendas of trade liberalization in the WTO or the development of "command and control" regulations in the environmental regimes.

All of these issues are matters of grave concern for China as the country with the largest population and as a country with a large and ecologically diverse territory. China's economy is growing rapidly and in this represents a unique opportunity to introduce new and more efficient technologies. And as a new member of the WTO and a long-standing member of most international environmental agreements, China must address the broad agenda of technology transfer in a constructive manner.

Perhaps the most difficult of these issues is the subject of technology transfer. Many international environmental agreements envisage processes of technology transfer, yet only the Montreal Protocol has actually funded such a process, through its Interim Fund. There are several significant obstacles to achieving successful technology transfer. The climate regime has gone furthest in seeking to institutionalize technology transfer.

"Technology transfer" is itself a complex concept. It obviously involves access to appropriate products, equipment and services on the part of developing countries. These goods and services, however, frequently require significant levels of training and know-how, which are in practice part of the package of technology transfer. It has become common to distinguish between "hard" technology transfer—of products and services—and "soft" technology transfer—of know-how and techniques. Providing technology hardware without the necessary technology software is a pointless exercise.

The ultimate goal of technology transfer is to enable receiving countries to participate actively in the continuing process of technology development and innovation, that is the transfer is designed to set in motion a process of innovation. None of these goals can be achieved without an appropriate institutional infrastructure in the receiving country and significant levels of supporting capacity building. In this manner, the technology transfer agenda and the trade liberalization agenda overlap, since countries require both institutional development and capacity building investments to be able to benefit from these international processes.

The process of identifying appropriate technologies for international transfer is important. This process is characterized by "subsidiarity," that is the need to take decisions as close to the point where the technology will actually be applied, even while maintaining a broad and supportive international framework. Ultimately, only those who will use the technology can assess its appropriateness to their needs, yet the international structure for the promotion of technology transfer will, almost inevitably, be highly centralized and linked to international negotiation processes. At the very least, this implies that small individual enterprises will be unable to participate effectively in international technology transfer because they frequently lack the means to attract the attention of relevant national and international authorities. Yet experience in developed countries suggests that small and medium enterprises are actually the focal point of innovation and development in dynamic market economies. The role of the large, often more visible, enterprises is frequently to commercialize innovations that have been initiated in an environment that is more capable of taking risks.

A further issue is whether to seek to "leap-frog" to the newest technologies. In all countries, existing technologies are the result of an incremental process that

involves a certain amount of trial and error. Opinions differ on whether it is necessary for all countries to go through a similar process in preparation for adopting the most advanced technologies. It is certainly true that to be efficiently utilized most such technologies require a high degree of institutional capacity, and that the process of trial and error is also a learning process that creates the conditions for the emergence of new, more efficient technologies. It is equally true that there are alternative routes to creating the capabilities to successfully utilize such technologies, in particular routes that are significantly more direct. Nevertheless the problem of matching capacity and technologies remains a difficult one. There is a natural tendency on the part of receiving countries to seek out the most advanced technologies, which are not always the most appropriate given the available institutional infrastructure and capacity.

Finally, there is the issue of ownership of technologies. In OECD countries, many, if not most, technologies of commercial interest are owned by private persons, individuals or enterprises. They are protected by intellectual property rights (IPR), which are in turn subject to the rules established by the Agreement on Trade Related Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO). In many instances, even technologies that are based on publicly-funded research and development incorporate elements that are protected by intellectual property rights. These technologies can only be transferred internationally with the consent of the holders of the relevant rights, and this is generally tied to payments of some kind. While governments may undertake to provide relevant technologies, they have the means to implement such promises only when they have full control over them—a situation that rarely exists in practice. The situation that existed under the Montreal protocol was unique in several respects. At the time when decisions were taken to begin phasing out ozone depleting substances, no private enterprise had technologies available that could simply replace the substances that were being banned. In many instances, available solutions would have required extensive redesign of equipment that was utilizing these substances so that a significant premium existed for "in-kind" replacement technologies, that is substances that approximated the chemical and physical properties of the ozone depleting substances as closely as possible without actually being ozone depleting themselves. The development of alternatives occurred under unusual circumstances, with close coordination between producers, users and governments. Moreover, as new technologies emerged, the producers had a vital interest to ensure their most widespread adoption, among other things to forestall the emergence of entirely new technical solutions, for example, in the area of cooling. Under these circumstances, relatively modest public funds could successfully leverage the active participation of rights holders in the diffusion of emerging technologies.

The situation of the Montreal Protocol is unlikely to be replicated in other areas, leaving the problem of technology transfer without ready solutions. Clearly, trade liberalization and the universalization of intellectual property rights regimes have a critical role to play in the processes of technology transfer. A number of processes can be distinguished in this regard.

There is evidence that foreign direct investment engenders technology transfer as the foreign-owned enterprise is integrated into the economy of the host country, equips its facilities and trains workers to operate them. The degree of technological diffusion remains subject to debate, but it appears likely that the liberalization of investment is one avenue by which technology transfer can be stimulated.

The existence of reliable intellectual property rights represents an essential part of this approach to technology transfer. It may be debated whether the specific provisions of the WTO Agreement on Trade Related Intellectual Property Rights (TRIPS) are appropriate to the needs of developing countries, in particular when essential public services are concerned. It is quite uncertain whether a period of twenty years for patent protection represents the optimum for the global economy, let alone for developing countries; it appears more likely that this represents an optimum for the holders of such rights and for the countries where they are located. Nevertheless, it is certain that the existence of an effective IPR regime is essential for the process of technology transfer. There is no incentive for the holders of rights to transfer technologies to countries where those rights will not be respected. In the absence of an effective regime for the protection of IPR, technology transfer will be concentrated on technologies whose protection has expired or is about to expire. Such technologies may, in practice, be appropriate for the applications they are intended for but they will certainly not be the most innovative technologies.

The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol has the greatest implications for investment and technology transfer of any international environmental agreement. The effort to limit anthropogenic emis-

sions of greenhouse gases that lies at the heart of the climate regime requires a substantial, technology-based restructuring of the global economy.

The problem with greenhouse gas emissions is that they are typically not susceptible to "end of pipe" approaches. It is not economical to attempt to capture carbon dioxide as it is being emitted, in part because this negates the very process that preceded the emission and that was designed to generate useful energy. Similarly, the containment of methane from rice paddies or emissions from cattle do not appear practicable. In addition, there is no ready way to dispose of the resulting "waste" which would have to be permanently sequestrated if emissions are to be avoided permanently.

The response to this dilemma will have to be based on a systematic process of technology change. Many of the required technologies already exist but have not achieved adequate market penetration. Many areas of concern remain to be researched with a view to discovering promising technologies. In global markets, the measures that will be required to foster the development of technologies and to ensure their adoption in time to help mitigate climate change must also be global in nature. This will require innovative structures to ensure that the benefits of this effort are equitably shared.

UNFCCC, like numerous other international environmental agreements, articulates the principle of common but differentiated responsibility. It reflects the reality that much environmental degradation is the result of activities undertaken by countries that are now wealthy. It has been argued that developing countries should have the right to follow the same path of development but in truth this is not a sensible route to follow. The development pathway of the wealthy countries is known to be bankrupt. It is now imposing extraordinary additional costs on the global community, costs that were never taken into account in the development process. It does not seem rational to pursue a development pathway that is known to be bankrupt. Yet, it does not seem equitable if the result is that no pathway to development is open to developing countries. This imposes a heavy burden of responsibility on developed countries that is expressed in the principle of common but differentiated responsibility. Operationalizing this principle, which is central to the process of technology transfer within UNFCCC has been very challenging.

The UNFCCC has given rise to several initiatives that seek to implement the principle of shared but differentiated responsibility, most importantly the Mechanism for Technology Transfer (MTT) and the Consultative Process on the Development and Transfer of Technology, part of the Subsidiary Body on Scientific and Technological Advice (SBSTA). China has articulated its position on technology transfer and climate change in a submission to the July 2000 session.[1]

In its submission, China covers five related issues: technology needs assessment; technology information; capacity-building for technology transfer; mechanisms for technology transfer; and creating an enabling environment. The discussion is built around a number of bullet points developing the individual issues.

Identification of technology needs is the basis of the process as envisaged by China's submission. The outcome of these needs assessments could be a prioritized set of technology needs and a portfolio of technology activities.

Technology information should be specific and target real-world problems with lessons learned. Each developed country should establish a one-stop technology transfer institution. This should be complemented by information centers at international, regional, and sub-regional levels.

Capacity-building efforts that can most successfully help to achieve and sustain effective technology transfer are those that utilize and enhance existing endogenous capacities and technologies. This includes "hard" technologies, that is equipment and goods, and "soft" technologies, that is know-how and practices. Successful capacity building is often a mutual learn ing process in which both the host country and the country of origin can benefit from the increased insight and knowledge, with priority given to capacity-building through demonstration or pilot projects.

The Chinese submission underlines that existing mechanisms for technology transfer are inadequate. The proposal is to create an institutional mechanism within which national focal points for technology transfer, an intergovernmental advisory body and a unit in the UNFCCC secretariat are established. A trust fund is needed for technology transfer, as well as a monitoring, reporting and evaluation system.

Both developed and developing countries need to take actions to create an enabling environment for technology transfer. Developed countries should provide financial and technical assistance to support the entire cycle of technology transfer. They should

remove restrictions on transfer of advanced technologies with proven climate benefits and create incentives for private sector participation. Developed country governments could also purchase intellectual property rights on commercial terms for transfer on beneficial terms. New links are also needed to establish links between the climate communities and those concerned with official development assessment.

Developing countries, on the other hand, need to establish focal points and build public awareness and support for environmentally-sound technologies. The promotion of South-South technology transfer would also be beneficial for the robustness of the overall international regime for technology transfer within UNFCCC. They need to establish or enhance domestic research capacities in the field of environmentally-sound technologies.

The Chinese submission to the UNFCC represents a road map for further development of international approaches to technology transfer within the climate regime but utilizing fully the options available in the trade regime. It clearly establishes that successful technology transfer requires the coordinated efforts of both the receiving country and the country of origin. Yet, important issues remain to be addressed.

The dilemma of shared but differentiated responsibility in environmental agreements and special and differential treatment in the WTO is that they entail the risk of moving their beneficiaries out of the mainstream of technological and economic development. Innovation and efficiency are the motors of both environmental management and economic growth, and the disciplines created by UNFCCC and the WTO are intended to foster such outcomes. By opting out of these disciplines, developing countries run the risk of opting out of the broader process of innovation and efficiency that continues within the global economy. This dilemma is illustrated by experience under the Montreal Protocol, arguably a case of successful technology transfer. The funds available for assistance to developing countries were devoted to transfering existing technologies from developed countries rather than invested in innovation for the benefit of developing countries. While the former approach has the benefit of a high degree of certainty in the outcome, it entails the risk of creating a dependency on the stream of technologies that are linked to the initial transfer. The latter holds the prospect of growth and independence, but it also entails the real risk of failure, that is of producing no environmental benefits.

Normally, governments do not take commercial risks. In market economies that is the function of private enterprise. Yet, without fostering a risk-taking culture it appears difficult to achieve the ambitious goals of technology transfer that are embedded in many international environmental agreements.

Endnote

1 http://unfccc.int/docs/2000/sbsta/misc04.htm

Cleaner Coal Technology Transfer: Obstacles, Opportunities and Strategies for China

by Dr. Jim Watson and Dr. Xue Liu

Coal plays a central role in the Chinese economy. It has accounted for 75 per cent of annual energy use throughout the 1990s.[1] While it is cheap and plentiful, the environmental and health effects of coal use are becoming more severe as the economy continues to grow at a rapid rate. There is an increasing need to find ways of limiting pollution of the air and water through the use of cleaner technologies and more efficient processes. Cleaner coal technologies have the potential to reduce emissions of the gases that cause urban smogs and acid rain, they can limit the effects of coal extraction on rivers and lakes, and they can make a contribution to global efforts to tackle climate change.

The increasing use of coal illustrates one of the Chinese government's most pressing problems: while there is a clear desire for rapid industrialization, there is also a need to protect the natural environment and safeguard public health. Cleaner coal technology transfer from international sources to Chinese firms is a key part of the Chinese government's strategy to address this problem. This part of the chapter focuses on the experience of technology transfer, and the extent to which real knowledge and skills have been transferred from international companies to their Chinese counterparts. It emphasizes solutions to the apparent tension between the wish of international firms to forge closer alliances with Chinese companies, and their need to maintain their technological and commercial position in the world market. It also explores the extent to which governments on both sides can help smaller- and medium-sized firms on both sides to make initial contacts and build up trust as a basis for broader collaboration.

While cleaner coal technology transfer is often discussed in terms of the export of hardware (e.g., power station boilers or flue gas desulphurization (FGD) units), the first part of this chapter has shown that such exports are not sufficient on their own for successful technology transfer to occur. Without access to training, technological knowledge and new management skills (e.g., through joint ventures or licensing arrangements with foreign firms), Chinese companies will find it much more difficult to develop their own cleaner coal capabilities. We have, therefore, emphasized the development of such capabilities as an essential ingredient of successful collaborative relationships between these companies and their counterparts abroad.

Cleaner coal technologies in China

To maximize the effectiveness of cleaner coal technology transfer to China, it is essential to understand which end uses are the most important. From an international perspective, the power generation sector is often regarded as the most important user of coal. In China, the picture is rather different. As one expert has observed, while around 90 per cent of the international effort to clean up coal use in China is focused on power generation, this sector only accounts for approximately 40 per cent of Chinese coal demand.[2] As Table 1 shows, coal is burned by a wide variety of different users which also includes industry, households, coking plants, etc. While power generation has recently emerged as the largest sectoral consumer of Chinese coal, the consumption of other industrial sectors is still extremely large.

Coal is the dominant fuel in China for most classes of end user. Coal-fired power stations constitute approximately two-thirds of China's installed capacity. Similarly, coal accounts for over a third of the energy needs of Chinese industry, with a further third provided by secondary energy sources that also depend heavily on coal (electricity and coke).[3] While many new Chinese power plants and industrial facilities use relatively efficient boilers and equipment, a lot of smaller inefficient units are still in service. The replacement or upgrade of these units, many of which were installed decades ago, could lead to significant reductions in emissions. As a result, the scope for improving the environmental performance of Chinese industry through cleaner coal technologies is extremely large. This is particularly the case in industrial facilities outside the power sector since they tend to use lower quality coal that has not been prepared before use.

Table 1. Coal Consumption in China by End Use

Type of Use	Consumption in Million Tonnes (per cent of total)	
	1997 (actual)	1999 (estimates)
Conversion:		
Power Generation	490 (35.2%)	494 (43.3%)
Heating	62 (4.4%)	59 (5.2%)
Coking	193 (13.9%)	167 (14.6%)
Gasification	7 (0.5%)	8 (0.7%)
Washing (net loss)	23 (1.7%)	26 (2.3%)
End Use:		
Industry	442 (31.8%)	
Households	122 (8.8%)	385 (33.8%)
Other	53 (3.8%)	
Grand Total	1392	1140

Note: The estimated figure for "end uses" in 1999 should be treated with particular care, and is subject to confirmation when more detailed information is available.

Source: J.E. Sinton and D.G. Fridley, "What Goes Up: Recent Trends in China's Energy Consumption," Energy Policy, Vol. 28, No. 10, (August 2000).

The definition of cleaner coal technology is not a simple one. As a general rule, coal-use technologies are regarded as "clean" if they offer an improvement over those currently in use. In practice, this means that the U.K. government's preferred description—"cleaner coal"—is much more accurate than the more commonly used "clean coal." As this refinement of the more common label implies, the precise definition of cleaner coal technology depends on the context in which it is used.

Cleaner coal technology in a Chinese context encompasses a range of technologies which cover the preparation of coal (e.g., washing and briquetting), its combustion (e.g., fluidized beds and gasification) and the clean-up of waste gases (e.g., flue gas desulphurization or FGD, and denitrification). It also includes non-hardware measures that can improve the overall efficiency of coal use, particularly the thermal efficiency of boilers and power plants. These include better maintenance and management of facilities, and the use of more sophisticated control and monitoring systems. Cleaner coal options for China can be broadly grouped into three categories. A detailed analysis of Chinese capabilities in these technologies is beyond the scope of this chapter.[4] It is, therefore, sufficient to summarize them here:

1. *Commercial technologies in which Chinese firms have a significant capability.* Chinese firms possess basic coal washing and coal briquetting technologies which prepare coal so that it can be burned more effectively and efficiently. In some cases, these technologies also allow sulphur capture. Another notable capability within the Chinese boiler industry is in the design and manufacture of small fluidized bed boilers.
2. *Commercial technologies that can be transferred to China in the near future.* Many of these technologies can be applied to improve the environmental and economic performance of existing coal-fired facilities. Examples include the provision of management and technical training, and the installation of better control systems. This category also encompasses improved versions of technologies already in use in China (e.g., supercritical utility boilers and efficient coal gasifiers) and end of pipe abatement technologies (e.g., desulphurization equipment).
3. *Technologies that are still being developed and demonstrated.* These advanced technologies are primarily designed for electric power applications, and have not yet been commercially proven anywhere in the world. They include pressurized fluidized bed boilers, integrated gasification combined cycles (IGCCs) and various hybrid designs which incorporate elements of these two technologies.

The remainder of this chapter will focus primarily on technologies that are included in the second incremental category of cleaner coal technology. There are two main reasons for this focus. First, despite a considerable amount of enthusiasm for more advanced cleaner coal technologies both inside and outside China, it is not realistic to expect that these options will have a large Chinese market in the short and medium term. Second, incremental technologies offer the most immediate additional benefits to China in terms of health, environment and economic efficiency.

In many cases, the transfer of skills and techniques for incremental improvement can lead to a significant reduction in emissions from coal-fired facilities. For example, Chinese fossil-fuel electric power plants have an average thermal efficiency which is significantly lower than the typical figure for plants in more 'industrialized' countries. The average industrial boiler in China operates at an efficiency of 65 per cent while boilers in OECD countries have efficiencies of over 80 per cent.[5] Similarly Chinese cement kilns consume 70

per cent more coal than their OECD counterparts to produce the same quantity of output. Some further examples are given in Table 2. These demonstrate clearly that the largest potential performance improvements through incremental cleaner coal technologies are to be found outside the electric power sector.

Table 2. Energy Consumption for Key Industrial Products in China, 1996

Industrial Product	Energy Consumption		
	China	OECD	Difference
Steel (kg coal equiv./tonne)	1392	629	221%
Synthetic Ammonium (kg coal equiv./tonne)	2062	930	222%
Cement (kg coal equiv./tonne)	174	113	154%
Coal Fired Electricity (g coal/kWh)	371	325	114%

Source: Yu Zhufeng, "Promoting Clean Energy and Developing Clean Coal Technology," Proceedings of the Second International Symposium on Cleaner Coal Technology, Beijing, China, (November 1999), p. 84.

Chinese policies to promote technology transfer

The development of capabilities in the design and manufacture of new cleaner technologies[6] is often mentioned by the Chinese government as one of its highest priorities. However, current Chinese domestic, scientific and technological capabilities, and the way in which its institutions are organized, have a considerable effect on the success of programs to acquire and master these technologies. Although there is sometimes a tendency to downplay the influence of these factors, it is important to take into account the organization and existing knowledge embodied within the Chinese national system of innovation. As one group of researchers has observed, the notion that technology can be "transferred" full-blown from one economic and cultural context to another[7] is now widely discredited.

Trade and investment policies

One way the Chinese government has sought to tackle some of the barriers to technology transfer is through its policies for trade and investment. Policies to facilitate direct investment in the Chinese economy by foreign firms were first introduced in the late 1970s. There are two main types of enterprise which may be partly or entirely owned by companies from outside China—joint ventures and wholly-owned foreign enterprises.[8] Joint ventures between foreign and Chinese companies have been subject to official regulations since 1979. Within such ventures, the foreign partner must hold at least 25 per cent of the registered capital. Article 5 of the 1979 Joint Venture Law refers specifically to the subject of technology transfer, stating that the foreign partner or another party should provide "advanced technology and equipment that actually suit our country's needs."[9] Wholly-owned foreign enterprises were not permitted outside China's special economic zones until 1986. The current regulations stipulate that such enterprises should use advanced technology and export the majority of their products.

Alongside these general rules governing foreign investment and trade by foreign-owned companies, there are often specific rules which apply to particular industries. For some strategic industries, such as telecommunications, there are tougher restrictions on the extent of foreign ownership and the import of foreign goods. In the environmental field, there are signs that specific investment policies are being considered to encourage new businesses to produce cleaner technologies. One illustration of this is the China Yixing Park for Environmental Science and Technology which was set up in Jiangsu Province in the mid-1990s.[10] It hopes to attract foreign investors to set up businesses, either alone or in partnership with Chinese firms, to produce items such as small industrial boilers and environmental monitoring equipment.

China's recent accession to the World Trade Organization (WTO) has important implications for these trade and investment policies. While it will be some time before the effects of WTO accession become clear, the Chinese government has already agreed to change the rules governing technology transfer from foreign investors. The U.S.-China bilateral WTO agreement states that China "will not condition investment approvals, import licences, or any other import approval process on performance requirements of any kind, including… transfer of technology."[11]

In parallel with these developments, the Chinese authorities have overhauled national intellectual property laws in preparation for WTO entry.[12] This is an effort to tackle one of the key concerns of foreign companies who could transfer technologies to Chinese firms—namely that their technology will be replicated and used without compensation in the form of licence fees, royalties, share of profits, etc. A recent study for the European Commission suggests that policy reforms are beginning to address this con-

cern. It found that while 78 per cent of companies interviewed raised this issue, "adequate formal institutional arrangements and a legal framework appear to be in place now."[13]

If they are successful in building confidence, China's moves to strengthen intellectual property laws as a result of WTO accession could enhance the effectiveness of technology transfer. While the Chinese government has agreed not to insist on technology transfer from foreign investors, it is more likely that this will happen in any case if knowledge rights are more clearly defined and protected.

Environmental policy and the Kyoto Protocol

Another policy approach employed by the Chinese government to encourage cleaner technology transfer from abroad is through environmental regulations. Air and water pollution have emerged as one of China's most serious challenges during the past 20 years. Overall emissions of key pollutants such as SO_2, soot and NO_x have increased rapidly as a side effect of the new prosperity which has transformed many of China's cities and towns. In 1998, the World Health Organization published a report which showed that seven of the world's 10 most polluted cities are in China.[14]

In response to these problems, the Chinese government has developed a range of specific environmental policies and regulations.[15] These include a 20-year old pollution fee system that penalizes industrial sites that exceed emissions limits, separate limits on emissions from new coal-fired power stations, programs to close small polluting factories, tougher sulphur dioxide emissions limits in specified acid rain and sulphur "control zones" and a recent regulation to limit overall national emissions of specified pollutants. While there are many deficiencies in these regulations, there is a general trend towards tougher standards. In some cases, this effort has now begun to pay off. According to official statistics, Chinese air pollution actually fell significantly in 1998 and 1999. Emissions of SO_2 and combustion particulates decreased by 11.2 per cent and 20.3 per cent respectively between 1998 and 1999.[16]

Despite these improvements, foreign companies and governments often comment on the lack of enforcement and monitoring within the Chinese regulatory system. The absence of monitoring means that regulations have little impact, particularly on the performance of existing coal-fired installations. Many of these plants do not even have monitoring equipment fitted, making it almost impossible for environmental protection officials to enforce regulations properly. In addition, some of those involved hold the view that officials are sometimes reluctant to carry out enforcement if it brings them into conflict with other State agencies (e.g., those whose primary aim is economic development and growth).

In addition to Chinese environmental policies, a further driver for cleaner technology transfer to China is now emerging from international efforts to tackle climate change. The Kyoto Protocol for the reduction of greenhouse gas emissions incorporates a number of flexibility mechanisms to help industrialized countries meet their emissions targets. According to a recent report published by the Intergovernmental Panel on Climate Change (IPCC), "the area in which the Kyoto Protocol itself may have the greatest implications for technology transfer is in its establishment of the… [flexibility] mechanisms, Joint Implementation (JI) (Article 6) and the Clean Development Mechanism (CDM) (Article 12)."[17]

For China, the CDM is the most important of these mechanisms since it allows developed countries to invest and implement emission reduction projects in developing countries and then receive credits for these projects in the form of "certified emission reductions" (CERs). These CERs can be used to fulfill their legally-binding emission obligations. The IPCC report regards the CDM as a particularly promising route for technology transfer to developing countries since it "invites Annex I countries to work with developing countries to further sustainable development."

Since the detailed shape of the CDM and its rules have only recently been agreed,[18] it is too early to assess its effect on China's capabilities in cleaner technologies. In principle, the CDM offers considerable short-term technological benefits to China including substantial foreign investment and advanced equipment. It also offers longer-term benefits through the improvement of knowledge and skills. However, as with all technology transfer initiatives, the effectiveness of the CDM will depend on the way in which the process is managed and negotiated.

The experience of state-led technology transfer

In recent years, there have been a large number of initiatives by foreign governments and international agencies to transfer cleaner coal technologies to China. The results of these initiatives hold important

lessons for future policy. This section of the chapter analyzes the technology transfer experiences of selected foreign governments, multilateral institutions and international firms. While its coverage is not comprehensive, the aim has been to highlight those lessons that are the most important.[19]

Perhaps the most important mechanism for the transfer of cleaner coal technologies to China and other Asian countries is the Japanese Green Aid Plan (GAP).[20] The GAP in China was launched in 1992 by the Ministry of International Trade and Industry (MITI) in cooperation with the Chinese State Development Planning Commission (SDPC). Each year, the Chinese side identifies its technological priorities and the subsequent plan of action is implemented by a large number of different Japanese government agencies and Japanese companies. The annual GAP budget grew from US$14 million in 1992 to US$171 million in 1999. The proportion of the budget that is used to support cleaner coal demonstration projects each year varies, but averages around US$30 million.

Under the GAP, there are three main categories of demonstration projects, namely energy saving projects, cleaner coal projects and electric power desulphurization projects. Although our focus is cleaner coal technologies, all three categories are relevant since energy saving projects are often implemented at facilities that burn coal. The majority of GAP demonstration projects have been implemented in China, including 16 out of 20 energy saving projects and 16 out of 24 cleaner coal technology projects.[21] A range of incrementally cleaner coal technologies have been deployed, including fluidized bed boilers, flue gas desulphurization plants and coal preparation plants. The costs of each GAP demonstration project are shared by the Japanese government and the Chinese host. Most of the costs (including equipment costs) are met by MITI in Japan but local costs associated with fuel, employment at the site and so forth are borne by Chinese agencies. The cost of each project varies but, on average, MITI officials estimated that each one costs a billion Yen (equivalent to £6 million).

Despite the large amount of money spent on the GAP, it has only been partly successful in facilitating technology transfer. One of the most fundamental problems is the lack of follow-up orders for the equipment used in the demonstration projects. This is caused primarily by the high cost of Japanese equipment. The response to this problem appears to be twofold. First, there has now been a shift in policy to favour equipment that can be manufactured (at least partly) by Chinese companies. Second, there is a recognition that Japanese equipment designs have to be simplified before they are "appropriate" for the Chinese market.

Despite these efforts, MITI's efforts to transfer technology will continue to be severely hampered by one of the most striking features of the GAP—the complete absence of Chinese equipment manufacturers from the process. Equipment transfer, training and design cooperation are targeted at people who work in user industries (e.g., steel and cement) rather than those who are involved in the design and manufacture of equipment in China. When questioned about this aspect of the GAP, Japanese officials and companies give two explanations. Some say that Chinese companies do not possess the capabilities to assimilate Japanese technology. However, a far more convincing view—which is particularly put forward by Japanese companies—is that they are worried that technology transfer will weaken their commercial position and create future competitors.

Although Japan is the most high-profile backer of technology transfer projects within China, it has significant rivals within this field. Most notable is the United States Department of Energy which runs the world's largest initiative in the field of advanced cleaner coal technology demonstration.[22] Funded by a combination of public and private sector money, this program was initiated by President Reagan in 1986. From the outset, the provision of government money was allocated to specific projects, each of which was designed to demonstrate new advanced power generation technologies or end-of-pipe pollution control technologies. The total funding for the program has now reached $5.7bn, of which the Department of Energy has contributed $1.9bn.

Despite the size and scope of this demonstration program, the commercial uptake of the featured cleaner coal technologies has been extremely limited. This is especially the case for more advanced technologies such as the pressurized fluidized bed and the IGCC. No follow-up orders have been placed by U.S. power companies for either of these technologies. As a result, there has been an increasing amount of pressure for the government and industry to look to countries such as China in order to recoup some of the money spent on the demonstration program.

In practice, the amount of comprehensive cleaner coal technology transfer from the U.S. to China has been small. During the past few years, the

Department of Energy has made several attempts to get funding for technology transfer activities. Increasingly, these efforts have focused on plans to finance and construct an initial IGCC demonstration plant. Although several U.S.-Chinese studies have been conducted,[23] there is no sign that the required financing will be made available in the near future either from the U.S. government or from multilateral agencies. Congress has declined to fund the Department of Energy's programs because of the continuing political tension between the U.S. and Chinese governments over issues such as human rights, world trade and the status of Taiwan. It is unclear whether China's accession to the WTO will help remove these barriers to cooperation.

In contrast to the Department of Energy's approach, many other U.S. initiatives take a more incremental approach to technology transfer. This is reflected in the work of other U.S. institutions including the Environmental Protection Agency, the National Laboratories and universities such as MIT. MIT's industrial boiler energy efficiency project[24] is a particularly good example of real progress being made in technology transfer. Whether or not more U.S. government funding becomes available in the future, the general consensus is that large programs to demonstrate capital equipment may not be the most effective way of transferring the knowledge and skills China requires.

In addition to individual state-led programs, international organizations are active in cleaner coal technology transfer to China. Their activities are dominated by lending institutions, particularly the World Bank and Asian Development Bank (ADB). Both have helped finance a series of large power projects in recent years. In each case, they have used their leverage to insist on the use of some cleaner coal hardware within these projects including low-NO_x burners, low sulphur coal and, in the case of two plants, supercritical boilers.

Despite a common bias in favour of power project lending, the ADB differs from the World Bank in its approach to cleaner coal technologies in China. Over the past few years, the ADB has also supported a significant number of technical assistance and environmental improvement projects in China that have included cleaner coal technologies for non-power sector uses.[25] The most notable examples are two environment improvement projects in Shaanxi and Shanxi Provinces, each of which attracted over US$100 million of ADB funding. These projects included the replacement of small coal-fired boilers with district heating plants, the reduction of particulate emissions from a cement plant and the construction of a new gasification facility.

Perhaps the only comparable initiative by the World Bank is the China Efficient Industrial Boiler Project which is funded by the World Bank through the Global Environmental Facility (GEF). This project aims to subsidize the acquisition of technology licences for new industrial boiler technologies by Chinese firms. The cost of the project is approximately US$100 million, with US$33 million contributed by the GEF. Despite its focus on substantive technology transfer, the project has run into a lot of problems. It has taken six years to identify suitable technology licensors, mainly due to the reluctance of major international firms to take part in the project on the GEF's terms. Althought the specifications for boiler efficiency and emissions were very closely defined, the coal to be used was not characterized in sufficient detail for the bidding companies to produce a suitable design with performance guarantees. Furthermore, many international boiler makers were not convinced that their intellectual property would be respected since the Ministry of Machinery wanted the licence to cover the whole of China (and all Chinese boiler makers).

The corporate dilemma

While government agencies and multilateral donors can shape technology transfer programs, the practical transfer of hardware and knowledge is largely done by international companies. It is, therefore, essential to understand their experiences and those of technology recipients in China.

The experience of Chinese firms

As we have already seen in this chapter, there are many different mechanisms for clean coal technology transfer in China. This section summarizes the experiences of Chinese firms of the three most important mechanisms: equipment imports, licensing and joint ventures.[26]

The largest importers of cleaner coal equipment in China are from the power, metallurgical, chemical, building material and mining sectors. They generally purchase new capital equipment to increase their economic efficiency. The import of new equipment from abroad is generally seen as a low-risk method for quickly achieving economic and environmental benefits. Despite this advantage, equipment imports are often less successful in helping Chinese firms to

acquire new technology and skills. China's own equipment manufacturers are not usually involved in the selection, installation and operation of foreign equipment. Therefore, the spin-off benefits for China's own innovation system are limited.

One way to improve the innovative capabilities of Chinese equipment manufacturers is for them to obtain licences for foreign cleaner coal technologies. These manufacturers usually acquire these technology licences to improve their old technology, or to develop new clean equipment or new products. In practice, Chinese firms have come across a number of problems which prevent them from making the most of technology licences. The most important issues stem from asymmetric information between the technology supplier and recipient. A lack of knowledge about the technology in question can mean that the Chinese recipient is unable to make the most it—in some cases, the technology is never implemented in a manufactured product. To avoid this problem, some firms spend considerable resources researching the international market, but this can make the transaction costs of licence acquisition unacceptably high. A further risk for Chinese firms is that the process of acquiring a license can take too long, making it more difficult for them to use it for competitive advantage.

A further important mechanism for technology transfer to Chinese firms is foreign direct investment, which is often directed to joint venture companies. These companies are potentially more effective in securing comprehensive knowledge and technology transfer. Specific advantages for Chinese firms include a reduction in the high transaction costs associated with the acquisition of international technology, the adaptation of foreign technology to meet Chinese needs (particularly to make it more cost effective) and the development of skills within the Chinese workforce. Despite the attractions of foreign direct investment, Chinese firms have experienced a number of problems when acquiring technology through this particular route. Many of them relate to the extent to which technology is shared or retained by the foreign investor. There is a perception that the Chinese firm is often disadvantaged because core skills and knowledge are not shared, and only "low-tech" knowledge is transferred.

International corporate perspectives

A series of interviews with U.K. suppliers of cleaner coal technologies[27] revealed that many are transferring cleaner coal technologies to Chinese enterprises and institutions as part of their business strategy. In many cases, technology transfer focuses on hardware equipment transfer and wider knowledge transfer. Technology transfer activities are being undertaken using a variety of different methods including joint ventures, technical assistance and project-specific collaboration.

In general, the most active firms in China tend to be large. These companies have the financial resources to develop the necessary long-term contacts with the Chinese government and industry. Small- and medium-sized companies are much less likely to form partnerships with Chinese firms due to a lack of resources to develop these contacts. As a result of the dominance of larger firms, many smaller companies do not have any experience of China. The implications of the lack of participation by smaller firms, and some of the ways in which policy-makers might help them in future, will be considered more fully in the concluding section of this report.

In general, it is interesting to note that the attitude of individual companies to technology transfer varies greatly. While some companies have a generally enthusiastic approach to technology transfer, others are more cautious about this aspect of their business in China. Of course, the strategy of most companies will include elements of both enthusiasm and caution. Indeed, many of the companies interviewed for this study had mixed feelings about technology transfer to China. On one hand, collaboration with Chinese firms provides one of the best ways for U.K. companies to access the Chinese market. On the other, technology transfer could help Chinese companies that might become competitors in the future.

International companies often identify a number of policy-related barriers to technology transfer. The most important of these appears to be environmental policy, an issue that was raised more times than any other policy area in interviews. There is a broad consensus that Chinese policies for pollution control are not tough enough to stimulate demand for cleaner coal technology hardware and services. Within this consensus, two main issues emerge. First, existing standards are not yet tight enough to change the behaviour of companies and individuals in China. Second, and more important, the implementation of these standards is poor and inconsistent. Perhaps the main exceptions to the record of weak environmental regulation are projects that use imported equipment. Some of these projects, particularly those in the power sector, are seen by the Chinese government as technological and environmental "showcases."

Another source of barriers relates to Chinese institutional capabilities. On the whole, the barriers to cleaner coal technology transfer which relate to institutional capabilities are not confined to technical matters. While some companies reported a lack of technical skills in Chinese enterprises they work with, a more common concern was insufficient commercial and organizational skills within the innovation system as a whole. For many companies, the separation between design institutes and manufacturers in China presents the largest institutional barrier to collaboration and technology transfer. Small firms are at a particular disadvantage since it is difficult for them to find an initial point of contact for collaborative work in China.

The issue of intellectual property rights was high on the list of concerns expressed by foreign firms. However, it is interesting that many companies did not appear to have formed their views on this issue from direct experience. If any consensus beyond a general feeling of unease is detectable from the views of international companies, it is that the intellectual property rights situation is beginning to gradually improve. This general perception echoes the analysis of another recent survey of European companies. It found that although 78 per cent of their interviewees raised this issue as a concern, "adequate formal institutional arrangements and a legal framework appear to be in place now."[28] This perception also concurs with the view from within China that the move to commercialize State-owned industries and accession to the WTO is strengthening respect of intellectual property rights.

Concerns about intellectual property rights were often accompanied by barriers related to investment and trade rules. Two specific types of Chinese trade and foreign investment rules were mentioned by interviewees which may discourage cleaner coal technology transfer. The first of these is restrictions on foreign ownership stakes in joint ventures with Chinese enterprises. Foreign firms raised concerns that foreign money is readily accepted by these joint ventures, but the Chinese authorities are sometimes reluctant to engage in joint decision-making. The second concern is that the negotiation and approval process that applies to foreign investments is much longer and more complex than that in some other countries.

A final set of policy barriers identified by international technology suppliers are in the area of finance and economics. Lack of finance is often cited as the most important barrier to technology transfer and diffusion.[29] However, it is not always clear whether the problem is purely in the financial sphere or rather reflects a deeper problem of genuine economic non-viability. If the objective is to reduce emissions through the application of cleaner technologies, projects may often be economically viable if environmental damage is appropriately valued. However, they may be financially non-viable if only private financial calculations are made. Three different types of concern were raised by foreign firms. First, the transfer of advanced cleaner coal technologies (e.g., IGCC) will require substantial public subsidies under most circumstances. Second, technologies that reduce emissions but do not improve economic efficiency (e.g., FGD plants) face barriers since economic incentives through pollution taxes are too weak to justify investment costs. Third, many "win-win" applications of cleaner coal technologies (e.g., low-cost measures to improve boiler efficiencies) that have economic and environmental benefits are not implemented due to poor economic incentives within Chinese firms.

Conclusions

This brief analysis has confirmed that there is enormous scope for the deployment of cleaner coal technologies throughout the Chinese economy. This scope for deployment is greatest for incrementally cleaner coal technologies such as more efficient industrial gasifiers, better control systems, improved plant management and a greater use of coal preparation and washing technologies. Advanced technologies such as IGCC and pressurized fluidized beds, which are usually grouped under a "cleaner coal" label, are not yet commercially available, and are, therefore, unlikely to be adopted in China in the short- to medium-term.

Although China's demand for coal has recently begun to fall, its continuing dominant position throughout the economy contributes to persistent and serious environmental effects. While China has significant capabilities in both technological and policy solutions to its environmental problems, there is a clear need for additional assistance from international companies and governments. This is particularly the case for non-power sector cleaner coal technologies. Although the Chinese power sector accounts for only 40 per cent of national coal demand, the amount of international effort devoted to non-power sector technologies is disproportionately small.

For the deployment of cleaner coal technologies to occur effectively, it is essential that Chinese companies find ways to improve their skills in the design, manufacture and operation of these technologies. At

present, the overwhelming majority of international technology transfer efforts focus on the export of new items of hardware equipment to China, backed by concessional finance from foreign governments and international agencies. Our study has shown that the deployment of new hardware in China must be accompanied by the transfer of technological knowledge from international sources if the skills of Chinese firms are to be improved. In many cases, this wider knowledge transfer is taking place. However, there is sometimes a lack of commitment to this broader agenda on both the international and Chinese sides. While it is unrealistic to expect international companies to carry out knowledge transfer for altruistic reasons, our study has shown that some incrementally cleaner coal projects are economic enough (without concessional finance) for this agenda to be pursued.

Our research has shown that the technology transfer activities that have taken place have advantages and disadvantages for Chinese and foreign companies. Equipment imports for new facilities such as power plants are perhaps the least complex way for Chinese firms to improve their knowledge of cleaner coal technologies. Foreign companies will often subcontract the manufacture of low-technology parts to Chinese firms, and plant operators will receive training either in China or abroad. The disadvantage of this type of arrangement for both sides is that it is difficult for Chinese firms to gain a deeper insight into the technology concerned. This is because most of the technology transfer centres on the export of capital goods, equipment and product designs together with additional knowledge about operations and maintenance practices. It does not include wider knowledge about how the hardware was designed and how it could be improved in the future. To go beyond this limited technology transfer, other mechanisms are required to broaden the process to include the knowledge, expertise and experience for managing technical change.

Experience has shown that State-led technology transfer programs fail if they are too prescriptive. The Japanese Green Aid Plan and the Global Environmental Facility efficient industrial boiler project have illustrated some of the problems that can occur if the role of companies is too closely defined. The most successful programs bring Chinese enterprises and design institutes into close, mutually negotiated collaboration with foreign firms.

Many different mechanisms have been successfully used to transfer technology to China. The choice of mechanism varies on a case-by-case basis, though it is important to allow the building of trust between the two sides. For smaller firms with fewer resources to build up this long-term trust, governments can help to underwrite some of the initial costs of establishing important personal contacts (*guan xi* in Chinese). One way in which policy-makers might help this process is to help establish national gateway organizations in China to help small- and medium-sized Chinese and foreign firms to make important personal contacts (*guan xi*) which can form the basis of collaborative relationships. Since many Chinese industries no longer have sponsoring Ministries within the Chinese government, the work of enterprises, design institutes and research centres is atomized and uncoordinated. A national gateway for each industry (e.g., steel, chemicals, cement, etc.) would function as a focal point for encouraging more co-ordination within China, and for foreign companies wishing to make new contacts.

Within future programs of technology transfer, there is also a clear need to capitalize on successful environmental improvement programs in China, many using incrementally cleaner coal technologies. There is often a tendency, especially within initiatives sponsored by foreign governments, to underemphasize the dissemination of the results from successful site-specific projects and to neglect monitoring of longer-term performance.

In addition to this focus on long-term relationships, processes of technology transfer need to be comprehensive if they are to succeed. It is not sufficient for a firm to complete the design of a new facility or efficiency improvement package and then present this to the Chinese recipient or manufacturer. The experience of successful firms shows that it is necessary to involve Chinese enterprises and institutions from the start of the design process and to continue this involvement through the manufacture, construction, commissioning and operation. Institutions and companies from all parts of the Chinese innovation system should be involved in future collaborative initiatives to strengthen links between Chinese universities, design institutes and enterprises. The willingness of foreign companies to develop such wider collaboration may be strengthened by recent improvements in Chinese intellectual property laws as a result of WTO accession.

Many of these lessons and insights will be particularly useful if China decides to participate in the Clean Development Mechanism (CDM). The CDM has the potential to significantly increase cleaner technol-

ogy transfer to Chinese firms. Our analysis in this chapter suggests that Chinese firms and government institutions should approach CDM projects with caution. As with other technology transfer efforts, the overall aim should be to maximize the wider benefits to China of projects to reduce greenhouse gas emissions. Greenhouse gas abatement equipment imports for CDM projects should be accompanied by enhanced skills for the design, manufacture and operation of equipment. The technologies transferred need to be appropriate for wider diffusion within China and supported by capacity-building efforts for policy-makers at national and provincial levels.

Endnotes

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16 State Environmental Protection Administration, State of the Environment 1999, (June 2000).

17 Intergovernmental Panel on Climate Change, *op. cit.*

18 A detailed outline of the CDM and associated rules can be found in UNFCCC The Marrakech Accords and the Marrakech Declaration (November 2001).

19 In each case, the analysis is derived from interviews with the relevant government officials and independent experts. For a comprehensive list of international collaboration with China, see issues of China Environment Series, Woodrow Wilson Center, Washington DC, USA; available at http://ecsp.si.edu/default.htm

20 Some detail can be found in NEDO, Projects of the New Energy and Industrial Technology Development Organization, Asian Region, NEDO, (no date).

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Section V
The Precautionary Principle and Genetically Modified Organisms

The Precautionary Principle in the GATT/WTO

by Konrad von Moltke

In the past years, there has been an increasing debate about the "precautionary principle" and its application in the GATT/WTO system, in particular the scope for members of the WTO to appeal to this principle in dispute proceedings.[1]

The precautionary principle—sometimes also called the precautionary approach—states that public authorities have an obligation to act to prevent possible threats to human health or the environment even in the absence of clear scientific proof that the threats can occur. In this manner, it reverses the burden of the proof for those proposing certain actions with potentially serious consequences.

The precautionary principle evolved initially in Europe. Unusually, for a principle of such general significance, it is possible to identify its origins. The German Bundesimmissionsschutzgesetz (general air pollution act) formulated the "Vorsorgeprinzip" for the first time in 1968. This aspect of the German law was not important to its application until the early 1980s, when the German government needed to justify dramatic action on the issue of acid rain, which they had not considered a proven threat up to that point. The "Vorsorgeprinzip" was translated into English as the precautionary principle in the context of a report of the Royal Commission on Environmental Pollution in the United Kingdom.[2]

In its original German version, the precautionary principle was distinguished from the obligation of public authorities to protect citizens from known hazards, that is events with known risks occur even though occurrences could be quite uncertain. It is useful to keep in mind this distinction between hazards that are uncertain of occurrence but scientifically well proven and risks that are both uncertain of occurrence and uncertain in terms of scientific proof of their existence in the first place. This distinction is helpful in particular in situating the precautionary principle in the GATT/WTO context.

The precautionary principle became an issue in the WTO through several highly visible disputes or potential disputes, most importantly two disputes between Europe and the United States, on the use of certain hormones in beef production and on trade in genetically modified organisms in different forms—as seeds, plants, animals, bulk crops and processed products. The former dispute has been decided whereas the latter has not yet reached the WTO dispute settlement procedure. As almost inevitably happens, discussion of the general principle has become entirely intertwined with the specific dispute as one side or the other seeks to employ—or reject—the precautionary principle to justify its position. The result is potentially problematic as a general principle is defined in relation to specific highly contentious issues.

Presumably, one of the reasons why acceptance of the precautionary principle has been much higher in Europe relates to the fact that it was articulated and discussed before there was a need to apply it to specific cases. With its much denser population than North America—indeed than most regions of the world—with its much higher intensity of utilization of the environment for a wide range of activities and with its high level of innovation, Europe, and Northwestern Europe in particular, is exposed to a wider range of environmental risks than almost any other region of the world. It consequently also has greater need to be cautious in its approach to environmental management.

From the perspective of trade policy, the central dilemma of the precautionary principle is determined by its multiple layers of uncertainty, which require more extensive exercise of administrative discretion and give rise to a greater number of opportunities for the adoption of measures with protectionist or discriminatory effect. In such instances it becomes necessary to assess whether the trade impacts are justified by the goals that are being pursued and whether there are other equally effective ways to approach the issue.[3]

It is widely assumed that this problem is addressed by GATT Article XX. In practice, however, Article XX does not provide sufficient guidance. GATT Article XXb and XXg played a central role in the early stages of the trade and environment debate. It was widely assumed that appropriate application of this article would address many of the emerging problems. In practice, interpretation of Article XX has been difficult, both in the dispute settlement process and in the broader analytical debate. This somewhat surprising

result may be attributed in large measure to two factors:

- Article XX addresses measures taken by member states of the GATT/WTO. In practice much of environmental policy involves either subnational jurisdictions or international agreements; and
- Article XX assumes that the exceptions it lists will be beyond dispute. It arises from a general obligation of governments to protect their territory and their citizens from recognizable dangers.

Fifty years after Article XX and similar provisions in other trade agreements were adopted, governments find themselves increasingly confronted with dangers that are difficult to identify and almost impossible to quantify. Governments must balance conflicting priorities, trying to interpret opaque scientific messages to assess their significance, to husband scarce resources, and yet to avoid any major occurrence that might threaten their citizens. At the same time, they wish to remain supportive of researchers and the economic benefits they expect to flow from the innovations that gave rise to the dilemma in the first place. This is a different activity than that protected by Article XX, so it is not surprising that its normative provisions have not proven particularly useful in dealing with the resulting dilemmas for the trade regime.

Governments everywhere responded differently to the problem of risks to public health and the environment that could only be identified by scientific research, but which scientific research was unable to characterize in an unambiguous fashion. The two approaches that have now clashed in the WTO reflect the fundamental differences in governance structure in the United States and Europe. The U.S. response to uncertain risks that required government action was to develop the techniques of risk assessment, a formalized method to build a comprehensive record in support of specific actions by public authorities. The techniques of risk assessment are universal insofar as they systematize the process of assessing scientific information. Nevertheless, as practiced in the United States, risk assessment is particularly adapted to the disjointed character of the U.S. government, which requires the constant construction of a formal record at one level or in one branch of government. Any decision is liable to be reviewed at another level or in another branch as an issue wanders under public pressure and the play of interests from Congress to the Administration, from there to the courts and to the states, and ultimately back to Congress where the cycle begins anew. In particular, decisions based on relatively ambiguous scientific findings are liable to be questioned over and over again. The results have been quite mixed with some decisions indicating a greater willingness to confront uncertain risks and others suggesting extreme risk aversion. The so-called Delaney amendment requires that any food additive must be banned that is shown to be cancer-causing in a single animal test (whatever the dose or the other relevant features of that test). As a result, saccharin is banned in the United States but almost nowhere else. Similarly, cheeses made from unpasteurized milk are not allowed to be sold in the United States while they are widely available in Europe, illustrating the fact that comparable data can lead to different results in different jurisdictions.

Most other countries do not have separation of powers and few have states that are as independent of federal supervision as those that make up the United States. In these countries, the priority is to balance conflicting interests and to husband scarce resources, including the resources of policy-making. Moreover, most of these countries are characterized by a much higher level of trust in government action than is the rule in the United States. The countries of Europe have consequently moved towards a different approach to the problem of deciding the extent of government intervention, encapsulated in the precautionary principle.

It is never possible to transpose instruments without adjustment from one jurisdiction to another. Paradoxically, to achieve comparable results in different jurisdictions it may be necessary to pursue different institutional strategies. This is particularly true of the move from a national context—with a well developed institutional framework that is simply presumed to exist when new measures are introduced—to an international one with only rudiments of a common institutional basis. In particular, the precautionary principle, with its potential for misuse without appropriate balances will prove very difficult to operationalize. In many respects, the tradition of risk assessment, with its emphasis on a carefully constructed record, is more appropriate for international organizations. Nevertheless, it is critical to recognize that "risk assessment" as practiced in international fora will never be the same as "risk assessment" as practiced in a single country.

From Germany, the precautionary principle has spread to the rest of Europe, and from there, via UNCED, to the international level.[4] It is taken by governments everywhere to legitimize the need to act in the absence of clear scientific evidence, particular-

ly in the face of phenomena with a rising probability of high damage even when the starting probabilities were very low.[5] The risk of such an approach, which relies quite heavily on social institutions to develop a consensus on the need for action, lies in situations where there is no interest group conflict to ensure the rigorous assessment of what evidence there is. This has been particularly the case in the EU Common Agricultural Policy, where fear of productivity increases that can undermine a tenuous consensus unites all parties in resistance to new technologies.

It is critical to recognize that the precautionary principle is meaningless without a robust analysis of the economic aspects of its application in particular cases. Resources are limited and never sufficient to address all risks clamoring for attention. Moreover, application of the precautionary principle in specific situations has economic implications, which should always be made explicit. The appropriate course of action emerges only when scientific uncertainty, social consensus and economic resources are seen together.

The differences in approach to scientific uncertainty in determining appropriate government action have led to a number of conflicts within the WTO, most notably those concerning the use of hormones in beef production and the introduction of genetically modified crops. Clearly, the rules used to decide on a course of action will impact the substantive outcome of the process. It is important, however, to recognize that differences in the rules reflect different approaches to the same problem, and always reflect the political and administrative culture of the jurisdiction. Attempts to harmonize these differences out of existence are liable to be resisted as attacks on a way of doing things rather than viewed as a dispute about science.

The WTO is not equipped to handle issues of such complexity. It is a relatively modest organization with a narrow institutional base, so that conflicts cannot be handled in a flexible manner when they involve disputed scientific evidence or major goal conflicts. The Appellate Body discussed the precautionary principle in the beef hormones case when it confirmed the panel findings against the European Union. It came to the conclusion that the precautionary principle is not (yet) a general principle of customary international law and was consequently applicable to WTO disputes only to the extent that it was explicitly cited in the text of the relevant agreements. In fact, the question when a principle becomes part of "customary international law" represents a contentious issue in its own right, since there are few hard and fast rules that govern such a determination. Moreover, the Appellate Body made a strange distinction between "international environmental law" (in which the principle was considered to have some standing) and "international law," as if the former were not part of the latter. These observations are perhaps more indicative of the hesitancy of the AB to accept the precautionary principle than as a conclusive finding.

The precautionary principle has been cited in a number of global documents that are not legally binding, most importantly in the Rio Declaration. It has, however, been much more widely accepted in Europe. It is not only to be found in the EU Treaties but also in the recent amendments to the Treaty on Long Range Transboundary Air Pollution, and in the major documents of the so-called Dobris process that aims at the integration of environmental policy in Central and Eastern Europe into the consensus of Western Europe. There can be little doubt that it represents a principle of customary European international law.

The precautionary principle is also increasingly cited in binding international treaties beyond Europe, in particular fisheries agreements and most recently the Biosafety Protocol to the Convention on Biodiversity. The latter mentions the principle no less than five times, suggesting that there has been a significant increase in its acceptance at the global level, at least when compared to the situation that obtained when the AB wrote its opinion on the beef hormones case.

The current situation is strongly reminiscent of the process the European Union went through when first confronted with the U.S. invention of environmental impact assessments (EIAs). Like risk assessment, EIAs reflect specific aspects of U.S. political culture as much as any general principle of environmental policy. EIAs are a solution to the need to identify environmental measures relating to specific projects but operating in the disjointed system of the U.S. administration and faced with a deplorable lack of prior land use planning. When the European Union attempted to transfer the EIA system to Europe, it was discovered that extensive modification was necessary until it could serve to complement the highly integrated structures of land use planning and project approval that already existed in Europe. As the Germans in particular found to their dismay, their prior system was far from perfect and needed substantial adjustment to meet the new criteria of environmental assessment. Nevertheless, the European adaptation of EIA has turned out to be different in many important respects from its U.S. template.

Similarly, it would be a mistake to assume that "risk assessment" can be transposed from the United States to Europe (or any other country for that matter) without extensive modification; nor could the U.S. system of governance tolerate the degree of administrative discretion implied in the precautionary principle. It was certainly a mistake to write it into Article 5 of the SPS Agreement language, which could be interpreted as meaning that risk assessment is a universal tool of policy. There is also an underlying assumption in the SPS Agreement that science will ultimately provide answers, so that the state of uncertainty is viewed as temporary. In many areas of environmental policy, such certainty is not available in the foreseeable future.

The WTO needs effective international organizations capable of assessing scientific evidence, understanding the different context of policy-making in different countries and able to assist in determining whether measures that have been adopted are reasonable. That is a daunting task, and one that will require a good deal of time and effort. There are interesting parallels in the process UNEP has gone through in developing an approach to persistent organic pollutants—a process that has taken almost twenty years. To cope with risk assessment and the precautionary principle it is important to promote the creation of effective organizations outside the WTO and to address the interface between the trade regime and these organizations. These organizations will operate differently than the WTO, according to different principles and utilize different institutional mechanisms. In this respect it resembles much of the environmental agenda.

Endnotes

1 More detail available in: Konrad von Moltke, *The Precautionary Principle, Risk Assessment and the World Trade Organization*. Winnipeg: International Institute for Sustainable Development, 2000. Also at www.iisd1.iisd.ca/trade/pubs.

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5 See Ortwin Renn, *et al.*, *On Science and Precaution in the Management of Risk*. Final Report of a Project for the EC Forward Studies Unit, May 1999, p. 37.

Genetically Modified Organisms and Trade Issues for China

by Ruqiu Ye and Wanhua Yang

I Introduction

Genetic engineering refers to modern biotechnology that is used to modify plants, animals or micro-organisms by introducing in their genetic make-up genes for special desirable traits, such as internal protection from insects or disease, tolerance to certain chemicals, and improvement in food quality. Genetic engineering techniques were mainly applied to the pharmaceutical industry in the early years of development. They are now mostly used in the agricultural sector, as they allow faster development of new crop or livestock varieties, since the genes for a given trait can be readily introduced into a plant or animal species to produce a new variety incorporating that specific trait. To date, the principal biotechnology products marketed have been genetically engineered field crops including corn, soybeans, cotton and canola. Other crops are tobacco, potatoes, tomatoes and sunflowers, although their production is still very small. The world's total agricultural area cultivating genetically modified crops has increased rapidly, from 0.5 per cent in 1996 to almost five per cent in 2000.[1]

Major producers of genetically modified crops are the United States, Argentina and Canada. The United States accounts for about three-quarters of biotech crops planted globally. In 2000, genetically modified crops accounted for about 25 per cent of the corn produced in the U.S., 54 per cent of soybeans, and 61 per cent of the cotton planted.[2] Argentina is a principal producer of genetically modified soybeans; while Canada is the largest producer of genetically modified canola.

Proponents argue that biotechnology is critical for innovation, productivity and competitiveness. The benefits of GMOs include: improving varieties more rapidly at lower costs; expanding dramatically the range of properties that can be developed; reducing the costs of production; potential environmental advantages such as reduction in the use of pesticides; creating new crops or enhancement of traditional crops with nutrients or pharmaceuticals; and increasing yields, thus alleviating food shortage.

However, opponents point out that genetic engineering may have potential risks; widespread use of GMOs could inevitably cause impacts on nature. Long-term effects of the production and use of GMOs can still not be detected. Current available scientific technology is unable to guarantee the safety of GMOs. It might be possible that GMOs would cause unexpected harm to human health, biodiversity and the environment.

Given these diverse views, different countries have different attitudes toward GMOs. This is clearly demonstrated by different domestic regulatory approaches as well as different positions held by countries in the process of negotiating the Cartagena Protocol under the United Nations Convention on Biological Diversity. G-77/China, known as the Like-Minded Group (a developing country negotiating coalition), supported a strong Protocol and insisted that the "precautionary principle" apply in dealing with transboundary movement of GMOs. The U.S., Canada, Argentina, Australia, Chile and the U.K. formed the Miami Group, and they wanted to ensure free trade of such GM products without burdensome bureaucratic approval procedures. The European Union agreed with the Like-Minded Group, supporting a strong Protocol and the "precautionary principle." Japan, Mexico, South Korea and a few other countries emerged as the Compromise Group. They formed during the final days of the Cartagena negotiations with the aim of bridging the major gaps between the other negotiation groups. The other group is the Central and Eastern European bloc of countries; they took a middle-of-the-road position.

Major concerns over GMOs include health, environmental, economic and ethical concerns. The number one concern is the impacts of GMOs on human health and the environment. To date, scientists are still not sure what impact GMOs will have on human health and the environment, and it is very difficult to predict the impact of GMOs. Under such circumstances, the implementation of measures such as risk assessment and the precautionary principle become very important. In recent years, a number of food incidents occurred in Europe, including the Mad Cow Disease (Bovine Spongiform Encephalopathy, BSE) in U.K. and the dioxin food scandal in Belgium. These and other food incidents make people very sensitive about the impact of GMOs on human health and the environment.

Another major concern about GMOs is economic benefits. Opponents of GMOs worry about the adverse distributional impacts by favouring large farmers and multinational companies. As GMOs have greatly affected agricultural productivity, consequently, they have led to changes in economic structure and crop prices. For example, GMO commercialization has led to monopoly of the GMO market by a few biotech companies. Some biotech companies have controlled almost the entire GMO seed distribution system. According to a European Committee report,[3] DuPont, Monsanto, Novartis and Dow have controlled 69 per cent of the market for GMO corn seed in North America and 47 per cent of the market for GMO soybean seed in the U.S. This trend has made the traditional agriculture sector worry about rapid reduction in prices for non-GM crops.

Concerns about the GMOs also reflect different development levels of countries. In Western Europe, in particular, where food supplies are abundant and incomes are high, people can afford to reject the introduction of food about which they are not sure and production processes that are not environmentally sound. In developing countries many people live in rural areas—increasing agricultural productivity and thereby their income is a high priority. Even for the urban poor, anything that can lower the price of basic food and boost the nutritional value is preferred.

There is also an issue of ethics. Some people think that human beings should not interfere with God's work, and therefore oppose genetic engineering ardently.

II Regulatory framework in different countries

The debate over the use of GMO crops in the food chain highlights the challenges to domestic regulatory regimes, to international environmental management and the world trading system. Given different views on GMOs, different regulatory approaches have been adopted. In general, there are two types of regulatory regimes—the "relaxed" approach and the "stringent" approach.

The U.S. has the most relaxed regulatory regime in the world, while the EU has the most stringent one.

The U.S.'s basic approaches are: 1) relying on the existing legal framework to regulate GMOs without any rules specifically designed for the use of GMOs in agriculture or food production; 2) regulating products, rather than processes; 3) not distinguishing the products between genetically modified organisms and like organisms in nature without GM processes; and 4) taking monitoring and control measures only when GMOs exceed a certain risk level.

There are three federal agencies in the U.S. regulating the different aspects of GMOs. The Department of Agriculture (USDA) issues permits for field trials and commercial release for production. The Environmental Protection Agency (EPA) regulates pesticides used in or on foods and feed. The Food and Drug Administration (FDA) regulates safety of domestic and imported foods, except meat and poultry which is regulated by USDA. In 1992, the FDA adopted a measure that has implications for GMOs. This measure requires any food containing non-traditional elements must be labelled. This implies that food containing GMOs should be labelled.

In contrast, the EU has a very restrictive approach. The EU makes it very clear that GMO products are not welcome, and that the precautionary principle applies in dealing with GMOs. The EU's regulatory framework was designed in the late 1980s. There are three major legal documents governing GMOs: 1) Council Directive 90/219/EEC of April 23, 1990 on contained use of GMOs, which provides EU-wide rules for the use of GMOs, both in research laboratories and industrial facilities; 2) Council Directive 90/220/EEC of April 23, 1990 on release of GMOs, providing EU-wide rules for field trials and marketing of GMOs; and 3) Council Regulation No. 258/97 on Novel Food, requiring mandatory labelling on any product containing GMOs, or that may otherwise be considered "novel."

The EU GMO regulations contain the following core measures:

1) *Approval Procedures for Market Sale of GMOs*. According to Council Directive 90/220/EEC, if any producer or importer wants to introduce GM products, it has to apply to a competent body in any EU country. The competent body will review the application and relevant risk assessment documents. If the competent body's decision is favourable, the application has to be submitted to the European Committee, and sent to other EU countries for comments. The product can be sold at the EU market only when all 14 Member States have no objection. The producer or importer will have to obtain a permit from the country to which it submits its application before the product can be sold in any EU country. In applying for a permit for a GMO, a producer or an importer may also request a simplified procedure.

2) *Labelling*. The Novel Food Regulation (Council Regulation No. 258/97) requires labelling on any novel food that 1) contains elements that are no longer "equivalent" to traditional food based on scientific assessment; 2) contains elements that are not inherent in original form, and would cause impacts on some people and thus on human health; 3) contains any elements that may cause ethical controversy; and 4) contains GMOs or is GM food. In addition, some GM products were granted the sale permits before the Novel Food Regulation came into effect. To strengthen the control of these food commodities, the European Union adopted the Council Regulation 1139/98. It requires mandatory labelling on these products. This regulation was amended in January 2000, and became Council Regulation 49/2000, which exempts food containing accidental traces of GM materials or contain less than one per cent of GM materials from labelling.

3) *Traceability*. The European Committee is now drafting even stricter rules on tracing and labelling GM crops, food and feed products. This proposed regulation would require documentation tracing biotech products through each step of the grain handling and food production processes. On July 3, 2002, the European Parliament voted in favour of the proposed rules during its first reading of the documents. Some members of the European Parliament even threw out the EC's plan to apply one per cent tolerance thresholds for the accidental presence of GM material in non-modified products. They proposed that the GMO approved elsewhere in the world but not in the EU should be banned entirely. They also preferred the threshold for EU-approved material should be lowered to 0.5 per cent.[4]

A majority of developing countries, except China, Argentina, Brazil, Mexico, Chile, India, Philippines and Thailand, have no domestic regulatory structures, legislation nor biotechnology industries. Even those that have GMO regulatory structures, their legal framework for GMOs are still at a starting point and not as advanced as in developed countries.

III International rules governing trade in GMOs

The increasing use of GMOs has also challenged the international regulatory framework. Multilateral forums where biotechnology has been dealt with include the United Nations Convention on Biological Diversity (CBD), OECD, CODEX Alimentarius (Codex Committee on Labelling), the World Intellectual Property Organization, and the International Conference on Harmonization (ICH). However, increased use of and trade in GMOs have encountered trade barriers for GMOs in some countries. The most important sets of international rules specifically governing trade in GMOs are the Cartagena Protocol on Biosafety under the United Nations Convention on Biological Diversity and the WTO rules.

The Cartagena Protocol on Biosafety

Given the different attitudes and national regulatory approaches to GMOs, the Cartagena Protocol on Biosafety was adopted in January 2000 with an aim to ensure safe transboundary movement of living modified organisms resulting from modern biotechnology. The Protocol is also intended to avoid adverse effects on the conservation and sustainable use of biodiversity without unnecessarily disrupting world food trade. It contains the following key measures:

- Establishes the advance informed agreement procedure (AIA) which gives Parties the right to receive information from the exporter on any living modified organism (LMO) for intentional introduction into the environment, and to approve, prohibit or restrict imports of that LMO;
- Establishes a "Biosafety Clearing House" to help countries exchange scientific, technical, environmental and legal information about LMOs; the Protocol requires governments to provide the Biosafety Clearing House with information concerning any final decisions on the domestic use of an LMO commodity within 15 days of making a decision;
- Requires different documentation accompanying shipments of different types of LMOs, including LMOs intended for introduction into the environment, LMO commodities intended for direct use as food or feed, or for processing (LMO-FFPs), and LMOs destined for contained use (e.g., for scientific or commercial research);
- Affirms the precautionary principle (which is in Principle 15 of the Rio Declaration on Environment and Development) on decision-making on imports. The Protocol provides that lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of potential advance effects

of an LMO shall not prevent a Party for Import from taking a decision with regard to the import of that LMO in order to avoid or minimize such potential adverse effects;

- Addresses the relationship with the WTO rules. However, this attempt is not very successful. The Cartagena Protocol seems still ambiguous about its relationship with the WTO agreements. Although the text states that the "Protocol shall not be interpreted as implying a change in the rights and obligations of a Party under any existing international agreements," at the same time the Protocol also says that the statement is "not intended to subordinate the Protocol to other international agreements"; and
- Requires that the "transboundary movement of LMOs between Parties and non-Parties shall be consistent with the objective of the Protocols." This means that exporters of non-Party countries will have to comply with the documentation and other requirements of the Protocol.

WTO rules and GMOs

The key objective of the WTO is to achieve effective use the world's resources by reducing barriers to international trade. However, the WTO rules acknowledge the rights of the Member States to use restrictive trade measures to protect human, animal or plant health and life as well as natural resources (Article XX(b) and (g) of GATT). These provisions are also applicable to trade in GMOs.

Member States of the WTO have more specific obligations under other WTO agreements, more specifically, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT). The SPS and the TBT restrict the extent to which trade measures can be used if Member States intent to adopt trade-restrictive measures against GMOs. The TBT governs technical regulations, standards and technical measure certifications, while the SPS regulates food safety and animal and plant health measures. Like GATT, these two agreements allow Members to take trade restrictive measures to protect human, animal or plant life and health, as long as they are no more trade-restrictive than necessary to fulfill the stated objectives. While the SPS agreement allows Members to set their own standards for food safety and animal and plant health, it requires that the measures be based on scientific risk assessments in a consistent way across commodities.

Both the SPS Agreement and the TBT Agreement encourage Members to use international standards, guidelines and recommendations where they exist, including ISO standards and the Codex Alimentarius (the Food and Agriculture Organization's international food standards body). However, under the SPS, a Member may apply higher than international standards only if these are based on appropriate scientific risk assessment.

The scientific requirement in the SPS Agreement has been seen as being in potential conflict with the "precautionary principle" specified in the Cartagena Protocol. Although the precautionary principle is enshrined in the SPS (Article 5.7 allows Members to adopt the precautionary measures on a temporary basis), the WTO Dispute Resolution Body is very restrictive in applying such a principle.[5]

The current debate about GMOs has prompted the WTO to look at the GMO issue. One important matter is whether the basic issues related to trade in GMOs are adequately addressed by existing WTO rules. The SPS provisions that may be discussed include Article 5 on assessment of risk, Article 5.7 on the precautionary principle, Article 3 on harmonization and Annex C on control, inspection and approval procedures. In the TBT Agreement, discussions on GMO issues are expected to focus on Article 2 on technical regulations and standards, and Article 5 on conformity with technical regulations. However, GMOs have been seen as a complicated issue that will need not only to be discussed in the TBT and SPS agreements, but also in the Agreement on Agriculture and eventually the Agreement on Trade-Related Aspects of Intellectual Property Rights.

The Cartagena Protocol vs. WTO

As mentioned earlier, the Cartagena Protocol is not very clear about how the Protocol relates to the WTO. Nevertheless, the language in the Protocol's three preambular passages suggest that both sets of rules should be supportive.[6] Nevertheless, conflict may arise over the implementation of the Protocol by Parties. Fox example, if a Party decides to ban imports of GMOs based on very little scientific basis, it can claim that the precautionary principle in Article 11 of the Protocol allows it to do so. Exporting countries, although recognizing that this argument is valid under the Protocol, could still allege that the Party's ban violates the WTO rules.[7] Under such a circumstance, the dispute would more likely be brought to WTO's Dispute Resolution Body under the WTO rules rather than to the Protocol dispute resolution

mechanism under the Protocol.[8] When this happens, the language of "not subordinate" under the Protocol could play a significant role. Even without such wording, a WTO dispute panel would very likely use non-WTO law, including MEAs, to help interpret WTO law. In WTO jurisprudence, it is a common practice.[9]

IV GMO development and regulation in China

Modern technologies have always been seen as important to Chinese agricultural development. The Chinese government has pursued a technology-driven agricultural development policy since the founding of the People's Republic of China. In recent years, the development and application of biotechnology has been regarded as a way to boost the country's food security while offsetting the forces migrating from rural areas to urban areas.

Chinese research on agricultural biogenetic engineering began in the early 1980s, and recently development has accelerated. To date, it has established a relatively complete system of research and development of biotechnology. By 2000, more than 90 research institutes were engaged in research and development of GMOs. By the end of 1999, work had been done on at least more then 90 recipient organisms. Forty-nine GMO plant varieties are currently in research and development involving 103 different kinds of genes.

The crop that was first commercialized was tobacco in 1993. To date, there are six genetically modified crops having been commercialized, including cotton, tomatoes, tobacco, sweet peppers and morning glories. Reportedly, there are another 12 species of plants that have been approved for "environmental release" which is the second stage in the safety evaluation process. Crops that have reached this stage include cotton, rice, corn, soybeans, wheat, tobacco, potatoes, tomatoes, green peppers, pawpaws and morning glories. The desired traits for these crops include insect resistance, disease resistance, salt tolerance, cold resistance and spoilage resistance.

The cultivation area for GM cotton has been increased sharply in China in recently years, which makes China the fourth largest country with the area sown to GM crops, after the United States, Argentina and Canada.

GMO regulation in China

There are five major governmental agencies that oversee GMOs in China. They are the Ministry of Science and Technology (MOST, formerly the State Commission of Science and Technology–SCST), the Ministry of Agriculture (MOA), the Ministry of Health (MOH), the State Environmental Protection Administration (SEPA), and the State Administration of Import-Export Inspection and Quarantine (SAIEIQ).

The earliest GMO regulation is the Regulation of Genetically Engineering Management issued by the SCST in 1993. This regulation requires that all GM products must be subject to safety evaluation and safety control measures. According to this regulation, SCST is in charge of the administration of genetic engineering safety. It established the National Genetic Engineering Safety Committee to supervise and coordinate overall administration of genetic engineering safety among different government agencies.

Agricultural GMOs

MOA is responsible for administration of agricultural GMO research and production. The earliest regulation on the use of agricultural GMOs is the Safety Administration Implementation Regulation on Agricultural Biogenetical Engineering issued by MOA in July 1996. In order to strengthen agricultural GMO safety management, ensure biosafety and protection human health and the environment, while promoting GMO development, the State Council promulgated the Administrative Regulation on Agricultural GMO Safety in May 2001 (SOC Decree No. 304). The regulation does the following key things:

- Establishes the statutory institutions to supervise the administration work related to agricultural GMOs: an Agricultural GMO Safety Evaluation Committee, overseeing safety assessment of agriculture GMOs and an Office of Agricultural GMO Safety Administration, overseeing the management of GMO research, production and sale, are established under MOA; a joint multi-departmental conference, a mechanism which brings MOA, MOH, MOST, SEPA, SAIEIQ and the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) together to coordinate the nation's GMO work;
- Specifies that a classified safety administration regulatory regime shall be established for better safety administration;
- Specifies that a systematic regulatory regime shall be established for reporting, reviewing, registration, assessment and approval of agricultural

GMOs in dealing with GMOs (including research, manufacture, production, commercial release and import);

- Establishes a scheme of GMO assessment;
- Requires mandatory GMO labelling; and
- Outlines the general principles for monitoring and enforcement mechanisms.

This Regulation delegates power to MOA to formulate the detailed implementation rules. Accordingly, MOA adopted several implementation rules in July 2001, including the Measures on Safety Evaluation Administration of Agricultural GMOs (MOA Decree No. 8), the Measures on the Safety Administration of Agricultural GMOs Import (MOA Decree No. 9), and the Measures on Agricultural GMO Labelling Administration (MOA Decree No. 10).

The Measures on Safety Evaluation Administration of Agricultural GMOs contain the following core measures:

- Providing the details for the classified safety administration regime. Agricultural GMOs are classified into four classes based on the nature of their potential danger to humans, animals, plants, micro-organisms and the ecological environment: 1) Safety Class I: no danger for the time being; 2) Safety Class II: low degree of danger; 3) Safety Class III: medium degree of danger; and 4) Safety Class IV: high degree of danger;
- Providing the details for the regulatory regimes for reporting, reviewing and approving safety assessment at various stages. Five stages for agricultural GMO development are specified: the experimental research stage, the intermediate test stage, the environmental release state, the commercialization test stage and the application for certification stage.
- Any organization and individual, who intends to import agricultural GMOs of Safety Classes III and IV for research at the experimental research stage and GMOs of all safety classes for research at the intermediate test stage, are required to report to the office along with the relevant documents. The office will undertake a preliminary review, record and submit the report to Agricultural GMO Safety Evaluation Committee (the Evaluation Committee hereafter);
- Any organization and individual who intends to import agricultural GMOs at the environmental release, the commercialization test and the application for certification stages, are required to apply to the GMO Office for safety evaluation. The Evaluation Committee of MOA will carry out safety evaluation of agricultural GMOs twice a year. The time open for application lasts until March 31 and September 30 respectively. The Evaluation Committee will respond to the application and decide whether the application is accepted or not within two months after receiving it. Decision will be made within three months after the application is accepted; and
- Providing measures for technical inspection, safety superintendence and supervision, and enforcement.

The Measures on the Safety Administration of Agricultural GMOs Import establishes the procedures for safety management for imports of agricultural GMOs (see below for details).

The Measures on Agricultural GMO Labelling Administration provides for the following major measures:

- Prohibiting sales and imports of agricultural GMOs unless they are properly labelled;
- Designating that MOA is responsible for review, approval and administration of GMO labelling; and
- Providing the detailed measures on how GMOs, GMO products, GMO raw materials or GMO processes shall be labelled.

Food safety

MOH regulates food safety. MOH's Regulation on New Source Food contains testing and approval measures for new foods, including GM food. It also regulates food packaging, labelling, user instructions and food standards. Most recently, MOH issued the Regulations on GMO Food Health Administration (Decree No. 28 of MOH) in April 2002. The Regulation contains the following main measures:

- Prohibiting any GMO foods to be manufactured, imported or used as raw materials for foods unless they are assessed and approved by the Ministry of Health;
- Establishing a system of GMO food safety and nutritive quality assessment;
- Establishing a GMO Food Expert Committee responsible for assessing GMO food safety and nutritive quality;

- Establishing a national inventory of GMO foods. GMO foods will be listed on the inventory after they are approved for production and import; and
- Requiring mandatory labelling for food products that contains GMOs.

Biosafety

SEPA and MOST are in charge of overall biosafety, which refers to potential adverse impacts of GMOs on biodiversity, the environment and human health. In 1992, SEPA adopted the National Biosafety Framework, which outlines the national policy framework and regulatory framework of biosafety management in China. China signed the Cartagena Protocol in 2000, and ratification is in progress. China is considering drafting a law on biosafety. SEPA, in conjunction with five other ministries—agriculture, science and technology, health, quarantine and foreign affairs—is now refining the details of the law before passing it to the National People's Congress for reading and ratification.

Trade regulation

There were no regulations governing imports or exports of GMOs until very recently. In 2001, the State of Council adopted the Administrative Regulation on Agricultural GMO Safety. It requires that imports of agricultural GMOs be regulated. To implement the Regulation, MOA issued the Measures on the Safety Administration of Agricultural GMOs Import, along with other rules. Major measures stipulated in the Regulation include:

- Establishing the assessment, registration, review and approval procedures for agricultural GMOs imported for the purposes of research, experiment, and production. (Any foreign companies that intend to export Agricultural GMOs for research, experiments and production shall apply to the Agricultural GMO Office and provide the relevant documents. They shall undertake the safety assessment, and apply for registration with the Agricultural GMO Office under MOA. For GMOs for the environmental release, the commercialization test and the safety certification for production, the GMO Committee will undertake a safety assessment. Applicants will not be able to go on to other importing formalities without the approval of the GMO Office. Upon the passage of review, an Agricultural GMO safety approval document will be granted by MOA before the importer can to through other relevant procedures with the appropriate authorities.)
- Establishing the procedures for registration, safety assessment testing, safety assessment evaluation, approval and certification for Agricultural GMOs to be imported for the use of raw material. (Any foreign company that intends to export Agricultural GMOs to China for the use of raw materials shall apply for an Agricultural GMO safety certificate to the Agricultural GMO Office, submitting relevant documents. Upon the passage of the safety evaluation, MOA will issue the Agricultural GMO safety certificate);
- Establishing a simplified procedure for those whose application was approved makes an application a second time; and
- Specifying that MOA shall make a decision of approval or disapproval within 270 days after receiving the application from the applicant.

The Regulation took effect on March 20, 2002. However, in response to some foreign exporters' concerns, MOA issued an interim regulation. The interim measure allows overseas firms that export Agricultural GMOs to China to apply for an "interim certificate" from the Agricultural GMO Office with the evaluation documents issued by the competent authorities of the exporting country or a third-party country. MOA will issue the interim certificate within 30 days if the documents are verified. This interim arrangement will be effective until December 20, 2002.

In addition, under the Regulations on GMO Food Health Administration adopted by MOH, foreign firms that intend to export GMO food to China will need to get the "safety certificate" from MOH, and have their GMO food products labelled. However, to avoid ensure current trade deals being affected, MOH announced that foreign companies are only required to obtain the safety certificate as of January 1, 2003.

From the above description, although there are five major departments working on different aspects of GMO administration, the country doesn't have an overall coherent legislation on biosafety yet. The regulatory approach is rather a segregated one based on sectors. GMO regulations in terms of trade are not very clear and consistent. Foreign exporters will need to apply to both MOA and MOH separately for certificates, depending on the GMO products involved. This may cause problems in terms of trade. Foreign firms may see the regulations as barriers to trade. Chinese process of defining comprehensive GMO policy and legislation is just beginning. MOST, which has overall authority to coordinate all the agen-

cies involved GMOs, should speed up its leading role and come up with a consistent and definitive policy.

V Trade issues for China

As the world's largest agricultural producer and consumer, China's attitude on GMOs in terms of production and trade is of great importance to other countries. China has been investing heavily in biotechnology research since the middle of the 1980s. Rules are in place allowing the production and import of GMOs, albeit with a lengthy safety testing procedure. Significant production and use of certain GMOs such as cotton and tobacco already exist, and China has imported large amounts of agricultural GMO products from the U.S., Canada and Argentina. With current GMO research, widespread production and use of GMOs in feed and food and other areas may soon become possible. Rapid development of modern biotechnology elsewhere and strong food safety, environmental and ethical concerns about the production and use of GMOs may well have trade implications for China as a member of the WTO.

Impact of increased GMO imports on China's agricultural development

China has a small-scale and scattered farming system. Productivity is quite low compared to the large-scale farming system in developed countries, and consequently competitiveness in the international market is very low. This can easily be seen from the prices for agricultural crops in China: the price for cotton is 17.3 per cent higher than that in the international market; wheat is 44.1 per cent higher; corn is 67.3 per cent higher; soybeans are 57.6 per cent higher; and, most stunningly, canola is 132.6 per cent higher.[10]

As the use of genetic engineering techniques reduces the costs of crop production, it improves the productivity greatly. This is particularly true in the U.S., Canada and Argentina. Compared with crops produced in these countries, Chinese crops are rather low in quality. Foreign GMO crops therefore have better competitive advantages than Chinese traditional crops in terms of cost-effectiveness and quality.

Due to the above two reasons, China has gradually increased its imports of agricultural GMOs from foreign countries. A study shows that the imports of corn, soybeans and canola from the U.S., Canada and Argentina increased greatly between 1996 and 1999. In particular, canola imports went up 356 times within the four-year period; while soybean imports went up 125 times. Meanwhile, the study noted that the increase of the imports in value is not as fast as the increase in amount. This means that the prices for these commodities decreased greatly.[11] The study finds that the drop in the prices for these products has already affected production in China. Taking soybeans as an example, although soybean consumption has increased in China in recent years, the production of soybeans has remained almost at the same level with little change. This means that the increased demand has been supplied by the import of soybeans from overseas, most likely by the imports of GMO soybeans. The impacts of GMO imports on China are relatively small now, but they could become potentially large in the long run.[12]

Impact of GMO imports on biosafety

In many countries, before a GMO food product enters the commercial market, it has to go through a rigid risk assessment process. China has just started such a risk assessment process. However, no matter how rigid a risk assessment is, no assessment can guarantee 100 per cent safety. On the other hand, some food products that do not have effects on foreign consumers may cause certain impacts on Chinese consumers due to the difference in consumption patterns. Without adequate control measures, certain GMO products may cause unexpected risk for domestic consumers.

The increased import of GMOs from foreign countries may also raise concerns over their impacts on biodiversity and the environment. For example, a certain weed-killer-resistant canola seed could harvest several times within a year, if improperly managed, any individually scattered canola seed could become an anti-weed-killer weed, and might lead to harm to agricultural production in a long run. Also, long-term exposure to insect-resistant GMO crops by certain insects could allow such insects to gain the ability to resist insecticides. This could create difficulties for future agriculture development.

China has imported and continues to import large amounts of agricultural GMO products and their processed products from the U.S., Canada and other countries. The issue of the impacts of GMO imports on biosafety (human health, biodiversity and the environment) needs to be adequately addressed.

Impact of strong GMO concerns on China's exports

The European Union countries and Japan are very sensitive to GMO products. Stringent restrictions on GMO food and products in these countries will like-

ly have impacts on trade in terms of both GMO products and non-GMO products.

Strong concerns over the use of GMOs have led to high demand for non-GMO food products in the countries that are sensitive to GMOs. In these markets, non-GMO products have a relatively high competitive advantage. There may be greater opportunities for China to expand its non-GMO exports and gain more economic benefits. In recent years, Chinese soybean exports to GM sensitive countries decreased slightly; while the price for Chinese non-GMO soybeans increased. This reflects the fact that the sensitive GMO attitude in these countries could cause impacts on GMO and non-GMO trade. However, soybeans are not a major exporting crop in China, as most of it is used domestically. Its export only accounts for 0.38 per cent of its total production. This implies that China should not limit the development of biotechnology in this sector simply because the GMO concerns of a few importing countries. The benefits of reducing the production cost for soybeans by using biotechnology is greater than profit from trade.

On GMO products, given the worries expressed abroad, an important issue would be market access for China's GMO food exports. China has produced GMO tobacco since 1993. In the EU countries and the U.S., the imports of the products containing GMOs have required adequate GMO testing and assessment certificate. Chinese GMO tobacco exports were somewhat unwelcome in these countries due to poor testing and assessment. Although China's tobacco exports have increased somewhat in recent years, the price for Chinese tobacco has dropped greatly. The GMO contents could be one of the reasons for the price drop.

As the production and use of GMOs have rapidly grown in China in recent years, it could become possible that Chinese consumers show a strong preference for GMO-free food. This would mean a larger proportion of GM production would have to go to export markets. This potential trend may imply future potential impacts on Chinese GMO exports.

VI Strategic recommendations

Biotechnology is now gradually exerting tremendous power in the agricultural sector. However, it is still in an early stage of development and has potential risk. China can gain a great deal economically from further development of modern biotechnology. However, the development of GMOs is not only a technical issue. The impacts of GMOs on the environment, biodiversity, economic sustainability, agricultural competitiveness and social benefits should also be taken into full consideration. Meanwhile, as the attitude toward GMOs abroad overseas varies from country to country, GMOs may create significant impacts on trade. China should think strategically and have an adequate regulatory framework and concrete measures in place to govern the development of GMOs and trade in GMOs so as to ensure economic and social benefits.

Strengthen the country's overall GMO policy

China has started to develop its GMO regulatory regime. Chinese MOA and MOH have set up their regulatory framework governing GMO safety in research, production, sale and the use of Agricultural GMOs and GMO foods. These regulatory measures are mainly based on risk assessment, and certain measures have been taken to ensure the safety of agricultural GMOs and GMO food products.

However, these rules are segregated based on sectors. Existing rules are not specific enough and future regulations on the implementation of the existing rules are still needed. Reportedly, MOST and SEPA are now working with other relevant agencies on a law on biosafety. This law under development aims to prevent potential impacts of GMOs on human health, biodiversity and the environment. China should speed up the process of the new legislation, and further develop a holistic and comprehensive GMO policy, taking consideration of biosafety, environment, international trade and sustainable development and agricultural competitiveness. Such a coherent policy will help realize the benefits of genetic technology for the Chinese industry and the environment, while ensuring human safety and preventing adverse impacts on the environment and biodiversity. Such a policy should be timely, science-based and consistent with China's obligations while taking account of socio-economic concerns.

Develop a single consistent and coherent GMO trade policy

There were no regulations regarding imports of GMO products and related products until early 2002. Although both MOA and MOH issued the rules governing the imports of agricultural GMOs and GM food this year (2002), the implementation of these rules have been delayed due to foreign exporters' complaints about non-transparency and not providing adequate prior notification in the rule-

making process. They also complained the complicated and duplicated review, assessment and approval processes under both sets of rules. The prospective new biosafety law under the development by MOST and SEPA could further complicate the current situation. It is urgent for China to come up with an integrated approach to address the issues related to GMO imports.

As a WTO member, China has committed to make its trade law and regulations consistent with the WTO rules. The WTO requires Member States to make their trade laws transparent and predictable. Chinese GMO laws and regulations should also abide be these rules.

China needs not only strengthen its import policy and law, but also develop its policy for GMO exports. It is important that the relevant government agencies formulate policy and measures to help its GMO producers get international market access.

China has signed the Cartagena Protocol, and ratification is now in progress. In developing its trade policy for GMOs, efforts should be made to meet its international obligations under the Cartagena Protocol.

Actively explore opportunities for exports

Agricultural GMOs could create a significant impact on China's agricultural development. From a macro development perspective, China should take into account the impacts of international trade in GMOs in developing its strategic plan for GMO development. Chinese decision-makers whose responsibility is GMO development should clearly understand the degree of sensitivity of its major importing countries. They should also clear about which Chinese commodities are competitive in the international market rather than all crops being used domestically. They should exercise an extra caution to how much and where to invest in biotechnology research. For those commodities which do not have strong competitiveness in the international market, genetic engineering should be greatly encouraged. Because the benefits of producing more such commodities would be far greater than potential exporting profits. It should be noted that although the EU countries have the most stringent GMO regulations in the world, the requirements for some coarse grains and oilseeds that are used for feeding animals and fish are not as stringent as GMO products used for food. There might be an opportunities for such Chinese crops. With such a good understanding of the international market direction, China could be able to determine its priority crops for GMO development.

As European and Japanese consumers have become more concerned about the food they eat and how it has been produced. They have increasingly moved towards having a lifestyle that is in harmony with the environment. They have even moved to organic food. Organic food is more expensive than conventional food, but many European and Japanese consumers are willing to pay more to guarantee the healthiest quality and the harmony with the environment. The trend may create the opportunities to expand its exports of non-GMO products, in particular of green food and organic food at higher prices. This will require the government to formulate policies and measures to encourage the development of green food and organic food and to facilitate their exports.

Endnotes

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Section VI
Environmental Measures and Market Access

Environmental Measures and Market Access: PPMs in the WTO

by David Runnalls and Wanhua Yang

Background

The Doha Declaration has launched a new Round of multilateral trade negotiations and mapped out the next stage in trade liberalization policy. It has also mandated WTO members to address the implementation issues to ensure greater market access for developing countries and integrate sustainable development principles into trade liberalization. The challenge of integrating sustainable development principles into trade liberalization is formulating an unbiased and even-handed sustainable development agenda in the WTO, which will allow consumers to integrate environmental concerns into purchasing decisions and prevent abuse of environmental measures for protectionist purposes.

Recent globalization and trade liberalization have seen two interrelated realities. First, there is an increasing consumer preference for environmentally-friendly products in industrialized countries. In response to such changes in the market, more stringent environmental measures, either mandatory or voluntary, have been put in place to restrict both domestic and imported products in the market. Second, developing countries are having their exports restricted from entering developed country markets, on an increasingly recurrent basis, because of impacts of standards in food, safety and environmental measures.

For example, Chinese exporters are having their agricultural products returned from foreign importing countries because of non-compliance of food, sanitary and environmental standards on a regular basis. Between January and March, 2002, China's Qingdao Customs Office received 505.4 tonnes of frozen chicken, returned by foreign importers, a 920 per cent increase from the same period in 2001. The Dalian Customs Office received US$1,590,000 worth of agricultural products returned by foreign importers, an increase of 174 per cent from the same period in the previous year.[1]

At the heart of many environmental measures is the environmental cost internalization (such as market-based instruments and subsidies) and process and production methods (PPMs). Many frequently used and most problematic environmental measures being discussed in the trade and environment debates are PPM-based standards. For example, most of the two dozen eco-labelling programs in the world have included PPM-based standards. ISO 14000 is clearly a set of PPM-based environmental management standards. This is because process and production methods are an important source of environmental impact. Logging practices, fish and fur harvesting, chemical processing and forestry management practices all have various degrees of impact on the environment. In reality, sustainable development is about how a product is produced. Products that are produced using environmentally-friendly production methods will contribute to both development and the environment.

There are two broad categories of PPMs: product-based PPMs and non-product-based PPMs. Product-based PPMs refer to production methods that affect the characteristics of the product itself. This type of PPM is found more frequently in industrial process requirements, ensuring a product's quality and fitness of use. Non product-based PPMs are situations where the environmental damage caused by PPMs is not transmitted by the product itself. However, only non-product-based PPMs will be addressed in this paper, as only they are problematic in determining the "likeness" of products in environment-related disputes. Product-based PPMs are normally dealt with through product standards.

Widely-spread interpretation of PPM in GATT/WTO law

The widely-spread interpretation of GATT/WTO law says that all process-based regulatory measures based on the process or production methods, rather than directly related to physical characteristics of the product itself, are violations of the GATT principles of non-discrimination. This is based on the popular construction of the "like product" language in GATT Article III. GATT Article III:4 is a cornerstone of the multilateral trading system, which disciplines discriminatory domestic regulatory measures. This article establishes the National Treatment Obligation, defining discrimination as the key concept in distin-

guishing between legitimate and illegitimate domestic regulations. GATT Article III:4 stipulates:

> "The products of the territory of any Member imported into the territory of any other Member shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use.…"

In early WTO jurisprudence, GATT Article III:4 was interpreted as forbidding discrimination among like products, based on non product-related PPMs. For example, in the Tuna/Dolphin cases, the panels ruled that domestic regulatory measures based on non-product-related PPMs, even if non-discriminatory (the sale of domestic and foreign tuna is subject to the adoption of a particular environmentally-friendly technology), constituted a violation of the GATT obligation. This interpretation has caused a great deal of concern in the environmental community.

Breakthrough in the interpretation of PPMs

In recent years, the widely-spread interpretation of process-based measures has been challenged by scholars and the WTO dispute settlement mechanism. Konrad von Moltke, a well-known scholar in the trade and environment field, has long argued that process and production methods are a fundamental factor in achieving sustainable development. To achieve sustainability requires producers to substantially alter their production methods. Professor Robert Howse, along with Professor Donald Regan of the University of Michigan Law School, in their article The Product/Process Distinction – An Illusory Basis for Disciplining "Unilateralism" in Trade Policy[2] argue that the distinction between PPM-based standards and product-based standards has no basis in the GATT text or in GATT jurisprudence. They point out that GATT Article III does not distinguish between process-based measures and product-based measures. They provide a thorough analysis, demonstrating that neither the text nor jurisprudence of GATT supports the process/product distinction.

In the Shrimp-Turtle case, the Appellate Body did not find the PPM-based measure (turtle-excluding devise) taken by the U.S. a violation of Article III:4. In the Asbestos case, the Appellate Body breaks new ground by holding that health risk constituted a legitimate factor in determining whether products were like and thus subject to the GATT Article III:4 obligations to be treated equally. This breakthrough in the determination of the "likeness" of products by the Asbestos Appellate Body may also change subsequent WTO jurisprudence in determining the "likeness" of products based on PPMs.

Issues of concern

Despite the lack of the textual and jurisprudence basis, the perception that process-based measures are particularly problematic is widely shared. There are a number of concerns about the product/process distinction of products.

First, unilateral process-based measures could give governments greater latitude in protecting their industries against foreign competition. Governments could even abuse them unilaterally. It could lead to the use of an array of eco-labels, increased boycotts, discriminatory governmental purchasing policies, and more.

Second, enforcing PPM-based standards is very difficult in practice. This is because product-based standards can be easily checked at the border for compliance, while non product-related PPM-based standards cannot. Compliance or non-compliance of PPM-based standards has no physical effect on the final product.[3]

Third, process-based measures have the extra-territorial effect and thus infringe on sovereignty by exporting the value of the importing countries to exporting countries. Many developing countries may be concerned that PPM-based discrimination based on environmental grounds would force them to implement standards that might not be appropriate for them because their priorities differ from those of developed countries,[4] although many environmental standards have an objective basis and may not only reflect "values."

Finally, and most importantly, because of the extra-territorial effects, some see PPM-based standards as imposing unacceptable costs on exporters, particularly on less-developed countries.[5] These countries will be denied market access because of irrelevant or irrational PPM-based standards imposed by importing countries. In theory, producers should be able to recover these increased costs from the product chain provided adequate environmental policies are in place. Indeed, if the environmental costs are covered there are clear benefits for the producing country, because consumers are no longer subsidized through environmental degradation in the producing country. However, it is very difficult to recover costs from

commodity markets under current regulatory regimes and practices.

Seeking practice solutions

It is quite true that allowing countries to use unilateral PPM-based measures to restrict foreign products into their markets might open a door for possibilities of using PPM-based measures for protection of domestic products. However, some scholars argue that the WTO is equipped with tools to address such problems. Indeed, a WTO panel has successfully used the GATT Article XX chapeau to screen out PPM-based protectionism. The WTO Appellate Body in the Shrimp-Turtle case had no problem with the application of PPM-based distinction, but it found that the measure was applied in a manner that was arbitrary and unjustifiable and therefore constituted a disguised barrier to trade.[6]

It is also true that enforcing PPM-based standards has been proven to be more difficult than enforcing product-based standards, as its compliance or non-compliance will have no physical effect on the final product. However, there are already some rules in the WTO that deal with PPM-based standards, such as rules for intellectual property protection, which are based on the distinction of production methods. Many sanitary and phytosanitary standards are also PPM-based. Although there are some practical difficulties, PPM-based standards are now a basic fact of life in many sectors. Third-party certification and testing is now in place to address issues related to PPM-based measures.[7]

As for the extra-territorial effects, scholars also point out that there is no difference between PPM-based standards and product-based standards. Indeed, both PPM-based measures and product-based measures require a change in the production process; both presumably imply a change in production costs.[8]

It is of great concern that PPM-based environmental measures will force producers in developing countries to produce to the standards of the importing countries, which may be inappropriate for developing countries. Even in the absence of protectionist motives, environmental measures implemented solely for health and environmental protection purposes will have trade effects on developing countries. Studies undertaken by the former Working Group on Trade and Environment on China's trade in textiles and packaging materials have verified this. Recent OECD case studies also conclude that environmental measures imposed by developed countries can restrict market access of developing countries unless certain measures are taken.[9]

It is important to seek practical solutions in ensuring developing countries' market access and to prevent PPM-based standards from being used for protectionist purposes. To alleviate poverty in these countries, developing countries require better access to export markets and have a greater opportunity of increasing their market access through trade liberalization. However, it should be noted that many WTO members are facing increased pressure from the domestic public to integrate sustainable development principles into trade practices. It has become an irreversible trend that consumers in industrialized countries prefer environmentally-friendly products. In response to this market change, governments and even private businesses have adopted more stringent environmental measures.

Although the integration of trade and environmental policy could help promote sustainable development in developing countries, it could also mean restricting market access to developing countries.

Practical solutions to this impasse will involve standards (both PPM-based and product-based) and standards development. One way to address the issue is to enhance the existing trade rules on standard setting. These measures include:

- openness and transparency in developing various environmental measures;
- efficient information dissemination about these measures;
- adequate technical support and advice to developing countries; and
- existence of effective rules for formulating national standards, certification, accreditation and mutual recognition mechanisms.

Another important step is strengthening the capacity of developing countries in the development of standards, and tackling the environmental measures in importing countries. Developing countries should be ensured that they:

- have equitable access to standard setting, and to the tools that follow such standards in developed countries;
- effectively participate in international standards development by developing countries;

- have the institutional capacity to establish and maintain national standards, certification, accreditation and mutual recognition mechanisms; and have centres for testing, certification and accreditation;
- receive adequate technical assistance; and
- financial assistance for one-time adjustment costs.

In fact, the WTO TBT and SPS agreements have included some important guidelines in these areas. However, there is still a need to enhance these existing rules.

The development of a set of rules governing the use of PPMs by importing countries must also be considered. Although developing countries are opposed to the adoption of such rules, they may eventually find that a clear set of enforceable rules gives their product better protection.

Endnotes

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Eco-labelling: Its Implications For China

by Wanhua Yang, Xiaoyue Shen and Lulian Cheng

I Introduction

Labels have been used for at least a century as means to inform consumers of special features of certain products or to warn consumers of possible impacts of particular products.[1] Since the late 1980s or so, the increased public awareness of environmental impacts of products has prompted the rise of a new body of labelling—often called eco-labelling or environmental labelling—to provide the necessary information for environmentally conscious consumers on products that have less environmental impact. Eco-labelling also encourages manufacturing industries to be actively involved in environmental protection and pollution control by designing and developing environmentally friendly products.

Eco-labelling is distinctive in several respects: it is based on voluntary application, and it is subject to third party certification. An eco-labelling program usually identifies products that have less environmental impact than other similar products, sets up non-binding environmental requirements for these products, and awards a special label to producers who meet these standards. Such labels are increasingly seen as important market instruments, used to complement mandatory laws and regulations for environmental protection.

The world's first ecolabel was initiated by Germany in 1978. Canada, Japan, and the United States established eco-labelling schemes in the late 1980s. Many more were launched in the early 1990s. Eco-labelling programs have also been introduced in some developing countries including China. By now, eco-labelling schemes are in place in more than thirty countries around the world. Some of them are government-supported programs, and others are privately run schemes.

Not all such schemes are purely national in scope. The European Union and the Nordic Council have established intergovernmental eco-labelling schemes, and there are also some international eco-labelling programs focusing on specific products or issues, such as the Forest Stewardship Council (FCS) forest product eco-labelling program and the Codex Alimentarius organic food labelling.

The growing use of ecolabels and the increasing number of different eco-labelling programs have caused confusion among consumers and producers both domestically and internationally. The International Organization for Standardization is now developing a standard for eco-labelling. It aims to draw up a series of internationally agreed guiding principles to guide national programs to implement eco-labelling.

The proliferation of eco-labelling programs has also raised a number of trade concerns. Countries, especially developing countries, feel that ecolabels could be used as a disguised form of trade barrier and thus affect their exports. Major concerns related to potential trade barriers include:[2]

- Many eco-labelling schemes lack transparency. In particular, they are poor at informing foreign producers of existing and emerging eco-labelling programs, and giving them opportunity to comment.
- Ecolabels are being increasingly developed in sectors of export interest to the developing countries.
- Criteria based on life-cycle analysis (LCA) can have a discriminatory effect. The issue is that LCA generates more information than can be incorporated in a label. Consequently, an explicit (or implicit) weighting adopted in the information aggregating process can be quite discriminatory.
- Developing countries may lose international competitiveness due to the high costs of complying with eco-labelling criteria; of getting access to certification and of being certified.

These issues have attracted international attention and are being discussed in a number of fora, including the World Trade Organization (WTO), the United Nations Conference on Trade and Development (UNCTAD), the United Nations Environmental Programme (UNEP), the Organization for Economic Cooperation and Development (OECD), and the newly formed Global Eco-labelling Network.

UNCTAD studies show that eco-labelling, in general, has not caused significant trade effects. However, it has created difficulties for producers in particular sectors from developing countries, such as paper and pulp, footwear, and textiles, and more serious problems are feared. Over the long-run, when eco-labelling programs increase their product coverage to include more and more products of export importance to developing countries, the impact of eco-labelling could potentially become more significant.[3]

Discussions in the above-mentioned international fora conclude that eco-labelling is a valid environmental policy instrument and it should be developed and implemented in a manner consistent with fundamental WTO disciplines of non-discrimination and national treatment. A number of possible solutions to promote the compatibility of trade and environmental interests have been proposed. These include: increasing transparency, establishing mutual recognition between eco-labelling schemes and equivalencies between eco-criteria, dealing properly with PPM-related criteria, establishing international principles (such as ISO eco-labelling principles), and dealing with special needs of developing countries through technical assistance. It was the general view supported by many delegates at a recent WTO Trade and Environment Committee meeting that voluntary eco-labelling programs should respect basic WTO TBT principles of national treatment, avoidance of unnecessary obstacles to trade, and promotion of the use of international standards.[4]

II China's eco-labelling program

China is a developing country with serious environmental problems. The implementation of an eco-labelling program in China may, on the one hand, encourage enterprises to actively prevent and control pollution through influencing consumer purchasing behaviour. On the other hand, it may increase the competitiveness of China products in international markets.

The work on the establishment of an eco-labelling program in China started in 1993, when the National Environmental Protection Agency (NEPA), the predecessor of the State Environmental Protection Administration (SEPA), issued a Circular Concerning the Establishment of the National Environmental Labelling Program. The logo, chosen through a public design contest, means "joint effort of the nation to protect the environment on which human beings rely."

The official launch of environmental labelling in China came with the establishment of the Certification Committee for Environmental Labelling of Products (CCEL) in May 1994. CCEL, authorized by the China State Bureau of Technology Supervision (CSBTS) and representing the national government, is China's third party certification agency. It deals with environmental labelling certification, and administers and supervises China's environmental labelling program. It consists of 24 members, of which 15 are government officials. The chairman is the Administrator of NEPA. It defines the policy, principles and rules of the program, selects product categories and approves certifications. It also sets the fees for certification, reports to NEPA and CSBTS, and cooperates with other related national and international organizations.

In April 1995, CCEL first awarded the environmental label for 18 products in six product categories to 11 manufacturers. Up to the end of 2001, more than one thousand products of 300 manufacturers in 41 product categories had been awarded the label. Specifications/criteria for 41 product categories have also been issued.

The ecolabelled products covered by China's program were closely related to people daily lives. The designers of the program hope that these products will guide average consumers in their purchasing and therefore promote their involvement in environmental protection activities, and that public awareness of environmentally friendly products will be thereby raised. It has been reported that the sales of water-based paints, non-phosphate detergents and other products which have close relationship with people's daily life bearing the environmental label have significantly increased within a very short time.

One obstacle that producers of ecolabelled products encounter is that the awareness of the environmental label does not appear to be very high. The label is not very well known among domestic consumers. Efforts have been made to disseminate information on the environmental labelling through television, broadcasting, newspaper as well as press conference. However, this is not enough. The eco-labelling committee is now working on ways to more effectively disseminate information on ecolabelled products.

Another problem with the ecolabelled products is that they are on average more expensive than unlabelled products. For example, a refrigerator labelled as CFC-free sells for 100–300 yuan RMB more than a regular one, which is a big sum to an average consumer in China.

III Implications of eco-labelling for China

The impact of eco-labelling on Chinese trade

Despite the fact that the primary goal of eco-labelling programs is to protect the environment, they at times discriminate against foreign producers. Although eco-labelling so far has not caused significant trade effects in general, it has created difficulties for some exports from developing countries—in particular paper and pulp, footwear, and textiles—due to differences in standards.

As eco-labelling programs world-wide have developed rapidly, China's exports have on a few occasions been affected. For example, eco-labelling criteria established for refrigerators and other cooling systems in some European countries have made China's exported refrigerators less competitive in these markets. In order to get easy access to the European market, manufacturers have to obtain a European ecolabel.

At present, there is no evidence to show that China's exports have been significantly affected by foreign eco-labelling in general. However, with the present development of eco-labelling, especially in European countries, some sectors including textiles and footwear in China could be potentially vulnerable to eco-labelling criteria established by these countries.

For example, the European Commission has adopted the decision establishing ecological criteria for the award of the EU ecolabel to textiles (bed linen and T-shirts).[6] After review, the decision concludes that the main environmental impacts of these items stem from the use of pesticides in growing cotton, harmful processes during the production of polyester, and the use of harmful substances during processing and finishing. Accordingly, the EU criteria for textiles contain requirements for limited use of pesticides in cotton growing, for restricted use of detergents and bleaching agents in wet processing, and for limited use of dyestuffs during dyeing and finishing processes. The criteria also set waste water treatment requirements.

How the EU textile ecolabel will affect China's textile exports still remains to be seen. The impact will probably not show up for some time. However, China should remain vigilant over the potential impact that may be caused by this and other eco-labelling programs.

On the other hand, as mentioned earlier, China's own program has so far not influenced China's trade. Since it is a rather new program, it is rarely known to other countries. No importer has obtained China's ecolabel.

Challenges and opportunities of eco-labelling for China

The challenges that China is now facing are twofold: the need to further develop and implement its eco-labelling program, and the need to link its eco-labelling to the international development.

To further develop and implement China's eco-labelling program. In order for eco-labelling to be an effective means for environmental protection and to increase the market share of ecolabelled products, there is a need to strengthen China's environmental labelling program.

First of all, China's eco-labelling program should be expanded to include more environmentally friendly products, and to increase the market visibility of the ecolabelled products in order to achieve its goal for environmental protection.

At the same time, the success of an eco-labelling program largely depends on the public awareness of eco-labelling and ecolabelled goods. The better the public understands eco-labelling, the more likely they are to support it by using their purchasing power. China has made efforts to disseminate information on the environmental labelling by means of television, broadcasting, newspaper as well as press conference. Still, a considerable portion of the pubic has little knowledge of the environmental label. More vigorous effort is needed in disseminating information on the eco-labelling program and ecolabelled products.

Second, efforts should be made to increase the transparency of China's eco-labelling program, since a greater transparency can provide a good basis to address some of the trade concerns raised about eco-labelling schemes.

Third, it is important to integrate the development of eco-labelling with overall environmental management and thus further promote the development of ecolabelled products.

Fourth, as the life-cycle assessment (LCA) approach has been used by most of the existing eco-labelling programs in the formulation of product environmental criteria, China should also consider adopting this method as a regular tool in its standard-setting process. However, it should be noted that conducting a complete LCA is very expensive and time-consuming. Alternatives exist which allow a step by step approach to LCA.

Fifth, China may also draw some good lessons from other foreign eco-labelling programs, so as to improve its program continuously based on its own domestic situations. For example:

- To create a mechanism for products that have environmental advantages but are not yet covered by the program. For example, the Canadian Environmental Choice Program has recently started a new method of awarding the Ecologo—the panel review awarding process. This process allows a manufacturer to apply to the program for their niche environmental products for which criteria have not yet been established. The panel will review the products and decide whether to award the Ecologo to them. This is a very flexible way of recognizing new environmental products and technologies, while the whole process from the selection of product categories to the award of the logo takes quite some time.
- To offer self-declaration certification. Self-claim labels by manufacturer are becoming increasingly common in many countries. This is true in China too. In order to promote the exports of environmentally friendly products as part of its overall export promotion strategy, China should be able to establish its environmental claims credibly.
- To create a multiple stage ecolabel. The Step Ladder Principle in eco-labelling aims to provide a mechanism which allows multiple levels of achievement.[16] This multiple stage ecolabel is much like the stars rating system used for hotels or restaurants. The French eco-labelling program will likely be the first program to include such multiple levels of achievement in its very strict and objective system. It was suggested to use a 100-point scale, linked to a five-star system, to assess the level of achievement of environmental performance:

  75–80 points = 1 star

  81–85 points = 2 stars

  86–90 points = 3 stars

  91–95 points = 4 stars

  96–100 points = 5 stars

This system may allow small companies or those in developing countries easily to enter into the eco-labelling system, and encourages them to start up the ladder and gradually to increase performance.

To link its program to international development. With the increasing number of eco-labelling schemes world-wide, China's exports have in some cases been affected. In order to avoid possible negative trade effects from other countries eco-labelling programs, China should first actively participate in international standard setting processes. At present, a major problem is that not many developing countries are participating in the ISO process, or if they do, they have small delegations and give little input. To make a meaningful impact, China should share its experience in operating its program and provide input to the standards-setting process.

Other international cooperative activities also offer opportunities for international cooperation. For example, a new Global Eco-labelling Network (GEN) was formed by national and multinational eco-labelling certification organizations in response to the need for mutual recognition of environmental labelling programs world-wide and the move towards harmonization of criteria for eco-labelling. The primary goal of the Network is to create a forum for eco-labelling organizations around the world to exchange information and views in establishing and implementing eco-labelling, and in the long-run to achieve harmonization of eco-labelling criteria. China should also participate in GEN.

Second, mutual recognition and equivalency have been recognized as the most important elements for coordinating eco-labelling programs world-wide. They may help to avoid or mitigate negative trade effects, while contributing to environmental objectives in a way which takes account of differences in environmental conditions and levels of development among nations. China should enhance multilateral and bilateral cooperation with the international organizations and with other countries in order to establish mutual recognition.

Third, UNCTAD Ad Hoc Working Group on Trade, Environment and Development and the WTO Committee on Trade and Environment have recommended that all eco-labelling organizations give consideration to adhering to the WTO TBT rules, particularly, the Code of Good Conduct (annex 3 to TBT). It is also important for China to bring its eco-labelling in line with the TBT rules, ensuring that its scheme is non-discriminatory, offers equal competitive opportunities to imported products, ensures a greater transparency, and promotes internationally agreed principles.

Finally, China should actively disseminate information about its program to the potential importers of Chinese goods and probably even to consumer organizations in other countries, in order to increase foreign awareness of and credence for China's ecolabel.

Although eco-labelling may create potential trade barriers, it may also create positive trade effects. China should exploit the potential of eco-labelling to respond to increased green demand in OECD countries, and to expand its production of environmentally friendly products.

IV Conclusions and recommendations

- Eco-labelling is primarily designed to provide accurate information to consumers on environmentally responsible products, encourage manufacturers to develop products that have less environmental impact, and ultimately to achieve environmental protection. Nevertheless, it has potential to discriminate against foreign producers, in particular some sectors of products imported to OECD countries from developing countries, such as paper and pulp, footwear, textile and timber.
- A number of questions and concerns have arisen concerning ecolabels as potential trade barriers. These include product coverage and market access, transparency, cost and competitiveness, PPM related and other standards, and mechanisms of access to certification.
- Although the trade impact on developing countries does not appear to be significant at present, in the long-run, with the increasing demand for environmentally friendly products in OECD countries and with the increasing number of eco-labelling programs, developing countries are potentially vulnerable to trade effects of eco-labelling schemes world-wide.
- Several international fora have considered eco-labelling issues, and some useful possible solutions have been proposed. These include: non-discrimination, transparency, acceptance of WTO TBT rules, and of international guiding principles. Mutual recognition and equivalency among eco-labelling schemes, and caution in using PPM-related criteria are also useful approaches and should be further explored.
- In order to encourage the production of environmentally friendly products, increase consumer awareness of green products, and promote its international competitiveness, China established its own eco-labelling program.
- With the present development of eco-labelling, especially in European countries, some sectors including textiles and footwear in China could be potentially vulnerable to eco-labelling criteria.
- Challenges of eco-labelling for China include the need to strengthen its eco-labelling program, to link its program to international development in order to reduce negative trade effects of foreign ecolabelling programs, and to take advantage of opportunities created by eco-labelling to expand China's exports.

Recommendations

1. Strengthen China's eco-labelling program

   China's eco-labelling program should be expanded to include more environmentally friendly products, and to increase the market visibility of the ecolabelled products in order to achieve its goal for environmental protection.

   It is important to increase public awareness of the eco-labelling program and to increase transparency. Efforts should be made to vigorously disseminate information on the program and ecolabelled products. In the process of selecting product categories, establishing product environmental criteria, and awarding the label, more representatives from various relevant organizations should be invited, such as manufacturers, retailers, consumers, government officials and academic researchers. Foreign importers should also be given opportunities to participate in the process.

   It is also important to integrate the development of eco-labelling with environmental management, and further promote the development of ecolabelled products. For example, watershed pollution control of Tai Lake Basin (and other lakes suffering from eutrophication) needs to restrict the use of detergents containing phosphorous. To promote ecolabelled phosphorous-free detergents can contribute to pollution control of these water basins. The promotion of unleaded gasoline should also be gradually linked to control of the use of leaded gasoline.

   In implementing its eco-labelling program, China should take into consideration internationally accepted principles, such as those that are being developed by ISO. Consideration should also be given to adhere to the basic WTO TBT

principles of non-discrimination and national treatment, avoidance of unnecessary obstacles to trade, ensuring transparency and promotion of international standards.

China should also take into consideration good practices of existing eco-labelling programs and to continuously improve its eco-labelling program based on its domestic situations. These may include the use of environmental impact assessment of a product life cycle in its criteria-setting process, mechanisms for products not yet covered by the program and the multiple stage ecolabel system.

2. Participate in international discussion and secure mutual recognition

   The development of the ISO eco-labelling standards (ISO140XX) is well advanced. It is important for China to actively participate in and provide input to such standard-setting processes. Meanwhile, China should also participate in other international cooperation activities.

   Eco-labelling criteria and specifications may differ between developed countries and developing countries, due to differences in economic bases. Efforts should be made to establish mutual recognition through international negotiation and cooperation, in order to prevent ecolabels from becoming barriers to international trade. This may mean strengthening both bilateral and multilateral cooperation with other eco-labelling programs.

3. Explore opportunities for China's export market

   China should exploit the potential of eco-labelling and expand its exports of environmentally friendly products.

   As the development of ISO 14000 environmental standards is moving forward rapidly, other countries' ecolabels are likely to be linked to the ISO environmental management system. China's enterprises, in particular export-oriented enterprises, should be well aware of this situation, prepare for the implementation of environmental management system standards, and to obtain ISO14000 certification as soon as possible. Steps should be taken to ensure that information about these developments is available to them.

   At the same time, China should also actively disseminate information about its program to the potential importers of Chinese goods, in order to increase visibility and credibility of China's ecolabel in foreign markets. Efforts should also be made to help Chinese enterprises to obtain foreign ecolabels.

Endnotes

1. Kristin Dawkins, *Eco-labelling: Consumers' Right-to-know or Restrictive Business Practice?* IATP, September 25, 1995.

2. UNCTAD Secretariat, *International Cooperation on Eco-Labelling and Eco-Certification Programmes and Market Opportunities for Environmentally Friendly Products*, TD/B/WG.6/2, October 6, 1994; UNCTAD Secretariat, *Trade, Environment and Development Aspects of Establishing and Operating Eco-labelling Programmes*, TD/B/WG.6/5, March 28, 1995.

3. World Trade Organization, *WTO Trade and Environment Committee Discusses Proposals on Trade Measures in Multilateral Environmental Agreements and on Eco-labelling*, Press/TE/008, April 29, 1996.

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Production and Marketing of Green Food Products in China

by Xuegui Lin

I Green food development in China

Since the late 1970s, pesticide and chemical fertilizer use in China has increased rapidly and steadily. According to China's Statistics Yearbook, by the end of 1989, China's fertilizer consumption reached 23.5 million tonnes, with an annual growth rate of 8.57 per cent since 1980. Pesticides consumption averaged 187,200 tonnes of active ingredients per year from 1980 to 1989. Although the widespread use of pesticides and fertilizers had boosted food production, this heavy reliance on these agro-chemicals has come at a huge cost. In recent years many cases have been reported in the newspaper of bans on Chinese agricultural products, because of high content of harmful residuals. Some overseas markets have since closed to Chinese products.

The high pollution caused by agro-chemicals jeopardizes the export of agricultural products and deteriorates the country's natural resources (soil, water and biodiversity). For example, pesticides, along with industrial pollution, have severely contaminated, rivers and lakes, and threaten China's remaining biodiversity. Many rivers once teeming with fish have become barren over the last decade, while many economically valuable species of lake fish have become extinct. Fertilizer and pesticides have also had a bad effect on human health. For example, during the 1980s and early 1990s, although the detailed reported number of persons poisoned by pesticide residues was unknown, many farmers were killed by pesticide poisoning, especially women, or committed suicide by drinking pesticides. The fact that pesticide residues in food and drinking water resulted in consumer poisonings was also reported (Qi 1987). A study of foods sold in major cities revealed that pesticide residues were 12.5–30 per cent above the state standards (Li 1991).

Under this circumstance, the Ministry of Agriculture proposed the plan to developing green foods in 1990. The primary goal of developing green food is to protect the ecological environment, and to improve human health by satisfying the growing demand for better food from consumers at home and abroad. In the early 1990s, the concept of "green food" was not very clear. It was defined as safe, good quality, and uncontaminated health food product. After the certification standards were established and "green food" was approved by the State Administration for Industry and Commerce in 1993, it was registered as the trademark of certified quality. Since then, "green food" has been defined as "food produced by a producer complying with certification standards and certified by specialized certification organization as 'Green Food'."

A "Green Food" label guarantees that the product was produced conforming to specific standards, which allowed limited or no use of synthetic fertilizers and chemicals. The Chinese Trademark Law regulates the term "Green Food." The characteristics of combination of quality certification with trademark management not only helps to regulate the production behaviour of the firms and farmers for better product quality but also protect consumer interests by reminding the consumers of the "Green Food" trademark. By the end of 2000, China had 964 enterprises producing green foods with a total output value of RMB 500 billion, including exports of two billion RMB. Once available only in hotels and restaurants through direct sales, both fresh and processed green foods have now entered the mainstream food market. Supermarkets in big cities now stock green foods ranging from cereals to condiments. The market for green foods has grown steadily in recent years, and is expected to continue this trend as more products are produced and the consumer demand continues to rise.

II Current state of green food production in China

Production scale

In 1990, there were 127 products certified as "Green Food," with 81 firms producing 350,000 tonnes of green foods and over 40,000 hectares of farmland under production for green foods. By the end of 1994 the volume of green foods in China reached 691,000 tonnes, which accounted for approximately 0.11 per cent of China's total food production. There were 580 food products registered as "Green Food" and 211 firms with a total cultivated area of 467,000 hectares, which represented 0.49 per cent of total agricultural land. The output value was estimated at RMB 10 billion (US$1.2 billion). The food products certified, total output, and total cultivated area in 1998 represent 4.57 times, 1.97 times and 11.68 times the 1990 figures respectively.

Table 1. Certified Green Foods in China, 1990–1998

	Number of Products Certified (number)	Number of Producers (number)	Area of Certified Farmland (hectares)	Area for Green Food as Proportion of Total Agricultural Area (per cent)	Production (tonnes)	Production of Green Food as Proportion of Total Food Production (per cent)
1990	127	81	40,000	–	350,000	–
1994	580	211	467,000	0.49	691,000	0.11
1998	1889	619	2,257,000	2.36	8,410,000	0.74

Source: Estimated from CGRDC statistics (1997, 1998) and the China's Statistics Yearbooks (1995, 1999).

Since 1994 the production of green food has continued to increase at a fast pace. In 1998, production of green food in China was estimated at 8.41 million tonnes, which is 24 times the 1990 figure and accounts for approximately 0.74 per cent of China's total food production in 1998. There were 619 firms registered as green food production entities, with 2.257 million hectares of farmland under green food production, which is equivalent to 2.36 per cent of total agricultural land. Table 1 shows the rapid growth in green food production in the past few years in China.

There are a number of reasons for this increase in green food production. First, the growth coincided with China's sustainable development policy. In mid-1994, the Chinese Government put forward its Action Plan for Sustainable Development (China's agenda 21). Two of its aims to support sustainable agriculture and sustainable development of food production and consumption. Second, growth in domestic and export demand was also an important factor. Third, much of the rapid growth can also be attributed to the local government's active role in encouraging farmers to convert to green food production. Production target plan and financial assistance from many local governments have been the key attributes for this increase. Since 1997 two state-level green food demonstration bases (GFDBs) have been approved by the Chinese government and established in Shanghai and Tianjing municipalities respectively. The GFDZs were selected in areas that have good ecological environment. These bases aim at providing production models for other areas in how to improve the development of green food production. Since then, as one of the measures of increasing farmer's income and improving ecological environment, many local authorities and organizations have set up many small-scale bases in provincial or county levels in China to produce green foods. All of the above reasons encouraged more farms to convert to green food production.

Distribution of production firms

The above table outlines the distribution of green food production firms by province. In 1996 China had a total of 463 firms engaged in green food production (Source: CGFDC, 1997). The leading province for green food production being Helongjiang and Inner Mongolia, followed by Beijing, Shandong and Hebei.

There are two main reasons for this unbalanced development between districts. First, the production of green foods is closely related to the development of ecological agriculture. In China, since the mid 1980s, 50 counties have been selected by the Chinese government to serve as experimental counties for sustainable agricultural production and for developing ecological agriculture, which aims at reducing natural resource degradation and environmental pollution and improving the quality of agricultural products. Generally speaking, because of the impact of developing ecological agriculture, the production of green foods for those Province where ecological agriculture has achieved progress has a larger share. Second, the development of green foods is attributed to the backing of local government. In order to stimulate green food production, many local governments have launched an action plan to improve green food production, distribution and sales. For example, the Helongjiang Province aims to make it one of the leading suppliers of green foods in China. The government set targets for green food production and land under production and set out plans to assist with distribution and marketing. The current plan calls for 20 per cent of all farmland to be under green food production in the next few years.

Table 2. Firms for Green Food Production by Province, 1996

	Number	Share	Rank
Helongjiang	85	18.4%	1
Beijing	43	9.3%	3
Shandong	29	6.3%	4
Hebei	25	5.4%	5
Inner Mongolia	44	9.5%	2
Liaoning	18	3.9%	7
Xingjiang	20	4.3%	6
Jilin	16	3.5%	8
Zhejiang	4	0.9%	16
Tianjing	15	3.2%	9
Hainan	8	1.7%	13
Shanxi	15	3.2%	9
Gansu	11	2.4%	11
Jiangsu	25	5.4%	5
Hunan	6	1.3%	14
Sichuan	15	3.2%	9
Shanghai	9	1.9%	12
Guizhou	4	0.9%	16
Henan	6	1.3%	14
Hubei	2	0.4%	18
Shanxi	5	1.1%	15
Guangdong	6	1.3%	14
Fujian	13	2.8%	10
Tibet	2	0.4%	18
Ninxia	3	0.6%	17
Anhui	9	1.9%	11
Jiangxi	8	1.7%	13
Guangxi	6	1.3%	14
Yunnan	6	1.3%	14
Qinhai	5	1.1%	15
Total	463	100.0%	

Product structure

According to the statistics from the China Green Food Development Centre (CGFDC), the green food products range from cereals, edible oils, fruits, vegetables, meat, eggs, dairy products, aquatic products, alcoholic and non-alcoholic beverages, and other groceries, green food products are produced all across the country, with 40 per cent produced in the South and 60 per cent in the North areas, and with primary products accounting for 38 per cent and processed products for 62 per cent in 1998.

The breakdown of green foods by product sector is provided in Table 3. According to Table 3, in 1998 the greatest number (approximately 39 per cent) of green food products is in the vegetable sector, followed by cereals and edible oils (18 per cent), other groceries (23 per cent), wine and other alcohol (six per cent), fruits (five per cent) and beverages (five per cent) respectively. Only one per cent of green food products are in the aquatic product sector. However the greatest area of green food production is in the alcohol and beverage sector. They accounted for 43 per cent of the total green food area while cereals and edible oils and livestock products accounted for 22 per cent and 17 per cent respectively, followed by vegetables (eight per cent), fruits (four per cent), aquatic products (four per cent) and other groceries (two per cent).

In 1998, among the 1,018 products certified as "Green Food," there are 22 per cent for cereals and edible oils, followed by beverages (20 per cent), livestock products (15 per cent), vegetables (14 per cent), fruits (13 per cent), other groceries (nine per cent), wine and other alcohol (six per cent), respectively.

Table 3. The Structure of Green Food Production by Product Category

Product Category	% (Volume)	% (Area)	% (Number)
Cereals and Edible Oils	18	22	22
Beverages	5	43*	20
Meat, Eggs and Dairy Products	4	17	15
Fruits	5	4	13
Vegetables	39	8	14
Wine and Other Alcohol	6	–	6
Aquatic Products	1	4	1
Other Groceries	22	2	9
Total	100	100	100

**The figure includes the wine and other alcohol sector. Source: CGRDC, 1998.*

III Certification system

In over 10 years of development, great achievements have been made in certification and standards in China.

Certification and inspection bodies

Green food certification and inspection bodies consist of a certification body, authorized management agencies, environmental monitoring and evaluation bodies, and food products testing and evaluation bodies. This system is set up using an authorization approach, and the management system is kept separate from the monitoring system to ensure fairness and justice in the process of certification.

In China, before 1992 the Ministry of Agriculture certified green food directly. Since then, the production, processing and marketing of green foods has been regulated by the CGFDC, which was established in 1992 based on the Green Food Development Office established in 1990 that is affiliated with the Ministry of Agriculture. The CGFDC is a semi-official certification and management body. The Centre has been a member of IFOAM since 1993. Anyone wanting to grow or process food that is to be sold as "Green Food" must be registered with CGFDC in China. In almost every Province, there is at least one local management agency responsible for the development and management of green food production in the relevant province. By the end of 2000 there are 38 green food management agencies established at provincial and regional level.

In terms of inspection, farm and processing facility inspections are employed by a third-party agency. By the end of 2000, there were 56 environmental monitoring and evaluation bodies accredited to be in charge of environmental inspection and evaluation at local producing areas, and nine food products testing and evaluation bodies accredited to be responsible for final products inspection and evaluation in the process of certification.

Certification standards

As described above, in China, green foods normally refer to those foods that are certified by specialized agency to carry the 'Green Food' label. To maintain the integrity of green food from farm to consumer, green foods are required to comply with the standards in farming, processing and post-harvest handling. Four standards must be met for food certified as "Green Food":

- The production of the produce, or components of products, must conform to the environmental standards.
- The farming of crops and aquatic products, the raising of livestock, and the processing of food products must conform to the production standards.
- All produce or products must comply with the products standards.
- The packing and distribution of products must conform to the packaging and label standards.

Therefore, the certification standards range from ecological environmental management to the packaging and labelling of the final product. From farm to market, thorough tests will be conducted to ensure the quality of the food and of the growing environment. The environmental and production standards are set forth according to geographic regions. The environmental standards contain soil, water, and air condition requirements. It requires that the primary farm produce or raw materials for foods processing be grown in areas under no threat of pollution from nearby industrial facilities, upstream or windward side, so that the air, soil and water all conform to the relevant standards. The production standards consist of production and handling requirements, and a list of substances allowed or prohibited for green food production and processing. Prohibited materials include most synthetic pesticides and fertilizers. It specifies the norms and obligations for crop farming, animal husbandry, fish farming, poultry farming and food processing, as well as the restrictions on the use of pesticides, fertilizers, food additives and antibiotics for livestock and poultry. The product standards consist of two parts, in which one is the product quality criterion and the other the hygienic standard that serves to guard against contamination by pesticide residual, toxic metals and harmful microorganisms. The packaging standards contain specific terms for trademark, the standard color, advertising wording, and packaging serial numbering norms along with typical examples for compliance.

According to the degree of foods meeting the above four standards, there are two categories of certified "Green Foods": The AA Grade and A Grade Green Food.

- The AA Grade Green Food is that which is certified by the accredited certificate body and produced according to approved standards without the use of synthetic pesticides and chemical fertilizers.

Table 4. The Standards of AA Grade and A Grade Green Foods

	AA Grade	A Grade
Environmental Standards	The First-Class Criterion under the National Atmospheric Environmental Quality Standard (GB3095-82). The National Farmland Irrigation Water Quality Standard (GB5084-92). The Fishery Water Quality Standard (GB11607-89). The Third-Class Criterion under the National Surface Water Quality Standard (GB3838-88).	Employing the same standard as the AA Grade but with a single pollution index computed from air, water and soil criteria for evaluation (the indices must be less than 1).
Production Standards	No use of any harmful synthetic fertilizers, pesticides or food additives, and the following two criteria: Criterion for Pesticide Utilization in The Production of Green Foods, Procedures on Green Food Production for Corresponding Regions.	Limited quantities and a restricted range of synthetic fertilizers and pesticides can be allowed.
Product Standards	No synthetic pesticide or food additives detected in products and other similar criterion as in A Grade.	Evaluated against the specific standards established for A Grade green food by the Ministry of Agriculture.
Packaging and Labeling Standards	The National Packaging Materials Standards, National Standardized Food Label Criterion (GB7718-94). The National Packaging Materials Standards, National Standardized Food Label Criterion (GB7718-94). The National Manual for Green Food Logo Design. Both the logo and the typeface in green, with the background in white.	Employing the same standards as the AA Grade, with white for both the logo and the typeface against a green background.

Source: CGFDC, 1995.

- The A Grade Green Food is that which is certified by accredited certificate body and produced according to approved standards with a specific list of fertilizers and chemical substances that can be allowed to use for growing and processing green foods.

As described in Table 4, both of these green foods should be produced in an environment that is in keeping with the prescribed criteria and according to specific production and product standards, and both should pass tests of processing and packaging quality controls before being certified by the certification body. The main difference between AA Grade Green Food and A Grade Green Food lies in that while no use of artificial synthetic such as artificial fertilizers, pesticides, herbicides is allowed in the AA Grade Green Food production, such substances can be applied in restricted range and limited quantity in the A Grade Green Food production.

In China, the range of products that can be registered as "Green Food" is extensive, with products ranging from fresh fruit and vegetables, cereal, meat and dairy products, to beverages and alcohol, condiments and other food products. Almost every food category has a green food version.

IV Marketing

Market size

The domestic market for green foods is just developing, with green foods appearing in specialized retail stores, supermarkets, and hotels and restaurants in the past few years. China's overall green food market is estimated at about RMB 40 billion ($US4.88 billion), and the green food market at the moment is a tiny niche within the retail food sector.

According to a survey of consumer attitudes toward green foods conducted by the CGFDC in 1996, up to 90 per cent of consumers in Beijing and Shanghai are interested in green foods consumption, and 79 to 80 per cent of consumers claim to be willing to buy green food and pay a premium if they are made available at a reasonable price. It is believed that with the increase of people's disposable income and of environmental protection and health food awareness, the domestic demand for green food will increase as well.

Meanwhile, according to the Xinhua news agency, the volume of China's green food export has increased to US$200 million in 1999 from US$50 million in 1997 and US$100 million in 1998. Demand for China's green food and organic products from overseas buyers in the U.S., Japan and Germany have driven a threefold increase in exported volumes during the last three years. Among the current exports of green food products from China of US$200 million, Japan is the largest market for China's green food exports, followed by Europe, the U.S. and other markets. Within total exports, Shandong Province has accounted for the largest portion of US$45 million with an export quantity of 68,000 tonnes, mainly of peanuts, fruits and vegetables. China's green food products that have been exported include beans, peanuts, vegetables, tea, honey and others.

Price premium

At a retail level, the price premiums for AA Grade Green Food range from two to 30 times higher than for their conventional equivalents. The premium for A Grade Green Food is mainly dependent on the market and consumer response. Table 5 highlights the price premiums of "A Grade Green Food" rice for selected markets.

Table 5. Consumer Price Premiums for A Grade Green Foods in Selected Markets

	Beijing	Tianjing	Xiamen	Tangshan
"Green Food" Rice (RMB per kg)	4.6	4.6	4.14	4.0
Conventional Rice (RMB per kg)	2.0	2.2	2.6	2.0
Price Ratio of "Green Food" to Conventional Equivalent	2.3	2.09	1.59	2.0

Source: Survey results by the author, March 1998

As Table 5 illustrates, although these markets clearly demonstrated a strong premium for green food, with the price ratio of 1.59–2.3 of green food to conventional equivalents, the premium achieved varied by market. In some markets, the premiums achieved are limited by the consumer's attitude to food spending. For example, consumers in Tianjing spend less on high quality food per capita than their Beijing neighbours.

According to a survey result from Beijing's several main supermarkets conducted by the authors in March 1999, the premiums for vegetables ranged from the same price as or up to 20 per cent higher than the conventional equivalents. An interview with consumers in Beijing showed that consumers' purchasing behaviour depends on the following factors: the quality of green foods was the main criterion affecting purchase decisions (cited by about 80 per cent of the sample), followed by price (20 per cent). Over 90 per cent of the respondents purchased green food for health reasons. Most consumers who purchased green food paid a premium of 10 to 30 per cent over conventional food. Higher price was the main reason for consumers not buying green foods.

The higher prices asked is mainly due to:

- higher production costs;
- generally lower yields; and
- fee for certification.

Distribution channels

In the early 1990s, specialized stores for green foods were opened in several large cities. They failed as a result of shortage in supply and variety of green food. As green food production increases, it is now distributed in a similar manner to conventional produce, with major supermarkets looking to year-round supply. At present, there are four main distribution channels utilized:

- direct sales from producer to consumer;
- supermarkets;
- special retail stores; and
- other outlets.

Table 6 illustrates the market share held by the various distribution outlets. As this table demonstrates, supermarkets dominate the market. As supermarkets have increased their market position since early 1990s, supermarkets have also become the main outlet for green foods, due to convenience, price and other

factors that attract consumers. Many major supermarkets in large cities undertake extensive market promotion through in-store advertising and consumer education, which have a positive effect on sales through increased consumer confidence. Direct sales also play an important role, accounting for 20 per cent of the market. The producers directly deliver products to restaurants and hotels periodically. While 20 per cent of green food products are sold through specialized retail stores and other outlets. Most supermarkets and food stores display green foods next to conventional items, although some stores also have a shelf specifically for green food.

Table 6. Green Food Sales Through Different Outlets, 1998–1999

Retail Outlet	Per cent share
Supermarkets	60
Direct Sales	20
Specialized Retail Stores and Other Outlets	20
Total	100

Source: Survey results in Beijing, 1999

Labelling

There are two trademarks labelled on Green Food. They are the government logo and the individual firm logo. The government logo is a nation-wide uniform label, the "Green Food." Growers and processors that comply with the green food standards use it. Previously described labelling standards and the China Trademark Law regulates the "Green Food." Products that meet the Green Food standards and are certified as "Green Food" can carry the government logo. The individual firm logo is used to build upon a firm's "brand" image.

V Future perspectives

As the development of the Chinese economy and the increase of people's disposable income continues, and consumers have become increasingly concerned about the quality of the food they are eating, it is expected that food consumption patterns will change. In domestic market, the demand for green food products in China has risen significantly due to consumers' concern about the environment, food safety and nutrition. In international markets—particularly developed markets—Green food will meet fewer trade barriers and will enjoy much faster growth.

Although green food production is still in the early stages of development in China, some farmers and government officials are beginning to see the market potential for the environmentally friendly green food products both in domestic and foreign markets. Green food production is being considered one of the ways to increase farm incomes and improve environmental quality in many districts. Higher volume of green food products will strengthen consumer confidence in the green food industry, which will contribute to bringing down the high prices that green foods tend to demand. With higher levels of consumer purchasing and further production development of green foods, the green food market should continue its growth toward becoming a strong food industry.

However there are many issues that must be solved for the further development of the green food industry in China. The main issues are as follows:

- There exists a lack of understanding of the deference between "organic food" and "green food." In China, although organic food and green food were certified by two different organizations,[1] green foods are accepted as the same as organic foods by most people. The effective cooperation between the certification bodies for "Green Food" and "Organic Food" must be intensified. Many local officials and farmers are undecided about whether to pursue sustainable agriculture by embracing organic food standards or by adopting green food standards.
- After China's entry into the World Trade Organization, the higher costs (with certification fees in particular)[2] of green food production make the products lack of competition in the international markets for some products. China's food exports, especially those destined for the markets in Japan, the U.S., EU, Hong Kong and other developed countries and regions, are actually the green foods in accordance with the A Grade Green Food, but most without the labels of Green Food.
- There is a lack of supply of effective organic fertilizer and of measures for pest control. In order to promote the use of organic and biological fertilizer instead of chemical fertilizer, new technology has to be introduced to promote the production of organic and biological fertilizer.
- "Green food" in China has primarily targeted the export market; although there is growing demand for organic food (not A Grade Green Food) export in the international food market, the production of AA Grade green food in China

is far behind demands. In order to meet the demands of foreign markets, the production of AA Grade green food must be increased.[3] Those farmers in remote regions who could never afford to use pesticides in the first place are in the best position to meet the growing demand for AA Grade green foods or organic foods. Their soils are usually uncontaminated by industrial pollution and they often retain knowledge of traditional farming methods, such as crop rotation and intercropping, that naturally increase soil fertility and reduce pest infestations. But there exists a lack of money and organized production management.

- Marketing linkages between producers and retailers are important aspects that must be addressed. As production increases, prices will decrease. Intensive market competition from major retailers will also result in lower prices at a retail level.

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Endnotes

1 In China, the Organic Food Development Centre, associated with China's State Environmental Protection Agency, certify organic foods and farms based on the standards of international organic standards such as that of IFOAM, the International Federation of Organic Agriculture Movements.

2 Taking the food product certified in Beijing as an example, the basic annual certification fee (excluding the fee paid for using 'Green Food' trademark) for one product was about RMB 8,600–9,300, which averaged 53–60 per cent of a farm household's annual income.

3 In China, the certification of AA Grade Green Foods began in 1996, with 14 products certified as "AA Grade Green Food," accounted for two per cent of total green foods certified. By the end of 1998, the number of AA Grade Green Food certified reached 22 products, which is equivalent to about 2.3 per cent of total green foods certified.

ISO 14000 Standards and China: A Trade and Sustainable Development Perspective

by Tom Conway

1 Environmental management systems (ISO 14001)

The International Organization for Standardization (ISO) is a federation of non-governmental organizations established in 1947 to develop international standards, improve international communication and collaboration, and facilitate the exchange of goods and services. The federation is currently comprised of close to 100 national standards bodies (member bodies) from countries representing approximately 95 per cent of the world's industrial production. The headquarters of the ISO secretariat is in Geneva, Switzerland.[1]

In connection with preparations for the UN Conference on Environment and Development (held in Rio de Janeiro in 1992), the ISO established a Strategic Advisory Group on the Environment (SAGE) in 1991 to assess the need for international environmental management standards.[2]

The key factor that has propelled the ISO 14000 series of standards forward throughout the early 1990s is the increase in national environmental standards. Examples of these standards include some two dozen eco-labelling schemes world-wide (see Annex 1), the British Standards Institute's BS 7750 (Specification for Environmental Management Systems), the Canadian Standards Association's Z750 (A Guide for a Voluntary Environmental Management System), and the EU EMAS (Eco-Management and Audit Scheme). Other similar environmental management standards have been developed by the French Standards Association, the South African Bureau of Standards and the Spanish Standards Association. With the proliferation of environmental standards, concerns have been expressed that these standards would fragment international markets and unduly favour the companies of the countries or of the regions where these standards were developed, unless they were developed by authoritative and broadly-based international bodies. The ISO was to serve this role.

In 1993, ISO set up a new technical committee, ISO/TC207 "Environmental Management" to develop the standards proposed by SAGE.

Two standards (ISO 14001 and ISO 14004) developed by the ISO/TC207 Subcommittee 1 (SC1) were published on September 1, 1996; and three standards (ISO 14010, ISO 14011 and ISO 14012) developed by SC2 were published on October 1, 1996. These five standards form the backbone of the ISO 14000 series of environmental management standards. Other standards under development in the ISO 14000 series include standards for environmental performance evaluation (EPE), life-cycle assessment (LCA) and environmental labels and declarations. Below are brief descriptions of the various standards.

- *Environmental Management Systems (ISO 14001 and ISO 14004)* – ISO 14001 and ISO 14004 are the central environmental management system standards in the ISO 14000 series. These standards allow an organization to take a systematic approach to the evaluation of how its activities, products and services interact with the environment and to control those activities to ensure that established environmental objectives and targets are met.
- *Environmental Auditing (ISO 14010, 14011 and 14012)* – The auditing standards developed by SC2 cover general principles of auditing, procedures for auditing an EMS, and qualification criteria for auditors. They focus on verifying that the EMS incorporates the specifications laid out in ISO 14001. They provide support tools allowing an organization to monitor whether its EMS conforms to planned arrangements and its effectiveness and suitability.
- *Environmental Labelling (ISO 14024)* – The environmental labelling standards developed by SC3 outline rules and procedures for developing three kinds of labels: a general label for products that meet specified requirements (Type I), one for specific claims such as energy efficiency or recycled content (Type II), and one that summarizes a life cycle inventory so consumers can compare products on the basis of environmental impacts in manufacturing and use (Type III).
- *Environmental Performance Evaluation (ISO 14031)* – The environmental performance evalu-

ation standard being developed by SC4 is to provide guidelines for measuring, analyzing and assessing a company's environmental performance relative to established objectives and targets. This standard will support the specification in the ISO 14001 standard that organizations seek continuous improvement.

- *Life-Cycle Assessment (ISO 14040)* – SC5 is developing various standards to provide guidelines for the use of life-cycle assessment in decision-making. Life-cycle assessment looks at the environmental impacts of products, processes and services from raw material acquisition to final disposition, or from "cradle to grave."
- *Environmental Product Standards and Definitions* – Working Group 1 on environmental aspects of product standards is at a very early stage. SC 6 on terms and definitions will not produce documents since its role is to review documents from the other SCs to make sure definitions are consistent throughout all ISO 14000 documents.

ISO 14001 provides an excellent opportunity to improve the environmental performance of companies. There is growing experience internationally that systematic approaches to improve corporate environmental performance (increasing efficiency, reducing resource use and minimizing wastes and polluting emissions) can improve government relations and public image in the market, reduce costs and expand market opportunities. However, because ISO 14001 does not establish performance standards on its own, the amount of environmental performance improvements will depend on the strength of a company's environmental policy and the domestic environmental policy regime. China will need to overcome a cost barrier to the implementation of the standard, particularly in small- and medium-size enterprises.

2 ISO 14000 and trade

There is a concern that ISO standards are likely to become increasingly important to international trade in part because of their treatment in the World Trade Organization (WTO). The Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary Standards (SPS) Agreements of the WTO require that countries base domestic regulations on international standards except where international standards would be an ineffective or inappropriate means for the fulfillment of the "legitimate" objectives of the domestic regulation.[3] The TBT Agreement specifically refers to the ISO and establishes rules for how mandatory "technical" regulations and voluntary "standards," including those in the environmental field, should be developed, designed and implemented.

A Code of Good Practice for the Preparation, Adoption and Application of Standards is included in Annex 3 of the TBT Agreement. The Code applies to voluntary standards and essentially incorporates the obligations imposed under the TBT Agreement for mandatory technical regulations. Voluntary standards supported by national governments are required to comply with the code, and national governments must take reasonable steps to ensure compliance by sub-central governments and non-governmental standardizing bodies within their territories. The TBT agreement applies to all members of the World Trade Organization (WTO) and disputes arising under the agreement may be pursued under the WTO dispute settlement procedures.

It can be argued that recognition of ISO standards under the WTO affords these standards a special status for members of the WTO and will result in them becoming more important over time. Many observers suggest that ISO standards will:

- constrain flexibility to develop environmental standards demanded by the public and that are appropriate to domestic circumstances since countries are urged to adopt international standards;
- result in pressure being placed on governments to not develop policies and regulations because voluntary standards produced by the ISO will be in place; or
- result in pressure to soften existing policies and regulations in ways that transfer more responsibility for environmental performance improvements to voluntary compliance without mechanisms being retained to ensure actual performance improvements.

As a result of these concerns, the ISO's work has recently become more political and more subject to scrutiny. The relationship between the WTO and the ISO will undoubtedly keep the ISO closely tied with current and emerging trade and environment issues. This relationship also points to the importance of countries, including China, staying actively involved in the ISO process.

The WTO will depend on the ISO to address some difficult standards questions where international harmonization is desired to avoid trade barriers and conflicts. The life-cycle assessment and eco-labelling

standards of the ISO 14000 series already exist as two important examples of this relationship. There is concern that activities in these two areas have high potential to lead to unnecessary trade barriers if international rules/standards are not set.

Procurement requirements in export markets

The ISO 14001 EMS standard will likely bring significant benefits to exporters who become certified to the standard and trade barriers for those who do not. These benefits and barriers will arise from governments, corporations and consumers requiring ISO 14001 certification before they will purchase products and services. For instance, many observers argue that if you are trading into Europe it will be essential to have ISO 14001, just as it is now essential to have ISO 9000 in the European market.[4] It is even possible that requiring ISO 14001 certification by suppliers will become a basic requirement in some jurisdictions in coming years.[5] In short, governments and multinationals may routinely require ISO 14001 by suppliers with very few opportunities for exceptions.

The impact on foreign suppliers of procurement policies influenced by environmental criteria can be demonstrated by the Scott Paper supplier challenge case. Scott Paper, a formerly Philadelphia-based company,[6] had become aware of the increasing importance of environmental concerns as a factor in its customers' purchasing decisions. To address this issue, Scott Paper developed the environmental standards through a systematic life-cycle assessment of its products from the forests through to disposal. Suppliers were informed of this decision and given "a reasonable amount of time" to address their problems. Scott's suppliers are located in various countries around the world. A number of suppliers were dropped by Scott as the changes required to improve their environmental performance were too great to be dealt with in the short term. Scott's initiatives also influence suppliers to the rest of the paper industry.

With the implementation of the ISO 14000 series of environmental management standards, increasingly purchasers are likely to require ISO 14001 as a minimum to differentiate between suppliers. However, it is also likely that they will look to other standards of environmental performance along the lines pursued by Scott Paper to provide additional differentiation between suppliers. Scott Paper undertook this initiative to answer environmental criticism in its major developed country markets, a circumstance that will become increasingly common for multinationals. Multinationals will compete on the basis of the total environmental quality of their products from cradle to grave, from suppliers to recycling or disposal.

The impact of ISO 14000 standards on other environmental policies

Certain of the ISO standards are also important to trade because of the influence they will have on other environmental policies and initiatives. For example, as noted above, there has been a rapid increase in environmental labelling programs world-wide that will be influenced by the ISO standards on environmental labelling. These standards will establish new rules for the development of environmental labels that can impact trade. Trade impacts of environmental labels are most likely when process and production methods form part of the criteria for assessing eligibility for the label.

The life-cycle assessment standards in the ISO 14000 series will also have far-reaching significance because life-cycle thinking is an underlying concept and/or an applied tool for many environmental policies within government and business. For instance, life-cycle thinking underlies concepts such as eco-efficiency, industrial ecology, pollution prevention, environmental management systems, including ISO 14001, full cost accounting, extended producer responsibility, product stewardship and green design. These concepts are becoming influential in corporate and government environmental policy throughout the developed countries because they attempt to answer the desire of decision-makers to improve the environmental performance of organizations (increasing efficiency, reducing resource use and minimizing wastes and polluting emissions).

The trade relevance of life-cycle assessment stems from the final phase of a life-cycle approach that addresses developing a plan to reduce environmental impact. For example, there could be a greater environmental benefit in switching to a different raw material in the manufacturing process. Or, possibly, switching to another supplier of a raw material who demonstrates fewer negative environmental impacts.

ISO 14000 and policies for sustainable production and consumption (SP&C)

ISO 14001 is but one element of the broader movement we are seeing around the globe towards sustainable production and consumption and environmental performance improvements more specifically. For this reason, it is likely that ISO 14001 alone will not be enough to address all the environmental performance and export trade challenges that countries and

companies will face as environmental requirements in global markets evolve. It is important to keep this point in mind because, as noted above, some countries and companies may believe that ISO 14001 is the total solution to their environmental challenges at home and abroad.

Most of the prominent international environmental organizations now have programs designed to encourage SP&C patterns that are looking well beyond ISO 14001. For instance, the OECD is helping define and evaluate the range of policy options available to promote greener commercial operations. Similarly, for the last four years, UNEP has collaborated to promote cleaner production on a world-wide basis by raising awareness of technology, exchanging information, strengthening capacity and supporting the establishment of National Cleaner Production Centres. International environmental agreements, such as the Climate Change Convention, are also influencing countries and businesses to move towards better environmental performance.

The Nordic countries, the Netherlands, Germany and Japan are current leaders in policies and activities targeted at improving corporate environmental performance, including integrating environmentally-conscious technology and products into their strategies for future industrial competitiveness.[7] Germany's leadership in this area is also very influential for developments in the rest of the European Union (EU). These leading countries have recognized that international trade, technological advantage, and quality employment prospects will increasingly be influenced by environmental issues.

One of the main lessons that can be drawn from an international scan of policies designed to encourage sustainable production and consumption, is that slow progress in certain countries will not provide any inherent competitiveness advantages to corporations and will likely involve many disadvantages. Slowness in adopting greener operations means that companies will enjoy fewer of the efficiency benefits associated with improved environmental performance. This could translate into lost trade opportunities, lower profits, less employment opportunities and a dirtier environment.

The leading countries are actively seeking new areas and innovative ways for government to help business move to greener operations. Although appropriate interventions differ according to the particular structure of the economies and the various political and cultural traditions, a number of common themes can be identified.

Green operations initiatives in the leading countries typically involve a mix of policy instruments and approaches. Generally, voluntary frameworks are tried first before development of regulations, taxes or charges. For instance, the Netherlands "Policy Document on Products and the Environment" stresses a voluntary framework, but does envisage supportive use of regulations and economic instruments as needed (Netherlands, 1994).

Where governments are intervening, they are focusing on articulating clear objectives by sector and then providing considerable flexibility as to how to achieve the objectives—either by means of voluntary challenge programs, negotiated agreements, or performance based regulations. Some governments are also making selective use of technology forcing and behaviour changing regulations. In Germany, for example, regulations remain a prominent means to advance greener products and services, especially in the area of recycling but with real potential for other regulations to be developed soon to pursue other SP&C goals. The 1994 Closed Substance Cycle and Waste Management Act requires radical changes in an attempt to move the economy from heavy reliance on waste disposal to one based on closed loop cycles.

China will need to closely watch these emerging policies to the extent that they bring environmental and economic benefits and challenges. Active participation in the ISO's work and undertaking ISO 14001 certification will be important steps that will help China face developments such as supplier challenges, but ISO work will not be all that needs to be done. From a trade point of view, China will need to look in an integrated fashion at the entire range of its environmental activities directed at improving the environmental performance of industry (e.g., clean production auditing and ISO 14000) to assess the adequacy of these activities to prepare China's export industries for emerging challenges and opportunities.

3 Choosing industry priorities for ISO 14001

The ISO 14001 standard will involve significant costs for industry, and governments assisting industry participation will not be able to move on all fronts at once. Therefore, a major challenge for governments is to choose industry priorities based on calculations about where best to make domestic environmental improvements, protect export markets and pursue new export opportunities.

It is worthwhile to note that China will have special difficulties in attempting to implement ISO 14001 in the growing township and village enterprises (TVEs) and the chronically indebted state-run enterprises. Most of the TVEs are located in rural areas, have few employees, use backward technology and cause serious environmental pollution in rural areas. It is reported that about one-third of the country's more than 100,000 state-owned enterprises are chronic money losers. Excessive workforces and outdated technology and management approaches are the main reasons for their financial problems.

It will be financially difficult to implement ISO 14001 in both the TVEs and state sector.

Nevertheless, introducing environmental management systems in these enterprises can help reduce their overall environmental impact and improve cost-efficiency by implementing new systems. However, ISO 14001 will only be a very small step. These enterprises will require other government policy instruments to move them towards better environmental performance, including domestic policy and regulations, economic incentives, exhortation and information, and direct government intervention, such as in the form of subsidies for restructuring.

A priority setting approach

An approach for selecting priorities for ISO 14001 certification would involve: 1) identifying industries with sensitive environmental issues; 2) disaggregating these industries to identify the companies that are most exposed to the environmental issues; and 3) disaggregating the companies to identify facilities that are the greatest contributors to this exposure keeping in mind that ISO 14001 certification is done at the facility level.

An assessment of environmental issues enters into ISO 14001 priority setting in two ways. First, it may be that an industry, company or facility is posing significant risks to human health and the environment in China that are a priority to the government and will be reduced through better environmental management systems. Second, it may be that a company is exporting products with greater actual or perceived environmental significance and, therefore, greater exposure to the environmental concerns of purchasers in export markets. The first point reveals the need for an analysis of environmental impacts and needs within China and will not be discussed further here.

Regarding the second point, it was noted in Section 2.5 that the chemical, electronics, pulp and paper, and non-woven industries have followed the development of ISO 14000 standards closely. This provides one strong indication of where companies are perceiving export trade exposure to environmental issues. However, there will undoubtedly be other Chinese companies that should be considered for priority action on this basis. One helpful way of identifying what these priorities might be is to look at certification activities in other countries that currently have a lead on ISO 14001 primarily for trade reasons.

Another helpful way of identifying priorities is an analysis of export profile. As noted earlier, the Nordic countries, the Netherlands, Germany and Japan are current leaders in policies and activities targeted at sustainable production and consumption and typically look for an environmental management system as a minimum requirement. With some exceptions, it is also these countries that experience the greatest environmental sensitivities of governments, the public and consumers, followed closely by the remainder of Europe and North America.

4 Conclusions

The analysis in this paper leads to four broad conclusions on the strategic issues for China associated with ISO 14000.

First, many important issues are unresolved in the ISO 14000 process. In particular, the product oriented standards for environmental labelling, life-cycle assessment, and environmental characteristics of product policies are still being developed. To this point, the ISO process has been dominated by industry from OECD countries and has under-represented developing countries and public interest groups.

Second, ISO 14001 provides an excellent opportunity to improve the environmental performance of companies. There is growing experience internationally that systematic approaches to improve corporate environmental performance (increasing efficiency, reducing resource use and minimizing wastes and polluting emissions) can improve government relations and public image in the market, reduce costs and expand market opportunities. However, because ISO 14001 does not establish performance standards on its own, the amount of environmental performance improvements will depend on the strength of a company's environmental policy and the domestic environmental policy regime. There is also a cost barrier to implementation of the standard, particularly in small- and medium-size enterprises.

Third, the ISO 14001 standard can be an important tool in domestic environmental management

regimes. It can improve compliance with domestic environmental policies and regulations and help export industries deal with environmental challenges in foreign markets. Environmental regimes and economic performance are linked because the environment increasingly influences competitiveness in important export markets.

Fourth, it is likely that ISO 14000 standards will become increasingly important to international trade arising from:

- the treatment of ISO standards in trade rules;
- the role that ISO 14000 standards will play in government procurement policies and the purchasing practices of large corporations and consumers as the standards become accepted in global markets;
- the impact that these standards will have on the design of eco-labelling programs and other government and corporate initiatives based on the life-cycle assessment decision tool; and
- the role that ISO 14001 can play in preparing countries and companies for current and emerging policies and initiatives directed at SP&C that can have an impact on trade.

These conclusions lead to certain recommendations for China. China has an opportunity to maximize environmental and economic benefits and lesson possible trade barriers of ISO 14000 by:

- adopting the ISO 14001 EMS standard aggressively in priority sectors, including by working with small- and medium-size companies;
- using the ISO 14001 system to begin preparing companies for the other environmental challenges they will face arising out of current and emerging SP&C policies;
- working with companies to improve their environmental policies so as to improve the environmental performance of the country;
- ensuring that the domestic environmental regime works with ISO 14001 to promote actual environmental performance improvements; and
- actively participating in the ongoing ISO process that is still producing product oriented standards, (e.g., environmental labelling and life-cycle assessment standards), that will be important to trade and environment issues in the coming years.

Endnotes

1 Detailed descriptions of ISO are found in Knight (1994), Nash and Ehrenfeld (1996) and the European Environmental Bureau (1995).

2 Nash and Ehrenfeld (1996) describe the formation of SAGE in this way although other authors have various explanations. Cascio (1994) attributes the formation of SAGE to the growing number of environmental standards world-wide and the overwhelming adoption and acceptance of ISO 9000, which moved ISO to command SAGE with investigating the need for an international environmental management standard and making recommendations on how to approach the development of such a standard.

3 The SPS agreement will not be discussed in this paper. This Agreement refers to the Codex Alimentarius which is an important international standards body involved directly or indirectly with human health and environmental issues. Any larger analysis of international standards that could impact China should also consider this organization.

4 Kirkpatrick (1995) and several other authors mention this point.

5 Kantardjieff *et al.* (1995) and Johnston (1995) speak of this within the pulp and paper industry, and Tibor and Felman (1996) are among the several others who mention this potential impact of ISO 14000.

6 The company was taken over by Kimberley-Clark, and no longer exists as Scott Paper.

7 Resource Futures International, Green Design (1996).

Impacts of Environmental Standards in EU Countries on China's Textile Industry

Xiaoyue Shen[1]

1 Background

China has a close trade relationship with the EU. In 1995, the EU became China's third largest trade partner following Japan and the U.S. Sixty per cent of China's exports to the EU consist of textiles, clothing, toys, electrical appliances and leather.

The textile sector is China's principal exporter. In 1997, China's textile exports totalled US$43.199 billion. China has indeed become one of the leading textile and garment producers and traders in the world.

Since the 1990s, many countries have adopted environmental standards and requirements restricting the use of harmful chemicals in the production of textiles and clothing. Some of these standards and requirements are imposed by laws and regulations. The best known is the Second Amendment to the Consumer Protection Act enacted by the German government in 1994 prohibiting the use of azo dyes. The Fifth Amendment to the Act came into force in April 1997. Since then, many other European countries have followed suit. In 1996, the Netherlands also enacted a law prohibiting the use of certain azo dyes. The contents of this legislation are similar to the list of banned substances in German law. Other countries in Europe, such as Sweden, France, Denmark and the EU are also in the process of formulating legislation concerning azo dyes.

In addition to mandatory environmental standards and requirements for textiles, there are some ecolabelling schemes imposing environmental requirements for textile products on a voluntary basis. The most well known programs include Milieukeur and Eko of the Netherlands, and Oeko-Tex Standard 100 and Toxproof of Germany.

Generally speaking, the German Act of 1994 forbidding azo dyes and some ecolabelling standards for textiles such as Oeko-Tex Standards 100 are the ones that have the most trade implications. They have had both positive and negative impacts on the world textile trade, imposing a great challenge for textile exports of China as well as other developing countries.

The azo ban in the amendments to the Consumer Protection Act in Germany

On July 28, 1994, the German government issued the Second Amendment to the Consumer Protection Act. The law prohibits the use of azo dyes in textile products that have direct skin contact for prolonged periods, such as textile garments (even outerwear) and bath towels (pages 1670–1671 in the Act). These banned substances can be any of the 20 specific cancer-causing aromatic amines that are formed from the azo group decomposition process. The law took effect as of July 1, 1995. Sales of textile products using such banned substances in the dyeing or printing process are prohibited in Germany.

The Fifth Amendment to the German Consumer Protection Act took effect in April 1997.

Provisions in the Fifth Amendment include:

- Products containing banned azo dyes manufactured or imported by March 31, 1996 can be sold in Germany until December 31, 1998.
- The import of work uniforms, working protection products is prohibited, but can be sold inside Germany after December 31, 1998.
- Products made from recycled fibres can be imported or manufactured until December 31, 1999.
- Products, which contain pigments that may release banned amines, can be manufactured or imported until March 31, 1998, and sold inside Germany until September 30, 1998. Pigments do not fall under the legislation if an azo test proves that they do not split off any of the banned amines.

2 Impacts of EU's environmental standards on China's textile industry

Various environmental regulations and standards concerning textile and clothing have aroused tremendous concern world-wide. Some countries have begun to amend and upgrade their own legislation and regulations, while others are actively doing research in the field. Generally speaking, the most influential ones are the German Act of 1994 forbidding azo dyes and the ecolabelling standards concerning textiles such as Oeko-Tex. These environmental standards and requirements have had both positive and negative impacts on international trade in textiles. They have imposed a great challenge for China and other developing countries.

Negative impacts

Although the study shows some positive impacts of the European textile environmental standards on China's trade, they have brought about some negative impacts. They include the following:

1. Affecting market access of some Chinese textile products in foreign markets

   There are a number of practical examples indicating the effects of the German Act banning azo dyes on Chinese textile exports.

2. Increasing production costs of some textile products

   In order to cope with the German Act and prevent further losses of China's textile exports, in 1995, the Dyeing Division of China Silk Industry Association required all textile-dyeing factories to check their commonly used dyes. At that time the Chinese dyes were not up to foreign standards and there were no unified and authoritative test organizations in China or any other countries. Many Chinese dyeing factories did not know what substitutes and what testing methods to use. Faced with this situation, the Dyeing Division of China Silk Industry Association proposed that all major textile factories, including Suzhou Silk Dyeing Factory, Suzhou No. 2 Silk Dyeing Factory, Shanghai No. 7 Textile Dyeing Factory, Shaoxing Silk Dyeing Factory and Huzhou Silk Dyeing Factory, use imported dyes manufactured by Bayer of Germany and Ciba and Sanders of Sweden, as they may provide the certificate indicating that the banned azo substances are not used. Products could only be manufactured after the sample was approved by importers. The price of the imported dyes was about 3–5 times higher than that of the domestic dyes.

   Although this contingent measure was taken to prevent losses such as return of goods, fines or even on-site destruction, the use of expensive imported dyes greatly increased product cost and affected the price and the overall competitiveness of the Chinese products.

3. Affecting the Chinese textile dye market

   Among various kinds of environmental standards and requirements, the ban on azo dyes used in dyeing has the most impact. The ban has not only affected textile and clothing manufacturers and trading companies, but also the dyeing industry, which is an inseparable partner of the textile industry.

After Germany imposed the ban in 1994 and relevant authorities checked all the domestic dyes against the list of the banned substances, it was found that 104 kinds of dyes being manufactured and used in China fall into the ban. Their output was a fairly large number. For example, RGFL yellow disperse dye alone had an annual output of more than 6,000 tonnes throughout the country.

As Germany did not specify the methods for testing at that time, some producers could not be sure whether domestic substitutes would meet the requirements. In order to avoid potential losses, relevant departments required that all the products exported to Europe use imported dyes. The investigation to textile and dyeing enterprises in Jiangsu and Zhejiang provinces found that during 1995–1996, the use of imported dyestuff increased from 10 per cent to 40–50 per cent. According to statistics, the foreign currency used to import dyes in 1996 amounted to US$134 million, about a US$1.5 million increase over that of 1994, with a growth rate of 12.5 per cent.

Direct dyes have a wide array of colours including yellow, orange, red, purple, blue, gray and black, the complete colour spectrum. They can be used for dyeing knit, silk, cotton, threads, towels and quilts as well as other textile products. They are widely used due to their convenient application, simple synthesis and low price. Twenty per cent of dyes used in the knitwear sector and 15 per cent in the silk sector are direct dyes. So the consumption of direct dyes is very large, the second highest after sulfur dyes, and sales of such dyes are also large in China. National statistics showed that 77 out of 118 Germany-banned sub-

stances are direct dyes. For two successive years in 1995 and 1996, the import of these direct dyes in China exceeded the export. Thirty-seven categories of direct dyes being produced and used in China have been banned by foreign countries, in particular European countries, accounting for 62.7 per cent of the direct dyes in China in terms of variety, or 30 per cent in terms of total output. The import volume of direct dyes in 1995 and 1996 was about 11,500 tonnes, costing US$25,371,100 in total.

Positive influences

Despite some negative impacts created by environmental standards and requirements in Germany and other European countries on China's textile trade, it should be noted that these standards and requirements have also brought about some positive influences. These include the following:

1. Promoting environmental standards for textile and clothing products

   During the past two decades, China has established a system of environmental regulation and management suitable for its own situation. It has promulgated 6 environmental laws, 28 environmental regulations, more than 70 environmental administrative rules and 375 environmental standards at the national level, and over 900 pieces of local regulations. However, as a developing country, the environmental infrastructure in China is still weak and the measures for environmental management are inadequate. Environmental standards are very low for some products. For a considerable number of products, there are no environmental standards or requirements at all.

   Environmental requirements for textile and clothing products are considerably low. For several decades, there have been no environmental requirements for most of textile products with two exceptions: a maximum amount of 300 ppm formaldehyde is allowed in silk and pure cotton slim cloth exported to foreign markets; and a maximum 500 ppm of formaldehyde is permitted for the award of a ministerial-level "National Excellent Product."

   With the increased international environmental agreements and public environmental awareness, particularly emerging environmental standards and requirements for various textile products in foreign countries in recent years, many enterprises in China, in particular many trading companies or enterprises that have trading rights, find it difficult to grapple with this new situation. Since there are no domestic standards and testing methods, Chinese products are in a disadvantaged position.

   In 1995, facing the azo ban imposed by Germany and some other European countries for textiles and the restrictions on heavy metal in these products while no domestic standards and testing methods were available, China Association of Textile Industry (now the State Administration of Textile Industry, SATI) formed a task force to research and formulate national standards and testing methods for azo dyes and heavy metal concentration for textile products.

   Testing standards for free ions of heavy metals in textile products in different countries have been studied, in particular the maximum value standard for heavy metals in textile products of Oeko-Tex Standard 100. A testing method of atomic absorption spectrophotometry has been defined. This method is currently under review.

   A great amount of foreign literature and numerous documents on testing method for carcinogenic substances in the dyes have been considered, mainly based on the Provisional Testing Method for Azo Dyes in Textiles formulated by the German Federal Institute for Consumer Health Protection and the Institute of Veterinary Pharmaceuticals. After the German azo ban, China has formulated a testing method by using gas chromatography and gas-mass chromatography.

2. Promoting environmental labelling in the textile industry

   Since the establishment of the Chinese environmental label in 1995, the environmental standards for three categories of textile products have been formulated, namely natural plant fiber textiles, anti-boring textiles and pure silk products.

   The technical standards for the natural plant fiber textiles are the same as those used in the Oeko-Tex standards. The products must be made of natural plant fiber without being dyed. There are also a number of very stringent restrictions on the amount of chemicals allowed in the production process. The products in this category must not be dyed or bleached with chlorine, nor contain chlorophenasic acid and chlorophenosic acid 2, 3, 5 and 6. The standards also limit the use of

formaldehyde, the content of derivable heavy metals and pH value of overflows. The difference is that this standard is currently only applied to natural plant fiber textile products. Since such textile products do not go through the dyeing and printing processes, hazardous substances in these products are fewer than those in other textile products. This may mean that such products are easier to comply with the standards.

3. Promoting research and development of green dyes in China

   Seventy-seven direct dyes being used in China fall under the 118 banned substances by German law, accounting for 65.2 per cent of the total variety of dyes in China. There are 72 dyes containing benzidine and its derivatives. Benzidine used to be an important medium in the dyeing sector and about 50 per cent of the total output of direct dyes use benzidine as the raw material. Its colour spectra are very rich, including red, black, green, gray, and brown. The toxicity of the banned dyes comes mainly from the medium of 22 kinds of aromatic amines, so research on substitute dyes has focused on these amines and the dyes produced by using these amines. The first step is to use a non-benzidine medium to replace the benzidine medium. Meanwhile, research and the development of substitutes for those banned direct dyes, acid dyes and disperse dyes should also be undertaken.

   Considering the German azo ban, the wide promotion of the Oeko-Tex Standard 100, and the dilemma that the Chinese textile and dyeing sectors are facing, the authorities for the textile and dyeing sectors in China worked together with the department of commodity inspection in 1994 and 1995 for strategies, solutions, and substitutes for the banned dyes. Their starting point was that the ban should be treated as an important opportunity to increase environmental awareness in the textile and dyeing sectors, to improve the quality of dyes, to expand the market share of dyes and to promote the development of the dyes in China.

   Shanghai, where many textile and dyeing enterprises are located, reacted actively to this ban. Led by Shanghai Municipal Economic Commission, Shanghai Dyes Company, many textile manufacturing companies and trading companies worked together to undertake research and development of substitutes.

   Research on substitutes for the banned dyes is a very complicated task. The substitutes must be better than the original dyes in terms of colour properties, durability, environmental requirements and price. Much progress has been made in this field in other countries while China has just made the first step. In recent years, the increasing demand for domestic and international markets for environmentally friendly dyes has accelerated research, development and production of substitute dyes in China. At present, the production capacity of a certain scale of some substitutes has taken shape. This has added new life and brought new opportunities to many textile manufacturing and trading companies.

4. Promoting product restructuring in the textile dying sector

   According to incomplete statistics, China had nearly one hundred companies producing banned dyes. Although as early as the 1970s, the department of chemical industry had formulated regulations which banned the production of some carcinogenic substances such as benzidine and use of these substances as raw materials to produce azo dyes, this ban was not implemented due to the weak enforcement mechanisms. In the past decade or so, a number of dye manufacturing enterprises, particularly those small village-and-township enterprises, continued to produce and sell these banned dyes in order to pursue high profits. These products still enjoy a certain market share due to their low price.

   After the German ban was adopted, China has begun the inspection of the implementation of the Chinese ban in the dying sector, focusing on the use of raw materials, the production process and management. Many companies have established the rules that their products will not contain or be derived from carcinogenic aromatic amines. Since environmental standards and requirements are being upgraded in other countries, many exporting companies and enterprises have to pay more attention to the source and quality of dyes they use to ensure that their products will not contain the banned substances. The result will be undoubtedly that the market for the banned dyes will gradually shrink. Therefore, many dye producers have to readjust their product structure, stop the production and sales of those banned dyes, actively develop new dyes, improve the dye quality and try to increase the market share through good quality and more variety of dyes.

5. Promoting foreign investment in the dyeing sector

   Since 1995, some big chemical companies from Germany, Switzerland and some other European countries have come to China to establish large joint ventures to produce dyes. BASF has established a factory in Shanghai to produce pigments and agents, with an annual production of 5,900 tonnes of pigment, 3,100 tonnes of positive-ion dyes and 26,000 tonnes of agents. In addition, a company merged by the two biggest German dye-manufacturing companies, Bayer and Hoechst,[2] has established a joint venture in Wuxi.

   These foreign-funded companies or joint ventures use mature technologies and adequate capital to produce conventional dyes as well as popular ecologically friendly dyes on a large scale. They claim that these dyes do not contain carcinogenic aromatic amines banned by Germany and other ecological labels. They play an active role in upgrading the level of production and management in the Chinese dye sector, improving the dye quality and developing the environmentally friendly substitutes.

3 Comprehensive analysis

WTO/GATT rules concerning trade and environment

With increasing international trade competition and globalization of environmental issues, the issue of environment and trade has increasingly become one of high concern for the international community. The WTO Committee on Trade and Environment, established in 1995, was mandated to address issues such as how to coordinate the relationship between environment related trade measures and trade related environmental measures to enhance sustainable development, impacts of environmental measures on market access, in particular on the developing countries. Although there was no special agreement on environmental issues in the final package as the result of the Uruguay Round negotiations, environmental issues were covered in the basic WTO/GATT principles and other related agreements, such as TBT and SPS.

The general principle is that all the Parties, on one hand, have the right to formulate and implement the environmental policies and measures to prevent environmental pollution and maintain public order; on the other hand, these measures should not impede the normal operation of the multilateral trading system and result in disguised means of trade protection. Moreover, transparency of legislation, necessary information, technical assistance as well as special treatment to developing countries should be fully considered.

Exports of developing countries are dominated by primary and processed goods; they do not have adequate funds and capacity to conduct new scientific research and develop new technology. Their environmental requirements are inevitably lower than those of the developed countries. Historically the world economic order has long given rise to substantial differences between developed and developing countries on many issues. Among them, the issue of different environmental requirements and standards is one of the most important focal issues between the North and the South.

Due to the differences in the level of development, the level of technology and environmental awareness, environmental standards in developed countries are generally higher than those of developing countries. Some developed countries adopted unilateral environmental measures and imposed higher environmental requirements for various purposes. Their departure points vary. One motivation may be for environmental purposes, which is aimed at protecting the environment and human health. This is a new trend in world trade development and shows that people's environmental awareness world-wide is increasing gradually. Another intention is to use environmental measures as an excuse for limiting the trade of some products and to protect certain industries. Because these unilateral measures lack transparency and scientific basis,[3] policies formulated and implemented reflect a great degree of randomness. Therefore these measures may easily impede international trade and affect the market access of the products from developing countries.

Observations on the German ban and its impacts on China's trade in textiles

Azo dyes are used as leading colouring agents in the textile industry, especially in developing countries. The German ban on azo dyes aroused the international community's attention once it was issued. The German legislation was contested in the European Court of Justice, as the ban was thought to constitute a trade barrier. More strong responses came from developing countries. Major textile exporting countries, such as China and India, were mostly concerned that the ban would affect market access and competitiveness of their textile exports.

According to the TBT, it is clear that the German ban was issued to protect public health. A number of studies have demonstrated that certain azo dyes could release certain carcinogenic and toxic aromatic amines, which would do harm to human health. Of various toxic dyes, the most problematic ones are azo dyes. Some azo dyes are found to have chronic toxic effects. Generally speaking, the original intent of the German legislation is to protect consumer health rather than protecting trade, so called green protectionism. This has been accepted in general by the international community. Nevertheless, some countries in formulating regulations concerning azo dyes have taken a more cautious approach, as the long-term effects of certain azo dyes on human health and the environment are still not clear. For instance, EU is still assessing the risks of azo dyes in textiles. The result of the assessment will form the basis of whether the EU-wide regulation should be adopted.

Although TBT ensures the right of states to protect public health, it also requires countries to follow the principles of transparency and openness in formulating rules and providing necessary technical assistance to other countries and special treatment to developing countries. The study finds that Germany neglected some of the important aspects of TBT, such as transparency, consultations with major exporting countries, and providing necessary technical assistance.

Moreover, the German ban is inadequate itself. It was amended three times, and the Fifth Amendment to the Consumer Protection Act was promulgated in April 1997. The Second Amendment issued in July 1994 prohibited the use of 20 categories of carcinogenic aromatic amines by January 1, 1995, and banned the sales of textile products dyed and printed with these harmful dyes in Germany by July 1, 1995. However, when the ban was adopted, Germany did not specify the standard testing methods and the thresholds for the testing results. The fact that the act was amended three times within two years indicates the ban itself was inefficient. The ban was a very immature act when it was first introduced. It was due to its immaturity and uncertainty that influenced international textile trade, in particular exports from developing countries.

Although the ban was revised during 1995–1996 and did not actually come into effect until the Fifth Amendment was adopted, many German textile importers nevertheless required exporters to provide the certificate of azo-dye-free for their products, because these importers were afraid the imported goods, if found to contain the banned dyes, might be impeded in the German market due to this ban.

Before the Fifth Amendment came into existence, many Chinese exporters were greatly troubled by the fact there were no standard methods for testing and no thresholds for the final tested products. Many manufacturing enterprises could not be certain whether their products exported to Europe could meet the requirements of the importing countries until the Fifth Amendment provided the final testing methods by the German Ministry of Health. A threshold of 30 ppm per banned amine was also provided. A product that contains less than or equal to this threshold is considered a non-azo product. Before the Fifth Amendment, some exporting companies in China suffered losses, as they could not be certain whether their products contained azo dyes or not. They had to pay higher costs for imported dyes and for testing so as to avoid unnecessary losses during 1995–1996.

Despite the fact that the original intent of the German ban was positive and legitimate, as it aims to protect human health, it has nevertheless brought about some obstacles in international trade, especially to exports from developing countries including China. Before the legislation was adopted or during its implementation, Germany did not fully consider providing necessary and relevant information and technical assistance to China or other developing countries. Meanwhile, special treatment to developing countries was not considered either.

According to the investigation of China's major textile exporting companies, during 1995–1996, the German ban caused great pressure to many textile, dye and dyeing enterprises and trading companies in China, as their products and exports were impeded because of this ban. Due to many uncertainties of the ban itself and lack of understanding and knowledge of this ban, some producers and exporters in China had to stop exporting the textile products containing azo dyes. The competitiveness of some products was weakened due to the increased costs as a result of this ban.

After suffering from some losses and high costs, the Chinese textile sector has gradually overcome the difficulties of the trade obstacles created by the German ban through necessary adjustment and adaptation.

With the promulgation of the Fifth Amendment, Germany finally announced the required testing standards and methods. The textile and dye sectors and the commodity inspection authorities in China responded actively and tried to turn the ban into opportunities to improve their products, expand mar-

ket share and upgrade environmental management in these sectors. The commodity inspection authorities both at national and local levels, such as in Shanghai, Guangdong, Shandong, Zhejiang, Jiangsu, Hunan and Liaoning, have established a number of testing institutions that have been accredited by Germany. This substantially reduces testing costs and makes exporters feel sure about the required quality of products. In addition, progress made in developing and use of some environmentally friendly dyes has helped reduce the product costs. Through a survey of some Chinese trading companies, the study finds that many companies no longer feel the pressure. Even though German and other European importers all require non-azo-dye products in general, Chinese enterprises do not use the banned dyes any more.

However, this does not mean that all the obstacles have been completely overcome. The domestic production of dye substitutes is far from meeting the domestic demand and many producers still have to pay higher costs to meet the higher environmental requirements. Meanwhile, the list of banned substances is still expanding and many other developed countries are following suit. Therefore, the textile, dye and dyeing sectors in China should pay close attention to international development in this area, and make great efforts to strengthen environmental management of these sectors in order to gain a better position in future international competition.

4 Recommendations on enhancing environmental standards and promoting trade development of China's textile industry

To increase the environmental standards and requirements and promote trade in the textile sector in China, the following recommendations are put forward:

1. Strengthening environmental standards and requirements and establishing environmental indicators for textile products

   Environmental standards and requirements for textile products in China are generally lower than those in the developed countries. To address this issue, China needs to gradually upgrade its environmental standards and requirements for textile and clothing products. In formulating its own standards, China should fully consider internationally accepted standards and specifications, and try to bring its standards in line with those international standards. This will level the playing field for Chinese products entering the international market. Meanwhile, in revising and improving its product quality standards for textiles, environmental indicators should also be established.

2. Strengthening environmental management of textile and dye manufacturers to ensure their environmental competitive advantages

   The fundamental for the textile and dye industries in China is to improve their environmental performance and strengthen environmental management. Efforts should be made to promote the implementation of ISO 14000 environmental management systems and ecolabelling in these sectors, and make ISO 14000 and ecolabelling certification consistent with that of other countries.

3. Undertaking technology innovation, expending foreign direct investment and actively developing domestic environmentally friendly dye substitutes

   Developing domestic environmentally friendly dye substitutes is the key to expanding Chinese textile products. This must be done according to the plan, placing emphasis on major, difficult technical problems. The government should increase investment to research and development of substitutes and strengthen cooperation with relevant foreign agencies, encourage foreign direct investment and technology transfer in order to promote the domestic production of dye substitutes.

4. Establishing a mechanism to monitor and publish information and strengthening international exchange and cooperation

   China should establish a mechanism to track and to release information on environmental standards and requirements in foreign countries to Chinese exporters. Relevant departments should be designated to closely monitor and collect information on various environmental standards including those for textile and clothing products; and provide such information to relevant exporters in a timely fashion.

   China should actively participate in the various activities organized by international organizations so that it will be well aware of the latest development and trend in the environment and trade area. China should be of vigilance about the threat of green protectionism that could impose

potential barriers to China's trade and boycott any environmental requirements that violate the WTO principles. Meanwhile, China should participate in international coordination and consultations aimed at harmonizing environmental standards, and seek to obtain mutual recognition of environmental standards and requirements and ecolabelling standards for textile products from as many countries as possible. China should also actively contact foreign standard-setting organizations in order to obtain necessary information and technical assistance.

Endnotes

1 The project is directed by Mr. Fengzhong Cao, former Director of the Policy Research Centre for Environment and Economy. The author is deeply grateful to Dr. Ruqiu Ye, Chinese co-chair of WGTE, Dr. Konrad von Moltke, Senior Fellow of IISD, international environmental affairs, U.S.A., and Dr. Wanhua Yang, Program Officer of IISD, Canada, for their useful comments and suggestions.

2 However, Hoechst has now merged with Rhone Poulenc and formed Aventis.

3 This is contrary to the WTO rules which requires transparency and a scientific basis.

Improving Outer Packaging for Sustainable Growth of China's Foreign Trade

by Zhihai Zheng and Jijian Yang[1]

I Introduction

Since the 1970s, developed countries and regions have become increasingly aware of the environmental problems caused by packaging materials. Major environmental problems associated with packaging materials include depletion of natural resources, disposal and recycling of packaging materials as well as wastes resulting from packaging. The European Union, the United States, Japan and other developed countries have placed an increasing number of restrictions on the manufacturing and consumption processes of packaging materials to protect environmental resources, revising their sanitary and phytosanitary regulations related to packaging, legislation regarding disposal of packaging materials and packaging wastes, and regulations concerning prohibition and restriction of certain packaging materials.

As a result, export and industrial packaging is experiencing unprecedented changes. Although pallets remain the most important forms to deliver exporting goods, yet its shape, weight, and nature are changing. Containers with lower transport cost, smaller size, and better shock absorption are being adopted. New collapsible pallet-containers are more popular as they can be reused and take up only one-third of the space when collapsed. Reuse and recycling are generating a far-reaching impact on all kinds of export packaging. Most of the packaging materials manufactured today contain a certain percentage of recyclable or reusable materials. The percentage of such materials in packaging is likely to increase continuously.

Wooden packaging, cardboard packaging, steel barrel and plastic packaging are the main composition of outer packaging for export goods as shown in Table 1.

Current status of Chinese outer packaging

Wooden packaging remains dominant in China's outer packaging and accounts for over one-third of all packaging. It is used extensively for the transport of larger and heavier goods weighing more than 500 kilograms. Major importers of such products include the United States, European Union, Germany, Canada, Australia, and Southeast Asian countries.

Wooden packaging comes from three sources. First, it comes with imported goods and is reused for export packaging. In such cases, place of origin is often not clear and such packaging can contain all kinds of insect pests. Second, it is made of timber imported mostly from the Southeast Asian countries. Third, it is made of domestically grown timber. Utilization of artificial timber is far lower than that of developed countries.

China exercises a licence management system for export packaging, which designates licences to producers. The licence system, however, only applies to the wooden packaging products covered by the Category List in the Commodity Inspection Law. Those wooden packaging products exclusive of the Category List are produced all over the country.

The treatment of wooden packaging is determined depending on the requirements of goods, producers, and local conditions. One way is to fumigate goods together with wooden packaging, which is applicable to those goods that can be fumigated without affecting the quality, or to those producers that want or have to do so for various reasons. Another way is to apply fumigation or heat treatment to wooden packaging separately before use. The main reason is that certain goods cannot be fumigated, or it is more economical to treat wooden packaging separately. Since the United States, Canada, and United Kingdom imposed new quarantine requirements on wooden packaging of Chinese goods since September 1998, to ensure quality of export goods, most producers require that packaging be fumigated with the goods inside the container.

In 1991, China's commodity inspection agency introduced a licence management system to ensure quality of the wooden packaging of export goods covered by the Category List in line with the Inspection Law and strengthen control over the selection of material, structural design, and product assembly during production. In addition, commodity inspection agencies also strengthened inspection and management of the use of wooden packaging to ensure that high quality timber is used properly and efficiently. In general, the quality of wooden packaging products covered by the Category List is relatively good, while those not covered are mixed.

To protect both the environment and limited forest resources, China has been encouraging the development of nontoxic and nonpolluting timber substitutes used as outer packaging for export goods. Some progress has been made. a) Synthesize or combine timber with other new materials to reduce timber consumption. b) Take advantage of the rich bamboo resources in south China to develop nonpolluting and recyclable bamboo packaging materials such as bamboo slab packaging box. c) Further research and development efforts in recycling of plastic, dissolvable plastic and substituting wooden containers with plastic containers for chemical, mineral, and agricultural products.

In general, China has made some progress in the development of packaging materials. With growing environmental awareness and advancing environmental technology, outer packaging made of materials other than wood and paper are likely to develop further.

Issues facing China in developing outer packaging of export goods

The State Commodity Inspection Administration developed and issued the Procedures Governing Inspection of Outer Packaging of Export Goods in 1990, laying a foundation for the improvement in inspection and administration of export packaging. Also, China's Environmental Protection Law has clear stipulations governing treatment, recycling, and reuse of outer packaging materials. The Rules Regarding Management of the Printing Industry issued by the State Council provides for the printing of packaging. China National Packaging Corporation is working with the State Economic and Trade Commission to draft the Law on Commodity Packaging Management. Generally speaking, much remains to be done in legislation related to packaging, particularly export packaging.

China's standards for outer packaging include the Standards for Outer Packaging of Mechanical and Electrical Products, National Standards for Corrugated Cardboard Used for Corrugated Cardboard Boxes as Outer Packaging of Export Products, and National Standards for General Technical Conditions for Outer Packaging of Dangerous Goods. These standards have specific requirements for the quality, technology, and management of outer packaging of export goods and also involve certain environmental requirements. To meet the growing needs of international economic cooperation and trade, the State Commodity Inspection Administration, together with the Ministry of Foreign Trade and Economic Cooperation, jointly issued the Circular on Introducing Standards ISO 9000 in Enterprises Producing Export Goods in October 1991. Enterprises producing packaging for export goods must follow ISO 9000 standards.

Despite significant progress, China still lags far behind the advanced countries in the world with respect to the development of laws and regulations, government management systems, and the quality, design, inspection, and quarantine of outer packaging of export goods. Major challenges include:

- Slow legislative process has adversely affected supervision and administration of outer packaging of export goods.
- China does not have a packaging law. An incomplete legal system is the root cause for a relatively backward outer packaging industry. There are more than 500 national standards for outer packaging in China. Some of these standards have met international standards while a large gap remains in other aspects.
- Packaging organizations scattered in different ministries and lack of government coordination have negative impact on the packaging industry. As packaging involves a large number of industries, each specific industry has its own different requirements for outer packaging of export goods. It is extremely difficult to place the packaging industry under unified supervision and management. Furthermore, China does not have a specialized body to deal with increasingly important export packaging, especially with internal and external organization, coordination, and management of the packaging industry. This is a great impediment to the improvement and growth of the packaging industry.
- Quality of outer packaging of export goods falls far short of international standards. Quality problems of export packaging are found in all kinds of packaging materials. The main reasons are: a) diversified channels of material supply create opportunities for substandard materials to come along. b) Confronted with increasing competition in the domestic and international market, Chinese producers seek to cut costs of export goods at the expense of the quality of outer packaging. c) Some organizations do not have strict quality inspection and control systems for outer packaging of export goods.

- Technical level and process design of outer packaging of export goods is generally low and poor. Low technical levels or process design problems in outer packaging of export goods have contributed to excessive packaging and waste of resources. With new handling equipment and improved transport conditions, the coefficient of safety necessary for packaging has fallen significantly. Consequently, excessive packaging has become a common problem.
- Inspection and quarantine for outer packaging of export goods need to be strengthened. Currently, the commodity inspection agency exercises a quality licence system for producers of outer packaging. This is an extensive management model. Experience shows that it has obvious problems: a) Standards for evaluation and issuance of licences are not scientific. It only covers part of the factors of the enterprise quality system and focuses only on individual factors ignoring their interconnection and coordination.The grading system is not easy to operate in actual evaluation. Evaluation results between different groups and locations vary greatly; b) inspection rules and procedures for outer packaging of export goods are not well targeted; c) supervision and management are weak, reflected by the lack of control over the materials, production technology, product quality, and internal management of the manufacturing enterprise; and d) China's inspection and quarantine standards regarding outer packaging materials are not in line with international standards. This is not helpful in quality improvement and technical innovation of the outer packaging products.
- Research and development efforts in new outer packaging materials are insufficient. Pallet-based delivery has become an independent mode of transport in the U.S. and European countries. Therefore, China should make greater efforts to extend the use of pallets.

II New environmental requirements for outer packaging materials of major importing countries of Chinese goods

On September 11, 1998 the U.S. Secretary of Agriculture signed a new act enforcing new quarantine measures on all solid wood packaging and dunnage materials from China. This set off chain reactions in Canada, the United Kingdom and EU countries.

It was estimated that Chinese export goods worth about $US50 billion were affected. In response, the Chinese government called on enterprises concerned to take whatever actions possible to ensure that their wooden packaging complies with the requirements of these countries. Based on the statistics provided by the National Bureau of Statistics, Table 1 and 2 below show the composition and quantity of the wooden packaging for Chinese export goods to the U.S.

Table 1. Wooden Packaging Products for Chinese Export Goods to the U.S.

Customs Classification Code	Wooden Packaging Products
4415,1000	Wooden box, basin, crate, barrel and similar containers, cable barrel
4415,2000	Wooden pallet, box-shaped pallet and other crate or wooden pallet protecting basket
4416,0000	Large wooden barrel, vat, basin, and other wooden truss and parts

Source: General Customs Bureau

Table 2. Quantity of Wooden Packaging Products for Chinese Goods to the US, 1997, 1998 (Jan.–July)

Time	Customs Classification No.	Quantity
1997 whole year	4415,1000	2,198,862 pieces
	4415,2000	89,974 pieces
	4416,0000	209,966 kilograms
1998 Jan.–July	4415,1000	495,864 pieces
	4415,2000	46,901 pieces
	4416,0000	150,631 kilograms

Source: General Customs Bureau

III WTO rules and new environmental requirements on packaging materials

The package agreements resulting from the Uruguay Round refers to environmental issues in a number of places. Article XX of GATT 1994 on "General Exceptions" stipulates that a government can take measures "necessary to protect human, animal and plant life or health" (b) and "relating to the conservation of exhaustible natural resources if such measures

are made effective in conjunction with restrictions on domestic production or consumption" (g), even if they are in violation or noncompliance with the GATT obligations.

The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) states that its purpose is to protect the sovereign right of the government to determine reasonable health levels. It defines the principles for Member States to establish their sanitary and phytosanitary regulations. It also states in the Preamble and Annex B, sanitary and phytosanitary measures of Member States should be based on international standards, guidelines, and recommendations developed by the relevant international organizations.

The SPS Agreement has set rules for the allowable level of sanitary or phytosanitary protection. Members shall take into account available scientific evidence; relevant processes and production methods; relevant inspection, sampling and testing methods; prevalence of specific diseases or pests, i.e., appropriate protection level should be based on existing scientific evidence of the surrounding environment and assessment of the risks of related technology, way of production and spread of special insect pest, etc. However, Paragraph 4 of Article 5 stipulates that Members should, when determining the appropriate level of sanitary or phytosanitary protection, take into account the objective of minimizing negative trade effects. Article 7 on Transparency stipulates that Members shall notify changes in their sanitary or phytosanitary measures and shall provide information on their sanitary or phytosanitary measures in accordance with the provisions of Annex B, so as to enable interested Members to become acquainted with the proposed regulations.

Article 9 stipulates that Members agree to facilitate the provision of technical assistance to other Members, especially developing country Members, either bilaterally or through the appropriate international organizations. Where substantial investments are required in order for an exporting developing country Member to fulfill the sanitary or phytosanitary requirements of an importing Member, the latter shall consider providing such technical assistance and will permit the developing country Member to maintain and expand its market access opportunities for the product involved.

The Technical Barriers to Trade Agreement (TBT) also recognizes that a Member has the right to determine its own level of protection as it sees fit (such as the protection of human health or safety, animal or plant life or health, or the environment), and take measures necessary to ensure the implementation of such protection.

In order to develop international trade and reduce obstacles created by differences in technical requirements and product standards between countries, the parties of the Uruguay Round arrived at the TBT Agreement (TBT). The TBT Agreement consists of 15 articles and three annexes including technical regulations and standards, conformity with technical regulations and standards, and information and assistance.

The TBT Agreement recognizes first and foremost that "No country should be prevented from taking measures necessary for the protection of its essential security interests." "National security requirements, the prevention of deceptive practices, protection of human health or safety, animal or plant life or health, or the environment" are listed as major legitimate objectives.

According to the TBT Agreement, mandatory standards shall not create unnecessary obstacles to trade if they are based on international standards. However, if Members cannot base their mandatory regulations on international regulations for geographic, climatic or other reasons, they have the obligation to make available the draft regulations to other Members and allow producers in other Member countries to make comments. The TBT Agreement also states that Members have the obligation to consider the comments of other Members when they finalize the standards to ensure that attributes of the products produced and exported by other Members are given appropriate consideration.

The TBT Agreement recognizes that Members have the right to adopt technical regulations to help set mandatory product standards (including packaging and labelling requirements). Technical regulations are aimed at ensuring quality of export goods, protecting human safety, animal and plant life or health, or the environment. The TBT Agreement requires Members to ensure that the technical regulations adopted meet the following conditions: first, they are applicable to imported goods from all sources on the basis of the MFN status; second, products imported from the territory of any Member shall be accorded treatment no less favourable than that accorded to like products of national origin (national treatment); third, Members shall ensure that regulations are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to interna-

tional trade; and fourth, scientific data and evidence should be used as the basis.

Article 2.11 stipulates that Members shall ensure that all technical regulations are published promptly or otherwise made available in such a manner as to enable interested parties in other Member countries to become acquainted with them.

The TBT Agreement stipulates that voluntary standards should be based on international standards. The great difference between voluntary standards of Members is likely to cause problems in international trade. Therefore, Members shall participate fully in the development of international standards for products within the limits of their resources.

To allow producers in other Member countries to learn about the standardization process underway in each Member country, the TBT Agreement requires standardization bodies to disclose the existence of their work program, and where details of this program can be obtained, at least twice a year. The TBT Agreement also requires that the WTO Secretariat be notified of draft regulations sixty days prior to their formal adoption, if possible, so as to allow time for other Members to make comments.

Article 12 provides special and differential treatment for developing countries.

Some observations of the new environmental requirements adopted by major importing countries of Chinese goods:

The adoption of restrictive measures to prevent potential environmental problems by some European countries and the U.S. is understandable and in compliance with WTO rules. There may be some problems in China's wooden packaging for exports and further improvement is needed. Yet the actual approach taken by some countries to address these problems was not consistent with the spirit of bilateral economic and trade cooperation or with WTO principles and regulations. Major manifestations are:

- Nonconformity with the principle of nondiscrimination

  The principle of nondiscrimination requires equal treatment of all Members when a Member adopts restrictive measures. The TBT Agreement stipulates that technical regulations are adopted to ensure quality of export goods, protecting human safety, and protecting animal and plant life or health or the environment. The TBT Agreement requires that Members ensure that the technical regulations are applicable to imported goods from all sources on the basis of the MFN status.

  According to experts, the longhorn beetle is a common, normal insect in the world. China is not the only country or area where longhorn beetles exist. It is also found in Japan, Korea, and Malaysia. Judging from the findings of the Chinese plant quarantine delegation, longhorn beetles were only found in New York and Chicago. These two cities are 800 miles apart. Neither is a major port for imported Chinese goods. No longhorn beetles were ever found in Los Angeles or Charleston, major destinations for 50 per cent of imported Chinese goods. On the trees victimized by longhorn beetles, both the emergence hole and tree trunk were rotten, indicating that longhorn beetles in high density could be traced back at least 10 years. The beetles must have been there even longer. The United States does not have direct evidence proving that the longhorn beetles found in the U.S. came from China. Yet the actions of the countries concerned only targeted China. Besides, longhorn beetles in China live mainly in eight provinces and feed on poplar, willow, elm and pepper. Yet these regulations were targeted at all wooden packaging from China. This is unjustifiable, unfair, discriminatory and not in conformity with the basic principles of the WTO.

- Nonconformity with the regulation of using scientific evidence as the basis

  The SPS Agreement states that Members may introduce or maintain sanitary or phytosanitary measures which result in a higher level of protection than would be achieved by measures based on the relevant international standards, guidelines, or recommendations, if there is a scientific justification. The SPS Agreement has set rules for the latter circumstances: i.e., in determining the appropriate level of sanitary or phytosanitary protection and assessing the risks, Members shall take into account available scientific evidence; relevant processes and production methods; relevant inspection, sampling, and testing methods; prevalence of specific diseases or pests; i.e., appropriate protection level should be based on existing scientific evidence of the surrounding environment and assessment of the risks of related technology, way of production and spread of special

insect pest, etc. The TBT Agreement also provides that technical regulations should be based on scientific evidence.

Measures taken by the United States and other developed countries against China, however, were not based on scientific evidence. According to explanations provided by the Americans, the objective of the regulations against China was to ensure that no wooden packaging with insect pest would be allowed to enter the United States. Therefore, any other measures in line with this principal objective should not be rejected, i.e., the act should not be exclusive of any other measures that can achieve similar effects in eliminating insect pest from wooden packaging. In fact, the act only specifies three treatment measures, i.e., fumigation, preservatives, and heat treatment, excluding other measures that can achieve similar effects such as soaking and thin board treatment. This is neither scientific nor consistent with international phytosanitary principles.

In addition, measures provided by the U.S. act could also cause serious pollution (fumigation with celfume causes ozone depletion). Exclusion of other measures that can remove insects without adversely affecting the environment is not in line with the WTO's goal of protecting the environment and achieving sustainable development.

- Nonconformity with the principle of avoidance of unnecessary obstacles to trade

  Both the SPS Agreement and the TBT Agreement clearly stipulate that the authorities shall avoid creation of unnecessary obstacles to trade barriers when they prepare and adopt technical regulations and measures. Paragraph 4 of Article 5 of the SPS Agreement stipulates that Members should, when determining the appropriate level of sanitary or phytosanitary protection, take into account the objective of minimizing negative trade effects.

  The interim acts, issued by the countries concerned, were directed specifically against wooden packaging of Chinese export goods, even though they were part of their domestic regulations. As wooden packaging prevails in the packaging of China's export goods, the acts have created great difficulties and obstacles for China's exports. This is not in conformity with the principle of avoidance of unnecessary obstacles to trade.

- Nonconformity with the WTO regulation of notification

  Article 2.11 stipulates that Members shall ensure that all technical regulations adopted are promptly published or otherwise made available in such a manner as to enable interested parties in other Member countries to become acquainted with them. To allow producers in other Member countries to learn about the standardization process underway in each member country, the TBT Agreement requires that standardization bodies report the existence of their work program, and where details of this program can be obtained at least twice a year. The TBT Agreement also requires that the WTO Secretariat be notified of draft regulations, sixty days prior to their formal adoption, if possible, so as to allow time for other Members to make comments.

  Article 7 on Transparency stipulates that Members shall report changes in their sanitary or phytosanitary measures and shall provide information on their sanitary or phytosanitary measures in accordance with the provisions of Annex B, so as to enable interested Members to become acquainted with the proposed regulations.

  Yet the countries concerned did not follow this principle. The European Union, for example, announced emergency measures on June 1, 1999 without notifying or consulting China in advance and allowing them to make comments. This is not in conformity with the principle of notification.

- Nonconformity with the principle of special and differential treatment

  Special and differential treatment given to developing countries is a basic principle of the WTO, reflected in almost all its agreements. The WTO allows developing countries to have greater flexibility in fulfilling their obligations, and requires developed countries to provide technical assistance to developing countries so as to enable the latter to better fulfill their obligations.

  Article 9 stipulates that Members agree to facilitate the provision of technical assistance

to other Members, especially developing country Members, either bilaterally or through the appropriate international organizations. Where substantial investments are required in order for an exporting developing country Member to fulfill the sanitary or phytosanitary requirements of an importing Member, the latter shall consider providing such technical assistance as will permit the developing country Member to maintain and expand its market access opportunities for the product involved.

Yet when they place restrictions against China unilaterally, the United States and other developing countries are not providing China with any technical or financial assistance or training to help China fulfill their requirements.

IV Measures taken by the Chinese government and enterprises in response to new packaging regulations

Since the U.S. and EU are major importers of Chinese goods, one-third to one-half of China's exports were affected by these actions, resulting in slower growth of exports, higher treatment costs, and weaker competitiveness. Apart from consultations with the countries concerned and field visits, the Chinese Government responded by requiring that departments and enterprises concerned make great effort to take feasible measures and enable wooden packaging to fit the related regulations of the U.S. and EU, so as to minimize the impact on exports. For this purpose, the State Entry and Exist Inspection and Quarantine Department issued several emergency circulars related to insect pest elimination treatment for solid wood packaging destined for the U.S., Canada, and U.K. It also developed and issued measures concerning the management of wooden packaging quarantine and treatment, measures concerning supervision and management of fumigation and sterilization, operational procedures for fumigation, and operational procedures and technical standards for heat treatment of solid wood packaging.

Other major measures include: Strengthen supervision of the solid wood packaging for export goods that have quarantine requirements, provide training on insect pests elimination treatment for solid wood packaging, encourage development of new, inexpensive, and easy ways of insect pests elimination treatment, and adopt new packaging material.

Thanks to active efforts of the Chinese Government, positive results have been achieved nationwide in the inspection and treatment of solid wood packaging for export goods. Between January and May 1999, the American quarantine agency sampled 33,150 batches of solid wood packaging from China. 95.4 per cent of those inspected were found meet the standards, while 137 batches or .41per cent were rejected or disposed for their failure to meet the standards. The Americans were satisfied with the overall quality of treatment of solid wood packaging from China.

In the wake of the new environmental requirements introduced by the U.S. and EU for solid wood packaging of Chinese export goods, enterprises specializing in the production of solid wood packaging for export goods faced enormous difficulties and obstacles. This also created an opportunity for them to seek survival and growth in adverse circumstances. The case study of Suzhou Helper Wooden Packaging Factory (See Appendix 1) elaborates on the difficulties confronting enterprises specializing in the production of solid wood packaging for export goods, the efforts they made, and the success achieved.

The findings of the case study are as follows:

- The restrictive regulations introduced by the U.S. and EU, on one hand, rang the alarm bell and posed a challenge for China's packaging industry by indicating that the traditional solid wood pallet will eventually be phased out. On the other hand, the packaging industry is also facing an opportunity to accelerate its transformation. By seizing this opportunity, packaging enterprises will have greater possibilities for survival and growth, and the packaging industry will have strong prospects for sustainable development. Sustainable development of outer packaging for export goods is an inevitable way to revitalize China's packaging industry.
- The transformation of the traditional solid wood packaging industry that had been using solid wood pallets for years was like a revolution. In this revolution, new technology and new products play a leading role in responding to market changes. Innovation is the driving force for the sustainable development of export packaging.
- A new kind of wooden pallet, the plywood pallet, is put through heat and pressure treatment. Naturally it can be exported directly without being subjected to fumigation, because there is no problem of insect pests. Therefore, vigorous efforts should be made to extend the use of plywood pallet in export packaging.

- Under the conditions of market economy, the government department concerned should take action to strengthen the protection of intellectual property rights and supervision of the packaging industry.
- The Chinese Government should provide more credit incentives and financial support to successful enterprises and encourage them to develop and extend the use of new technology, so as to bring the entire packaging industry to a higher level.

V Recommendations for improving outer packaging for export goods and promoting sustainable development of China's foreign trade

Recommendations for helping the outer packaging industry to take a sustainable development approach

China should continue to strengthen macro-management of the outer packaging industry for export goods, develop new packaging materials to ensure sustainable growth of exports. Our recommendations are:

- Given China's distribution of resources, vigorous efforts should be made to develop new wooden packaging and wood substitute products: extend the use of plywood pallets and plywood board; develop OSB to upgrade the level of packaging materials in China; efforts should be made to develop all kinds of bamboo-based wood substitute packaging products in those areas rich in bamboo resources; experiments should be carried out to study the feasibility of substituting solid wood packaging with other materials.
- Develop laws and regulations to strengthen the legal framework for outer packaging of export goods. There is not sufficient macro-control of the packaging industry and there is no packaging law in China. Therefore, it is a matter of great urgency to develop laws and regulations related to outer packaging for export goods. We recommend that the Ministry of Foreign Trade and Cooperation develop the Outer Packaging Management Regulation first so as to provide a legal framework and ensure the quality of outer packaging for export goods.
- Given the problems related to the current decentralized management and discrepancies between policies in the packaging industry, we recommend that a special body be established to centralize management of outer packaging for export goods and conduct supervision of the export packaging in all industries, particularly outer packaging. This can help strengthen supervision of export packaging and ensure compliance with the related regulations and policies.
- Improve inspection and management systems for outer packaging in export goods. a) Detailed rules for the appraisal of quality licensing should be developed on the basis of ISO 9000 so as to provide criteria for the commodity inspection departments as well as enterprises. b) Since the quality of outer packaging depends on a variety of factors including the nature of the goods contained, mode of transport and time of delivery, we recommend that the procedures for outer packaging inspection be modified on this basis. c) Supervision of the quality of licensees should be strengthened to ensure material supplies and production be organized in strict quality control.
- Formulate a green packaging development program and increase government support.

  Since the financial benefit of green packaging is not immediately obvious, the government must give greater tax and credit incentives to accelerate the growth of a green packaging market.
- Implement ISO 14000, extend the use of biolabels and strengthen the foreign exchange generating capacity of outer packaging. In designing packaging products, focus should be placed on simplicity and recyclability, as well as non-toxicity, regeneration, and degradation. In production, priority should be given to reducing environmental pollution and raising the efficiency in utilization of materials.
- Commodity inspection departments should provide information and feedback to the packaging enterprises in a timely fashion and organize training of quality control and inspection staff in factories on a regular basis, to help enterprises improve the quality of packaging and enhance their environmental awareness.

Joining the WTO to better protect the rights and interests of China

As a developing country, China is weaker in economic and trade capacities compared to its major developed trading partners, and constantly faces the threat of uni-

lateral retaliation imposed by a few major trading partners. In bilateral trade disputes between countries, settlement of disputes is determined, to a large extent, by the economic strength and ability to retaliate, and judgment is likely to be biased toward the interests or standards of one party, with little objectivity and justice. There have been no existing international agreements or organizations to help arbitrate and settle trade disputes between China and a few developed countries. The WTO rules and principles were developed through consultations and negotiations with more than 130 countries, with significantly enhanced fairness, impartiality, and transparency. Assuming that China will join the WTO, its major trading partners would need to resolve their trade issues with China according to the rules and principles of the WTO and refrain from their unfair trade practices. In the case of non-compliance with WTO principles, China would be able to resort to dispute settlement mechanisms and seek fair explanations and practices to protect its own interests. Take the solid wood packaging case as an example. According to Section Four of WTO rules (which will not be repeated here), China should at least enjoy the following rights that are normally not available in bilateral trade:

- The principle of transparency.

  According to WTO rules, China's technical exchange and cooperation with its major trading partners would increase while incomplete information would decrease. China would have greater say and maneuvering space regarding the formulation and revision of technical rules of other member countries. Trading partners have the obligation to make public relevant information and solicit comments from the related parties in drafting those rules. This would help improve the external environment for China's exports and enhance its predictability and transparency. According to the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and Technical Barriers to Trade Agreement (TBT Agreement), China would have had opportunities to receive prior notification and express its views in such cases as the solid wood packaging case. But since China is not a member of the WTO, it had no choice but to compromise.

- The nondiscriminatory principle.

  According to the TBT Agreement, in the solid wood packaging case, the U.S. would not have had direct evidence that the longhorn beetles found came from China, and the new regulations introduced against China would have been in violation of the basic principles of the WTO. But since China is not a member of the WTO, it cannot defend itself.

- The special and favourable treatment and technical assistance provided by the developed countries as an obligation.

  According to the SPS Agreement and TBT Agreement, the developed countries should take into consideration the special requests of the developing countries, allow relatively longer time for their critical products to adapt and keep their access to export opportunities, and also provide other favourable and technical assistance. But since China is not a member of the WTO, it does not have these benefits.

- Take advantage of the dispute settlement mechanism of the WTO to resolve trade frictions and disputes.

  If China were a member of the WTO, it would not have had to compromise in the case of the U.S. or EU in violation of the WTO principles, because of the discrepancy in economic strength.

  The dispute settlement mechanism of the WTO provides the developing countries with an important means to deal with the few powerful developed countries. China should study and take advantage of the dispute settlement mechanism of the WTO as a useful weapon against unilateralism. This is not just a means to protect a country's economic and trade interests in bilateral negotiations, but provides multilateral procedures in seeking justice and defending one's own interests when bilateral negotiations fail or when one is facing unilateral threats or pressures.

  The rules and procedures governing dispute settlement were agreed among all members of the WTO through negotiations. They were not developed unilaterally on the basis of the domestic trade legislation or policy measures of any one Member country. This is essential in the judgment of disputes and balancing of rights and obligations.

  The WTO principles governing dispute settlement include: (1) the multilateral principle. The WTO Member countries are obliged not to take any unilateral action in cases that they regard as a violation of trade rules but must resort to multilateral settlement procedures and abide by its

rules and decisions; (2) the WTO dispute settlement mechanism has defined a common set of procedures for dispute settlement; (3) the principle of dispute settlement through consultations; (4) the principle of voluntary mediation and arbitration; (5) the principle of authorization to relief; (6) the principle of reasonable period of time; and (7) the principle of special procedures involving developing countries.

According to the WTO report released in May 1999, 168 cases were processed through its dispute settlement body from the date of the WTO's founding in 1995 to April 22, 1999. Thirty-two of the 168 cases were submitted by the developing countries, and 10 were jointly submitted by the developed and developing countries. This provides the developing countries with an opportunity to appeal and defend their rights and interests.

Endnote

1 This study is undertaken with the assistance of Fanchang Kong, Jing Chen, Jian Wang, Hongxia Wang and Xiaoyang Gu.

Section VII
Looking to the Future

Addressing Trade and Environmental Challenges in the Post-WTO Accession Era

by Ruqiu Ye

China joining the World Trade Organization (WTO) is an important event in China's social and economic development. It signifies that China has been further integrated into the process of globalization, and will bring profound impacts on Chinese future economic and social development. To adapt to new international economic and trade development and to promote sustainable development of national economy, China has now been carrying forward its reform and open-door policy. Joining the WTO is a necessary step for China to intensify its reform, enlarge its opening and establish its socialist market economy to further accelerate its economic development.

After accession to the WTO, China needs to fulfill its obligations to reduce tariffs, eliminate non-tariff measures that are not consistent with the WTO rules, open its domestic market, reduce market access restrictions and open more sectors, etc. Since the Uruguay Round, the average tariff in developed countries has been reduced to around four per cent, while developing counties to around 14 per cent. The average for WTO Members is six per cent. In 2000, China's tariff was 15 per cent, and will have to reduce to 9.44 per cent in 2005. China will gradually open its domestic market including the market for industrial products, agricultural products and services. China's major commitments include: state trading, non-tariff barriers, governmental pricing, subsidies and anti-subsidies, member reservation clauses, tariffs on industrial products, dumping and special safeguards, agriculture, and services such as telecommunication, life insurance, financial services, retail distribution systems, as well as the trade-related investment measures. In agriculture, China will have to phase out export subsidies and domestic support to 8.5 per cent of the total agriculture output value; reduce tariffs from 22.1 per cent to 17 per cent, and 14.5–15 per cent for certain products; apply the "tariff-rate quota" system to wheat, maize, rice, cotton, barley, wool, sugar, palm oil and vegetable oil; phase out special state-trading for soybean oil and cotton; and increase the proportion of non-state trading.

WTO accession Is conducive to industry restructuring and pollution control

China's economic and industrial structure will have a drastic change after joining the WTO. It will affect the composition of various productive elements including capital, labour, natural resource and the environment. The impacts on the society and the economy will be multifarious.

Globalization and trade liberalization will accelerate industrial restructuring world-wide. During this process, China will have opportunities not only to speed up its economic development, but also face the challenges of fierce international competition. Market liberalization, changes in the trade structure and the trade volume will cause dramatic changes in China's economic structure, consequently changes in the environment.

China's overall environmental condition depends largely on its economic and industrial structure and its technology and equipment level of major industries. To date, Chinese secondary industries take up approximately 50 per cent of the country's total industries; the tertiary industry is relatively smaller—accounting for around 30 per cent. In the industrial manufacturing sector, the proportion of energy-intensive industry is around 35 per cent. In recent years, Chinese high-tech industry has developed rapidly, including information technology, biotechnology, new energy and renewable energy technology, new materials technology, space technology, and environmental technology, etc. However, China still depends largely on traditional industries for its economic development. These traditional industries are still very out of date with old and backward technology and equipment; in particular those of capital-intensive industries such as metallurgy, chemical, mechanical industries which have high resource consumption and high pollution discharge.

China's agriculture has certain disparity with the world in terms of natural resources, scale, and efficiency. China's arable land per capita only accounts for 1/3 of the world average; water availability per person is similarly low. Moreover, land and water dis-

tribution is rather uneven. In the agricultural industry, land-intensive products such as grain, cotton and vegetable oil take up the dominant proportion of the industry. Individual farmers are the basic working unit undertaking agricultural production and operation. The levels of industrialization, production scale and technology contents are all very low. Although agricultural production and labour costs are low, high input of fertilizers and pesticides, low productivity, low efficiency and huge run-off have led to serious non-point source agricultural pollution.

China's WTO accession may allow China to better use global capital and technology; take the advantage of both international and domestic markets to allocate resources more efficiently according to its own advantages. It also provides China a historical opportunity to address environmental pollution and ecosystem deterioration caused by the old irrational economic structure.

After China's WTO accession, China will further open its market and Chinese enterprises will face intense competition from international and domestic markets. This will prompt Chinese enterprises to upgrade their technology; improve their management; to adopt modern business practices; hence to advance their competitiveness. All these will greatly speed up China's industrial restructuring and optimization. On the other side, introducing foreign advanced technology and management experience will further accelerate this process, and be conducive to the formation of a development mode which highly and efficiently use natural resources and energy, but cause less environmental harm.

Through industrial restructuring, the proportion of tertiary industries in the national economy will be increased by a wide margin; labour-intensive industries will be further enlarged; the development of knowledge-intensive high-tech industries will be expedited; the proportion of traditional industries with high resource and energy consumption will be gradually decreased; and industrial pollution discharge per production unit will be lowered. Consequently, it is possible to resolve the long-time pollution problems created by irrational industrial structure.

In agricultural industrial restructuring, overall agricultural production could be optimized according to the local specialties and their comparative advantages. On the premise of national food security, regional development could be directed to shift from the traditional agricultural production such as grain, canola and cotton to more advantageous non-land-intensive production, such as livestock, fisheries and horticultural products. In participating in the process of world economic integration, China should make good use of both international and domestic markets through trade liberalization, properly importing certain land-intensive agricultural products and increasing the imports of resource products in shortage and products with high environmental costs, such as timber and petroleum, etc. This will greatly relieve the pressure on natural resources due to population growth and speedy economy development. This will also conduce to the ecological conservation and construction projects, such as shelter-forest, water and soil conservancy, desertification prevention and control, restoration of forest and grassland from farmland. Also this will be conducive to gradually dealing with non-point source agricultural pollution caused by fertilization and pesticides.

WTO accession will accelerate environmental management reform and improvement

Chinese laws, regulations and policies; governmental regulatory regimes; and administrative ideology and behaviour have been developed and formed for a long time under China's planned economy system. Many of them are inevitably inconsistent with commonly-accepted international norms based on a market economy. China's accession to the WTO will first require significant changes in governmental administration, and prompt the governmental regulatory regime gradually in the line with international regulatory regime. Since China's economic reform and liberalization, China has initially completed the transition from a planned economy to a market economy, and established a socialist market economy system with Chinese characteristics. A corresponding legal system has been gradually formed. It is the basic principle in Chinese legal system that all the laws and regulations are universally implemented nationwide. According to the commitment made by China upon WTO accession, China will modify and adjust relevant laws and regulations as well as the administrative and judicial procedures related to trade in goods and services, trade-related intellectual property rights, trade-related investment measures, etc. About 40 pieces require modification and adjustment, which only accounts for a very small proportion in the entire body of Chinese laws and administrative regulations. Most of them have been put into China's legislative plan. China's joining the WTO will accelerate the modification and adjustment to these laws and regulations.[1] In regard to environmental protection, in

order to fulfill China's commitments to the obligations of WTO's multilateral trade agreements, certain adjustment and modification should also be made to environmental laws and regulations as well as the management system formed under the planned economic system, making this body of regulatory regime in compliance with the rules that are commonly followed internationally. China's environmental policies and regulations should not only be compatible with international environment agreements signed by China, but also be consistent with WTO's fundamental principles and rules.

Under the Protocol of China's WTO Accession, Chinese environmental laws, regulations and measures that have trade effects should be universally implemented nationwide, and be consistent with the principles of transparency and non-discrimination. The government should set up and designate one official publication to publish trade-related laws, regulations and measures; it should also designate a single consultation focal point to provide information to individuals, enterprises, and WTO members. In regard to technical barriers to trade and the sanitary and phytosanitary measures, the government should publish in the designated official publication all formal and informal standards including technical regulations, standards, or conformity assessment procedures. The government should also notify the WTO all its laws, regulations and measures in regard to sanitary and phytosanitary, including products categories and relevant international standards, guidelines and recommendations. To fulfill its commitments, the State Council Bulletin of the People's Republic of China has not only been published openly at present, but has also been circulated down to the most grassroot administrative unit level, so that enterprises and individuals can easily get access to the information on policies and regulations published by the government, including those related to environmental protection.

Environmental standards are the key measuring tool in implementing environmental laws and regulations, and have significant effects on import and export as well as foreign investment. Under both WTO's Agreement on Technical Barriers to Trade and Agreement on the Application of Sanitary and Phytosanitary Measures, Members are encouraged to adopt international standards to the best of their ability, and to harmonize and mutually recognize each other's standards. To strengthen environment management of enterprises, upgrade environmental standards for their products and enhance their international competitiveness, China should try its best to ensure its national environmental standards are in line with the international ones. By so doing, China can avoid the impacts that may arise from technical barriers to trade and the sanitary and phytosanitary measures on Chinese exports to the international market. China's environmental standards are generally compatible with international ones, but in certain areas there is still a disparity with the WTO requirements and international standards, with the implementation particularly weak.

China's WTO accession will accelerate the establishment of China's market economy, be conducive to the use of more economic incentives in environmental regulation, such as environmental tax, pollution trading and risk deposit, etc. Economic instruments and administrative measures can be complementary to each other, and will increase the government's regulatory efficiency in environmental governance. Increasing transparency of rule-making will be conducive to the promotion of public environment awareness and the acceleration of public participation.

WTO accession will bring challenges and opportunities for the environment industry

China's environmental industry has gradually developed along with the country's environmental protection cause since China adopted its reform and open-door policy. To date, an environmental industry sector has been formed, which includes environmental goods manufacturing, technical development, environmental services, integrated resource utilization, and ecological conservation, etc. However, China's environmental industry is still in its initial development stage. There is certain disparity between China's general technology level and the advanced international level. Only less than four per cent of Chinese major environmental goods have been up to the current international level, around 20 per cent up to the international level in the 1980s, and still around 35 per cent only up to the level of some developed countries in the 1960s. The majority of the products are not in a standardized form nor of serial production. For a long time, there have been no uniform standards for these products which prevents this sector from being specialized and socially commercialized. Among over 9,000 domestic environmental protection enterprises, most are small operations; only 4.3 per cent are large in scale. The environmental market is not standardized, and the market for environmental services not well formed. There exists local protec-

tion. Certain products are doubly certified or some of them are administratively designated products. Meanwhile, unfair competition in the market exists. Generally speaking, China's environmental industry cannot meet the need of environmental protection.[2]

In China's Tenth Five-Year Plan period (2001–2005), the environmental industry will be significantly strengthened: investment to environmental protection will be increased, expected to be over 1.3 per cent of GDP. This means the environmental market will be potentially huge. However, market liberalization and the entry of foreign enterprises will bring serious competition to the domestic environmental industry. At the same time, domestic enterprises will also have the opportunities to obtain foreign investment, advanced technology and management skills. These will be beneficial to technology advancement and structure adjustment for the environmental industry and environmental products. Chinese environmental enterprises will have the advantage of human resource; some of their technologies have already reached a relatively high level, including smoke and dust removal, water pollution treatment, solid waste disposal, as well as noises and vibration control techniques, etc. Other advantages of the Chinese environmental industry will include good understanding of the country's situation, conditions and the market demand; and familiarization with governmental policies and information channels, etc. From now on, China should also accelerate technical cooperation with foreign joint ventures or cooperative operation in this sector. This will be an important direction for the development of the environmental industry with China's WTO membership.

Operation and management of environmental facilities in China still haven't entered a market system. Enterprises that produce pollution are responsible for building and operating their own pollution treatment facilities. They usually do not pay much attention to it. Public pollution treatment facilities are invested and built by the government, which then grants the fund to enterprises to operate them. As such, operation and management of pollution control facilities have not become specialized and commercialized services offered to the society, thus efficiency is low and the costs are high. Management and operation of pollution treatment facilities become burdens for both the government and enterprises. Under the government's guidance in recent years, specialized and commercialized operation of pollution treatment facilities has gradually developed. Environmental service firms are contracted to operate both public and enterprises' pollution treatment facilities. After China's WTO accession, foreign environmental service firms will enter the domestic market, which will speed up the process of specialization and commercialization of pollution treatment operation, as well as accelerate the development of the environmental market. The establishment and optimization of the market economy system and nationwide implementation of environmental laws, regulation and standards, will accelerate standardization of the environmental market. Local protection and unfair competition will be dealt with. This will provide a better and healthy environment for the environmental industry development. China has a great potential market in other areas of environmental services, such as environment technology development, engineering design and construction, environment impact assessment, environment consultation and training etc.

Trade and environment concerns

Today, the economy is becoming globalized day by day. International trade has played an increasingly significant role in accelerating economic growth. At the same time, in the process of globalization, due to the existence of an irrational economic order and improper development modes, global environmental issues have continuously arisen and developed. Environment protection and trade development are two important aspects in social and economic development and have close linkages. From a trade perspective, its rapid growth will accelerate the development of environment protection to a certain extent. From an environmental point of view, strengthening environment management will bring tremendous trade opportunities to many products especially environmentally friendly products. However, trade and environment are irreconcilable under certain conditions. On one hand, environmental protection raises new requirements to trade development; environmental laws and regulations even forbid many products to be traded internationally. On the other hand, if not based on sustainable development principles, blind trade growth will also bring significant adverse impacts on the ecological environment.

The WTO's essential mandate is to promote trade liberalization; its fundamental principle is non-discrimination, achieved through most favoured nation treatment, national treatment, a measure of transparency and dispute settlement. All the WTO's multilateral agreements reached by all members are the rules with which every individual member must comply. However, given there is a difference in economic and

social development in the world, the WTO has worked out some exceptional provisions to accommodate different interests of different members. In trade in goods, the WTO rules provide 10 general exemptions; and in trade in services, six exceptions. Among them, environment-related exemptions are those necessary for the protection of human, animals and plant life or health, as well as related to conservation of exhaustible natural resources. The Agreement on Technical Barriers to Trade (TBT) and the Agreement on the Application of Sanitary and Phytosanitary Measures agreed in the Uruguay Round have clear and specific provisions in this regard.

At the same time, in order to protect global environment jointly, many countries have signed a great deal of bilateral and multilateral international environmental agreements through very difficult negotiations. Among over 200 multilateral environmental agreements (MEAs), there are over 20 containing trade provisions. Trade measures are used by these MEAs as the necessary instruments to achieve their goals. These MEAs include: the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer; the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal; the United Nations Convention on Biological Diversity and its Cartagena Protocol on Biosafety; the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, United Nations Framework Convention on Climate Change and its Kyoto Protocol, etc.

Environmental measures that would have impacts on international trade also include domestic environmental laws, regulations, standards, sanitary and quarantine measures, as well as voluntary environmental measures and so on, particularly those adopted in developed countries. Using environmental measures in international trade plays an active role in global environment protection and accelerates trade development in new areas, including markets for green products, cleaner production technology, environmental technology and equipment, and environmental services, etc. However, increased environmental standards for products, especially requirements for process and production methods, impose more restrictions preventing more products from entering the market, thus affecting international trade in goods and services.

Given environmental standards and environmental management in developing countries are generally lower than those in developed countries, higher environmental standards and management measures in developed countries become green barriers to trade in developing countries. China is a developing country and its major trading partners in the world are developed countries. Compared with developed countries, there exist certain disparities in environmental standards for many Chinese products. According to the information published by China's Ministry of Foreign Trade and Economic Cooperation, Chinese exports affected by environmental factors are mainly due to the failure to meet the environmental standards and requirements in the importing countries.

However, stringent environmental management measures in developed countries may also bring trade development opportunities to China. China has adopted sustainable development as the fundamental strategy for its economic and social development. It requires that the extensive development mode practised in the past be changed into an intensive development mode, so as to increase resource utilization efficiency, to lower consumption, and to strengthen ecological environmental protection. Thus, from the positive perspective, stricter environmental management requirements will prompt domestic enterprises to strengthen their environmental management, to adopt new technologies and processes, to lower energy and raw material consumption, and to develop green products. This will ultimately increase the competitiveness of their products. It is not only conducive to overcoming green barriers to trade, but also compatible to China's sustainable development strategy.

Environmental policies have great impacts on trade. On the other side of the coin, trade policies may also lead to impacts on the environment through their guidance to import and export. Improper trade liberalization will harm the environment, especially in developing countries. Before the 1980s, China eventually adopted an export strategy focusing solely on export quantity over all the other factors. The consequent impacts on natural resource and the environment were never or seldom considered. Under such a guidance, China exported large amounts of cheap petroleum, mineral, agricultural, and husbandry products. This led to serious consequences of dramatic petroleum and mineral resources reduction, farmland and soil quality declination, and grassland degradation. Another risk of trade liberalization is the transfer of wastes and pollution to developing countries, mainly through two ways: 1) waste imports; and

2) pollution industries transfer through foreign investment.[3]

After China's WTO accession, foreign investment to China will increase dramatically due to improvement of the investment environment. As estimated, the investment amount will increase from US$45.6 billion in 1998 to around US$70 billion in 2003. Foreign investment has made important contribution to China's rapid economic growth. Many foreign invested enterprises, particularly large multinational corporations have normally taken a rather responsible attitude toward the environment. They have introduced advanced technology and pollution treatment facilities, and implemented advanced environmental management. However, there are still some foreign invested enterprises engaged in industrial activities that cause pollution, most of them are small- and medium-size enterprises.[4]

To strengthen the control of wastes imported as raw materials and based on existing regulations, from 1995 to 1997, China successively issued the Circular on the Control of Foreign Waste Transfer to China; the Provisional Regulations on Waste Import and Environmental Management; and the Supplementary Rules on the Provisional Regulations on Waste Import and Environmental Management, etc. As a result of strengthened enforcement, waste import has been effectively brought under control. In terms of management of foreign investment, the relevant competent authorities under the State Council have adopted the new Guiding Directory for Foreign Investment Enterprise (March 2002). This document will be an important guiding policy regarding foreign investment between now and the next phase, and will guide foreign investors to better promote sustainable development in China.

Active participation in trade and environment negotiations in the new round

At the Doha Ministerial Conference held on November 14, 2001, there was no consensus on trade and environment issues among WTO Members. However, given the importance of related issues, trade and environment was listed in the negotiating agenda. The Doha Declaration adopted at this Conference reaffirms the principles and objectives that were embodied in the Marrakech Agreement Establishing the World Trade Organization. These include: while upholding the WTO fundamental principles, Members should strengthen environmental protection, promote sustainable development, every country has the right to take measures to protect the life and health of humans, animals and plants as well as the environment; Members are encouraged to conduct environmental impact assessment of trade policies; and the WTO relevant committee should work closely with UNEP and other international environment and development organizations.

Ministers participated in the Doha Conference agreed to launch the initial multilateral trade negotiations on January 31, 2002, and end in 2005. The major negotiating contents regarding trade and the environment contain: the relationship between the WTO rules and the trade-related provisions in multilateral environmental agreements (MEAs); information exchanges between the secretariats of MEAs and the relevant WTO committees as well as the rules for granting the "observer" status to each other; reduction of non-tariff barriers to environmental goods and services. The Declaration also instructs the Committee on Trade and Environment, in pursuing work on all items on its agenda within its current terms of reference, to give particular attention to: the effect of environmental measures on market access and those situations in which elimination or reduction of trade restrictions and distortion would benefit trade, environment and development; and the relevant provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights; and labelling requirements for environmental purposes. The Doha Declaration also particularly emphasizes the significance of technical assistance and capacity building in the trade and environment area to developing countries, in particular to the least-developed countries. In addition, negotiations on other topics will also likely involve environment issues, such as agricultural "green box", fishery subsidies, the environmental impacts of transportation, tourism, and energy supply services; the relationships between investment and sustainable development, and between intellectual property rights and the Convention on Biology Diversity, etc.

On March 22, 2002, the WTO held the first meeting of trade and environment negotiations. Chinese delegation participated in the negotiations as an official WTO member. Discussions on trade and environment in the WTO have been carried on for many years. They reflect different interests of different members, in particular, those between developed and developing countries. Given the distinctive development stages in the two sets of countries, their focuses on development and the environment vary. Developing countries have more concerns, in particular over development and poverty, which require

immediate solution other than ecological and environmental protection. Developing countries also worry that the disparity in environmental management and environmental standards with developed countries would affect their market access to the international market. In addition, the trade and environment debates also reflect the interest conflicts among different country groups. The major controversies are as follows:

- The relationship between the WTO rules and MEAs. As the promotion of trade liberalization and the protection of the global environment are two regimes that are based on different premises, some of their principles and rules are conflicting. These may raise the issues of how the obligations will be fulfilled and how the disputes be settled;
- Environmental impacts of process and production methods may not necessarily be reflected in the properties and the usage of finished products. But at present, different treatment has been given in export trade to "like products" based on process and production methods. In developing countries, environmental standards and environmental management are generally lower than those in developed countries. Their exports will thus be likely affected due to process and production methods;
- Given the disparity in environmental standards, certain technology and products which are strictly restricted or forbidden in one country will likely to be exported or transferred to other countries with lower environmental standards, mainly developing countries;
- The adoption of the "precautionary principle" in relation to trade and environment should not be used as an excuse for trade protectionism; and
- Developed countries and developing countries have common but differentiated responsibilities in global environmental protection. Developed countries should provide financial, technical and capacity building assistance to developing countries. The WTO also has provisions on special and differential treatment to developing countries, although the implementation greatly lags behind.

Given the above-mentioned interest conflicts and standpoint disparities between developed and developing countries and among different country groups, negotiations on trade and environment will be complicated and difficult. With respect to the goals of the next Round of negotiations, the Chinese government calls for the negotiations to be built on a new international economic order which is fair, equitable and rational; that it be beneficial to world economic development and trade investment facilitation, and be beneficial to the balance of the interests between developed countries and developing countries, in particular beneficial to economic development in developing countries.

In 2001, China's foreign trade jumped to sixth place in the world from seventh in 2000. Its GDP has increased continuously, the country's strength been reinforced, and its influence grown internationally. As an official member and the largest developing country, China's participation in the WTO negotiations will play a significant role in upholding the broad interest of developing countries and in reversing the negotiating power unfavourable to developing countries.

In summary, China should adopt proactive measures to address the new challenges that may come about by China's accession to the WTO:

1. *To establish an integrated mechanism for trade and environment coordination*

   China's accession to the WTO marks China's entry into a new stage of opening to the outside world. China will integrate into the world with a more proactive attitude. It will further develop its foreign economic cooperation; adequately utilize international and domestic resources; promote sound development of environmental protection; and accelerate healthy development of its national economy and foreign trade. To achieve the goal of mutual supportiveness, trade and environmental policies should be integrated on the basis of the sustainable development strategy. Therefore, China should establish an integrated policy-making mechanism for trade and environment. This mechanism should aim to coordinate various relations at the interface of trade development and environmental protection; to perform environmental impact assessment on major trade policies; to integrate the principles of national environmental security and sustainable development into trade policies; and to actively use trade measures to promote environmental protection. Such a mechanism should also consider the establishment of an effective coordinating system among relevant ministries and commissions, central and local government agencies, in particular among those of foreign trade, environment and quality control.

2. *To modify and improve environmental policies, laws and regulations*

   After China joins the WTO, current laws, regulations and policies regarding foreign trade and economics need to be checked, adjusted and amended; other relevant new laws and regulations need to be enacted according to the need. Meanwhile, environmental policies in the nation should also be brought in line with the international ones, taking into consideration the WTO principles and rules as well as the obligations under MEAs; and increasing transparency of the process of environmental policy-making. To adapt to the increasingly improved market economy, China needs to make better use of market-based economic instruments. Focusing on key issues of trade and environment, China should strengthen the work on environmental standards, environmental management of enterprises, environmental labelling, cleaner production, green products, green packaging, environment assessment as well as quality certification.

3. *To address pollution problems through economic restructuring*

   China should seize the opportunity of economic restructuring offered by WTO accession; actively participate in international cooperation and division of labour through trade liberalization; develop advanced high-tech; develop its tertiary industry, and ultimately optimize the industrial structure. Technical renovation should be undertaken in the traditional industries; these industries should be upgraded to a new technology level, improving the quality and increasing their economy benefits. To accelerate industrial restructuring towards high efficiency and low pollution, China should gradually establish/build an economy that uses resources economically and efficiently and addresses environmental pollution problems now created by irrational economic structure.

4. *To promote the development of the environmental industry*

   In strengthening ecological protection and increasing environmental investment, the government should take full advantage of the opportunities offered by China's WTO accession, realign the environmental industry development planning and programs, develop new technology and new products by making full use of both international and domestic markets. Domestic environmental enterprises should participate in industrial restructuring as soon as possible, form large-scale environmental industrial groups, and develop key technology and large and complete equipment facilities. Small- and medium-size enterprises should concentrate on research and development of practical technology and products to bring the development of the environmental industry to a new level. At the same time, they should exert their compared advantages of labour and cost to increase their market competitiveness.

   China needs to establish and perfect the market-based mechanisms and their implementation, take full advantage of the macro-directory role of the government to guide and standardize the environmental market, and further promote the commercialization of environmental facilities operation. Efforts should be made to adopt incentive policies in order to attract various investment sources to invest in the environmental industry, and to form a diverse environmental capital market.

5. *To address "green barriers"*

   Efforts should be made to collect and research the information and the trends of environmental measures that may have trade effects from China's major trading partners, and provide the information to relevant authorities and enterprises; to help exporting enterprises enhance their environmental management; to upgrade environmental standards for exporting products; and to address green barriers imposed by developed countries. Meanwhile, in order to ensure national environmental security and to protect health of humans, animals and plants, China should strengthen its green technical measures and SPS measures in accordance with the WTO's rules and international trade norms.

6. *To actively participate in the new round of negotiations*

   China's WTO membership allows China to participate in the new Round of trade negotiations and other related activities as an official member. China will not just adapt to and follow the WTO rules passively, but uphold developing countries' interest on their behalf, actively participate in the development and reform of various rules, making the WTO a more fair, equal and rational organization.

Endnotes

* translated by Debbie Xiaoling Guo

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Contributors

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Task Force on WTO and Environment
China Council for International Cooperation on Environment and Development

The Task Force on WTO and Environment is the successor of the Working Group on Trade and Environment (WGTE) established by the China Council for International Cooperation on Environment and Development (CCICED) in 1994.

The Task Force is a high-level advisory body reporting to the CCICED and carrying out policy-related research leading to practical recommendations for consideration by the Government of China on the development of trade policies and environmental policies that promote sustainable development and trade liberalization. The mandate of the Task Force is to assist China in developing and implementing long-term, comprehensive and integrated trade and environmental policies and measures that support sustainable development, in particular within the context of China as a WTO member.

In Phase III of the CCICED, the Task Force has more defined objectives. With China's WTO membership, the Task Force aims to help China to enhance its ability to address environment and sustainability issues while it further opens its markets, taking advantage of "green trade" opportunities without sacrificing its environment or natural resources. It also aims to help China to be prepared to address issues related to the environment and sustainable development that may arise in the Doha Round of negotiations.