



Integrated Assessment of Trade Liberalization and Trade-Related Policies

UNEP Country Projects – Round II

A Synthesis Report

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NOTE

The views and interpretation reflected in this document are those of the author(s) and do not necessarily reflect an expression of opinion on the part of the United Nations Environment Programme.

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The Economics and Trade Branch (ETB), Division of Technology, Industry and Economics (DTIE) of the United Nations Environment Programme (UNEP), was responsible for the overall coordination and management of all six country projects. International expert meetings further provided a forum for project implementation review by national teams and representatives of relevant International and United Nations organizations. Additionally, critical reviews of draft reports were provided by Charlie Arden Clarke, Eugenia Nuñez, Sophie Foster and Emeline Fellus. Administrative support was provided by Rahila Mughal, Desiree Leon and other members of the ETB team.

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United Nations Environment Programme

The United Nations Environment Programme (UNEP) is the overall coordinating environmental organization of the United Nations system. Its mission is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations. In accordance with its mandate, UNEP works to observe, monitor and assess the state of the global environment, and improve our scientific understanding of how environmental change occurs, and in turn, how such changes can be managed by action-oriented national policies and international agreements. UNEP's capacity building work thus centers on helping countries strengthen environmental management in diverse areas including freshwater and land resource management, the conservation and sustainable use of biodiversity, marine and coastal ecosystem management, and cleaner industrial production and eco-efficiency, among many others.

UNEP, which is headquartered in Nairobi, marked its first 25 years of service in 1997. During this time, in partnership with a global array of collaborating organizations, UNEP has achieved major advances in the development of international environmental policy and law, environmental monitoring and assessment, and our understanding of the science of global change. This work has, and continues to support, successful development and implementation of the world's major environmental conventions. In parallel, UNEP administers several multilateral environmental agreements including the Vienna Convention's Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (SBC), the Convention on Prior Informed Consent procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention, PIC) and most recently, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity as well as the Stockholm Convention on Persistent Organic Pollutants (POPs).

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The mission of the Division of Technology, Industry and Economics (DTIE) is to encourage decision-makers in governments, industry, and business to develop and adopt policies, strategies and practices that are cleaner and safer, use natural resources more efficiently and reduce pollution risks to both human beings and the environment. The approach of DTIE is to raise awareness by fostering international consensus on policies, codes of practice, and economic instruments through capacity-building and information exchange and by means of pilot projects

Economics and Trade Branch

The Economics and Trade Branch (ETB) is one of the Branches of the Division of Technology, Industry and Economics (DTIE). The work programme of the Branch consists of three main components: economics, trade and financial services. Its mission is to enhance the capacities of countries, particularly developing countries and countries with economies in transition, to integrate environmental considerations in development planning and macroeconomic policies, including trade policies. UNEP's mission in this field is also to address the linkages between environment and financial performance and the potential role of the financial services sector in promoting sustainable development. The trade component of the Programme focuses on improving countries' understanding of the linkages between trade and environment and enhancing their capacities in developing mutually supportive trade and environment policies, and providing technical input to the trade and environment debate through a transparent and a broad-based consultative process.

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FOREWORD

There has been an increasing interest and concern over the potential positive and negative impacts of trade liberalization, particularly on the environment and social fabric of developing countries where trade has grown most rapidly. The countries were chosen on the basis of ensuring a diversity of experiences as well as a capacity to implement these studies. A useful addition to the country studies is the case of China where economic openness is relatively recent, and which is related to entry into the WTO.

There is a large volume of literature which has emerged in the last few years on integrated assessments of the environmental, economic and social effects of trade liberalization. Most point to the impossibility of generalization and the need for empirical studies to gain an insight into these complex linkages. UNEP's mission in this field is to improve the capacity of countries to understand the close links between trade, the environment, and development and to help decision-makers reflect sustainable development objectives in their trade policies.

This document synthesizes and summarises studies in six countries commissioned by UNEP. Over a two-year period, UNEP has worked closely with national institutions in Argentina, China, Ecuador, Nigeria, Senegal and Tanzania to identify the environmental, social and to a certain extent economic effects of trade liberalization. These studies mark a substantive improvement in methodology over the first group of UNEP studies carried out during 1998-2000.

The studies in this publication focus on trade-related environmental problems and their social and economic implications as they apply to diverse economic sectors and a range of countries. Importantly, these projects involved a wide range of stakeholders who could identify the dynamics of environmental degradation and changes in income distribution, and develop innovative and acceptable national response strategies. They also offer differing conclusions and recommendations pointing to the country specificity of the instruments which can be implemented to alleviate environment and social impacts associated with trade liberalization. The projects are also a first attempt at comprehensive cost benefit analysis of trade liberalization. Though differing in the degree of sophistication of methodologies as well as data, the studies in this book offer to the extent possible an integrated impact assessment of particular trade liberalization policies. The key feature of these studies from UNEP's perspective is that they have been conducted by research institutes in the countries themselves.

These publications are designed to be of particular use to environmental and trade analysts, as well as policy makers and negotiators.

INTRODUCTION

Introduction

This report presents a synthesis of the main findings and conclusions from six projects undertaken by UNEP to assess the environmental effects of trade liberalization and other trade-related policies in developing countries. These country projects have been conducted in an overall policy context in which there is increasing recognition of the need for the environmental assessment of economic policies, in order to contribute to the design of policies which support sustainable development. The data collection and empirical research on which these projects are based, have been carried out by policy research institutes in the respective countries, which are familiar with local conditions, economic and environmental needs and policy priorities. The projects provide data and analysis on *actual* situations and linkages between trade, environment and development policies and objectives, at the national level. The relative lack of such data and analysis on real life situations has been hampering discussions and design of policy responses to trade/environment/development linkages.

These projects had three more specific objectives. The first was to provide a rigorous analysis of the complex interaction between trade, environment and development policies in economic sectors that are of particular importance to these and many other developing countries. The second is to enhance the capacity of institutions within these six countries to analyse the linkages, as well as to enhance the networking between researchers, policymakers and other stakeholders who may wish to respond to those linkages. The third is to record the analytical process and policy design taking place in these national level projects and to disseminate it more broadly, including at the global level.

The current round of projects builds on the results of an earlier round of six UNEP projects that examined the environmental effects of trade liberalization and the use of economic instruments for environmental protection, undertaken between 1997 and 1999. UNEP was one of the first organizations to initiate such work at the national level, and the current round of country projects has been designed to have stronger elements of capacity building and design of policy responses to recorded environmental effects.

The current round of projects has, to varying degrees, focused on environmental, social and economic effects depending on the availability of data. In some countries economic and social effects were found to be more prominent than environmental effects. Moreover, environmental data were lacking and/or methodologies for determining and quantifying the environmental effects of trade liberalization are still

evolving. As noted above, one of the primary objectives of these UNEP country projects has been to build the capacities of those national institutions to tackle such methodological challenges when undertaking assessments, in a creative manner, in the specific context of these sectors and countries.

The projects have been undertaken simultaneously with the drafting of UNEP's *Reference Manual on Integrated Assessment of Trade-Related Policies*, which was published in June 2001. This manual was drafted with the assistance of a group of experts which included the team leaders from the current six country projects. This inclusive drafting process enabled UNEP to combine the knowledge of experts with conceptual and theoretical expertise of assessment methodologies, with those of experts applying and developing them on the ground. In the reference manual, the experts also sought to extend assessment beyond the environmental effects to economic and developmental effects of trade-related policies.

The results from the country projects show that the relationship between trade liberalization and the environment is complex, often indirect, and mediated via effects on levels and patterns of production and consumption. Trade through changing patterns of production and consumption has both beneficial and adverse effects for the environment: for example, increased trade can lead to the increased generation of financial resources to help overcome poverty and pay for environmental protection measures, but also to more pollution and natural resource depletion. Many factors influence what the particular mix of benefits and costs will be in different countries, at different stages of economic development, and under different policy and market conditions. The assessments undertaken in these country projects are a first step towards defining and quantifying those different effects.

These projects have been undertaken in developing countries. This developmental context is important, because achieving a sustained rise in the levels of per capita income is a policy priority for these countries. In developing countries with a weak industrial base, a rapid and sustained rise in the levels of income depends on increasing investment, which often may have a high import content. This is because in the initial stages of development, capital equipment has to be imported and paid for by increasing the exports of natural resources. However, the exploitation of these endowments can be detrimental to sustainable development when the resources are not renewable, such as minerals, or their rate of depletion is greater than the rate of regeneration, as can be the case for resources such as timber. The pressure on natural resources will vary between countries, but is likely to be greater when imports are liberalized before competitive export industries are established. This can be explained by the fact that, when increases in imports precede export growth, countries tend to reduce their trade deficit by raising their natural resource exports. Associated problems of natural resource depletion and environmental degradation will then be exacerbated, especially in the absence of a well developed environmental policy framework.

By deepening the appreciation and analysis of this nexus between trade, environment and economic development, these country projects aim to empower governments and other institutions seeking to respond to this dilemma. The ultimate aim of such assessments is to *maximize the net gains of trade and trade liberalization*,

by enabling countries to design and implement integrated policies which minimize associated environmental damage.

UNEP expects that all six country projects will be completed by the end of 2001, and that some of them will be extended into a policy design and implementation phase with interested governments. The findings of these assessments will be published in separate volumes and in a more comprehensive synthesis than is possible to draw together in this paper. Readers of this paper are therefore referred to those more complete publications, which will be available in the first half of 2002. In the meantime, UNEP hopes that this preliminary synthesis of the results of this work will make a useful contribution to understanding the dynamic relationship between trade, economic development and the environment.

Theoretical framework¹

This section aims to present the theoretical framework on which the country case studies are based. This framework has been elaborated according to the UNEP Reference Manual on Integrated Assessment of Trade-Related Policies, which has been developed simultaneously with the conducting of the country case studies. This Manual has itself been structured to a large extent by efforts to theorize and summarize the experiences of assessment ‘on the ground’, in both rounds of UNEP country projects.

Assessment focusing on a sector

A number of organizations have adopted a sector-based approach to the assessment of trade policy and trade liberalization at the national level. The advantage of this approach is that the positive and negative effects of the policy or agreement under consideration may be more easily identifiable as collecting statistical data can prove less difficult and the data itself, more reliable. The disadvantage of this approach is that economy-wide impacts are not immediately identified and that important cross-sector links may not be captured in the process.

Among the most important criteria for selecting priority sectors, are the following characteristics and considerations:

- The sector is important to the national economy, and in particular in its contribution to export revenues.
- The sector relates directly or indirectly to major environmental media and natural resources.
- The sector relates directly or indirectly to important issues of equity and social well-being.
- The sector furnishes strategic natural resources (such as a certain foodstuff) to a large proportion of the population.

¹ This section draws on “Building on developing countries’ experiences with integrated assessments of trade”, Train for Trade 2000, UNCTAD, mimeograph, 2001, Geneva.

- The sector is subject to changes in economic rules induced by trade-related policies.
- The sector is significant in terms of trade flows, both in volume and financially, and should be experiencing changes in trade flows.
- There is a presumption of important sustainability effects due to trade-related policies.

Timing

The timing of an assessment is another important factor. An *ex ante* assessment takes place prior to the implementation of trade liberalization policies (TLP), a trade-related measure (TM), or the negotiation of a trade agreement (TA); a *concurrent* assessment takes place during the implementation of TLP, a TM or negotiation of a TA; an *ex post* assessment takes place following the implementation of TLP a TM or the final ratification of a TA.

Until now, UNEP has mainly conducted ex post assessment. However, it is also important to note that integrated assessments can also stretch over more than one of these time periods, or could even be conducted as a continuous process. For instance, the results of a particular ex post assessment could be used as the baseline for a future ex ante assessment.

Preliminary assessment

There are many ways of assessing environmental and sustainable development effects of trade policies or trade liberalization. One of the most commonly used approaches is based on the environmental assessment methodology of the OECD,² which has been further developed by other practitioners of assessment, including UNEP. This methodology qualitatively assesses the impacts of trade on the environment, and can be similarly used to assess the social impacts of trade policy. It takes into account the full range of effects - direct and indirect - that trade reforms may have on the environment and on society. Five broad categories of environmental impacts from trade reforms can be identified:

Product effects. These effects occur when the products themselves have an impact on the environment or development. Some of the products traded may be environmentally friendly, while others may be hazardous to the environment. Overall product effects therefore can be positive or negative, depending on the nature of the products traded as well as their volume.

Technology effects. Increased trade may lead to the transfer of production technologies across borders. Again, these technologies may be harmful or friendly to the environment. There is a positive technological effect when a trade policy allows the

² Organization for Economic Cooperation and Development, *Methodologies for Environment and Trade Reviews*, Paris, 1994, OCDE/GD(94)103, online.

flow of environmentally friendly technologies, and a negative effect when it prompts the transfer of harmful technologies.

Scale effects. Scale effects occur as trade reforms often raise the overall level of economic activity. This is usually accompanied by a higher rate of use of natural and environmental resources. This could be offset if efficiency is improved, or if higher economic growth makes greater investment in environmental projects possible.

Structural effects. Trade liberalization could lead to changes in the composition of a country's economy, as it specializes in the production of goods or services where it has comparative advantage. If the changes favour the less-polluting industries, then positive environmental effects could be felt in that country. On the negative side, the products where the country has comparative advantage may have a higher pollution intensity, or may require a greater use of the country's natural resources.

Regulatory effects. Trade reforms may have an impact on environmental regulations and standards. On the positive side, trade agreements may explicitly include measures to improve environmental standards. But it is also possible that particular provisions of trade reforms may impinge on a government's ability to set environmental protection standards.

Trade can have a range of environmental, health, and social impacts. Environmental impacts include those measured by air, water, or land pollution associated with the enterprises producing traded products. There could also be natural resource effects associated with changes in the demand for the use of natural resources, leading to either higher or lower resource depletion or environmental degradation, depending on the scale and resource-efficiency of enterprises following liberalization. In the case of social impacts, more open trade may result in certain sectors expanding and others contracting, possibly leading to a rise in inequality or loss of employment opportunities (depending on the labour intensity of sectors and enterprises shrinking or expanding following liberalization). There can also be positive effects in terms of poverty alleviation due to higher rates of trade-led growth.

Such preliminary assessment can be facilitated by the use of a simple diagram shown below. Each corresponding impacts will be filled in with signs (+++/- for significant positive/negative impacts, ++/-- for moderate, and +/- for light, and 0 for no noticeable effects).

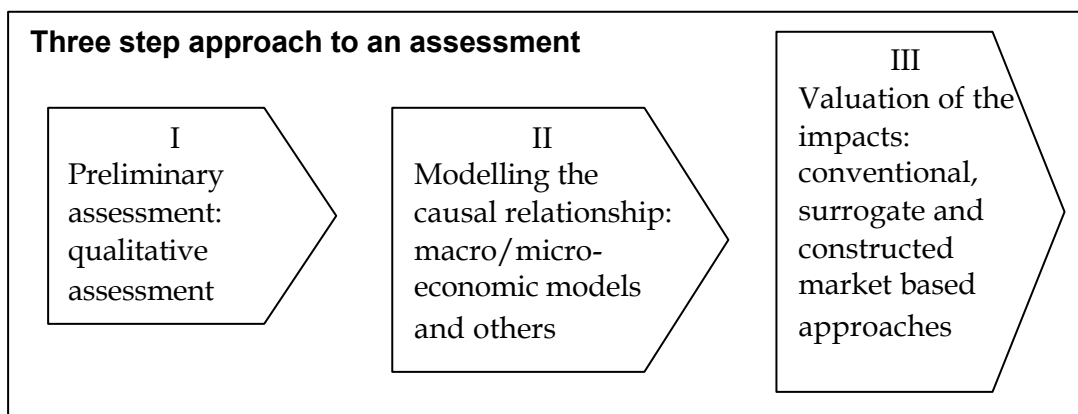
	Product effects	Technology effects	Scale effects	Structural effects	Regulatory effects
Impact on environment					
Impact on economy					
Impact on society					

Approaches used to trace the trade-environment linkages

The preliminary assessment described above helps to identify, in a qualitative manner, the effects of trade on the environment. Although the next step may not be feasible in all cases, UNEP recommends quantifying and valuating these impacts in the following manner.

A range of frameworks helps to establish causal links between available indicators and the selected significant effects identified in the preliminary analysis. There are three broad categories of frameworks; **macroeconomic models**, **microeconomic (sector-based) models** and **a group of other models**. Ideally, a methodology should be chosen which best suits the nature of the system being examined. In practice, the choice may be constrained by factors such as data availability and the user's familiarity with the model.

Any model will require a clear definition of the policy measures to be assessed, as well as identification of the impacts to be included in the model, which will typically include product, technology, structural and scale effects. The regulatory impact of trade agreements may also be considered.



Among the macroeconomic models are the input-output models and general equilibrium models. The microeconomic models include partial equilibrium models, environmental impact assessment, cost-benefit analysis, multi-criteria analysis, extended domestic resource cost approach and life cycle analysis, among others.³

Approaches used to assign values to the effects

Once the intricate task of tracing all the major causal links of specific activities or policies on the environment is completed, the next step is the quantification and valuation of these impacts.

Valuation techniques can be classified into **conventional market-based, surrogate market-based** and **constructed market-based approaches**, depending on the type of indicators available to the analysts. Conventional market-based approaches include the change in productivity approach, cost of illness approach, and cost-based approaches. There has been only limited application of these techniques in the country projects described below.

Results from the country projects

This section presents the six country projects in accordance with the UNEP framework for assessment described above. The next section provides a review of elements that built the foundations of the initial assessment stage in these country projects. Section 3.2 presents the results of qualitative assessment and modelling undertaken in the six country projects, by country. This section ends with a summary of the limitations to and challenges for assessment methodologies. Section 3.3 provides an evaluation of the impacts, both negative and positive, revealed in each country project. Section 3.4 concludes with some more generic practical and procedural lessons learned from these country projects.

Basic elements in designing the assessment

Focus

The focus of the country studies in this project was on specific sectors and specific trade-related policies. Some country projects dealt with tariff rate quotas or subsidies that are related to some WTO agreements, but the reference to WTO commitments is not prominent in country projects. When examining a specific sector, it was observed that currency devaluation or market distortions, such as price distortions, had a large role to play in determining environmental, economic and social effects. Compared to macroeconomic policies and trade-distorting policies, trade liberalization policies proved less influential in determining production and consumption effects and hence environmental effects. In future work, it is recommended to focus more explicitly on WTO-related commitments which may have implications for the environment in a particular sector. The country project in China is

³ Further discussion on these models and their application will be found in *the Reference Manual for the Integrated Assessment of Trade-related Policies*, UNEP, Geneva, 2001.

the only study in the current series to have focused on WTO-related liberalization measures.

Timing

All studies except China carried out an *ex post* assessment. China conducted an *ex ante* assessment.

Indicators

The country projects often used the physical depletion of natural resources as an indicator. In some cases, proxy indicators on health have been used to track the environmental effects. In other cases, a rapid appraisal technique was employed for qualitative assessment and to indicate environmental effects where appropriate.

Qualitative assessment and modelling in the country studies

China

In China, the specific policy studied is that of import liberalization rather than export expansion. The study examines the impact of tariff rate quotas (TRQs) on the production and import of selected agricultural products. Environmental, social and economic effects are largely imputed through changes in production and consumption structures. The methodology used is a partial equilibrium econometric analysis called a JAPA model (Jiangsu Agricultural Policy Analysis), which seeks to examine the effects of some trade policy variables. This is the only *ex ante* study in this series of studies, i.e. it forecasts the potential effects of the TRQ on Chinese exports and imports, on the basis of current consumption patterns and current utilization of resources.

The study on China examines the impact of TRQ offers under the US-China Bilateral Agricultural Agreement, 1999. As this is a theoretical projection, two assumptions have been made. First of all, it is assumed that the bilateral trade concessions given by China to the US would have to be extended on an MFN (most favoured nation) basis to all the member countries of the WTO, subsequent to China joining the WTO. Thus its TRQ would apply to all members of the WTO. Second, it is assumed that the entire TRQ will be imported irrespective of whether imports are more or less competitive than domestic products. Subject to these assumptions, the following examples have been chosen for simulation by the JAPA model.

TRQs for year 2002 according to the schedule of US-China Bilateral Agricultural Agreement for:

Wheat	8.1 million metric tons;
Corn	5.58 million metric tons;
Cotton	819,000 metric tons.

Assuming that the entire TRQ is imported, this increase in imports would result in a decreased cultivation of some crops. Wheat, corn and cotton imports are likely to

bring significant shifts in overall crop production structures. According to the optimal solution of the JAPA model, compared with the baseline projection, the total cultivated land area will decrease by 1.11 per cent, or about 92,624 hectares.

Reduced cultivation is expected to bring about positive effects on the environment because of the reduction in the application of chemical fertilizers and pesticides. The reduction of pesticide application was evaluated at 0.10 million RMB, and the reduction of chemical fertilizer application was evaluated as 1.11 million RMB. This did not include, however, the reduced application that would result from effects other than reduced cultivation. For example, decreased prices of agricultural products may encourage decreased fertilizer application per hectare.

However, the study also imputes negative economic and social effects to the decrease in cultivated land. If cultivated land were to be abandoned, it could be used for non-agricultural purposes, such as city extension, industry and building. The average shadow price of the cultivated land estimated by the partial equilibrium model is 155 RMB/ha which works out to total value of 14.36 million RMB for the abandoned land. The study assumes that this is a social opportunity cost rather than an environmental cost. The higher rental value of urban land, which would accrue as an economic benefit is not included in these calculations. This is justified by the study on the grounds that their model is a partial equilibrium analysis which focuses exclusively on the agricultural sector and does not examine other interlinkages with either urban expansion or related industries such as the textiles sector.

After China joins the WTO, opportunity and challenge both can be found in the agricultural sector. While theoretically, China could expand agricultural exports, increased agricultural imports (TRQs) in the initial period, could have economic, social and environmental effects. According to the study, the overall production of cotton would go down because of imports provided for in the TRQ, however, it is likely that textile exports and production would go up. This would thus result in increased export revenues, which have not been taken into account in calculating the economic losses arising from trade liberalization. Whether this is environmentally beneficial or harmful has not been analysed by the study, but literature does suggest that moving up the value added chain would lead to environmental benefits. At the same time, it must also be recognized that textile production can be pollution intensive, and also has high water consumption demands.

Argentina

The purpose of this project was to examine *ex post* the impacts of trade liberalization policies on the fisheries sector. Dealing with a sector which is almost exclusively export-oriented, the study provides a stark example of the environmental effects of trade liberalization and the socio-economic impact of these changes. The methodology is based on qualitative data assessment combined with cost-benefit analysis, and the study appears to be one of the clearest studies on the counterfactual, i.e. a situation without trade liberalization and that with trade liberalization.

The main policies that created the conditions for a significant expansion of fishing activity and its exports from Argentina included deregulation of numerous economic activities and markets, price stabilization and dollar parity policy, easier credit availability, free movement of foreign capital, and reduction of import tariffs and export taxes. This was accompanied by policies such as opening up of trade for Argentine fisheries products in previously closed foreign markets, caused in part by the diminishing resources in oceans under developed countries jurisdiction, together with a transfer of fishing overcapacity from developed countries to Argentine waters. This transfer of fishing fleets was encouraged by subsidies from developed countries, i.e. a trade distortion.

This transfer of fishing fleets to Argentine waters was brought about largely through two types of policy instruments. First, Argentina negotiated agreements with the European Union in the early 1990s to transfer fishing fleets and establish joint ventures between EU-based and Argentine companies operating in Argentine waters, which were also in receipt of EU subsidies. Secondly, Argentina sold temporary fishing licenses to fleets from Asian countries (notably Japan and Korea, but also South East Asian nations), for capture in waters under Argentine jurisdiction. These agreements represent a form of subsidies provided by developed countries to their fleets.

The exploitation of fisheries resources was insignificant in Argentina, until export-oriented growth took place. Indeed, consumer preference in Argentina is for beef rather than fish, the former also being less expensive in general terms. Thus, 90 per cent of the fish catch is exported to diverse foreign markets, mostly with little or no value-added. Exports increased by 478 per cent between 1985 and 1995. Capture grew at high rates until 1997, after which it fell sharply. It reduced by 16.6 per cent between 1997 and 1998 and by 10 per cent between 1998 and 1999. Over the period between 1997 and 1999, the catch fell by 25 per cent. The decline in revenues over that period was about 14 per cent.

The Argentina study strongly links over fishing and the related depletion of fish stocks to subsidies from developed countries for fishing overseas. It points out a clear link between these trade distortions and the negative environmental effects on the fisheries sector. The study also reports a significant shift in the structure of the industry and its geographical location. Traditional fishing communities that supplied the local market lost their ascendancy to enterprises in other locations in Argentina that developed their fishing activities almost exclusively around the export of fish products.

While the vessels utilized in the past were mostly small-scale largely artisanal boats, with some medium sized (ice trawler) vessels involved in the activity, other types of vessels with a much larger capture capacity, mostly from the EU and Asian countries, were introduced in the early nineties. These were mainly processing ships (freezer, factory, and squid jiggers), which led to an increase in capacity of freezer fleets legally registered, by more than five fold from 1990 to 1995, also accounting for the increased depletion of fishery resources in Argentina.

Increasing and unregulated fisheries trade has had critical negative impacts on resources and on the socio-economic structure of the fisheries sector. Some of the verifiable impacts identified by the study are: degradation of the fisheries biomass (unregulated trade), and increased operation costs. Increased exports of fish also increased the fiscal burden through corruption and non-diversification of catches towards species preferred by export markets. Many of these specific impacts were directly related to overcapitalization of fleets, i.e. to the changed production structure which favoured large instead of small producers, as well as harvesting with little control.

Senegal

The purpose of this project was to examine the effects of trade liberalization and other trade-related policies on the fisheries sector in Senegal. Like the Argentina study, this one provides a clear *ex post* examination of the effects of trade distortions, such as the developed country subsidies, bilateral fishing agreements and preferential trade arrangements, on fish stocks in Senegal. The methodology of this study is based on qualitative data assessment of the species concerned, and their biomass over a period of time. Point estimates have been used where time series were not available.

The main trade-related policies that led to a substantial increase in fishery exports, and consequently a decline in fishery resources, were the following:

- non-reciprocal advantages under the Lomé Agreements, authorizing Senegalese piscatorial products to enter the European market with the exemption of custom duties;
- export subsidy of 15 per cent, later raised to 25 per cent, first applied to canned tuna and later extended to all piscatorial products;
- 50 per cent devaluation of the CFA franc, which more than compensated for subsidy suspension (also linked to devaluation);
- fishing agreements concluded with a number of foreign fleets, giving them access to Senegalese waters and fish stocks.

In the late 1980s, the poorly performing traditional fishery exports forced government intervention towards its expansion to external markets. The presence of European fleets and export firms, together with distribution networks hinged on the European market favoured this development. However, increased exports were also due to the ability of small-scale fishing to adjust to favourable price signals, guaranteed market access through the ACP (preferential trading arrangement with Africa, Caribbean and the Pacific), subsidies to fishing fleets and fishing agreements with the EU.

In this context, an expansion of the capacity of both fishing units and factories took place, rather than the modernization of existing facilities. This is because most of the developed countries wanted to fish in Senegalese waters, instead of giving preferential tariffs for value added Senegalese fish products. Thus, even with an ACP regime there was a tendency to export raw fresh and frozen fish rather than processed

fish. The wastage rate of processing facilities was very high and the pressure on resources increased. The share of fresh or frozen whole products in total exports was much higher than that of more processed products.

Thus, the overall sale effect of trade expansion in Senegal was negative for the environment. Resource scarcity became serious for some species, particularly those such as coastal demersal species (deep lying fish) with high market value. The sector has faced serious disequilibria both in terms of resource exploitation and market supply. There is a risk of local market supply shortages in the near future as fishing effort shifts from locally consumed species to those destined for export. This has important food security implications for major segments of the Senegalese population. While the study does clearly indicate the species most at risk and quantified the stocks of those species, it did not attempt any economic valuation of the species depletion, nor of the cost of possible eventual exhaustion of stocks.

Despite the danger that stock depletion represents, the small-scale sub-sector continued to favour exports rather than domestic markets. This is because though the operating costs of small-scale units have increased for inshore fishing, that of coastal demersal fishing has not increased at the same rate. Thus market signals favour fishing for export markets, rather than for domestic consumption where prices are lower and costs are higher.

The dynamic scenario may, however, be different for the future, on account of trade preferences in international markets and especially in the EU. Presumably, Senegal will lose some of the tariff advantages that it enjoyed in the European market. This prospect seriously threatens the stability of its trade balance, which depends heavily (around two thirds of its export revenues in dollar terms) on fish exports to the EU.

Ecuador

This project examined the effects of trade liberalization on environmental, economic and social effects in the banana sector. It examines three distinct periods of trade liberalization, and is thus an *ex post* analysis of the effects of trade liberalization on the environment. The methodology is one of qualitative data assessment, analysing production trends and linking it to policy initiatives. In this case, a fairly large time series of comparable data have been obtained.

Three distinct periods of trade liberalization have been identified by this report. The first period (1980-1989) saw the adoption of a system of 'mini-devaluations' with periodic adjustments to the exchange rate. This increased the prices of imported inputs and decreased the price of the banana exports, thus improving its competitiveness. This period also experienced a fall in interest rates, a rationalization of credit to the productive sector and a policy of subsidies on credit for the agricultural sector. All this led to a sustained increase in production and export of bananas over this period.

As far as the environmental effect of expanded cultivation of bananas is concerned, it is difficult to obtain exact data on deforestation related to banana

cultivation. Indirect inferences can be made by looking at the data on increased agricultural expansion. Since the mid 1980s, increase in extraction of wood by small and large scale producers, as well as the unrestricted planting of various agricultural products (including bananas in the central and southern coastal area), have become the principal reason for the destruction of the habitats of the region. On the other hand, the natural areas which border the cultivated areas are subject to pressures due to the extensive use of certain resources, specifically the selective extraction of wood. Thus the destruction of natural habitats cannot be entirely attributed to the trade expansion policies for banana exports.

The introduction of new varieties of banana in the 1980s, did not generate a positive technology effect as it did not lead to a more efficient use of natural resources or to an increased use of technology by the workforce. The returns to banana producers increased over the 1980s on account of guaranteed minimum export prices. However, costs of inputs registered a sharp increase over the decade with the result that the trend rate of increase in profits was a modest 0.4 per cent per annum over the decade. Small producers have rarely made a profit, and in most years they ran losses.

The second period, 1990-1994, saw quantitative restrictions being replaced by customs duties, resulting in increased market access for six thousand items. The lists of exceptions to market access requirements were also reduced. The system of advance payment of 80 per cent of all customs duties for imports was suspended, and the adoption of a common customs duty structure in the Andean Community of Nations with four customs duties levels 5 per cent, 10 per cent, 15 per cent and 20 per cent for products not originating in the region was instituted. This resulted in the import of capital goods and new technologies in the banana sector, thus improving its productivity. **During this period, banana plantations grew at an average rate of 18 per cent, which was significantly higher than the previous decade.** The substantial increase in cultivated area resulted in an increased use of natural resources as well as a decrease in biodiversity, constituting a negative environmental effect.

Pricing policy during the 1990s has been variable, and at the same time favourable for banana producers in some instances. Since 1993, the Government periodically fixed the *minimal procurement prices*, i.e. the prices that exporters were obliged to pay banana producers. The Government also moved to an exchange rate policy (fixed band), which would ensure that the prices of capital goods or technologies did not become excessively expensive. This ensured that the cost of production was kept to a minimum,

During the period 1995-1999, reforms of fiscal and monetary policies were introduced. Complementary economic agreements with Chile and Argentina in 1994, Ecuador's entry to the WTO in 1995, and complementary economic agreements with China and Japan in 1996 were also important in improving market access for bananas from Ecuador. These occurred at the same time that important trade and environmental policies and regulations came into place. In 1994, the Environmental Security Regulations for the Banana Sector, the Plant Quarantine Handbook, the Export Facilitation Law, plague control norms, packaging norms, and the banana policy for plantations re-conversion were implemented. In 1995, norms to diversify markets and

varieties of the fruit and to control packages and bails were established. The Plant Health Regulations and the Environmental Management Law were passed in 1998 and 1999, respectively.

The result of the application of these laws has been evident since 1995, particularly in the lack of expansion of the area under banana cultivation, despite a steady increase in output and exports. The majority of banana producing provinces have maintained relatively constant cultivated surface area totals in recent years, and some provinces have even considerably reduced their cultivated surface area. In this case, the increase in exports may not have generated any additional environmental burden. The study attributes this to improved technologies, appropriate macroeconomic climate, i.e. flanking exchange rate policies, and most importantly, appropriate environmental policies.

The diverse price policies aimed at adjusting and fixing the minimum referential price for bananas resulted in the increased profitability of the banana plantation activity. However, it is important to take into account that the production prices, costs, and income are directly linked to the technological level of the plantation. In addition, changes in input prices were determined by exchange rate fluctuations. Thus, while the minimum referential price has increased a few times, production costs have constantly increased, hence SME producers have seldom been able to cover their production costs and even less able to generate a profit from the activity.

As far as the terms of trade are concerned, they are completely different for the banana exporters as compared to the producers. During the last decade, exporters generally made a profit, whereas producers rarely made a profit. Wages for banana labourers generally kept pace with agricultural wages.

In Ecuador, in the 1980s, a high percentage of banana production came from non-technology based farms. The technology structure of the farms also changed as a consequence of trade liberalization. Plantations became more technology intensive by the end of 1990s. However, the majority of the plantations by this date were less than 30 hectares, i.e. they ranged from small to medium sized farms. In the study, high-technology farms have generally been associated with better environmental management, though not necessarily with higher productivity. Paradoxically, productivity increases during the 1980s were higher than during the 1990s.

In general terms, during the three periods studied, banana production affected the environment in the following ways: loss of biodiversity, alteration of water, soil, and air quality, accumulation of toxic waste and non-degradable material. Furthermore, some other social indicators were also negative. The alteration of the health of banana workers and of people who live in neighbouring areas of the plantations is a demonstration of this fact. During the last several years, many of these impacts have been reduced by means of initiatives such as: national regulations, international regulations as established by multilateral agreements, such as the Convention on Biological Diversity, and the FAO's International Undertaking on Plant Genetic Resources, as well as appropriate market mechanisms.

Tanzania

This project examined the effects of trade liberalization on the forestry sector. Economic and social effects along with deforestation have been examined in this study. The methodology used has been one of qualitative data assessment, and data over a sufficiently long time was available for this study. The researchers however had little access to data on specific domestic and export uses of the forestry sector which made it difficult to infer the link between trade expansion and deforestation. The analysis is an ex post analysis and was validated by primary data collection wherever possible.

Specific trade liberalization measures that have directly or indirectly impacted on the forestry sector include; diminution of price controls and introduction of market-based prices, abolition of export tax, and abolition of the export licensing system. All these policies led to a significant increase in exports of forest-based products. The elimination of the requirement of registration of exporting companies, the introduction of a retention scheme in late 1980s which allowed exporters to retain an increasing share of their export proceeds to finance their imports, rationalization of import tariff rates, and abolition of import licensing led to increased import of better technologies in wood production.

Following trade liberalization, there has been an increase in the production, distribution and marketing of forestry products of Tanzania. This is reflected in the increased growth of the share of forestry products (both domestic and exports) from 2.6 per cent of total GDP prior to liberalization, to about 3.3 per cent after liberalization, representing a 35 per cent increase. Exports of forest products as a proportion of total exports increased from 3 per cent prior to liberalization to about 10 per cent after liberalization. The share of exports of forest products in overall GDP continued to remain small. The increase in production of forestry products has however led to an increase in the rate of deforestation. Although the exact rate of deforestation is not accurately known, the rapid increase of the phenomena is indisputable.

The most comprehensive measurement of deforestation is based on the assessment of tropical forests and woodlands conducted more than two decades ago by the FAO within the Global Monitoring System (GEMS), which estimated the deforestation rate for the period of 1978-1980. The rate of deforestation in Tanzania for that period was at 130,000 hectares annually. Another estimate was made in 1983 by the Forestry Division, which came up with the figure of 300,000-400,000 hectares of forest being lost annually through deforestation. Beginning in the early 1990s, the estimates have gone up to 500,000 hectares of forests being lost annually. It is worth noting here that the debate has been more on the figures than the trend, and most of the reports in this area admit that deforestation is increasingly becoming a threat. However, not all this deforestation can be linked to trade expansion. It is estimated that about 3 per cent of this can be directly attributed to expansion of exports in timber products. The net social cost of this deforestation has been estimated at US\$ 7,921,169, which though much lower than the revenue generated from exports at US\$ 44,425,945.5, is nevertheless sizeable.

The study in fact shows that though the contribution of exports of forest products to the total GDP generated from this sector is low, negative environmental and social effects could be indirect through changes in production structures caused not so much by trade liberalization, but more by factors such as the construction boom due to investment liberalization.

The positive impacts included; increased value added in forest products, mostly because of the use of wood for construction purposes in the domestic markets, import of machines used in the sector, and technology impacts in the form of increased availability of equipment. These have resulted in changing production patterns, from wood to finished products, increased market price of the traded forest products because of value addition, and increased contribution to GDP, especially through the use of wood in the construction sector, increased investment growth, and increased employment. However, the study also points out that increased activity in the forestry sector led to a lot of wastage of wood. Appropriate flanking policies as well as technologies to reduce this wastage have not as yet been put in place.

The negative impacts associated with the same policy measures are due to the results of increased intensity of the economic activities in the sector triggered by demand for forest products from other expanding, export-oriented economic sectors. These indirect effects of liberalization include: loss of soil fertility thereafter accelerating undesirable farming practices like shifting cultivation, decline of forest productivity in a given area because of depletion, decline in productivity particularly of the agricultural sector, increased forest invasion and social migration to the forest margins, and increased human health problems.

Nigeria

The project has examined the effects of trade liberalization on the environmental, trade and economic aspects of the cocoa and rubber sector. The project is based on extensive qualitative data assessment and a cost-benefit analysis. The study is an ex post one and examines the effects of macroeconomic policy reform, including trade liberalization on the cocoa and rubber sectors. The results of the study have been cross-checked by a rapid rural appraisal methodology.

The overall objectives of Nigeria's trade policy include:

- integration of the Nigerian economy into the global market through the establishment of a liberal market economy;
- promotion and diversification of exports in both traditional and non-traditional markets;
- promotion of the transfer, acquisition and adoption of appropriate and sustainable technologies to ensure competitive export-oriented industries, among others;
- successive devaluations which contributed to making exports from Nigeria more competitive.

As a result of these policies, both production and export of cocoa and rubber increased. However, in the case of cocoa, because of excess capacity in this sector,

environmental effects were not negative. New areas were planted to cocoa before the structural adjustment period (SAP) more than during SAP, but the rate of abandonment of cocoa farms fell sharply during SAP as farmers recommenced management of existing cocoa plantations, to boost production. This may have had a beneficial environmental effect in terms of better ecosystem management.

In the case of rubber however, there was an increasing trend for new areas to be planted to rubber during and after the SAP period. Over-tapping (slaughter tapping) of rubber led to early destruction (death) of the rubber trees and exposed the soil to processes of degradation. Most trees that dried up as a result of slaughter tapping were then used as fuel wood and/or were not replanted, thus reducing soil cover, with negative consequences for nutrient cycles, soil erosion rates and the ecosystem more generally.

The import of fertilizers and fungicides rose sharply during the SAP period rather than the pre-SAP, period but that of fungicides declined after the SAP period. Chemical input prices have been rising sharply, partly because of the continued depreciation of the *naira* since the SAP period, but the prices of cocoa and rubber declined after SAP and hence lowered the demand for agrochemicals by tree crop farmers. Even though farmers indicated that the agrochemicals are important for increasing output, the high prices of agrochemicals relative to those of export crops led to little or no demand.

The results of this study show that economic liberalization had no perceptible influence on the environment in the case of cocoa. It must be realized that this appears to be so simply because the response of farmers to the incentives created by the liberalization policies was more of rehabilitation of existing farms, rather than further expansion of cultivated areas. Were the response to be accompanied largely by expansion in plantation, this action would obviously have had a negative impact on the environment since forests, land and ecosystems in general would have been disturbed. The need for macroeconomic policies to have a built-in mechanism to ameliorate or quickly arrest unwanted environmental effects is clear. The results of this study also shows that the use of agrochemicals by farmers has been low, not only because of the escalating prices of agrochemical inputs, but as a result of farmers' reliance on traditional agronomic practices and a farming system approach that tends to enhance the management of the ecosystem.

An overview of assessment

The country studies show that the environmental effects of trade liberalization vary according to the policy regime as well as the sector studied. In the case of the fisheries sector which is mostly export-oriented (two thirds for Senegal and 90 per cent for Argentina), it was possible to make direct links with trade expansion. It is to be noted that these two cases could be classified as a response to trade distortions introduced in the shape of distant water fishing access agreements, rather than a consequence of trade liberalization. Solutions to reducing the negative scale effects in this case would therefore lie in negotiating more rational fishing agreements rather than reversing trade liberalization, or more rational fishing policies. The calculation of

maximum sustainable yield would help in formulating quotas which can be then used in the conclusion of fishing agreements.

Import liberalization may lead to both negative and positive environmental effects. Some other effects such as economic savings stemming from lower chemical usage are relatively easy to estimate. Evaluating the environmental benefits of setting aside land or leaving agricultural land fallow has proved a major challenge in the case of developing countries such as China. It is much easier to estimate the social loss resulting from decreased employment. Shadow pricing techniques have thus been more useful in estimating the social opportunity cost of land used for agriculture rather than the opportunity cost of land set aside for environmental benefits. This is an area which requires further work in the context of developing countries.

Delinking the environmental effects of trade expansion and economic expansion has proved a major challenge. Data on deforestation for example do not clearly list how much of the deforestation is due to expanded trade and how much is due to expanded economic activity. It is also difficult to get accurate data on deforestation. In Ecuador, for example while it was possible to estimate the expansion in banana cultivation, it was not possible to obtain data on the deforestation directly associated with banana cultivation. That had to be imputed indirectly. The environmental effects were indirectly measured, and it was projected that increased cultivation would have negative environmental effects because of increased use of fertilizers and pesticides. In Tanzania as well it was difficult to distinguish the effects on deforestation of increased construction and increased consumption of fuel wood from those of expanded trade. It is estimated from figures on value added that the consumption of wood by the domestic sector was quantitatively much more significant than increased exports of forest products.

The studies also point to important attenuating factors in mitigating negative environmental effects. In Nigeria, the existence of excess capacity in the cocoa sector generated no negative, and even some positive environmental effects from increased exports. Conversely, slaughter tapping induced in the rubber sector because of the need for increased exports generated negative scale effects.

Cross-country comparisons thus do not yield any systematic patterns either of methodology, or environmental effects consequent to policy liberalization. The specific sectoral situation, the overall policy environment, and more importantly the external market realities are important in determining whether environmental effects of trade expansion would be positive or negative.

In general, the product, composition, and technology effects tend to be positive as a consequence of trade liberalization. However, the distribution of the gains from trade may be skewed against small-scale producers. They may additionally favour traders over producers, though wages may rise generally. The overall social effects of trade liberalization needs more detailed study. These country studies have pointed to some ameliorative social policies, such as minimum floor prices for producers and taxing of traders' income, which could be implemented. However, a more in-depth study is required.

As far as environmental effects are concerned, except for the fisheries case, changes in production structure did not cause significant environmental effects. In the fisheries case the composition in Argentina changed from small-scale artisanal vessels to large fleets leading to excessive fishing. In Senegal, small-scale fisheries also found export markets more financially attractive than domestic markets. In fact Senegal fears a change in EU's market policies, as this may decrease its foreign exchange earnings significantly. Senegal clearly outlines the dilemma for a developing country where short term gains are difficult to write off even if there are long term benefits of sustainable fisheries. This is a clear case where ameliorative measures such as technical assistance, higher prices and moving to higher value added products could help maintain sustainable fisheries in Senegal.

Evaluating different effects of trade liberalization

Most of the studies have attempted to evaluate different effects. The study on China shows that in a cost-benefit analysis (CBA) framework, the negative economic and social effects would be higher than the positive effects. This perception is also based on the fact that Chinese imports of agricultural products are not likely to be balanced by Chinese exports of agricultural products, as standards in export markets may be exacting and difficult for China to meet. The study does point out that the revenue generated from a 5 per cent increase in exports of textiles would be greater than the net economic and social losses calculated from the CBA. It also points out that the possible benefits to linked industries such as animal husbandry have not been examined by the study, as these could also be positive.

In Argentina, a cost-benefit analysis (CBA) solely for the species of fish that were overexploited in the study period, shows that trade liberalization had a significant negative economic effect. The quantifiable economic costs and gains, evaluated through a CBA, indicate that the policy situation of the 1990s (that is, uncontrolled fishing activity as well as lacking adequate economic instruments) has implied a net direct cost of about US \$500 million for the most exploited species. The same sort of CBA was carried out for a hypothetical situation defined as respecting maximum sustainable yield (MSY). If this parameter had been respected, a net benefit of about US\$ 5,100 million would have accrued. The evaluation of the environmental costs is mostly qualitative with an exact quantification of a broad range of species loss, though not of its economic value.

In the case of Senegal, since most of the positive benefits of trade expansion, such as technology development and increased value added were not experienced, the effect was predominantly negative on the environment. Although various measures of declines in catches and fish stocks have been provided, at this point no economic valuation has been made.

In the case of Ecuador, there were two opposing effects of trade policies on the environment during the 1990s. The substantial increase in cultivated area resulted in an increase in natural resource use as well as a decrease in biodiversity, amounting to a negative environmental effect. However, the substantial technological improvement,

particularly the incorporation of environmentally friendly technologies had positive environmental effects. Simultaneously, the introduction of environmental policies had a positive effect. Whether these different effects balance each other resulting in an environmentally neutral situation is difficult to determine. It seems however, that in the 1980s, trade liberalization may have had a negative impact on the environment. It is important to note that when the Government put in place new environmental policies in 1990s, as well as favourable macroeconomic policies such as the Export Facilitation Law, plague control norms, packaging norms, and the banana policy for plantations re-conversion were also implemented. This led to re-conversion of plantations to forest land or to organic farms. In 1995, norms to diversify markets and varieties of the fruit and to control packages and bails were also established. The combined effects of these policies appears to have reversed the trend towards increased negative impacts on the environment.

In the case of Nigeria, the net effects of trade liberalization appear to have been environmentally neutral. A number of other factors tended to minimize the negative effects of trade expansion, or render them positive. Most of these have to do with the existence of unused farms in the cocoa sector, traditional farming practices which did not favour the use of agrochemicals, and constant devaluation which led to increased prices of agrochemicals and its consequent decreased usage. Thus in this sector there were indications of a win-win situation, in which trade expansion was simultaneously environmentally beneficial. Conversely, expansion of rubber production resulted in negative environmental effects.

In the case of Tanzania, while rates of deforestation and associated environmental degradation have grown, linking it to trade expansion or trade liberalization is close to impossible. This is because while production of forest products expanded rapidly, the share of exports in total GDP generated from this sector continued to remain very low.

Some lessons learned from the practice of assessment

Some preliminary, general lessons about the conducting, the evaluation of the results, and the design of policy responses to assessments are beginning to emerge. The ones cited below provide some of the more important preliminary insights.

Timing

So far, most of the projects conducted have largely been focused on ex post assessment of the effects of trade liberalization and other trade-related policies. However, the value of ex ante assessment of trade-related policies as a means to enhance policy integration was demonstrated by the case study on China. In that sense, a periodic monitoring of the countries studied could lead to a comparison of ex ante and ex post effects.

Data limitation

In most cases, other inter-linked economic issues are only marginally examined, perhaps because of the difficulty of obtaining data as well as the complexity of these

interlinkages. The country studies suggest that the data requirements of even the most well known methodologies, such as those laid out in the Reference Manual, proved demanding and the necessary data sets are not easily accessible in developing countries.

It is therefore necessary to develop simpler methodologies such as rapid appraisal or data analysis, including causation analysis, to provide an alternative to more sophisticated methodologies which may be difficult to apply in developing countries. Data constraints encountered in the studies made it difficult to get more than qualitative impressions of the identified impact. In this case it may be necessary to link qualitative impacts with proxy indicators or ranking methodologies to estimate environmental effects.

Valuation has proved to be a major challenge in the country studies, as again the traditional methods in economics such as shadow pricing, contingent valuation etc., have proved difficult because of the lack of data. The only method used is the direct economic losses associated with species depletion and perhaps this methodology, as well as proxies for arriving at direct or indirect loss of benefits associated with environmental degradation should be further studied,

Cross-sectoral effects of trade liberalization

A number of the country projects demonstrated that there are important trade-offs between environmental and economic effects. In the four projects other than the two on fisheries, environmental effects were deemed relatively insignificant in comparison to economic gains. Some of the projects, notably the China study, suggested that negative economic and social impacts in one liberalized sector, may be balanced by related positive ones in another sector, but this possibility was not examined in any of these wholly sectoral country projects.

Correlation of different effects

Generalizing across countries is difficult, and the same policy under different circumstances may have both positive and negative effects. As both negative and positive effects ensue, it is necessary to focus policies on mitigating negative and enhancing positive effects. The only problem with this decentralized approach is that the same policy, e.g. reduction of customs duties may lead to import of improved technologies but also increased exploitation of forests through increased production of forest products. This would thus generate a positive technology effect but a negative scale effect. In fact, this was empirically observed both in the case of Tanzania and Ecuador. In the case of Ecuador, the negative scale effects were countered by new land management laws, which prevented increases in cultivated land and through appropriate environmental policies. This indicates the value of flanking policies in securing sustainable development.

Impacts of policies other than trade-related ones

The assessment work to date has underlined the need to **assess the environmental effects of other macroeconomic policies** such as devaluation, commodity price stabilization, preferential trading arrangements etc., as these also

often have significant implications for trade, environment and sustainable development.

These country projects suggest that **appropriate interventions would frequently address appropriate development, value addition, market diversification, and macroeconomic policies** rather than trade policies or even environmental policies. Trade policies so far identified as bringing environmental benefits are those which reduce trade distortions such as tariff escalation, thereby enabling the countries to move to higher value added and lower rates of exploitation of natural resources. Where trade expansion has been the major cause of environmental degradation, trade distorting policies have had a large role to play in it. In these cases, less trade distorting policies would also protect the environment.

Monitoring and evaluation

Implementation of policy packages, even at a pilot level, is key to the success of these studies. Equal effort needs to be put into implementation and identifying the challenges to implementation, as into the assessment of environmental and other impacts of trade-related policies. This implies engaging senior decision-makers at an early stage in the assessment process, enabling them to see its inherent value and also develop some ownership of its ultimate policy product.

Next steps and policy responses

Various policy proposals have been put forward as a direct result of conducting these assessments. The country studies arrived at a mix of environmental, macroeconomic, and other policies to improve export competitiveness. The diversity of solutions proposed to the environmental, economic and social problems generated by trade liberalization emphasize the specific country situations as well as their institutional structures,

China

As the most important problem identified by China was the negative economic effects of its WTO accession, the solutions also were economic in nature. An important priority of China was to improve the competitiveness of its cotton sector. For this it proposes to introduce permitted subsidies, improve its cotton breeding programme, encourage the formation of cooperatives, and various other measures.

Maintaining the balance between supply and demand, and avoiding fluctuations was also considered an important part of its strategy. This balance includes regional balance and varietal balance. The study also recommends that integrated pest management techniques, use of traditional Chinese herbal medicine, and decreasing use of water and agrochemicals be applied. The study however, does not recommend a comprehensive set of instruments that could be used for this purpose.

On environmental policies, the study strongly recommends that assessments, especially general equilibrium (GE) assessments be carried out. However, even if data

for a comprehensive GE analysis may be difficult to obtain, it is necessary to examine some of the interlinkages with other related sectors, especially livestock and textiles, which would benefit respectively from reduced prices of grain feed and cotton. As this is an ex ante analysis, it would be interesting to monitor the actual developments in these sectors as WTO accession commitments are implemented, to compare actual effects with ex ante assessments. Pilot implementation of some of these policies can also be carried out in the meantime.

Argentina

The thrust of the policy package according to the Argentina study should be to maintain natural resources at adequate levels to sustain long-term exploitation while generating revenue and productive employment.

A policy package of this type would, therefore, need a multi-level policy coordination and implementation, as well as the judicious use of economic instruments. The study recommends that the economic instruments used should result in changes in the structure of production of the fisheries sector. It is also proposed to alter the current export structure from a commodity type to one that is based on value-added. However, the study recognizes that exporting value added products may be difficult because of market access barriers such as tariff escalation. It therefore recommends a thorough study of the production chain to understand the international dimensions of the market.

The study notes that although a quota management system was prescribed by law in 1997, the design of a quota system has only begun recently. The use of individual tradable quotas (ITQs), could therefore be introduced to protect Argentina's stocks of fish. However, the full design, implementation and application of this innovative type of instrument is one of the major challenges in policy making in the near future, in particular because there is little knowledge or experience with the use of such instruments to date, particularly in developing countries. Furthermore, the application of quotas in the Argentine case would be complicated by the fact that they would be applied in a context of a scarcity of some fish stocks. This would also make it difficult to introduce markets for tradable quotas. Hence, pilot testing of these instruments would be appropriate. It would also represent a good basis so as to provide recommendations on the use of such instruments in other countries, especially Senegal.

A series of measures are being applied and need to be expanded in order to maintain resources at a level that can be efficiently and equitably used. Measures such as use of fines for exceeding quotas, upgrading control methods, procedures and strategies; regulating the gear used for fishing; and expanding control procedures, are some of the measures that need be applied to forestall collapse and unsustainable use of fisheries resources.

Senegal

The study recommends that fishing agreements concluded with foreign fleets be amended by increasing access prices, and in cases where fish stocks are seriously depleted, such agreements should not be renewed. Other possibilities would be to limit

agreements to species which are in relative abundance, to increase the price of licenses, or to establish a collective quota system.

Differential fuel prices could be introduced for small enterprises versus large fleets, so that local employment and supply of the domestic market would be preserved. Regulations concerning the kind of nets used as well as fishing zones should be strictly enforced, and new regulations, especially on endangered species, should be imposed. In contrast to the proposal by Argentina for the establishment of a system for trading quotas, Senegal proposed to distribute quotas between communities through multi-stakeholder groups.

Finally, a set of policies to add value to the fisheries product is proposed. This includes: increased infrastructural investment; granting of tax and customs advantages in proportion to the value added of a product; financial incentives notably in terms of credit to facilitate acquisition of technologies adapted to industrial and small-scale processing; and market diversification away from Europe to Africa and Asia.

Ecuador

Currently, one of the most widespread measures being used to address the environmental effects of banana production is the development and application of environmental certifications. Several environmental certification programmes have been adopted by some banana companies, including the ISO 14001 standard and the Eco-OK Programme. In terms of organic certification, the banana industry works with the Organic Crop Improvement Association International, Inc. (OCIA), of the United States, which operates primarily in the El Oro province, and Eco-Cert, based in Germany and Italy, which operates in the Guayas and Los Ríos provinces. Fair trade certification also offers an important avenue for exporting bananas at fair prices. These programmes combined economic gains with environmental benefits and were thus adopted readily by banana plantations.

The study also recommends a range of economic instruments that can lead to the development of environmentally friendly plantations, both on the supply and the demand side. On the supply side, the study recommends that tariffs on import of cleaner technologies as well as taxes be reduced. The study also recommends easier credit lines, higher procurement prices, environmental certification, group certification for small and medium enterprises as well as policy support for them, and capacity building as well as institution building. It lays particular emphasis on implementation mechanisms and on institution building for this purpose. No specific environmental policy is recommended by the study. Testing the implementation of some of these instruments, including the supportive structures or the flanking policies needed to implement them, could be usefully examined in the next phase.

Tanzania

In order to minimize the negative impacts of trade liberalization and the related policies in the forestry sector and at the same time enhance the positive impacts of the same, this study recommends some policy packages which include the following policy instruments;

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- Pollution control agreements
 - Forest product charges
 - Control of licenses given to operators in the forests
 - Certification for products from sustainably managed forests
 - Increased environmental fines/penalties to reflect the magnitude of the damage.

It is also interesting to note that the study proposes the creation of a Task Force with the mandate to implement the policy package outlined above. It is hoped that the combination of these policies would lead to a more rational exploitation of forestry products.

The Task Force formed should include members from: the Forestry and Beekeeping Department, the Vice-President's Office (Environment Division), the Ministry of Trade and Industry, the Ministry of Local Government, the National Environmental Management Council, the Centre for Environmental Economics and Development Research, and other stakeholders such as the private sector.

Nigeria

Macroeconomic policy initiatives that have significant implications for natural resource utilization must incorporate strategies to curtail unintended consequences on the environment. Some of these policies could be as follows:

- The Ministry of Environment, along with the Cocoa Development Unit (CDU) and the Ministry of Agriculture could put in place a control mechanism to advise on and monitor the rate of expansion of export crop farms, and also give incentives for replanting old trees so as to be able to dissuade farmers from unprofitable and environmentally degrading practices. This could be in the form of easier loans.
- Introduce an effluent charge on pollutants arising from the activities of rubber processing industries. This should be monitored by the Ministry of Environment, which could also set a minimum charge and maximum level of permitted effluents.
- The Federal Ministry of Environment could recommend the imposition of tariffs on selected products, especially agrochemicals as it may help to control unregulated imports and indiscriminate use of these products.
- There is the need to encourage research institutes, especially the Cocoa Research Institute of Nigeria (CRIN), the Rubber Research Institute (RRIN) and universities to develop cocoa and rubber varieties that are much more resistant to some of the major diseases for which pesticides are used. Moreover, appropriate Integrated Pest Management (IPM) control methods for cocoa and rubber could be developed to reduce the environmental problems associated with any increases in hectareage of these crops in future. Furthermore, high-yielding varieties should be developed to increase the productivity and income of farmers, which will limit increases of crop hectareage so that pressure on the environment will be reduced.

- A Farm Development Advisory System (FDAS) should be established to advise producers of cocoa and rubber on appropriate environmentally friendly techniques which are simultaneously profitable.
- Development of infrastructure such as roads, water supply, health centres schools, etc., in export crop producing areas to serve as incentives/encouragement to farmers, could minimize the negative environmental impacts of trade liberalization. This is because better infrastructural development would increase value addition opportunities, by reducing transport costs and costs of washing cocoa which is expensive in cases where water has to be obtained from long distances. Increased value added may in turn reduce the tendency for unsustainable exploitation of cocoa and rubber plantations. Improving social infrastructure would have beneficial social effects (for example, on health and literacy of plantation workers).

Conclusions and recommendations

All the country projects have shown that trade expansion which is consequent upon either structural adjustment policies or trade liberalization has both negative and positive effects on the environment. In most cases however, these studies indicate that the economic and social effects of trade expansion are more significant than the environmental ones. The studies underline the importance of these assessments in understanding the static and dynamic interlinkages between different economic sectors, different economic agents and the environment. Most of the measures identified to alleviate environmental, economic and social problems include a mix of sector-specific policies, broader macroeconomic policies, and environmental policies. The only trade policy identified in this regard was a measure that promotes higher value addition of exports.

The country studies also suggest that an integrated treatment of policies underpinning economic development may do much to enhance the viability of policies directed towards the environmental and social aspects of sustainable development in these countries. The policies to be considered should include not only macroeconomic balance and stability, but also pay due attention to infrastructure, and incentive structures for development. For example, devaluation will need to be balanced with higher value added for which incentives such as tax rebates would be required. In addition, improved infrastructure would be needed to build a competitive export structure. In several cases, commodity price stabilization, skewed preferential trade agreements and other such factors may also need to be corrected before the right balance between trade, environment and development can be achieved.

Coordination at the national level between government line ministries, industry and non-governmental organizations must be actively encouraged if the policies advocated by the studies are to be implemented, even on a pilot basis. There is no shortage of in-country expertise to identify trade/environment problems and design responsive policies. However, there is a need to build an awareness of the different effects for informed policy making.

It is to be noted that these are preliminary results of the country case studies, many of which need to be further refined. Nevertheless, there is already an opportunity to initiate implementation of some of the policies recommended by the country studies, on a pilot basis. It is hoped that the stakeholder buy-in generated during the process of the assessment will help some of the countries to begin this work soon.

Outputs from these assessments have already been used in the development of the UNCTAD Train for Trade course on trade, environment and development. They can also serve as valuable models for countries involved in similar exercises in the framework of the UNEP-UNCTAD Capacity Building Task Force on Trade, Environment and Development (CBTF). This task force is already providing capacity building for environmental and integrated assessment of trade-related policies, and on the design of appropriate policy responses to such assessment

THE FISHERIES SECTOR IN ARGENTINA

Introduction

The exploitation of fisheries resources was not very high in Argentina until the opening up of the economy. The growth of fisheries exploitation then took place at unprecedented rates, and this has been one of Argentina's most dynamic economic sectors in recent times. It has been categorized as the world's fastest growing fishery.¹ A strong international dimension is present in current patterns, not only because of the growth in international trade and a heavy reliance on foreign markets by the sector on harvesting (since only about 10 per cent of products are consumed domestically), but also due to the transnationalization of capital in the fisheries sector.

As in other areas of the economy, the impact of trade liberalization on the fisheries sector has been mixed. Furthermore, after intensive over-fishing, a strong degradation of the fisheries biomass has been documented, putting the main species harvested near biological collapse and causing increased fishing effort. This and other negative environmental impacts have been closely inter-linked to the social and economic crises in this sector.

This report addresses several issues such as the social, economic and environmental impacts of trade liberalization in the fisheries sector in Argentina in the 1990s. Furthermore, the report attempts to draw guidelines for a proactive policy package that could be implemented in order to address the problems and strengthen the positive aspects of trade liberalization.

In evaluating the social, economic and environmental effects of trade liberalization, the report examines these effects before and after liberalization. To situate these effects in the context of the Argentine fisheries industry, the report analyses the importance of the domestic versus the export market, as well as conducts an analysis of the labour markets in different fisheries sub-sectors, i.e. those related to trade and those which are oriented mostly for the domestic market. A cost-benefit analysis of some specific trade liberalization policies in this sector has been carried out in this report. Here there is an attempt to delineate a policy approach that aims at curtailing the negative impact that trade liberalization has had on the fisheries sector, yet at the same time harnessing the possible benefits that this type of economic policy can have. The types of policies recommended are (a) command and control measures and (b) economic and market-based instruments.

¹ See Global Environmental Outlook 2000, United Nations Environment Programme, 1999.

Development of in-country methodology

Why this sector was chosen for study

The fisheries sector has been relevant to the Argentine economy in recent years for several reasons. In the peak years of production (1995 - 1997), exports accounted for about US\$ 1,000 million. For those years, the export revenue from fish products surpassed revenue from exported beef, a historically important export product of Argentina.² Although the crisis situation of the fisheries sector is already being felt in economic terms, in 1998 seafood exports earned US\$ 860 million. The creation of several new Asian markets (Japan, South Korea, Taiwan and China now rank among the ten most important importers of Argentine fish), further reiterates the importance of this sector in Argentina's export diversification strategy. Besides its economic relevance, the social implications of the economic activity from this sector were also important. Twenty-five thousand jobs are directly dependent on the fisheries harvesting and processing sectors. Some estimates indicate that indirect employment in the fisheries sector could be as high as 100,000. Besides, several communities depend on fisheries as their most important economic driver. In the 1990s, the fisheries sector provided, on average, 3.3 per cent of total export revenue.

Methodology used

In the context of the project, the aim of the report is to analyse in a comprehensive manner the social, economic and environmental impacts that trade liberalization of the Argentine fisheries sector has had in the 1990s. The study followed a deductive method. The multiple approaches utilized respond to an integrated assessment of aggregated issues to be analysed when dealing with the fisheries sector.

The methods used include review of relevant literature and primary research, analysis of economic trends in the fisheries sector, and examination of norms and laws relevant (directly and indirectly) to the regulation of the fisheries sector. The study reviews relevant literature dealing with the social and employment issues related to fisheries exploitation in Argentina in the 1990s, and reviews the effects of increased exploitation on the depletion of species. It analyses the trend and structure of fisheries exploitation in Argentina in the period of trade policy and macroeconomic reforms. The study compares these trends with national and international norms and laws that have a bearing on the fisheries sector and also conducts an analysis of fisheries administrative organizations, at the national and sub-national levels.

The study conducts a cost-benefit analysis to assess the social, natural resource and economic impact of the export-oriented exploitation of the *Merluccius hubbsi* species. Testing several hypotheses ranging from factual policy to sustainable management practices also forms an integral part of the study. It finally outlines policy packages that could harness the positive impacts of the opening of trade in the fisheries sector while mitigating negative impacts.

² For example, beef exports for 1997 reached US\$ 803 million.

Impact of trade and investment policies on environmental management

First and foremost, the project aimed at developing a methodology and carrying out an integrated environmental, social and economic assessment of trade liberalization impacts on the fisheries sector in Argentina.

Impact of economic reforms and liberalization of trade in Argentina

The project examines the impact of the following policy package on exports of fisheries from Argentina;

- Stabilization programme: fixed foreign exchange rate, tight monetary policy;
- Commercial openness (trade liberalization);
- State reform: privatization of public utilities;
- Deregulation of markets and economic activities.

State reform (privatization of public utilities), deregulation of markets and economic activities changed dramatically the economics rules inherited from the import substitution period.

General impacts

The structural adjustment process was characterized by control of the inflationary process and high activity levels. These processes led to overall increases in domestic consumption, production, productivity, investments and exports; higher pressures on natural resources, without appropriate institutional, legal and organizational rules and control systems; increasing fiscal deficit and foreign indebtedness.

Impacts of economic and investment reforms on the fisheries sector

Until the 1990s, only national flag fleets could fish and disembark in national ports; fishing vessels could only hire national crews (100 per cent of officers and 75 per cent of sailors). According to several analysts, these highly protective policies would have been some of the causes for a relative underdevelopment of the fishing fleet and a low growth of the fisheries sector. In fact, fisheries were oriented to the relatively small domestic market since no significant external demand was present and high barriers in the European and Asian markets were to be found. As a consequence, very few ships were fishing in waters under Argentine jurisdiction. The rate of catches and exploitation of all species was below the total allowable catch (TAC) estimated by INIDEP (National Institute for Research and Development of Fisheries) and set by national authorities.

The change in several norms, including the possibility of importing second hand vessels in 1992, the modification of national personnel in the crew as well as the change in previous regulations led to a change in fishing practices. In Argentina, external enterprises (mainly Spanish) opened local companies as Argentine firms in order to comply with existing regulations (i.e. only ships under national flag could fish

within the Argentine Economic Exclusive Zone, EEZ). Consequently, the size and power of the Argentine fishing fleet grew significantly from 1986 to 1991.

In 1994, an Agreement with the European Union led to the establishment of joint ventures with local firms. At the beginning of the 1990s, a growing demand from external markets (mainly the European Union and some Asian countries) put additional pressure on South Atlantic fisheries. Also, in the Malvinas area, local authorities started a rather liberal policy of granting fishing licenses to vessels from these origins.

The main impacts of the economic reforms initiated in 1991 affected all economic activities, including the fisheries sector, as follows:

- Price stabilization and fixed foreign exchange rate
These measures provided solid guarantees on the stability of the foreign exchange rate and curbed inflation, which meant that fisheries projects found a favourable environment in which to develop. National firms began investment programmes but with financial constraints and uncertain foreign markets.
- Credit availability
Economic reforms rebuilt financial markets and bank deposits, enlarging national credit availability. The expansion of fisheries activities was financed highly with local credit.
- Free movement of foreign capital
This had significant impact on the fisheries sector where foreign investors owned most of the new national firms. Consequently, the settlement rate of foreign capital in the fisheries sector saw significant growth.
- Reduction of import tariffs and export taxes
Several working inputs for the operation of fishing vessels, as well as equipment were affected by these measures, reducing operating costs and increasing profitability.
- Deregulation of numerous economic activities and markets

The fisheries sector, as well as many other economic activities, benefited from this new environment, as *inter alia* labour laws including crews of ships were liberalized.

- Privatization of public utilities
The privatization of ports and their operation had a significant positive impact on the fisheries sector. Privatization on the other hand increased prices of energy, fuel and communication services.

In brief, the economic and investment reform policies of the early 1990s had positive impacts for the growth of the fisheries sector.

Policy instruments for the fisheries sector

The high degree of economic protection that characterized the fisheries sector until the mid 1980s was clearly affected by the package of economic and investment reforms above presented. The fisheries sector did not change the general and basic legislation that regulated its activities. Instruments such as allowing joint ventures, chartering of foreign vessels, as well as import of 'second hand' vessels constituted the main legal framework for fisheries regulation in Argentina between 1994 and 1999.

Impacts on the fisheries sector

Fisheries have been one of the most dynamic economic sectors of Argentina in the past 15 years. Value added has grown steadily and exports grew 478 per cent between 1985 and 1995 (while, in comparison, total exports increased 159 per cent). The social and economic scenario in this sector, however, changed, and the impact on the sustainability of measured biomass has been negative.

The main positive economic impacts in the fisheries sector in the 1990s can be listed as follows:

- Increase in fisheries production and employment leading to revenue generation;
- Increase in exports leading to increased foreign exchange earnings;
- Improvement and growth of the fisheries fleet;
- Technological innovation, increased research and skills in the sector;
- Opening of new markets and trade exchanges;
- Increase in public income and development of infrastructure.

The main negative effects were the following:

- Degradation of fisheries biomass;
- Increased costs for fisheries regulation and control;
- Increased operation costs;
- Increasing fishing effort,
- Fiscal costs (subsidies) and investment oversizing;
- Non-diversification of catches;
- Increasing unemployment and possible decline in work conditions in some areas.

A diagnosis of the Argentine fisheries sector

Description of fisheries resources

Argentina's extensive continental platform, as well as its coastal extension on the South Atlantic, is indicative of the country's high level of fisheries resources. Geopolitically, two fisheries areas can be identified: the Economic Exclusive Zone (*Zona Económica Exclusiva*) and the Argentine-Uruguayan Common Fisheries Zone (*Zona Común de Pesca Argentino-Uruguaya*). Due to this last zone, fishing vessels with Argentine flags can fish until parallel 34 (while the platform's extension is made up of the area south of parallel 36). Regarding the fish, only some 20 per cent are currently considered of interest to fisheries exploitation.

Knowledge about particular species as well as ecological dynamics varies greatly from species to species and from sub-system to sub-system, going from highly studied species and dynamics to other species or ecological dynamics which have not been analysed fully.

Main species in Argentine fisheries and their status

According to the National Institute for Research and Development of Fisheries (INIDEP), the fisheries resources exploited currently can be classified according to the impact that the current degree of exploitation has on the particular resource.

The over fished resources were those which experienced a high degree of fishing pressure.³ In order to avoid fisheries collapse, measures to recuperate the resource are advised. The main fish species within this category was the Argentine hake (*Merluccius hubbsi*), which forms the main focus of this study.

In addition, several other resources were fished up to maximum advisable levels. The main recommended measure for the species in this category is to maintain fishing at current amounts. The most commercially important fish species within this category includes the fin squid, the red shrimp, scallops, cod, and others. Resources with feasible increased exploitation in the short and medium term include those currently captured at numbers below advisable catch level, and therefore increased extraction is feasible without endangering resources. The important species in this category include anchovies, mackerel, sprat and others.

Geographical distribution of fisheries

The geographical distribution of fisheries is an intensely important variable in fisheries exploitation given that this distribution is related to management regimes, administrative aspects of the fisheries sector as well as with the determination of areas where fishing can or cannot take place for a particular resource or period of time. The geographical distribution of resources is also relevant in the context of the substantial

³ For some species, fishing took place not only to a high degree but also well beyond advisable levels for several years.

shift that has taken place with liberalization and increased exploitation. Five ecologically defined areas of geographic distribution of fisheries have been identified.

History of fisheries exploitation

Argentina is not a country with an intensive fishing history. Some sporadic periods of exploitation followed either commercial or geopolitical goals. For example, in the 1960s, accords with the former Soviet Union allowed for intense fishing of Argentine hake. In the 1980s, agreements with the former Soviet Union and Bulgaria were signed in order to implement a geopolitical strategy with the Malvinas. In the 1990s, the introduction of a new set of fishing policies saw a shift from under utilization to over-exploitation of fisheries. This change, as well as global transformations in the areas of fisheries, has radically changed the way that fishing activities are conducted in the country.

Fishing gear

As can be expected from multi-resource fisheries, a wide extent of different types of fishing gear was utilized for capture. The fishing gear used were however not specific to the species captured nor even to the size of the capture. These factors resulted in large incidental by-catches and discards, as well as the capture of juveniles thus reducing the reproductive capacity of the stock. Incidental and by-catch effects can also have impact on non-fisheries resources, such as seabirds. The non-specificity of the fishing gear along with the fact that some species have a higher market value than others, has led to resource depletion. It is estimated that shrimp fishers discard hake by-catches which could go up in some cases to 62 per cent of the catch.

Fisheries exploitation

Individual species landings have decreased sharply since the beginning of the 1990s. Furthermore, there is no argument from any source that fishery resources of Argentina have been overexploited. Information varies from species to species and some are more studied than others.

From the reported landings, there is an indication that it is 47 per cent beyond the total allowable catch. In 1999, with a fully distended conflict already taking place, the total capture for some species was nearly 314,000 metric tons.⁴ The total allowable catch was 238,000 metric tons (declared capture was, therefore, 32 per cent above this figure). This produced an inordinate amount of fishing pressure on just a few species. In 1999, 77 per cent of capture was for only three species. Argentine hake makes up 48.7 per cent of fish landings for 1999 (even in a year with an ample biological stop for this species).⁵

⁴ By Resolution 293/1999 of the Secretariat of Agriculture, Animal Husbandry, Fisheries and Food.

⁵ Hake landings in 1999 were in the amount of 311,992 metric tons, while total landings were 1,012,803 metric tons. Total fish landings (i.e. not including molluscs and crustaceans) were 640,017 metric tons.

For hake, different estimates show that reported capture can range between 110 per cent to 150 per cent over TAC. Furthermore, harvesting out of the EEZ as well as in the Malvinas area has a high impact on fish stock within the EEZ. The lack of full control over the extensive platform and national jurisdiction has had strong implications on fisheries stock.

National consumption patterns and the domestic market

National consumption of fish is not very high when compared with consumption in other countries. Cultural factors as well as the high price of fish and fish products in the local market (when compared with other protein sources), has resulted in a historically small domestic market. Nevertheless, there has been a steadily increasing consumption of fish and fish products in recent years.

National consumption only accounts for about 10 per cent of the total seafood catch. Hake again represents a very high ratio of fish consumed, with about 60 per cent of the local market. The second largest product consumed is Argentine short-fin squid with about 8 per cent of the local market. Most local seafood consumed is either fillet or whole fish. The market value of domestic fish consumed is of about US\$ 184 million.

Argentina has a long tradition of local canning and processing industries in the seafood sector. Since the mid 1990s, the emerging pattern is that while seafood that comes from the local market is consumed fresh with little value added, imported fish products are generally processed foodstuffs or products of higher value than local fish. The sources vary greatly from product to product. The opening of markets for processed imported products (especially canned) has created a crisis in the processing sector.

Export pattern of fisheries

The growth and change in export patterns is undoubtedly an outcome of the fisheries policies in Argentina since the early 1990s. Over 90 per cent of the harvest is exported, making Argentina currently one of most important exporters of fish products in the world. In 1998, with fisheries exports down due to the stock crisis, they still reached US\$ 860 million.

For the fish species, in the peak export year of 1997, over 33 per cent of the exports were made up of hake, while the value of squid is also highly similar to the value of exported hake. Other products exported are fish paste (surimi) and shrimp, which have a higher market value yet lower volume in overall exports.⁶ Processed seafood products only account for a very small percentage of exports.

⁶ The value of these exports for 1997 were: for surimi US\$ 58,000,000 and for shrimp US\$ 51,000,000.

Foreign markets

Markets for internationally traded seafood products are somewhat diversified. The main market is the European Union, which accounts for roughly 50 per cent of Argentine exports, followed by the Asian markets with 25 per cent and MERCOSUR (Southern Common Market) with 14 per cent of the market. The North American Free Trade Association (NAFTA) block secures 10 per cent of exported products. Exports of seafood to Brazil increased 271 per cent from 1991 to 1996. Most exports to Asia and the EU are unprocessed, whereas a significant proportion exported to the NAFTA block and MERCOSUR are processed. Two thirds of the hake produced are exported to three countries, i.e. Brazil, Spain and The Netherlands. Other products are directed to different markets.

Subsidies in Argentine fisheries⁷

Subsidies are an essential dimension to the situation facing global fisheries today. It has been indicated that the main impact of fisheries subsidies can be divided into three outcomes, i.e. expansion in the number of enterprises, upgrading fishing technology to increase catches, and discouraging exit of industry even when it is no longer sustainable.⁸

Ineffective management of fisheries was consistent with over fishing as well as with overcapitalization/overcapacity. Overcapacity in turn was intrinsically linked to subsidies. Argentine subsidies can basically be approached from two perspectives, foreign subsidies, and national ones.

Foreign subsidies

First of all, the European subsidies employed for access to distant waters (in the case of the EU-Argentina Accord as well as previous agreements of the type), were categorized by the EU as positive subsidies, given that they reduced pressure on natural resources in European waters.

As has happened throughout many regions of the world, over-exploitation and fisheries collapse in developed countries, as well as increasing consumption in international markets led to a shift in fishing activity from developed countries to the Argentine Economic Exclusive Zone.

The EU, together with Japan, Korea and Spain account for 80 per cent of all budgeted subsidies for ocean fisheries in OECD countries. It is clear that some of the most subsidized fleets from these countries operate either directly or indirectly in Argentine waters. Spain is a net importer of fish and fish/seafood products, and Argentina has been in recent years the second largest source (after Morocco) of these

⁷ This section is drawn largely from "Subsidies in Argentine Fisheries", paper submitted at the UNEP Fisheries Workshop, Geneva, 12 February 2001.

⁸ See Porter, 1998.

kinds of products entering the Spanish market from waters outside the EU.⁹ Spain is the main recipient of total Argentine fisheries products.

The situation vis-à-vis subsidies and fleets from Asian countries is not as clear. The main assessments have been carried out for European capital (that is, in direct relation to Argentine fisheries). Asian cases have not been studied from this perspective as fully as the EU Agreement in relation to fisheries in Argentina. Asian fleets (from Japan, Korea, China and Taiwan) are generally granted permits to fish squid in Argentine waters in exchange for fishing fees. As these countries' markets are practically closed to Argentine products, Argentina's strategy has been to open fisheries for distant water fleets. Distance water fleets from Asian countries operating in Argentine waters and harvesting squid vary in the period analysed since fishing rights/permits are temporary.

Domestic subsidies

Although the levels of subsidies are not nearly as great as those applied in developed countries, they are non-actionable under WTO rules due to their characteristics, the fisheries industry operating in Argentina with different capital origin has received a series of explicit and implicit (or budgeted and unbudgeted) subsidies as well as environmental subsidies in the 1990s. No study to date has fully analysed the issue in relation to domestic subsidies to fisheries. Essentially, subsidies are of the following kinds:

- reimbursements for fisheries processed products and for exports from Patagonian harbours;
- fuel tax subsidy for Patagonian activities;
- environmental subsidies.

Export promotion: reimbursements for exports from Patagonian harbours, for on-board processed products and others

The reimbursement applied to all fisheries products until 1996, and from then on just to products processed on land in the Patagonian region. The total subsidization, including all products and not only fisheries, was US\$ 92 million per year.¹⁰

From 1988 to 1993, the Patagonian provinces experienced a growth in their exports of fisheries products of 275 per cent, while during the same period, all exports (including fish products) from this region increased 141 per cent. For example, the PROMEX project for the export of non-traditional products was created in 1992 with

⁹ "Spain Annual Seafood Report", AGR Number: SP5039, US Embassy, Madrid, 1995.

¹⁰ Government of Argentina, "SUBSIDIES NOTIFICATIONS PURSUANT TO ARTICLE XVI.1 OF GATT 1994 AND ARTICLE 25 OF THE AGREEMENT ON SUBSIDIES AND COUNTERVAILING MEASURES", World Trade Organization, Committee on Subsidies and Countervailing Measures, G/SCM/N/3/ARG. 25 March, 1996.

the goal of increasing Argentine exports of non-traditional agricultural products (such as fish and fish products) in foreign markets. Specific export subsidies in the form of reimbursements for the fishery industries have oscillated between 0 and 10 per cent depending on product, without taking into account harbour of origin.

Fuel tax subsidy for Patagonian activities

Fuel tax receives a subsidy in the Patagonian region. Although, as in other cases presented here, it cannot be said that fuel tax subsidies in this region have been exclusively used for fisheries activities, fisheries exploitation is one of the main endeavours of this regional economy.

Environmental subsidies

Subsidies on the use of resources themselves have been identified in studies on fisheries' subsidies. In the case of Argentine fisheries, rent extraction mechanisms for the exploitation of fisheries resources has been practically non-existent in the period analysed. In the case of Argentina, the amount of management costs recovered from fees and royalties only covered an estimated 14.5 per cent of the annual fisheries management budget for some periods of time.¹¹ In the Argentine case, as in most if not all intensive natural resource use instances, a strong environmental subsidy is present.

Labour in the Argentine fisheries sector

Employment

A major component of the analysis is the employment generated by the fisheries sector. The total number of people directly employed in the fisheries sector is about 24,000. Some estimates indicate that, in total, some 100,000 jobs (direct and indirect) depend upon the fisheries sector. The industry is divided into a harvesting and a processing sector, with about 50 per cent of employment in each sector. The following analysis on labour in Argentine fisheries follows this distribution and clearly implicates labour variances.

Employment in the harvesting sector

The harvesting sector employs about 12,000 people. The processing fleet is the larger employer, hiring 72 per cent of workers. The ice trawler fleet hires 18 per cent of the workers, the coastal inshore fleet 6 per cent, and the artisanal fleet the remaining 5 per cent. Labour costs account for an estimated 50 to 55 per cent of the vessels' total variable cost.

¹¹ Estimates by other sources are much more critical. For 2001, a collection of only 0.6 per cent of the total value of fisheries exports is foreseen. (Comunidad Pesquera, 6 July 2001.)

Employment in processing activities

Total employment in the processing on-shore sector is estimated at 12,400 people, including cooperative workers (about 30 per cent of the total). Between 1987 and 1996, total employment has decreased by 11 per cent, and many plants moved from Buenos Aires to Patagonia (due to incentive measures, promotion policies, subsidies). In the hake processing plants, labour accounts for 10 to 15 per cent of all costs. Labour cooperatives were created to reduce labour costs as these cooperatives hired their work force on a piece meal rather than a wage basis. This reduced overall costs by 30 per cent, and has led to the creation of a large informal sector.

The legal framework for the fisheries sector

Constitution and environmental norms

Argentina is a federal republic, which divides responsibilities between a federal government and the provinces. Navigation activities and international trade, as well as inter-provincial trade fall under federal jurisdiction. Although the principles of sustainable development are embedded in the National Constitution, several different jurisdictions and rights over natural resources compete, making the legal implementation of environmental laws difficult.

Background to the Federal Fisheries Law

Historically, fisheries exploitation was reserved to national exploitation. National Law N° 17 500 of 1967 and other complimentary norms regulated this area until the current Federal Fisheries Law of 1998. During this period (i.e. 1967-1998), labour, capital investments, vessels' flags and fisheries' processing had to be Argentine and carried out in Argentine territory. Nevertheless, certain occasional exceptions were permitted through special international treaties (e.g. Acuerdos Marco), for fishing in Argentine territorial waters or for foreign investment made to Argentine enterprises.

Up until 1991, fishing permits were unrestricted. Ships could capture any species in any amount solely by obtaining a fishing permit. Permits were granted per vessel.¹² In 1991, new reforms paving the way for the Agreement with the EU were introduced. A latter resolution¹³ attempted to fix limits to the fishing capacity of vessels that would allow exploitation. Argentine fisheries for the first time (by replacing older vessels) limited their annual capture allowance.

The Federal Fisheries Law

The Federal Fisheries Law of 1998 changed the issue of provincial domain over natural resources inherent in much Argentine legislation related to natural resources.

¹² These are still current, although as it will be seen below, there are now other sorts of licenses involved, creating a mixed system until the individual quota system is fully implemented.

¹³ Resolución No. 985/1994.

The norm established objectives, defined authorities and different mechanisms for regulating all aspects of fishing activity in Argentine territorial waters. It set controls, finance and research mechanisms as well as conservation, protection and administration of living resource regimes. Further, it explicitly regulated fisheries exploitation and established sanctioning systems.

Regarding environmental objectives, the Law states that there should be "... rational use of living resources ..." as well as "...long term conservation of resources ...". In addition, the "development of fisheries processes that are environmentally appropriate".

Concerning productive objectives, the norm states that fisheries exploitation should promote "... exercise of fisheries seeking maximum development...", "...sustainability of fishing activities...", and "... obtaining maximum value added (to products from fisheries)." Article 2 especially determines that fishing activities and marine living resources processing are an industrial activity. Regarding labour, the Law establishes that fisheries' activities should promote the maximum employment of Argentine labour force. The Law also established the creation of the Federal Fisheries Council, with representation from national and provincial authorities. It also established a secretariat for implementing fisheries policies, regulating exploitation, supervision and research.

The Federal Fisheries Council

Its functions are to:

- set a national fisheries policy;
- establish a research policy;
- determine total allowable catch;
- approve permits and establish rights and royalties;
- regulate artisanal fishing;
- modify the distribution of income from the National Fisheries Fund.

According to the Law, the establishment of a fisheries policy should be based on research and recommendations carried out by the National Institute for Fisheries Research and Development (*Instituto Nacional de Investigación y Desarrollo Pesquero*, INIDEP).

Fishing practices

To be able to fish in areas under Argentine jurisdiction, it is stated the vessels should have a permit. However, this permit only allows access to the fishing zone.

International issues in the Federal Fisheries Law

Access to Argentine waters by foreign vessels is permitted through international treaties for unexploited or under-exploited species. In the Federal Fisheries law, several considerations are regulated, such as opening markets of the foreign contracting country, conservation of resources in areas adjacent to the export promotion zone, and negotiating reciprocal rights for fishing in distant waters for Argentine fleets.

National Fisheries Fund (FONAPE)

The Secretariat of Agriculture, Animal Husbandry, Fisheries and Food administer the fund with the participation of the Federal Fisheries Council. These funds come from royalties, fishing permits, penalties, sale of decommissioned vessels, and other such sources. The fund is shared between the federal government and the governments of maritime coastal provinces.

Infractions regime

A wide and strict sanction regime for different activities that breach fishing norms was established. The current norm, it is agreed, was not the best law needed for a country with a fisheries sector in crisis, given that it was a norm that mainly promoted fishing and fishing activities without adequate sustainability caveats. The Federal Fisheries Law substituted dispersed and dated norms that concentrated most decisions on the Federal Executive Power. Furthermore, several stakeholder groups, such as some sub-federal governments and private interest groups, resist the quota system which is one of the main innovations in the Law.

The international legal framework for fisheries

Background to the international legal framework for Argentine fisheries

Argentina is a party to several international accords directly dealing with fishing activities. Besides these, Argentina is also party to a multiple number of other international norms and accords that tangentially deal with fisheries or impact on fisheries (for example, the agreement on maritime pollution, high seas safety, double flag, etc.). The United Nations Convention on the Law of the Sea legally established the 200-mile Economic Exclusive Zone (EEZ) for fishing rights for coastal countries, and sovereignty over living marine resources. Chapter 17 of Agenda 21 provided for the protection of oceans, seas, coastal areas etc., and all the living resources therein. This was the main driving force behind the UN Agreement on Straddling fish stocks.

United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

The Argentine Parliament has ratified this agreement.¹⁴ A recent ratification is Law No. 25 263,¹⁵ which regulates fisheries in the Antarctic zone and which

¹⁴ National Law No. 25290 “APROBACION DEL ACUERDO SOBRE LA APLICACION DE LAS DISPOSICIONES DE LA CONVENCION DE LAS NACIONES UNIDAS SOBRE EL DERECHO

determines a functional relation to the Federal Fisheries Council since it is this organization that should grant fishing rights in this area to Argentine vessels. The norm also establishes management guidelines (control, surveillance and research).

Code of Conduct for Responsible Fisheries

The Code, which is voluntary in nature, includes several measures, such as the precautionary principle. It also promotes several conservation and rational utilization standards, as well as regional perspectives to fisheries.

Fisheries Agreement with the European Union

This Agreement was a forceful instrument which regulated the entry of European vessels and capital into Argentina. It facilitated the import of vessels from the EU, and the formation of joint ventures. It was also explicitly established that the "transformation of Argentine fisheries resources would be within a perspective of priority supply to the Community's market". The agreement went further into detail as to regulate the species to be fished, the maximum captures, incidental catch, and other issues related to the management of resources.

To support fisheries exploitation, one of the expressed conservation objectives of the norm is the joint research to promote preservation and conservation of living resources (Article 3). This Accord was key in the fishing activity and fishing policy of Argentina and also dealt with conservation issues. As a result, an enormous flow of capital and material resources were transferred toward Argentine fishing activities.

Administrative layout of the fisheries sector in Argentina

National administration

The policy and administrative arrangement of fisheries issues in Argentina is highly elaborate. The Secretariat of Agriculture, Animal Husbandry, Fisheries and Food is the highest authority (implementation authority) at the national level in fisheries policy, and the Secretary presides over the Federal Fisheries Council (*Consejo Federal Pesquero*). Within the Secretariat, the specific area dealing with fisheries is the National Fisheries and Aquaculture Directorate.¹⁵

The Secretariat is, as stated above, the implementation authority charged with conducting and executing policy as fixed by the Federal Fisheries Council. The National Institute for Fisheries Research and Development (*Instituto Nacional de*

DEL MAR RELATIVAS A LA CONSERVACION DE PECES", becoming effective on 17 August 2000.

¹⁵ National Law No. 25 263 "REGIMEN DE RECOLECCION DE RECURSOS VIVOS MARINOS EN EL AREA DE APLICACION DE LA CONVENCION PARA LA CONSERVACION DE LOS RECURSOS VIVOS MARINOS ANTARTICOS (CCRVMA), becoming effective on 25 July 2000.

¹⁶ This structure is current as of the latest national administrative changes of December 1999. Although some of the literature and reports refer to the Under-Secretariat of Fisheries, this division does not exist any longer.

Investigación y Desarrollo Pesquero) is an autonomous division of the Secretariat. INIDEP is the main and official research organization in the country oriented toward the development of fisheries. INIDEP has a programme of on-board research assessment and observation of fishing practices, and collects extensive amounts of data on fisheries resources. The Federal Fisheries Council sets INIDEP's general areas of work. INIDEP also recommends the total allowable catch amount to the Federal Fisheries Council, based on information determining maximum sustainable yield (MSY).

The Ministry of Foreign Affairs, International Trade and Religion is in charge of foreign policy and international negotiations. The Ministry has a seat in the Federal Fisheries Council. The Secretariat of Sustainable Development and Environmental Policy deals with environmental and conservation issues, such as environmental quality, natural resource management, biodiversity. It has a seat in the Federal Fisheries Council.

The Federal Fisheries Council

The Federal Fisheries Council (*Consejo Federal Pesquero*) is a new figure in the administrative scheme established by National Law No. 24 922 of 1998. The Council is in charge of setting fisheries policy.

National Parliament

Following are descriptions of both house committees specifically dealing with fisheries. The National Senate's Committee on Fishing, Maritime and Harbour Interests (*Comisión de Pesca, Intereses Marítimos y Portuarios*) is the specific area within the Senate to deal with fisheries issues. It has distinct yet very wide capacity to pronounce itself on "all matters related to the exploitation in terms of sustained use for all of the sea's living resources; to the administration, investigation and destiny of economic resources drawn from surpluses; harbour assistance; industrialization linked to the fisheries potential of the Argentine sea's continental platform, incentives to aquaculture, sanitary control, fisheries statistics and information, shipbuilding industry related to fisheries and all matters related to fisheries exploitation."¹⁷ The Chamber of Deputies also has a permanent committee for dealing with fisheries, especially with preservation, development and exploitation of renewable and non-renewable water resources, harbour and navigational systems, research, shipbuilding and transport.

Sub-Federal Government

Several levels of the Sub-Federal Government do have an important role to play vis-à-vis ocean fisheries in Argentina. All maritime coastal provinces do have, by law, a seat in the Federal Fisheries Council.

¹⁷ Art. 76 del Reglamento del H.S.N.

Control and enforcement

Enforcement and surveillance carried out by the coast guard and the navy falls under two categories:

1. Control of the Argentine flag fleet
2. Control of foreign fleets operating illegally within the country's Economic Exclusive Zone.

Regional fisheries bodies

Argentina is part of several regional and supra-national commissions dealing with ocean fisheries, as can be expected from a coastal country which shares several of its resources.¹⁸ Most of these agreements deal with preservation and the rational use of marine resources. Research and development, especially on different forms of conservation, can also be a part of the mandate of these bodies. Data dissemination and information gathering also forms an important aspect of some of these agreements.

The fisheries industry structure

The industrial structure of the Argentine fisheries system is extremely complex, and data and available information are neither comprehensive, nor homogeneous, nor well developed. Economic groups operating in this industry may have several integration forms.

Harvesting sub-sector

Although no comprehensive studies on the industrial structure of the extractive sector exist, the level of concentration in the hake fishery appears to be high. INIDEP estimates that even though the number of business groups that own vessels which harvest hake has increased from 49 to 98 between 1987 and 1996, a small group of firms control a majority of the hake landings: the largest 10 per cent of the firms control over 70 per cent of the catches while 77 per cent of small and medium sized firms control only 10 per cent of the catches.

Fleet composition

According to size, range and operational mode or fishing gear, the fleet can be grouped into three types: coastal or inshore vessels, ice trawlers and processing vessels. In the 1990s the number of freezers and factory vessels grew rapidly from 28 per cent in 1989 to 67 per cent in 1998.

The main characteristics of the fleet are:

- Inshore fleet:

¹⁸ Argentina is also a member of FAO's Committee on Fisheries (COFI).

Coastal boats are the most important and technologically more advanced in this category. This fleet consists of boats ranging from 17 to 25 metres in length and possess large refrigerated holds. They account for 88 per cent of total landings, while representing only 40 per cent of the boats. Mar del Plata (65 per cent) and Rawson (21 per cent) are the main operating ports. Artisanal vessels (60 per cent of the total), account for the remaining 12 per cent of total landings; they are smaller - 10 to 17 metres in length - and do not possess any cooling equipment; they pack their catch in ice. They are concentrated in Mar del Plata (70 per cent of the total) and are family operated.

- Ice trawler fleet:

They range from 25 to 63 metres in length, possess refrigerated holds but don't process the fish on board. The fish are preserved in layers of ice. The fleet provides chilled products to processing plants on shore. This operation tends to be vertically integrated: most of the boats are owned by firms which have on-shore plants in Mar del Plata, Puerto Madryn, or Comodoro Rivadavia. Most of the ice trawler fleet (77 per cent) operates from Mar del Plata.

- Processing fleet:

These consist of freezer (arrastreros), factory (with fishmeal plants), surimi, scallop, shrimp trawlers, jiggers and longliners. The trawler component varies in size depending on the resource they exploit. This fleet chills the catch and does some processing on board. Jiggers concentrate on squid, while large trawlers target squid and hake. Most of the freezer and factory fleets operate out of Patagonia.

On-shore processing sub sector

Processing activities

According to the National Industrial Fisheries Census of 1996, there were 240 active processing plants and 81 active cooperatives (processing and filleting of fresh and chilled seafood), mostly concentrated in Mar del Plata, Buenos Aires. Plants located in Patagonia had received promotional benefits from national and regional economic policy.

Processing costs

In the hake processing plants, raw material for filleting accounts for 60 to 70 per cent of the costs, and labour for 10 to 15 per cent. Seafood prices for Argentine exports (mainly hake and squid) are formed in international markets and are influenced by scarcity in other fishing areas and in the availability of other fishing grounds. Argentine exports are of commodity type and most exports are frozen fish blocks, frozen fillets, H&G and minced products.

Towards a typology of agents in the fishery system

Several typologies of agents operating in the fishery industry have been proposed by different studies, but none have estimated the economic importance of different agents. The first classification is by different kinds of fleets. Another important classification is by ownership of foreign capital. In the case of hake, an additional classification by the number of years fished in the South Atlantic waters is also included. INIDEP provisional data on total costs, showed that salaries accounted for 40 per cent for coastal and ice trawler ships, and of 35 per cent for the freezer fleet.

Labour and private organizations

Labour organizations

Labour organizations include different trade unions as well as other types of associations for on-board and on-land workers. Among unions, there are several agglutinating food industry workers and fisheries workers' trade organizations.

Business sector organizations

Business sector organizations are differentiated regarding the type of vessel and working modalities, as well as geographical location. There are also business associations of fish processing firms and of canning enterprises. This diversity reflects also excisions and changing factors in the fisheries business sector.

Valuation of trade liberalization

Environmental impact

Fish stock reduction and impact on fishing effort

Research has indicated that there are six commercially utilized species of endangered fishing stock.¹⁹ Three essential indicators were examined for these species in order to be able to determine environmental impacts: total biomass estimations, reproductive biomass as well as fishing effort.²⁰

¹⁹ These fish species are: Merluza / Argentine hake (*Merluccius hubbsi*); Polaca / Southern blue whiting (*Micromesistius australis*); Corvina rubia / Croaker or White Croaker (*Micropogonias furnieri*); Pescadilla de red / Striped weakfish (*Cynoscion guatucupa*); Besugo / Red porgy (*Pagrus pagrus*); Merluza negra / Patagonian Toothfish (*Dissostichus eleginoides*); and Merluza austral / Southern Hake (*Merluccius australis*). Source: Casal J. L. y Prenski L. B. (Editors). *Diagnóstico de los Recursos Pesqueros de la República Argentina*, INIDEP. Mar del Plata, Argentina, 2000.

²⁰ Fishing effort measures are gauges that attest to the effectiveness of fishing, and – together with other indicators such as biomass estimation – can act as index to species abundance. They are recorded in local literature as captured tons per hour of trawl (Captura por Unidad de Esfuerzo – CPUE) or simply in hours. When examined over time, this indicator can grant impact evidence.

Hake was the species most at risk of collapse. The average size of captured hake has decreased. Fishing effort analysis concurs with biomass assessments. For example, for the commercially most important hake, in the period 1986 – 1997 there has been a change in fishing effort measured in captures per unit of effort, which rose 68 per cent while total standard effort increased 2.6 per cent in this period. Furthermore, when analysing by fleet, other drastic change in fishing effort can be perceived.

Ecosystem impact of fisheries: other indicators

Other indications are the impact on coastal systems and coastal cities with a large amount of fishery activities. The increased environmental impact of fisheries and adjoining activities (such as increased harbour transit, impact of processing plants, and so on) are repeatedly reported. In sum, several strong indicators are present that show there are several ecological impacts when fisheries are analysed as a system and not only on a species by species basis.

Social analysis of the fisheries sector in Argentina

Every sustainable development assessment should incorporate a social analysis, given the inter-relationship between natural resources and the productive sector. The following section will deal with an evaluation of the impact that fisheries development has had on labour opportunities, examining in particular the possible impact that a collapse of hake fisheries could have on labour issues.

Impacts of the hake crisis and industry restructuring on employment

It has been indicated that in the period of growth in the fisheries sector in Argentina, 11 per cent of fishery-related jobs were lost in the period 1987 - 1996. Thus the increase in catch did not lead to higher employment rates in all areas. Workers can be classified as on-shore or on-board. Cooperatives dominate on-shore employment.

Cooperative arrangements represent nearly 30 per cent of total on-shore employment. When analysing the social impacts of the hake crises, it is estimated that the number of workers directly involved in the hake catch and processing activities is about 8,200 people. The minimum impact hypothesis presents impact on 70 per cent of hake-related on-shore employment and 65 per cent on hake-related on-board employment. The maximum impact scenario presents a impact of 100 per cent on-shore and 80 per cent on-board of hake-related employment.

Scenario I: Minimum impact:

On shore impacts	
Hake	70%
Other species	15%
On board impacts	
Hake	65%
Other species	10%

Scenario II: Maximum impact:

On shore impacts	
Hake	100%
Other species	20%
On board impacts	
Hake	80%
Other species	20%

In addition, several instances of social conflict and even violent conflict have been documented by the media and other types of public information. Conflict was concentrated between towns that have fishing as a traditional activity and those which have entered into it as an industrial activity.

Cost-benefit analysis²¹

For the future, the fisheries crisis imposes the urgent adoption of better sustainable management policies. The present Fisheries Law provides an acceptable legal and regulatory framework for improving the effective control and management of the sector activities.

The comparison of the net benefits of two scenarios (a) with current policies and (b) with optimum policies, would clearly show the costs of adopting the wrong policies for fisheries control and management. The CBA is applied exclusively for the case of hake fishing. Furthermore, hake represents a historically high proportion of fisheries resources traded, and is consequently the species most studied from several perspectives.

The identification of costs and benefits

The positive impacts of sectoral policies and benefits estimate These could include primarily the following:

- increase in fisheries catches (production);
- increase in exports;
- increase in employment;
- improvement and growth of the fisheries fleet;
- technological innovation in the sector;
- opening of new markets and trade relations;
- increase in public income.

²¹ This section follows the methodology presented in Villalobos, Ruy de, "Notes on the valuation of renewable natural resources", Mimeo, 1999.

The net value added for the economy should correspond to the fisheries production and its related sectors (i.e. construction, capital goods production, etc.)²² Value added has been estimated at 89 per cent of gross production value.²³

The negative social, economic, and natural resource impacts and costs estimates

The main negative impacts (costs) have been the following:

- degradation of the hake biomass (i.e. the value of the natural resource);
- increased costs for fisheries regulation and control;
- subsidies costs;
- non-diversification of catches;
- investment oversizing (fleets, ports, etc.)

The CBA undertaken on alternative Argentine fisheries policies during the 1990s has shown that:

- The hake biomass would have a total value of about US\$ 7,900 million, at constant prices.
- The factual policies carried out during the 1990s would have had a net direct cost for the economy of about US\$ 500 million, which includes the assumption of a total degradation of the hake biomass.
- An optimal set of fisheries management policies (simplified as respecting the TAC) would have had a net benefit of about US\$ 5,100 million.
- Therefore, the opportunity cost of the factual policies in the 1990s would amount to about US\$ 5,600 million, if the hake biomass will not recuperate.
- Under a more optimistic scenario, where the hake biomass would recuperate for year 2004, the opportunity cost of the factual policies in the 1990s would amount to about US\$ 2,000 million, provided that the future catches would respect TAC.

²² The assumption of a social price of salaries equal to 0 is rather strong, given the fact that the unemployment rate was not too high during the period 1990-1995 and that skilled labour is required for the sector. This assumption would result in overestimating net benefits. On the other hand, giving several indicators of idle capacity in the Argentine economy, assuming that all incremental operative costs are considered as net costs for the economy, is also a matter of discussion. This assumption would result in underestimating net benefits.

²³ No official (nor reliable) information is available on prices, GPV or VA for the sector. Only exports series seem to be consistent. It has been estimated that, for 1996, a Gross Production Value for the sector equivalent to US\$ 1,500 million while exports for this year were US\$ 1,030 million. Hake constitutes approximately 34 per cent of the value of exports and approximately 400,000 tons (for a total declared hake catch of about 584,000 tons). Therefore, the implicit average price has been estimated at US\$ 900/ton. Estimates indicate that value added is about 85 to 90 per cent of sectoral GPV. For the hake sub-sector, VA was estimated at 89 per cent of GPV (See Schonberger and Agar, 1999).

- The distribution of benefits and costs proves that the main beneficiaries of the 1990s policies would have been the private firms (and the workers), with very low net benefits for the Argentine fiscal revenues (about US\$ 50 million) and an enormous social loss for future generations valued at approximately US\$ 3,500 million.

In conclusion, the adoption of a consistent and strong fisheries control and management policy would have net economic benefits for the economy as a whole and Argentine society that would be worth about ten times the factual economic results obtained so far, as indicated by the products of the analysis above. Furthermore, the value of a sustainable hake and fish biomass for future generations do not have, indeed, any price.

Conclusions

Data and analysis on the commercial structure of the fisheries system are not comprehensive, nor homogeneous between sources, nor well developed. Command and control failures of different sorts are one of the crucial issues to be dealt with in Argentine fisheries. Throughout the whole system of fisheries, high rates of control failures are identified, from weak administrative structures at the national and sub-national level, fragile application of norms, to inadequate systems of vigilance over the activity per se. The high rates of capture (even reported capture) that multiply permitted captures are just one indicator of the command and control failure. The command and control failures have also had an impact on the ecosystem due to pulse fishing patterns present, given the stop-and-go application of biological stops or other fisheries control norms.

Market failure

Economic evaluations, incorporating the issue of subsidies and overcapitalization, have indicated that market failures have occurred in the case of fisheries in Argentina, even by conservative estimates and even by dealing exclusively with quantifiable costs. Economic policy instruments that would derive in sustainable development management have not been applied in this case.

Inter-relationship between management systems and economic aspects of the fisheries sector

Altogether, it can be said that the problems faced by the Argentine fisheries sector after liberalization are due to an ingrained inter-relationship between management questions and economic issues. The problems faced by Argentine fisheries are classic mismanagement regime issues compounded by economic flaws. An *open access* regime is basically a system without control of the quantity of resources fished and where the fish captured is not paid for adequately. Open access regimes for fish-exporting countries (as is the case in Argentina) without trade barriers (which to a certain degree has happened in the Argentine case), leads to fishing being a more profitable activity over time. *Catch control* regimes are an improvement over

open access systems since total catch from a particular species is regulated, either directly or indirectly.

Direct catch control is carried out by setting (and meeting) a total allowable catch or indirectly by curtailing the fishing boats' actions. In the long term, and analysing this with economic issues such as the reduction of trade barriers for fish-exporting countries, the opportunity to sell, and price variations, does not lead to a decline in fish stock given that this is controlled. Formally, this is what the Argentine fishing system was supposed to be until the late 1990s. That is, officially Argentina has operated under a catch control system.

A third organizational regime would be an *effective management* scheme where predetermined catch levels are not only set by biological variables, but also by an economically optimal guide. In this type of regime, government authorities set a maximum capture limit yet give incentives to the industry to maximize the value derived from the catch.

Policy package

Economic instruments for sustainable fisheries management

The economic instruments proposed can be perceived as two types:

- (a) An economic tool to capitalize the sector and generate public revenue that, to some extent, incorporates into the commodity's price full-cost accounting of the natural resource, and therefore reduces market distortion.
- (b) Economic instruments which reduce pressure on resources while at the same time leading to gainful employment and generating revenue.

Market-based instruments: quota management system

As it has been established elsewhere in this study, the National Fisheries Law of Argentina (adopted in 1997) prescribes the implementation of a quota management system (QMS) for fisheries exploitation where individual tradable quotas (ITQs) are set by the Government and are exchangeable via a secondary market. The capture quotas are to be established by species, vessels, fishing zones, and type of vessel.

ITQs are logical extensions to fisheries of tradable emission permits. The management of fisheries resources through economic instruments leads, in theory, to an improvement over other methodologies that allow for a 'run to fish' of open access fisheries. The common property characteristic of public goods, such as fisheries resources, is deficient in a system with large-scale exploitation and diminishing resources. A quota management system implies greater use definition in the Argentine case, as well as improved resource use charges to be levied. The transferability factor implies an opportunity to use market forces in addition to policy, in order to control fisheries exploitation.

Quota design and implementation

In general, the policy attempted through QMS is the reduction of over fishing and 'race for fish'. It should counter the tendency for the concentration of markets and build in social compensation measures.

Labour and fisheries adjustment through a quota system

The adjustment process, which in the Argentine case would be through a quota system, has strong implications for the labour force. Due to the distinguishing factors that fisheries labour has, and the close relationship between a primary natural resource and employment, analysis of the implementation of quota management systems (as other output controls), in a context of responsible fisheries adaptation, has shown the following:

Length of fishing season	Increases
Catch per unit of effort (long term)	Increases
Harvesting employment	Decreases

Other measures to improve management and use of fisheries resources

Many other measures to improve management and use of marine fisheries resources have also been identified, such as:

- Technological and exploitation mode changes
Technological changes imply, in this case, modifications of fishing gear used in fisheries, and exploitation mode changes imply diversification of species used to reduce pressure on any one resource or reduced number. Gear utilized in many cases does not discriminate species, entailing the capture of less desirable species or species with less market value than the target product. Gear that catches juveniles together with adult fish is amply utilized.
- Command and control changes
It cannot be over emphasized that some of the most serious impacts of trade liberalization in the Argentine fisheries sector has been the implicit and explicit lack of control over resource extraction. The following measures are proposed:
 - Improvements in surveillance systems
 - Enhanced monitoring system.

Trade policy revisions

A running theme in the evaluations is that the problems present in Argentine fisheries have a marked international dimension. New negotiations of international fisheries accords in which Argentina is party, active participation in trade/sustainable development debates, and other such policy-setting mechanisms where the role of fisheries in developing countries are set, are guiding principles for this type of revision.

The failures of the international economic system for non-commodities expansion, such as fisheries from developing countries, are another aspect that must be acknowledged. Disloyal international competition, tariff escalation, and subsidies are integral parts of the policy transformations at the international level that have to be part of the modifications needed to make fisheries sustainable.

THE COTTON SECTOR IN CHINA

Introduction

China is the largest cotton producing country in the world. Among 31 provinces in mainland China, 24 provinces produce cotton, and about 300 million people are involved in cotton production. From 1978 to 1984, China's cotton output increased steadily, and reached a historic high of 6.26 million metric tons in 1984; afterwards the cotton output fluctuated between 4.1-5.7 million metric tons, but dropped to 3.8 million metric tons in 1999. After China joins the WTO, both opportunity and challenge will exist in the agricultural sector. The opportunity for agricultural exports could be a potential in the future, but in the early period of China's WTO accession, the biggest challenge is the large agricultural import (TRQs) which could bring huge impacts. The Jiangsu Agricultural Policy Analysis (JAPA) model was applied to make a scenario analysis of the economic, social and environmental impacts of agricultural imports. The model scenario analysis results showed that the trade liberalization could bring the following positive and negative impacts:

Economic impacts

- help solve the shortage of some commodities;
- sown area and output decrease;
- prices of agricultural products decrease;
- producer surplus and farmers' income decrease.

Social impacts

- promote agricultural production structure adjustment;
- utilization rate of cultivated land decrease - valuable land lies waste;
- reduction in the self-sufficiency rates of the agricultural commodities;
- agricultural employment decrease;
- poverty and problems of social instability.

Environmental impacts

- reduction in application of chemical fertilizers and pesticides;
- valuable cultivated land may lie waste or could be used for non-agricultural purposes, which will impair the sustainability of Chinese agricultural production.

On the basis of integrated assessment and cost-benefit analysis, a series of policy recommendations are made:

- support agriculture with 'green box' policies;
- promote new cotton variety breeding;
- promote the production of special purpose cotton;
- adjust regional distribution;
- establish cotton production cooperatives (sector association);
- analyse the impacts of China's WTO accession, deciding on cotton production, scale and distribution;
- complete the multi-channel cotton marketing system promoting lateral cooperation among different cotton marketing entities;
- promote cotton production to order;
- improve the cotton wholesale market;
- establish a textile exporter association;
- establish an agricultural consulting system;
- decrease the applied quantity of chemical fertilizers;
- establish a pest and disease prevention service;
- adopt Integrated Pest Management;
- strengthen administration of GM cotton production;
- ban the production, marketing and application of all highly toxic, high residue pesticides;
- levy an environmental pollution tax;
- promote the research and development of pesticides made by Chinese herbal medicine;
- increase the efficiency of irrigation;
- promote the production of organic cotton.

Project objectives

The objective of this study was to make an integrated assessment of the economic, social and environmental impacts of China's WTO accession with a focus on the cotton sector, and provide policy recommendations for a transition to the sustainable development of the cotton sector in view of China's entry into the WTO.

The project sought to:

- Enhance the country's understanding of the implications of WTO membership, promote cotton sector trade liberalization in China in a sustainable manner, and enhance its negotiation capacity in future rounds of trade talks.
- Assess the environmental as well as the social and economic impacts of China's potential trade liberalization in cotton.
- The established Jiangsu Agricultural Policy Analysis Model (JAPA) is used to assess the impacts of trade liberalization on cotton production, and to identify optimal resource allocation adjustments after trade liberalization.
- Formulate a policy package to mitigate the identified negative impacts of liberalized trade and to maximize the positive ones, with both economic and regulatory instruments.
- Contribute to enhancing coordination between related national entities and to increasing national expertise in using integrated assessment tools to identify and quantify both negative and positive environmental, social and economic impacts of trade liberalization.
- Enhance and support national capacity in international trade policy-making and research.

The research methods include the application of the JAPA model to make a scenario analysis of the impact of large agricultural imports; integrated assessment and cost-benefit analysis is then applied to assess the social, economic and environmental impacts of the trade liberalization; on this basis a series of specific policy packages are recommended.

The cotton sector in China

Cotton is one of the most important cash crops in China. Cotton is a pillar agricultural commodity in many regions, and benefits a large rural population. Cotton is also an important raw material in the textile industry. The cotton textile industry is the biggest sector, with over 10 million workers in China, while textiles and garments are the most important export commodities. China's WTO accession brings favourable opportunity to the textile industry, but on the other side it may have a huge impact on cotton production.

The last five years have seen a continuous decline in China's cotton acreage. A sharp fall occurred in 1996 of 12.91 per cent, from 5.4 million hectares in 1995 to 4.7 million hectares. In 1999 the cotton acreage declined by 15 per cent to only about 3.7 million hectares. Since 1982, China's cotton output has ranked first in the world, accounting for more than 20 per cent of the world's total production. From 1978 to 1984, China's cotton output increased steadily, and reached a historic high of 6.26 million metric tons in 1984; afterwards the cotton output fluctuated between 4.1-5.7 million metric tons. Finally the cotton output dropped to 3.8 million metric tons in 1999. Broadly speaking, China has three major cotton growing regions, the Xinjiang

Autonomous Region, the Yangtse River Basin Region (which includes principally Jiangsu and Hubei), and the Huang-Huai Region (principally, Hebei, Henan, and Shandong).

Cotton is grown or used in virtually every country in the world. The largest producers, consumers and exporters are China, the United States, the former Soviet Union, India, and Pakistan. China is one of the largest cotton producing and consuming countries, accounting for more than 20 per cent of world production and nearly 20 per cent of world consumption. Any development in China will have a significant impact on the world cotton market. In 1997 China imported 783 thousand metric tons of cotton, which was about 13.6 per cent of the world's total import, but in 1999 it became a net exporter of 330 thousand metric tons. While the increase in China's exports was not extraordinarily large by historical standards, and its decrease in imports was not its largest ever, on a net basis, the impact of these two changes was extraordinary.

Before 1993 China's domestic cotton price was very low, about 32.91 US cents/pound. The Government increased the cotton purchase price by 47 per cent in 1994, and again in 1995 by 29 per cent, which caused an enormous increase in domestic cotton prices, going up to 76.79 US cents/pound. Since 1999 the Chinese Government decided to free the cotton price, and the domestic cotton price dropped to 42.02 US cents/pound, but the price fluctuated around 54.72 – 63.47 US cents/pound in 2000. This means that Chinese cotton has lost its competitive advantage in price. After China opens its cotton market, foreign high quality and low priced cotton could be imported, which may influence Chinese cotton production.

Production costs is one of the key factors in competing in the international cotton market. According to the survey of the International Cotton Advisory Committee (1998), China still has a comparative advantage in cotton production. The average cotton production cost was US\$ 1110.1 per hectare, which was lower than that in the USA, Australia, and Israel, but was higher than in Pakistan and India. Among the different items of the costs in China, the physical costs were high, but the labour costs were relatively low.

Textiles and clothing as a main foreign trade earner

China is traditionally a textile exporter; while basically satisfying the people's demand for clothing, a considerable proportion of textile production is exported. Textile exports have accounted for a very large share of total export revenues since the early fifties. As of 1990, the amount of foreign exchange earned from the export of textiles and clothes reached US\$ 12.5 billion, accounting for 20.1 per cent of China's total export earnings, but in 1997 the amount of foreign exchange earned from the export of textiles and clothes reached US\$ 45.6 billion, accounting for 24.93 per cent of the total export earnings. The textile export earnings was US\$ 42.9 billion in 1998, a decrease of 6 per cent compared with 1997; its share in total export revenue fell to 23.34 per cent. This fall in textile exports was largely attributed to the Asian financial crisis.

The world ranking of China as a textiles and clothing exporter has moved steadily up over the past 20 years, rising from tenth place in 1980 to number one position in 1995. According to WTO figures, the value of China's textiles and clothing exports accounted for 4.6 per cent of the world total in 1980 and 12 per cent in 1995. It reached 13.7 per cent of the world total in 1997. In terms of volume, China has been the world's top exporter of textiles and clothing since 1997. China's comparative advantage in textile and clothing production is based on its large labour force. According to an estimate by the World Bank, China's working population was 723 million in 1995, which was 29 per cent of the global total, and half the working population of low-income countries. Compared to other large textile and clothing exporters of the world, the labour cost is very low in China - lower than all the other countries for its labour costs in textile production and the second lowest in labour costs of apparel production.

The impact of China's accession to the WTO on agriculture

The provisions and commitments defined by the Agreement on Agriculture include a number of important elements. These can be roughly divided into the following four areas: market access, domestic support, export subsidy, and sanitary and phytosanitary measures (SPS). The agricultural market access commitments include tariffication and tariff reductions. After China joins the WTO, both opportunity and challenge will exist in the agricultural sector. The opportunity of agricultural exports could be a potential in the future, but in the early period of China's WTO accession, the biggest challenge is the large agricultural imports (TRQs) which could bring huge economic, social and environmental impacts.

The impact of China's accession to the WTO on agricultural environment

After its WTO accession, China should find its position in the global agricultural market, and adjust its agricultural production structure according to the comparative advantage. Although China possesses comparative advantages in some agricultural products, the low quality (especially the environmental quality) of the commodities could limit export competitiveness. Many countries have increased their sanitary and phytosanitary standards and the inspection measures are becoming stricter, which constitutes a method of Technical Barriers to Trade (TBT). If China wants to export agricultural products in the international market, it must urgently improve the quality of the products to meet international standards.

The environment could be a serious problem in China's sustainable agricultural development, therefore environmental considerations should be taken into account in agricultural policy formulation. Promotion of 'green agriculture' could be the ideal solution for China to maximize the benefits of trade liberalization and achieve sustainable agricultural development. The main environmental problems in cotton production are the following:

- pesticide pollution;
- chemical fertilizer pollution;

- plastic film pollution;
- irrigation problems;
- transgenic cotton production.

Scenario analysis: policy simulation

This model scenario analysis tries to find what kind of impacts large agricultural imports could bring to China. According to the Compilation of the Legal Instruments on China's Accession to the World Trade Organization, China will adopt tariff-rate quotas (i.e. a system in which imports up to the quota level are charged a minimal tariff and imports above that level a high tariff). Three examples are chosen for simulation:

- Wheat – According to the schedule of the Compilation of the Legal Instruments on China's Accession to the World Trade Organization, the TRQ of wheat for year 2002 should be 8.468 million metric tons.
- Corn – According to the schedule of the Compilation of the Legal Instruments on China's Accession to the World Trade Organization, the TRQ of corn for year 2002 should be 5.58 million metric tons.
- Cotton – According to the schedule of the Compilation of the Legal Instruments on China's Accession to the World Trade Organization, the TRQ of cotton for year 2002 should be 818,500 metric tons.

The reason for selecting the import of three products for scenario analysis is based on the following consideration. The JAPA model is an equilibrium model, all resources are movable. If only cotton is imported into the Chinese market, the resource (land, labour etc.) can move to the production of wheat, corn and other products, which means the import of one product would not bring a huge impact on Chinese agriculture. Wheat, corn and cotton are three important products which have no competitive advantage in China. When large imports of the three agricultural products enter the Chinese domestic market at same time, it could bring enormous impacts to Chinese agricultural production, the agricultural resources surplus may happen and the prices of agricultural products may decrease.

The scenario analysis tries to find if the import TRQs for the above three commodities can fully enter Chinese markets, and what could be the consequences. Actually the JAPA model is designed only for Jiangsu province, so it is necessary to divide the total TRQs into the different provinces in China. Jiangsu province gets its shares of TRQs according to its production share.

Integrated assessment of trade liberalization

The integrated assessment aimed to assess the consequences of the first couple of years of China's WTO accession, when large agricultural imports enter the Chinese market, with the assumption that China has not make obvious progress in agricultural

exports because of technical limitations and green barriers. The model scenario analysis showed following results:

Economic impacts

- Helps to solve the shortage of two commodities

The baseline projection shows that in 2002, Jiangsu will have shortages in cotton and corn, but not in wheat. The import of cotton and corn can help Jiangsu to solve the shortage, bringing a positive impact evaluated as a benefit of about 871.56 million RMB.

- Sown area and output decrease

The wheat, corn and cotton imports will bring a great pressure on agricultural production, therefore the production structure should be adjusted to adapt to the change. According to the optimal solution of the partial equilibrium model, compared with the baseline projection, the sown area of wheat will decrease by 4.91 per cent, that of corn by 2.48 per cent and that of cotton by 3.82 per cent, and as a result of structural adjustments, the sown areas of other crop products may increase. For example, the sown area of rice will increase by 0.24 per cent, and soybean by 0.86 per cent, but this sown area expansion will be limited by the levels of consumption. In any case, the total sown area will decrease by 1.11 per cent, about 92,624 hectares.

The production structure adjustments will also cause output decrease, so farmers will face loss. For example, after production structure adjustments, the output of wheat will decrease by 436,294 metric tons, evaluated as -521.37 million RMB; that of corn decreases by 58,106 metric tons, evaluated as -71.12 million RMB; that of cotton decreases by 22,707 metric tons, evaluated as -296.42 million RMB; on the other hand, the output of rice increases by 42,902 metric tons, evaluated as 51.56 million RMB; that of soybean increases by 4,475 metric tons, evaluated as 12.67 million RMB; that of rapeseed increases by 16,355 metric tons, evaluated as 48.13 million RMB; that of fruit increases by 35,168 metric tons, evaluated as 26.77 million RMB. The aggregated impact of the outputs change for all agricultural products is evaluated as -703.62 million RMB.

- Prices of agricultural products decrease

The wheat, corn and cotton imports will cause price decreases, not only the prices of the three commodities, but also the prices of all other crop commodities, because the production structure adjustment increases the sown area and output of other crop production. The model scenario analysis results shows the price of wheat will decrease by 3.89 per cent, corn by 0.57 per cent, cotton by 2.84 per cent, rice by 0.52 per cent, soybean by 1.01 per cent, rapeseed by 2.99 per cent and fruit by 1.23 per cent, comparing with the baseline projection. The price decrease of agricultural commodities is favourable to consumers, and is also favourable to animal production because some main products and by-products can be used as feed, but it is unfavourable to producers of agricultural commodities.

- Producer surplus and farmers' income decrease

The wheat, corn and cotton imports cause farmers to reduce the production of the three products, and at same time increase the production of other products to a small extent. Although it could bring positive income effect accruing from increased production of rice, soybean, rapeseed, fruit and barley, in general after agricultural production structure adjustment, the producer surplus for crop products will decrease by 3.2 per cent. The price decreases are negative to the producer of agricultural products, but they are positive to consumers. The impact of aggregated price decrease is evaluated as 921.75 million RMB.

After China's accession to the WTO, China will reduce the tariff to 1 per cent within TRQs, so the Government tariff income will decrease. The tariff decrease for importing the three commodities within TRQs is evaluated as 1,018.55 million RMB.

China should pay foreign currency to import agricultural commodities, the cost for importing the three commodities is evaluated as 1,626.90 million RMB. This should be netted for current expenditures on the three agricultural products, roughly 703.62 million RMB, therefore the net outlay on imports would be 923.28 million RMB.

Social impacts

- Promote agricultural production structure adjustment

The trade liberalization should promote agricultural production structure adjustments according to the comparative advantage. China needs to find its position in the global market, and reallocate resources to the products which have comparative advantage.

- Utilization rate of cultivated land decrease; valuable land lies waste

Jiangsu province in south-eastern China, carries out a multi-cropping system of production, so there may be two or three harvests in one field. There are many combinations of cropping patterns, so sown area and cultivated land usage are differentiated. Planting-packages for multi-cropping systems are used in the JAPA model. After agricultural production structure adjustments according to the import increase, the model scenario analysis results indicated that the valuable cultivated land can not be sufficiently used, and about 92,624 hectares of cultivated land will lie waste. The average shadow price of the cultivated land estimated by the partial equilibrium model is 155 RMB per hectare. Therefore the opportunity cost of cultivated land which lies waste is 14.36 million RMB.

- Reduction in the self-sufficiency rates of agricultural commodities

Owing to the three commodity imports, after the production structure adjustment, the self-sufficiency rate of the three agricultural commodities will decrease, i.e. the

self-sufficiency rate of wheat decreases from 144 per cent to 137 per cent, that of corn decreases from 40 to 38 per cent, and cotton from 91 to 87 per cent, while the self-sufficiency rate of rice increases from 124 to 125 per cent, that of soybean from 35 to 36 per cent, rapeseed from 81 to 82 per cent, and fruit from 159 to 160 per cent.

- **Agricultural employment decrease**

The model scenario analysis result also shows that after the production structure adjustment, owing to the decrease of agricultural production, the agricultural employment decreases by 16.55 million working days, farmers do not have enough farm work to do. Unemployment in the agricultural sector will increase. Calculated according to the current agricultural labour force wage rate, the opportunity cost of the increased unemployment is 148.95 million RMB.

- **Poverty and social instability**

Poverty is still a big problem in China. About 60 million rural residents are still below the poverty line, mostly located in less developed areas where agricultural production constitutes their main source of income. Any decrease in farmers' income could worsen the poverty in rural areas. Decrease in farmers' income and increase in unemployment could be factors for social instability. Additionally, if large numbers of farmers move to urban areas to find jobs, it could also worsen unemployment in urban areas.

Environmental impacts

- **Reduction in the application of chemical fertilizers and pesticides**

The wheat, corn and cotton imports will necessitate agricultural production structure adjustments. According to the optimal solution of the partial equilibrium model, the sown area of crop products will decrease. This could result in a decrease in chemical fertilizer and pesticide application. The reduction may include two parts: firstly, the production structure change causes the sown area decrease, which will reduce the inputs that include chemical fertilizers, pesticides, water, etc. The model scenario analysis shows that the usage of chemical fertilizer will decrease by 1.01 per cent and pesticide by 1.39 per cent, comparing with the baseline projection. Secondly, owing to the decrease in prices of agricultural products, farmers could reduce the quantities of applied chemical fertilizer and pesticide. If the reduced quantities caused by the decrease of sown area are considered, the reduction of pesticide application can be evaluated as 0.10 million RMB, and the reduction of chemical fertilizer application can be evaluated as 1.11 million RMB.

- **Cultivated land may be lost**

Cultivated land is a very important revival agricultural resource. China is a 'cultivated-land-scarce' country; cultivated land per capita is 0.11 hectares. In Jiangsu province, the cultivated land is even less, only 0.07 hectares per capita and

0.185 hectares per agricultural labour force in 1999. The average rate of cultivated land decrease was 0.3 per cent for the last 15 years, meaning that China has lost on average 282 thousand hectares of valuable cultivated land each year. In such circumstances, the waste of cultivated land could be a very serious problem for sustainable agricultural development. If cultivated land lies waste, this valuable land could be occupied for non-agricultural purposes, such as city extension, industry and building, which will impair sustainability of China's agricultural production capacity. In north-western China, if the cultivated land is not used and irrigated, it may simply turn to wasteland. The decrease of cultivated land has been a serious phenomenon in China.

Cost-benefit analysis

Cost-benefit analysis (CBA) is a framework that allows the monetized costs and benefits of a project or policy to be compared, using the various valuation tools. It is a useful way of converting all the information relevant to the assessment of a proposed action into a comparable and easily understood form. The CBA can be undertaken ex ante or ex post, which could help policy makers understand the net benefit of a project or policy. In this section, the CBA will be applied to assess the impact of the import TRQs of the three agricultural commodities. Because it is very difficult to assign economic values to some indirect social and environmental impacts, the CBA only includes impacts which can be evaluated. The result of the CBA is listed in Table 1.

Table 1: Cost-benefit analysis of the impacts in the agricultural sector in Jiangsu

	million RMB
Costs of the import TRQs of the three agricultural commodities	
Agricultural output value changes	703.62
Prices of agricultural products decrease (for producer)	921.75
Agricultural employment decrease	148.95
Tariff loss	1,018.55
Cultivated land lies waste	14.36
Payment for the import	923.28
Total costs:	3,730.51
Benefits of the import TRQ's of the three agricultural commodities	
Solve the shortage of the two commodities (corn and cotton)	871.56
Prices of agricultural products decrease (for consumer)	921.75
Reduction of pesticide application	0.10
Reduction of chemical fertilizer application	1.11
Total benefits:	2427.20
Net cost:	1,303.31

Source: Author's calculation according to simulation results.

Table 1 shows that after the import of the three agricultural commodities (TRQs), the agricultural production structure change could cause the agricultural output value to

decrease by 703.62 million RMB; the price decrease will reduce farmers' income by 921.75 million RMB; the agricultural employment will decrease by 16.55 million working days, the opportunity cost is valued as 148.95 million RMB; after China decreases the tariff rate to 1 per cent, the tariff loss for the TRQ import of the three commodities is about 1,018.55 million RMB; the opportunity cost of the cultivated land which lies waste is evaluated as 14.36 million RMB, and the payment for the import of the three commodities is about 923.28 million RMB. Therefore the total cost is 3,730.51 million RMB in Jiangsu province.

On the other side, the imports can solve the shortages of corn and cotton in Jiangsu (Jiangsu does not have a wheat shortage), so the benefit for this is valued as 871.56 million RMB; and the price decrease of agricultural commodities is a positive impact to consumers, so it brings 921.75 million RMB in benefit to consumers. Additionally, the agricultural imports can reduce the application of pesticides and chemical fertilizers, reducing environmental pollution. The benefits are about 0.10 million RMB and 1.11 million RMB respectively, therefore the total benefit is 2,427.20 million RMB in Jiangsu. Because in Jiangsu irrigation water is abundant, there is no water quota used, therefore the irrigation factor is not evaluated here.

Comparing the total costs and total benefits, assessment of the net cost of importing the import of the three commodities is 1,303.31 million RMB in Jiangsu. However this estimated net cost applies only to the agricultural sector in Jiangsu, the benefits to city extension, industry and building, to textile industrial production and export are not included, which will be estimated by each sector. For example, if Jiangsu can increase textile exports by 5 per cent, the export revenue could increase by US\$ 230.45 million, roughly 1,843.6 million RMB.

Proposed policy recommendations

Increasing the competitive advantage of Chinese cotton

After China joins the WTO, both opportunity and challenge will confront the agricultural sector. China's domestic markets will become a part of the global market. As China imports some products, it should adjust its production structures and develop a long-term strategy for agricultural exports. Therefore it is important to increase the competitive advantage of cotton.

- Supporting agriculture with 'green box' policies

The agricultural basis in China is weak, and agricultural input is very low compared to other countries. Agricultural production has a low resistance to natural disasters such as drought, flooding, typhoons, and plagues of pest or disease. For example, the main cotton producing regions are located in the dry or semi-dry areas on the north side of the Yangtse river, and water shortage is a restrictive factor for the sustainable development of cotton production. It is important to use 'green box' policies to build water conservation projects and

improve irrigation systems to protect the agricultural environment, to improve rural infrastructure, to establish marketing information services and to invest in research, training and extension in agriculture. (Recommendation to MOA.)

- **Promoting new cotton varieties**

For long time now, Chinese cotton variety breeding has aimed at increasing yield without paying much attention to improving quality. After the China's WTO accession, Chinese agricultural products will face not only the competition of prices, but also the competition of variety and quality. Local governments should invest more to promote technological innovation in order to increase the product quality. The prevalent varieties of Chinese cotton have an average length of 29-31mm and an average fineness of 5500-6500m per gram, which are well above the world average level. There is a big demand for long-staple variety, medium long-staple variety, the variety with a fibre strength of 23-28 gf/tex, micronaire 3.7-4.2, and varieties which are resistant to blight, cotton wilt and pest. (Recommendation to MOA, research institutes.)
- **Promoting the production of special purpose cotton**

Because textile industries are required to produce high quality products, they impose increasing demands for special purpose cotton, such as long-staple cotton, medium long-staple cotton, colour cotton and organic cotton. Owing to climatic conditions, Xinjiang has the advantage in producing long-staple cotton and organic cotton. The Huang-Huai region and Yangtse river region may try to produce medium long-staple cotton and colour cotton. (Recommendation to MOA, farmers.)
- **Adjusting regional distribution**

Mainland China has 31 provinces, out of which 24 provinces produce cotton. Some provinces have a strong comparative advantage, while others do not. Production capacity and future demand should be analysed, and regional cotton distribution should be adjusted in order to shift production to regions that have the comparative advantage. There are 10 top cotton producing provinces, which can be considered as the cotton production zone. Local government should invest capital in the construction of farmland and in developing new varieties through technological extension to stabilize cotton production. (Recommendation to MOA, local government.)
- **Establishing cotton production cooperatives (sector association)**

China is a 'cultivated land scared' country, a situation that results in low land productivity and also low labour productivity. The low level of production cannot suit the big markets - it is not possible to increase production efficiency over small scattered plots. This restricts the demand for agricultural inputs and hinders the application of new technology, which is not favourable to improving the quality of agricultural products.

Establishing cotton production cooperatives is a possible solution. The cooperative is organized by farmers on the principle of voluntary participation. It should be an economic corporate organization and can assume a legal status. The cooperative will have the ability to purchase good quality cotton seed, cultivate one variety in one region in order to ensure the quality, and demand high prices for high quality products. Additionally, it can increase agricultural inputs, introduce new varieties and benefit from technical innovations. Finally it can negotiate production orders with cotton end users in order to stabilize production and ensure farmers' income. The establishment of cotton production cooperatives can be top down and bottom up at same time. (Recommendation to MOA, farmers.)

Maintaining a balance between supply and demand

The ultimate objective in government intervention in cotton production is to maintain a basic balance between supply and demand and avoid fluctuations. This balance includes regional balance and variety balance. Creating regional balance means that regional production quantities should be decided according to the regional processing capacity, transport capacity and cost, natural resources limitations, and it should try to minimize the risks of natural disasters.

Different textile industries require different grades and varieties of cotton. Some textile industries need long-staple cotton to produce high quality textiles, some need short-staple cotton to produce jeans, some need organic cotton and others require colour cotton. Given the need for variety, China should not only pursue the supply and demand balance of aggregate cotton quantity, but also balance the availability of the main grades and varieties.

- Analysing the impacts of China's accession to the WTO and deciding on cotton production scale and distribution

After China's WTO accession, the supply and demand situation of agricultural products could change, therefore the production structure and resource allocation should be adjusted. The production structure adjustment is not simply a matter of changing the ratio of grain products to cash crops, but deciding on the production quantities of main products according to the comparative advantage. There are many constraints for agricultural production, such as resources limitations, potential demand, import and export possibilities. The complement and supplement relationship among products are very complex, which could be solved by applying the CGE model. The next target is to establish a Chinese Agricultural Policy Analysis model (CAPA) to provide a quantitative basis for the agricultural structure adjustment of each province. (Recommendation to MOA.)

- Completing the multi-channel cotton marketing system and promoting lateral cooperation among different cotton marketing entities

After the old cotton-marketing monopoly system is abolished, chaos in the cotton markets can be expected. The 'cotton war' in 1999 was characterized by different

cotton marketing entities redividing shares in the cotton market. China is in the process of establishing a new, open cotton marketing system. It will be important to coordinate relationships between the different entities in order to avoid vicious competition.

In the current situation, the different cotton marketing entities have their advantages and disadvantages, and it is necessary to promote lateral cooperation amongst them. For example, the textile mills could cooperate with the cotton gin factories of the Supply and Marketing Cooperatives (SMC) in purchasing and processing the cotton; the textile mills could provide a purchase fund and the cotton gin factories of the SMC purchase and process the cotton, both of them benefiting from this cooperation. (Recommendation to SMC.)

- Promoting the production of cotton to order

One approach for balancing the production of cotton grades and varieties is to promote the production of cotton to order. The textile industries and cotton production cooperatives (or farmers) can contractualize cotton production and purchasing. The contract should indicate the purchase quantity, variety, grade and price; the purchase price will be decided according to the price in the wholesale market at the harvest season (for example 5 per cent higher than the price of the National Cotton Exchange). The textile industries will pay earnest money to the cotton production cooperative, both parties to the contract take legal responsibility. This method will ensure that the textile industries are supplied with the qualified cotton when they have special requirements, while at the same time it can stabilize the cotton production. (Recommendation to MOA, textile factories and farmers.)

- Improvement of the cotton wholesale market

A National Cotton Exchange was established in April 2000 in Beijing. It has 122 seats, 77 belong to SMCs, 35 seats to textile industry entities and 10 seats are allocated to cotton import and export companies. The Exchange sells 'old cotton' (cotton stocks and reserves) and Xinjiang cotton at auction, about 10 thousand metric tons per day. Although the Exchange has established 20 stations through its frame of networks, it is only allowed to deal in Beijing Central Station. In other stations it is only possible to observe the auction information.

There are still improvements to be made to the National Cotton Exchange. It is urgent to include 'new cotton' at the auction. There are only 122 seats in the National Cotton Exchange, which is too few for all the cotton marketing dealers in the whole of China. The future target of the Exchange should be that every cotton marketing dealer with a license is entitled to a seat in the Exchange, and any kind of cotton can be traded in any network station of the Exchange.

Besides the National Cotton Exchange, China needs 'on the spot' cotton transaction markets in the main cotton producing regions. For long time, the Chinese Government did not allow 'on the spot' transaction markets, in order to ensure SMC monopoly. After the monopoly marketing system is removed, it will

be necessary to establish on the spot transaction markets in the main cotton production regions. (Recommendation to SMCs.)

- Establishing a textile exporter association

After China's accession to the WTO, many enterprises could have licenses to export textiles and clothing, and it would be advisable to establish a textile exporter association in order to avoid vicious competition and to guarantee product quality. China's textile industry should change strategy from producing low-price products to producing medium price/medium quality products, and even high quality products (such as organic cotton or colour cotton products). (Recommendation to MOFTEC, textile companies.)

- Establishing an agricultural consulting system

After the economic reform, the production plans made by the Government in the agricultural sector were abolished. An agricultural consulting system can engage in the collection and analysis of marketing information, and provide a service to farmers to guide their agricultural production. As a semi-government organization, the agricultural consulting system works as an intermediary between the Government, the industrial processing enterprises of agricultural products, wholesale markets, agricultural cooperatives and farmers. After China's WTO accession, China will have to adjust the structures of agricultural production, and the consulting system can work with government policy makers, marketing research institutions, wholesale markets, agricultural cooperatives and farmers, to realize the agricultural production structure adjustments. (Recommendation to MOA.)

Stimulate sustainable development in the cotton sector

Sustainable production is defined as "production that meets the needs of the present and does not hamper the ability of future generations to satisfy their needs." Although the Government also has to consider other policy objectives concerning income, equality, technology, financial constraints and the priorities under such constraint, these objectives should be a part of policy making instead of only the definition of sustainable agriculture. China is a big agricultural country and large quantities of chemical fertilizers, pesticides, plastic film and irrigation water are used in agricultural production. For example more than 1.6 million metric tons of chemical fertilizers, 6.7 thousand metric tons of pesticides, 40 thousand metric tons of plastic film and 368 million m³ irrigation water are applied for cotton production annually in China, which must have enormous influence on the environment.

Different regions have different natural conditions and different degrees of dependency on unsustainable production methods. Therefore, in transition to developing sustainable cotton production, there should be alternative methods to choose from.

- Carrying out integrated assessment on environmental impacts

When a country tries to accelerate economic growth through trade liberalization, it should also consider the possible negative impacts on the environment. It is necessary to enhance any integrated assessment on the environment with the methodological approach suggested by UNEP, to increase government and public awareness on environmental issues, and to address the relationship between economic development and environmental protection.

- Decreasing the application of chemical fertilizers

One of the environmental problems with cotton production is that the utilization rate of chemical fertilizer is very low (about 35 per cent), and a large proportion of the product is wasted and causes environment pollution. So China should therefore support research and extension into using chemical fertilizers more efficiently. If the utilization rates of chemical fertilizer can be increased to 45-50 per cent, the applied quantities could be reduced. Although all fertilizers have adverse effects on the environment, natural manures cause less problems than chemical fertilizers. Plant residues can remain in the field after harvesting so that the minerals within the crop stalks decompose back into the soil, lessening the pressure to apply chemical fertilizers. (Recommendation to SEPA and MOA.)

- Establishment of a pest and disease prevention service

The utilization rate of pesticides in China is also very low (about 30 per cent). There are several reasons for this; firstly, farmers cannot find the right time to kill the pests in the early stages, so after the pest plague become very serious they have to use large quantities of pesticides to control the situation; secondly, farmers like to use over the recommended dose of pesticide to be sure the pests are killed immediately; thirdly, when farmers do not apply pesticides at the same time, pests can move from one plot to another plot to avoid exposure; fourthly, farmers like to buy low priced pesticides, which tend to be highly toxic, high residue and harmful to the environment.

In order to increase the efficiency of applied pesticides, a pest and disease prevention service should be established. The service will have contracts with farmers and production cooperatives to provide a service to control plant diseases and eliminate pests. The advantage of the service is it will be able to predict plant diseases and plagues of pests, and use appropriate pesticides to effectively eliminate them, while at the same time minimizing environmental pollution. An experiment in Jiangsu showed that this method can decrease the applied quantity of pesticide by 50 per cent. (Recommendation to SEPA and MOA.)

- Integrated pest management

Integrated pest management (IPM) consists of a careful integration of a number of available pest control techniques that discourages pest population development and keeps the use of pesticides and other interventions to levels that are economically justified and safe for human health and the environment. IPM emphasizes the

growth of a healthy crop with the least disruption to agro-ecosystems, thereby encouraging natural pest control mechanisms. It seeks to reduce pest populations to economically manageable levels through a combination of biological control (use of pest-resistant varieties), culture control (e.g. crop rotation, inter-cropping), physical control (hand picking of pests) and less toxic chemical controls (use of pheromones to trap pests). However, it allows the use of chemical pesticides, even synthetic and toxic ones, only when there is a real need.

A few countries in Asia, including China, have adopted national IPM policies, with the help of national and international agencies. Although these policies were targeted at rice production initially, their effects have subsequently spread to other crop sectors. Presently, a 12 million euros project to enable small cotton farmers in Asia to cut their insecticide use by half and increase their production is to be implemented by the FAO. The European Union-funded project will train 90,000 small cotton producers in integrated pest management. Six Asian countries are participating in the project, China, India, Pakistan, Bangladesh, the Philippines and Vietnam. The EU/FAO project provides for 3,800 Farmers' Field Schools. The schools use the participatory learning approach to educate farmers in IPM techniques, as has been done by Indonesia. Farmers will learn more about cotton agronomy, cotton agro-ecosystems and alternative pest control techniques. The aim is to keep a balance between pests and their natural enemies and to keep the spraying of expensive and potentially damaging and dangerous insecticides to an absolute minimum. Pilot projects in China financed by the Asian Development Bank have shown that cotton farmers have reduced their use of pesticides and increased yields at the same time (FAO, 1999). The Chinese Government should also provide financial support to extend Integrated Pest Management. (Recommendation to SEPA and MOA.)

- Partial alternatives to pesticide

Partial alternatives to the use of pesticides exist that lead to more sustainable cotton production. Partial alternatives include biological control, microbial control, control through sex pheromones, physical removal of pests and cultivation of genetically modified cotton. The first two are based on the idea that every organism on earth has natural enemies; biological control emphasizes the importance of parasites and predators as natural enemies and microbial control usually involves a spray containing a bacterium or a fungus or a baculovirus. Pheromones are the substances female insects secrete to attract males for mating. It is possible to trap part of the pest population through imitating these pheromones by making a synthetic substance with the same effect. (Recommendation to SEPA and MOA.)

- Strengthen administration of GM cotton production

The acreage of transgenic cotton in China has been increasing fast. In 1998 the acreage was no more than 100,000 hectares, whereas in 2000 it skyrocketed to almost 1 million hectares. The proportion of the transgenic cotton out of the total cotton growing area has increased from 2.2 per cent in 1998 to 28 per cent in 2000.

Three series are dominant in China, accounting for more than 80 per cent of the total transgenic cotton grown.

Until now, China has not issued administration regulations for agricultural GMO products on commercial production, processing, marketing, import and export. In the initial period of GMO production, a series of practical administration regulations are essential for its stable development. The principle is that administration regulations should consider not only the benefit to producers, but also the benefits and rights of consumers, as well as the environmental impacts.

- Prudently make extension of currently approved GM cotton varieties
Only after approval from the GMO administration body can farmers produce the currently approved GM cotton varieties, within isolated zones to prevent hybridizing with non-GM cotton varieties.
- Carry out an identity preservation (IP) system for GMO products
It is important to apply an IP system for GMO products. The storage, processing, transportation, and marketing of GMO products should be separated from non-GMO products, which could increase the costs by 6-17 per cent, but this is the best measure to be taken to prevent genes proliferation and pollution.
- Carry out labelling for GMO products
The GMO labelling should indicate which gene has been modified in the product (such as Bt), which makes it possible to identify the specific product when some transferred genes prove unsafe. Consumers have the right to information on GMO products and to make informed decisions.
- Promise not to export GMO products
China should promise not export GMO products, as this strategy could increase the competitive advantage of exporting non-GMO products.
- Apply the (AIA) procedure for the import of GMO products
The purpose of the Advanced Informed Agreement procedure (AIA) is to ensure that recipient countries have both the opportunity and the capacity to assess risks that may be associated with a living modified organism (LMO) before agreeing to its import. (Recommendation to MOA, SEPA and the private sector.)
- Ban the production, marketing and application of all highly toxic, high residue pesticides
Many highly toxic, high residue pesticides have been banned by developed countries, but they are still being used in China - farmers can still buy them and use them in agricultural production. It is important to ban the production, marketing and application of all highly toxic, high residue pesticides through legislation. The Government should offer subsidies to the factories that produce pesticides to compensate for the revenue decrease owing to the ban, and encourage

them to produce high efficiency, low toxicity, low residue pesticides. (Recommendation to SEPA and MOA.)

- Levy an environmental pollution tax
Agricultural area-source pollution is more difficult to control than the industrial point-source pollution. The low prices are the main reason that farmers like to apply low efficiency chemical fertilizers, and highly toxic, high residue pesticides; and on the other side, high prices hinder farmers from applying high efficiency fertilizers (such as compound fertilizers), and low toxicity, low residue pesticides. It is possible to use an environmental pollution tax to give farmers the economic incentive to reduce the applied quantity of chemical fertilizers and pesticides. The tax will increase the price of low efficiency chemical fertilizers, highly toxic, high residue pesticides, and revenue can be used to subsidize farmers in purchasing more environmentally sound products. (Recommendation to SEPA.)
- Promoting the research and development of pesticides using Chinese herbal medicine
Chinese herbal medicine is a great treasure, and it can contribute to the production of pesticides that are friendly to environment. The Chinese Government should provide financial support to research into producing low toxicity low residue herbal pesticides which can be degraded in the eco-environment. This would benefit not only the farmers, but also the consumers of agricultural commodities as an environmentally friendly industrial sector with bright future. (Recommendation to SEPA, MOA, research institutes and the private sector.)
- Increasing irrigation efficiency
In the north-western area of China it is very important to increase the utilization rate of irrigation water, from a current 30 per cent to 70 per cent (Mao, 1999). This calls for technological, institutional and policy changes. Drought-resistant varieties need be bred to reduce water requirements, and irrigation systems that reduce percolation and leakage should be developed. The various kinds of irrigation practices such as drip irrigation, furrow irrigation, sub irrigation, sprinkler irrigation and irrigation at night to reduce water evaporation, should be experimented with to discover the best methods in different regions. Research on optimal irrigation scheduling and irrigation volume should be encouraged and flood irrigation that is typical in many regions must be stopped as soon as possible.

More fundamentally, new laws governing the use of water should be established and the enforcement of laws be strengthened. Policies concerning subsidies on irrigation and water use must be reformed in most producing regions. In some regions, irrigation water quotas could be established, where quota price and above-quota prices of irrigation water could be settled in order to increase irrigation efficiency. (Recommendation to SEPA, MOA and farmers.)
- Promoting the production of organic cotton

Local governments should encourage the introduction of environmentally friendly cultivation practices. Organic cotton is the most sustainable alternative to conventional production and it comes close to this goal. Organic farmers use biologically-based rather than chemically dependent growing systems to raise crops. Organic cotton is produced without synthetic insecticides and fertilizers and defoliators, as well as other inputs prohibited by the certifying organization. Organic cotton farming is a high yielding and environment preserving farming method. However, the transition to organic farming is not an easy task. Much effort has to be made to facilitate the transition and address the aftermath. Due to variations in natural conditions, in-depth research needs to be conducted to find out if local conditions are conducive to organic farming and if so, what specific combinations should be chosen for organic farming. China has started building a base for encouraging the production of organic cotton in some regions, on a very small scale. In some other regions however, organic cotton farming is unheard of. For the Chinese Government and cotton growers, organic farming is a new challenge after years of dependency on chemicals for higher cotton yields. At present, organic farming is still conducted as pilot projects. However, further development can be expected from China's organically grown cotton. Since organic cotton farming is a highly labour intensive process, it will be to China's advantage to grow organic cotton, given its abundant labour resource and low labour costs, which is a bright way forward for sustainable agricultural production. The Xinjiang region has very good natural conditions for the development of organic cotton, and the local government can play a very important role in promoting organic production. (Recommendation to SEPA, MOA, private sector and farmers.)

Conclusions

This study developed an analytical framework with the JAPA model scenario analysis, integrated assessment and cost-benefit analysis to make an ex ante assessment of the economic, social and environmental impacts caused by China's accession to the WTO. The scenario analysis results show that trade liberalization policies do not always bring benefits, the economic benefits accruing from trade liberalization are not equal among sectors and countries, and at the same time trade liberalization may bring social and environmental impacts such as unemployment, poverty, and environmental pollution. Therefore, as policy makers draw up trade liberalization policies to increase economic gains, it is necessary to consider their impacts on social and environmental problems.

THE BANANA SECTOR IN ECUADOR

Introduction

Important changes in economic policy took place in Ecuador in the 1980s and 1990s that aimed to integrate the country into the international trade regime.

In the 1980s, the average contribution of the banana export sector to total exports was 9.38 per cent, and bananas accounted for 38.6 per cent of all agricultural exports. Banana exports comprise a large proportion of all exports from the country, and thus generate a significant amount of hard foreign currency. During the 1990s, banana exports comprised 21.1 per cent of total exports and 64.7 per cent of all agricultural exports, a notable growth in banana producing activity during the last decade.

In terms of international trade policy, the export of bananas has been a major source of trade disputes within the WTO. In social terms, the banana sector has become one of the most important production activities in the Ecuador. Bananas production is labour intensive, thus generating a wide range of employment. By 1998, the number of proprietors of banana plantations registered at the National Banana Programme (PNB) was 4,941. According to labour productivity and cultivated land statistics, there are around 98,000 workers that are directly involved with banana plantations.

The general objective of this study is to evaluate the social, economic and environmental impacts (both positive and negative) of the adoption of specific policies of structural adjustment and international commerce during the 1980s and 1990s, on the banana producing activity of Ecuador. Structural adjustment and trade liberalization policies were implemented in Ecuador in the 1980s to promote economic development. The underlying rationale behind trade liberalization was to promote exports. In this regard, several of the policies implemented during the two decades being examined are reflected in domestic trade policies that have affected banana industry activities.

Both domestic trade policies and multilateral trade agreements have had an impact on Ecuador's banana industry in terms of production, cultivated land area and yields, as well as in terms of use of natural resources and labour, *inter alia*.

The study also examines the effects of the European Union's regime on the commercialization of bananas on Ecuador's banana sector. The following indicators were used for this analysis:

Economic indicators:

- Production: increase in banana production; total banana production per hectare.
- Technology use: technological investment by the banana companies.

Environmental indicators:

- Volume of imports of agrochemical products applied in banana production, particularly fungicides.

Social indicators:

- Minimum salaries/income established for banana plantation workers.
- Social and economic indicators: demography, housing, health and education of the principal banana districts of Ecuador.

Effects of structural adjustment and trade policies in Ecuador

In the case of the banana producing activity of Ecuador, the ‘transition model towards structural reform’ and the applied policies have had different economic, social, and environmental impacts.

SAPs in the 1980s

SAP policies had a visible effect in the technological development of the banana production sector, which is evident in the raised technological level of this sector, and in the introduction of new and more productive varieties of bananas during the latter part of the 1980s. This obviously affected the production costs of the banana industry.

The policy of fixing a minimum referential price for bananas in 1980 was among the measures specifically directed to regulate banana production activity. This policy established an export price for bananas that worked as base for estimating a ‘minimum support price’, which is the price that each Ecuadorian producer should receive. Although price fixing and referential pricing are policies contrary to the free action of market forces, this measure is indispensable due to the monopolistic nature and social importance of the banana industry in Ecuador.

On the other hand, in terms of its effects, the policy of price fixing generates a greater capacity to anticipate the levels of investment, working capital and technology for the banana producers.

Although these measures aimed to promote all exports, they had an important effect on the increase of production and the technological development of the banana industry in Ecuador. Consequently, the costs of production in the banana industry were reduced.

SAP policies in the early 1990s

Among the SAP policies that had the greatest impact on banana production, monetary and fiscal policies are the most important. Starting in 1993, a sharp decline was registered in exports of banana, and furthermore there was a decrease in the price of Ecuadorian bananas in the international markets.

Among the SAP initiatives, the following deserve mention: (i) the policy of minimal price support for banana producers in 1992; (ii) the creation of agreements to exempt banana exporters from certain financial compromises acquired with the *Programa Nacional del Banano* (National Banana Programme); (iii) the issuing of the *Reglamento de Saneamiento Ambiental Bananero* (Environmental Management Bylaws for the Banana Sector); and, (iv) the issue of Decree 2294 of 1994 that prohibits the cultivation of new areas of banana.¹ The environmental management bylaws for the banana sector were meant not only to regulate the process of production of bananas, but also to introduce environmental preservation as a determining factor.

All these policies had a two pronged effect. On the one hand, the adopted instruments reduced the costs of imported inputs and increased the levels of technology in the production of bananas, on the other they reduced certain administrative restrictions for the exports of bananas.

Parallel to the adoption of these instruments, several other initiatives were generated to increase the exports of Ecuadorian bananas and to improve its access to international markets.

Period of “economic inconsistencies in economic policy and commercial opening” (1995 - 1999)

Even though the banana producing activity in Ecuador has been influenced by the application of policies of structural adjustment, because bananas are mainly an export product, behaviour of the sector also responded on many occasions to the application of national and multinational trade policies. A particular event that strengthened the policies of liberalization in Ecuador and that influenced the commercial prospects for the Ecuadorian banana, was Ecuador’s entrance to the World Trade Organization (WTO) in 1995.

Effects of international trade policies and the national regulatory framework

Effects of multilateral trade rules on production and trade

The commercial development of the banana sector, as is the case with other agricultural products, has been directly influenced by the multilateral trade rules set by the WTO, and by commercial policies adopted by the main export markets of Ecuador. It was the entrance of Ecuador into the WTO that gave the country access to judicial mechanisms that could confront the restrictive measures of the European Union to the import of bananas from Latin America.

¹ Those regulatory instruments were created with the objective to control environmental impacts caused by the use of agrochemicals and the expansion of the agricultural frontier.

The multilateral trade rules established by the WTO have had important effects on the production and trade of bananas in Ecuador. Such agreements have generated changes in the normative structure of the governmental institutions. For example, the Environmental Security Law for Bananas was passed in 1994 with the goal of establishing certain parameters for banana production and the use of agrochemical products.

In addition to those instruments, the commercial disputes over bananas from Ecuador reveal how the agreements of the WTO have allowed the country to access mechanisms to stimulate the entrance of bananas from Ecuador into European markets.

Bilateral trade agreements and their effects on the banana sector

Ecuador's banana sector has also been influenced by certain bilateral trade agreements. In 1994, Ecuador signed a trade agreement (*Acuerdo de Complementación Económica*) with Argentina, through which plantain, cavendish, dried and fresh bananas from Ecuador could access this market with a customs exemption of 90 per cent. The implementation of multilateral and bilateral trade policies have had positive effects on export volumes, prices paid to producers and prices paid to exporters of Ecuadorian bananas.

National and institutional regulatory framework of the banana sector

Banana production activity has always had a strong social component. Moreover, the Government dictated a policy through which it obligated trading companies to purchase bananas from local producers in the same quantity as those they exported from their own production. This action marked a policy of state intervention and promoted the development of small to medium sized banana plantations.

In 1955, the National Association of Banana Producers was created to deal with issues relating to the cultivation and production of banana, for both local consumption and for export. The Association was to guide and resolve conflicts among producers, exporters and foreign companies dedicated to banana activity.

The most significant change in government policy towards the banana sector occurred in 1970 with the creation of the National Banana Programme (PNB). Its main objective was to regulate all matters related to the production and commercialization of bananas.

Analysis of institutional policies directed towards production and the determination of internal prices

In the 1980s, the banana sector continued to be ruled by the PNB, which operated under the authority of the Ministry of Agriculture. This programme dictated important policies for the banana sector, such as the reference price fixation for the producer, and the minimal reference price for the withholding of hard currency by the Central Bank to the exporters. In addition, the PNB continued to provide technical assistance to banana producers without discrimination regarding the surface area planted, and to provide services of automation to all producers registered in the programme. As mentioned, in

1980 the Government intervened in the market, fixing the minimal reference price for the commercialization of bananas at a national level, which is the price paid to the local producer. The regulation of the production of bananas brings along a responsibility to look after the application of fair income distribution policies.

Parallel to the application of these policies, specific measures for the banana producing sector were adopted. In 1997, the categories PREMIUM and EXTRA were established for first-class bananas for the export market, and minimum referential prices were set for those products. During the same year, the Law to Stimulate and Control the Production and Commercialization of Bananas is promulgated. Another important regulation in terms of effects on the production process of bananas was the promulgation of the Regulations of Vegetable Sanitation in 1998, which establishes certain parameters and applicable norms for the production of bananas.

In terms of internal policy, in 1999, with the disappearance of the National Banana Programme, the Banana Consultative Council (Consejo Consultivo del Banano) is formed. The Council's principal work is focused on the discussion of policies for the promotion of the banana producing sector. In conclusion, the policies implemented in the 1990s were measures that focused on the incorporation of technology, the increase of production, and the modernization of the banana sector. Furthermore, starting in 1995, the prices for the producer declines, which coincides with the increase of exports, reflecting an increase in production.

Environmental effects of banana production and trade

The adoption of an economic model based on economic openness and implementation of trade liberalization policies has changed the production patterns of agriculture in Ecuador. In the case of Ecuador's banana sector, the single crop system causes environmental consequences associated with the three banana production stages, which are: (i) the establishment of plantations, (ii) the maintenance and management of plantations, and (iii) packaging.

Import volumes of agrochemical components for banana production is another indicator of the effects of trade policy on the sustainable management of natural resources in the banana industry.

Finally, given the increase in banana production and the changes in foreign demand in recent years, a number of instruments have emerged that are designed to increase the compatibility between the aspirations of both environmental protection and trade by promoting the adoption of clean production systems. Among these instruments are environmental certification programmes. Certification programmes encourage the incorporation of standards of sustainable production and promote conversion to production of other goods, such as organic bananas.

Environmental externalities associated with the banana production cycle

The expansion of banana production and the resulting extension of the agricultural frontier has caused important environmental effects associated with the three production stages.

Expansion of the agricultural frontier and its impacts on biodiversity

The structure of the banana industry in Ecuador has changed to the extent that the land area used for banana production has expanded drastically in recent years. Comprehensive data concerning the total area of land devoted to banana production is not available. The information that does exist has been collected by the National Banana Programme (PNB). Although a considerable number of hectares have been registered by the PNB, this does not represent the total. In 1992, the number of cultivated hectares increased by 6 per cent to 178,500 hectares. In accordance with the previous point, in the province of Los Ríos, the cultivated surface increased by 20 per cent, due to the presence of large banana plantations.

Ecuador has sustained the greater portion of yearly increases in agricultural production by expansion of the agricultural frontier. The El Guabo canton is one of the best banana producing regions in Ecuador. In El Guabo, small areas of land are dedicated to the production of bananas which, when taken all together, represent the entire agricultural surface of this canton. El Guabo is based primarily in banana production and has an agricultural structure totally dedicated to this crop. The limits of the banana producing zone are set by the four cantons from El Oro.

Scale, structure and productivity effects

The cultivated surface of bananas has grown 153 per cent between 1980 and 2000, going from 63,235 hectares to 160,001 hectares. The production of bananas at national level has grown from 150 per cent between 1980 and 1997. In the 1990s, the production of bananas increased from 2,850,000 to 5,750,000 metric tons, equivalent to a rate of growth of 100 per cent. The banana industry experienced relatively favourable productivity between 1980 and 1999. At the beginning of the 1980s, banana productivity at the national level was 20 metric tons per hectare, and increased to 23 metric tons per hectare by 1989. The increase in production occurred because of an increase in the cultivated surface area rather than because of an increase in productivity.

Ecuadorian foreign trade policies implemented during the 1980s and 1990s significantly affected the productive structure of the banana sector. By 1989, farms ranging between 21 and 50 hectares represented most of the national banana production surface at 28.1 per cent. Finally, plantations ranging between 501 and 1000 hectares or more monopolised the smaller proportion of the national banana production surface: 2 per cent in 1989, 1.7 per cent in 1990, and 1.8 per cent in 1991.

According to data provided by the System of Information and Agricultural Census (SICA), by 1998, 80 per cent of the banana producers owned plantations ranging between 1 and 30 hectares, 10 per cent owned plantations ranging between 51 and 100 hectares, and 3 per cent of the national producers owned plantations with more than 100 hectares.

Today there are 5,491 banana producers in Ecuador, of which 80 per cent own plantations no larger than 30 hectares. This means that the productive structure of the banana sector depends considerably on the small and medium producers (SICA-MAG,1998).

Technology effects

Banana production in Ecuador has had to face important technological changes as a result of events of natural phenomena, changes in international demand - particularly with respect to 'environmentally friendly' products, and trade policies that have forced the producers to gradually incorporate new technological processes.

In the 1980s, the technological changes in the Ecuadorian banana sector arose from the need to deal with natural phenomena. In the 1980s, a high percentage of banana production came from non-technology based farms. In 1989, 28.2 per cent of the production came from technology based farms, 15 per cent from semi-technology based farms, and 57.3 per cent from non-technology based farms. This reflects the efforts made by the banana sector to improve its production process efficiency over the last few years.

The causes for the increased level of technology in banana production are closely linked to the implementation of national production and trade policies as well as international trade policies, for example, national pricing and commercialization policies.

Effects of minimum prices or regulatory effects

Since the regular fixation of a minimum price for Ecuadorian banana producers in 1993, the level of technology based production has increased.

While the implementation of price fixing policies occurred in 1993, the European Union adopted a quota regime to their banana imports, which forced Ecuador to channel its export offer to new markets and thus incorporate better technological processes into its banana production systems.

Quality effects

An important niche has been established for the market of organic bananas. In 1998, world imports of organic bananas were estimated to reach 27,000 metric tons in comparison to the total import of bananas at about 11,000,000 metric tons. In the medium and long term, the increase in demand for organic bananas can become a potential market for small producers.

During the last decade, the world banana market has been characterized by an increasing demand for product quality. The feasibility of the banana sector depends on different physical changes, including pathological and physiological alterations. In order to access international markets with a high quality product, the banana sector has developed a consciousness of the environmental effects of its activities.

A number of environmental certification programmes have been adopted by several banana companies, including the ISO 14001 standard and the Eco-OK Programme. Certification covers banana plantation, farming, harvesting, packaging, and transportation.

Environmental certification helps the banana producers demonstrate their environmental commitment to consumers, and helps them be more competitive in the global market.

In addition to the emergence of environmental certifications, the Ecuadorian banana industry relies on important initiatives in terms of sustainable production. One of these initiatives is organic production. Although there is currently no record of the number of producers who have adopted this measure, the National Banana Corporation (CONABAN) has designed a project to encourage the production of organic bananas, principally in the El Oro province. Organic production presents both advantages and disadvantages.

On balance it appears that the environmental effects of increased banana production and trade was positive in Ecuador.

Social effects of increased banana production and trade

Another key aspect in the economic evaluation of trade policies related to the banana sector, is the analysis of the terms of trade. The terms of trade reflect to an extent the level of competitiveness of a productive sector or the economy by connecting international prices to national prices. It also has an important bearing in determining the distribution of the gains from trade and hence its social effects.

Social effects

During the 1980s, there was, in general, no government policy to foster agricultural production, particularly as related to pricing. Furthermore, the few government policies in place were directed to foster the export of agricultural products.

Thus, there was no control over the price that was paid to the banana producers, until the beginning of the 1990s when price fixing policies appeared. The significant increase in prices during the nineties conveys the competitiveness policy of Ecuador's banana in world markets, and the translation of international market prices to local producers, which improved the producers' terms of trade. Pricing policy during the 1990s has been variable and in some instances favourable for banana producers. Since 1993, the Government periodically fixed the *minimal sustenance prices* that the exporters would have to pay the banana producers. In 1995, two other banana varieties, the Baby Banana and the Red Banana, are included into the minimal price fixing system, which resulted in the diversification of banana production that would help producers improve their economic situation.

In synthesis, the diverse price policies aimed at adjusting and fixing the minimum referential price for bananas resulted favourably in some cases, as shown in the increased feasibility of banana plantation activity.

The referential price for the producers is a dollar component of the exporter price. Furthermore, even though the goal was to seek some equity in the income of the banana

production activity, in many cases the policy resulted in deterioration for both the producers and exporters.

During the 1992-1997 unstable period for the exporters' price, a drastic change occurred in the banana production structure, which allowed for the diversification of production and consequently in exports. In 1995, the banana for export began to be differentiated in order to satisfy the demands of new markets, and the prices of the new varieties of banana (Baby and Red) began to be controlled. Even though prices fluctuate from year to year, 1995 showed an improved price for the banana exporters, because they were able to identify a box of banana as '22XUNM', subject to the fixation of minimum referential and FOB (free on board) prices.

Finally, during the last months of 1999, Ecuador endured a market campaign that affected the national banana industry, by spending US\$ 1,500,000 in publicity to misinform the public about the real interests of the banana producers.

Terms of trade effects

As far as the terms of trade, they are completely different for the banana exporters as compared to the producers.

The consumers of bananas are characterized as demanding high quality products. For 1999, this offer extended to the 'Orito' or Baby Banana 0.30 per cent and the 'Morado' or Red Banana 0.04 per cent. During the 1980s and 1990s, Ecuador's banana activity faced a series of changes, arising mainly from economic and trade policy measures that have also resulted in direct and indirect social effects.

In order to establish the relationship between a policy and the wage level, the study compared the average income of a worker in the banana sector, to the general living wage.²

Furthermore, the analysis relates the evolution of the banana workers income with such indicators as export volumes and the evolution of the exporters' price. This relationship will reveal whether an increase or decrease in the banana trade and in the producers' price creates a better or worse wage or income situation. This analysis will be completed with the criteria gathered in the banana sector regarding the situations that influence the evolution of the income of the banana worker, including plantation productivity and yield, producers' prices, changes in the international market and natural phenomenon.

On the other hand, in order to estimate changes in socio-economic and demographic levels, several social and economic indicators from the Integrated System of Ecuadorian Social Indicators (SIISE) for the main regions dedicated to banana production activity were analysed.

² In the banana sector, the workforce employment is categorized by activity. Therefore, wages differ depending on whether the worker works at the plantation or at the ports. This analysis refers to the wages earned by workers at the banana plantations.

Effects on the banana workers' wage levels

An analysis of banana worker income first requires a knowledge of the wage structure in Ecuador, as well as the wage structure particular to the banana industry.

Banana workers are seasonal labourers whose income depends on the type of work done, the number of hours worked or the number of bunches of bananas harvested. Although in wage terms, the increased work productivity could have generated increased wages during the 1980s, no substantial increase occurred. In fact, between 1981 and 1983, the banana plantation worker wages were frozen. Furthermore, this happened when banana exports and the internal referential price were increasing.

The income increases between 1989 and 1994 coincide with two situations: the growth in banana exports and a significant improvement in the export and production prices, except for 1993. This situation increased the profitability of the banana producer and increased the number of planted hectares, the number of employed workers, and their income level. Between 1994 and 1998, although the tendency is toward export growth and the stability of the producers' price, there are no positive changes in banana production wages.

To better appreciate the wage situation of the banana worker, the study includes information concerning the average income received by a high technology plantation worker during the last three years. The social impacts of banana production activities during the 1990s were, in general, related to the adoption of economic and trade policy measures, among them structural adjustment policies, the implementation of a pricing system in the sector, and the elimination of credits to the agricultural sector. Linked to credit elimination is a lack of integrated promotion policies to the banana producers and, in general, to all agricultural producers.

Composite effects in most representative banana production zones

The analysis of the demographic and socio-economic characteristics of the most representative banana production zones requires a brief review of the situation in the equally representative banana producing provinces. Banana plantations demand a series of climatic, topographic, logistic (proximity to suppliers and ports for shipment) conditions - which define the coastal region of Ecuador as the prime banana producer, trader, and exporter. However, some highland provinces (Sierra), especially those bordering the coastal provinces, also have the right conditions. Each province that has dedicated most of its area to banana plantations, also has a particular characteristic in terms of the banana plantation extension.

The prominent banana regions are grouped in the central and southern coastal provinces, corresponding to the provinces of Los Ríos, Guayas and El Oro. There are different reasons why banana plantations have concentrated in these provinces. After the economic crisis of the 1980s and the change in banana varieties, the province of El Oro held half of the national banana planted area, consisting mostly of small and medium farms; however, the provinces of Los Ríos and Guayas hold the most extensive banana properties as compared to El Oro. The exportable production of banana in these regions is quite significant since it represents its main economic support.

The demographic indicators from the 1982 census clearly show an uneven population distribution in the banana producing regions. The weak concentration of land holdings among the banana producers was one of the factors influencing the demographic growth in this region. El Oro is considered as the banana producing province par excellence, and shows the best socio-economic conditions.

Other social effects

In a national context, education in most of the banana producing regions registers indicators below the national average. In the banana sector, access to these services is limited, since the plantations are located far from towns. The El Oro Province, on the other hand, has improved the situation with respect to education in most of its regions, compared to the average in the country.

Integrated assessment of trade liberalization

The implementation of structural adjustment and foreign trade policies, as well as national and international norms, has influenced the banana sector in different ways. The increased volume of banana exports has increased banana production and thus land and natural resource use. Important changes in international and national trade policy occurred during the 1990s. The European Community's Banana Regime reduced the prices of the Ecuadorian banana in international markets, which made Ecuadorian exporters attempt to increase the exported volume to compensate for the lower price.

Competitive production structures

Ecuador's banana sector production structure is characterized by the level of a plantation's technology, which determines the use of inputs. By adopting trade liberalization and structural adjustment policies that have to do mainly with the banana sector, as referred to earlier, the Government has sought to improve the producers' competitiveness in the market.

Technology and quality effects

The technology effect refers to changes in technological development in an economic activity generated or fostered by trade liberalization policies. A positive technology effect occurs when trade liberalization and an increase in exports promote the use of better technology, which improves the economic yield, and internalizes environmental and social impacts.

Banana production in Ecuador has experienced several technological development stages.

The introduction of new varieties of banana was one of several important developments in the sector that resulted in higher profit levels for producers.

The increase in the international demand for quality as well as quantity of bananas during the 1990s generated a higher level of technology use in the farms. Higher levels of technology not only improve economic yield by reducing certain production costs, but also improve the efficiency of the use of natural resources.

Increase in banana certification

There has been a significant increase in certified banana plantations and businesses in this sector that use environmental management systems and that abide by national environmental laws. Although only a few of the businesses in the sector have actually adopted clean technologies for their production processes, the initiatives above mentioned show the occurrence of a *positive technology effect* in the banana sector.

Specialization, environment and health policies

The degree of specialization depends on the adoption of different technology levels, as mentioned earlier. Ecuador's economic opening has fostered the specialization of banana producers in order to maintain access to world markets. A negative effect occurs when a trade agreement or policy makes it difficult for the state to implement adequate environmental policies.

The Government implemented significant structural adjustment policies and signed trade agreements relevant to the Ecuadorian banana sector. It also implemented significant environmental policies. In 1994, the Environmental Security Regulations for the Banana Sector, the Plant Quarantine Handbook, the Export Facilitation Law, plague control norms, packaging norms, and the banana policy for plantations re-conversion were implemented.

Thus the overall social, environmental and economic effects of SAP policies in the banana sector have been positive.

Policy recommendations package

The proposed policy recommendations include economic and non-economic incentives. As has been determined throughout the study, an important percentage of banana producers are small and medium producers. They should be provided with feasible mechanisms with which to access technology transfer, i.e. the establishment of a database of capital goods that constitute certified clean technologies intended for banana production.

The interest rate that will be paid to the final beneficiary will act as the financial incentive or credit facility that could be granted to those banana producers at the national level that are willing to reconvert their production from traditional banana varieties to organic bananas, to adopt environmental certification systems or to raise their land productivity through the adoption of efficient technological processes.

Environmental certification

In recent years, there has been a significant increase in certification programmes among banana producers. Unfortunately, until now, because of the high cost of certification, most of the banana producers that have acquired certification are large

companies. Producers that apply for an 'ecolabel' hope to attract 'green consumers' who are prepared to pay higher prices for bananas that are guaranteed to have generated lower environmental impacts in the process of production. There is a need to devise special mechanisms to help small producers and to reduce the costs of certification, including through financial incentives.

Referential price fixing policy

Since 1980, the Government has fixed the referential price for banana producers. Banana production is still considered a strategic product in terms of social and economic well-being. However, the referential price for producers does not consider all the externalities related to banana production. The referential price fixing policy is an important mechanism to avoid large corporations from setting the price and driving away small producers. Some banana producers' associations have been interested in increasing availability of clean technologies in order to take advantage of the benefits of complying with higher environmental standards, but this initiative needs to be reinforced if it intends to reach small and medium sized banana producers.

Environmental awards

It may be highly beneficial for banana producers to create a system of environmental awards granted by municipalities in order to give recognition to those businesses that are making important efforts to adopt clean technology in Ecuador. In addition to environmental awards, a periodic publication containing a list of companies that comply with the national and regional environmental regulations could motivate banana producers to pursue such awards and improve the image of the Ecuadorian banana internationally.

Institutional policy

In 1999 the National Banana Programme was phased out and the Banana Consultative Council was created in its place. The Consultative Council is in charge of fixing the referential price for producers, but is not in charge of controlling and monitoring banana production or with providing producers with technical assistance. The National Banana Programme was no longer viable because of a lack of resources. There is a need to strengthen the institutions that can address internalizing sustainable policies aimed at Ecuadorian banana production.

Capacity building measures

To control the environmental impacts caused by banana production requires the participation of the actors in training programmes. To implement the policy of promoting cleaner production alternatives, the proposed action consists of compiling a manual on the advantages and disadvantages of organic production, environmental certification and recycling systems. To strengthen international markets, the proposed action consists of developing open trade contacts to promote the export of organic bananas. In order to assist in this process, the producers must increase their efforts to search for a more environmentally compatible product and to develop markets for organic bananas.

Implementation of the recommended social policies comprises the greatest economic cost for the banana company owners.

Conclusions

The project has revealed important results concerning the development of an industry of great economic and social importance in Ecuador. The project has also shown the positive and negative effects of distinct policies of foreign trade, structural adjustment measures and national and international regulations on the sustainable development of the banana industry.

The banana industry is an agricultural industry based on the export of its production. Banana production requires the direct use of natural resources and a labour force. The banana industry has become extremely vulnerable to fluctuations in international prices, changes in world consumption standards, trade and environmental regulations, sanctions applied by Ecuador's principal buyers, and the opinions of civil society. These situations have increased the consciousness of the banana industry, not only to analyse the effects of the industry in terms of sustainable development, but also to discuss policy measures to be implemented in order to achieve sustainable production.

Non-tariff measures applied by the European Union have increased the economic, environmental and social costs to the industry. This situation exposes a need to empower those who make the policy decisions in the banana industry. The project further reveals the need to promote and quantify the analysis of trade and national production policies, as well as to study the existing environmental regulations of Ecuador.

THE EXPORT CROP SECTOR IN NIGERIA

Introduction

Prior to liberalization, the overall objectives of trade policy in Nigeria included a Marketing Board Policy (1960-1977) through which all exportable agricultural products were purchased by the Government at prices far lower than world prices, and incentives were given to farmers to increase their acreage and adopt some imported technologies (Okuneye, 1985). Commodity Marketing Boards were established in 1977 by the Federal Military Government to take care of specific crops such as cocoa, rubber, roots and tubers, etc. Food imports were limited, but crop production for exports was intensified during the period of liberalization.

The Structural Adjustment Programme period 1986–1993, especially trade liberalization, enhanced export prices partly due to the devaluation of the Nigerian currency. This led to higher levels of output of many crops primarily destined for the export market.

The rapid growth in exports that followed large and successive devaluations necessitated a study of the environmental impacts of trade expansion, using the main export crops, cocoa and rubber as case studies. In general, average figures for the period 1993-1995 show that cocoa, rubber, fish and shrimps, and cotton were the major agricultural commodities being exported from Nigeria. Cocoa increasingly accounted for the largest percentage of non-oil exports in Nigeria. Both cocoa and rubber still remain the largest non-oil exports from Nigeria. The expansion of these exports has, however, not been neutral to the environment. This report investigates the specific effects of export expansion on the environment and the social sector. Additionally, the report attempts to quantify some of these effects and specifically evaluate policy options that would mitigate some of the negative effects.

Agricultural trade and the environment: SAP and trade liberalization in Nigeria

A major component of SAP was the diversification of the export base away from oil and the expansion of non-oil exports, especially agricultural exports. The liberalization policy environment under Nigeria's SAP was initiated principally to support the agricultural sector in general, and agricultural exports in particular.

Specific trade liberalization measures undertaken under SAP included the removal of bureaucratic controls on trade. The import licensing system, together with exchange control on all current transactions was abolished as soon as exchange liberalization began in September 1986. In addition, commodity-marketing boards were abolished. The number of prohibited imported items was drastically reduced.

Export prohibitions were abolished for most items. In 1987, a new export finance facility was introduced by the Central Bank. A financing and rediscounting facility to assist private exporters by providing refinancing for the export of both agricultural and non-agricultural products was introduced. In 1987, a duty drawback/suspension scheme was introduced to enable exporters to import raw materials and intermediate products for use in the manufacturing of export products.

While export promotion policies were primarily intended to move Nigeria away from a dependence on primary commodities, cocoa beans, rubber and palm kernel provide more than 70 per cent of Nigeria's non-oil export earnings. Thus commodity market instability, as well as unfavourable terms of trade were experienced to different degrees by Nigeria. Specific export promotion policies included successive devaluation of the Nigerian currency, which improved the export competitiveness of the cocoa and the rubber sectors.

In order to achieve the SAP objective of diversifying the export base of the economy, Nigeria adopted a liberalization policy, which was anchored on a number of important macro and meso economic policy initiatives. At the macro level, a deregulated exchange rate market was a prime policy instrument, while at the meso level, a liberalized trade policy regime and the development of a workable rural (agricultural) infrastructure and efficient markets were the keys to the success of SAP.

Environment policy in Nigeria

Export expansion had an effect on the environment of the Nigerian economy which could be mitigated by the policies being pursued. The analysis of government policies aimed at environmental protection and natural resource utilization derives from information from the Development Plan documents (1st - 4th Plans and the Rolling Plan) and from the document on the National Policy on the Environment.

These documents indicate that environmental policies as far as the trade sectors were concerned, consisted of soil conservation measures aimed at wind and water erosion. Projects that had relevance for environmental protection were, however, subsumed under the 'Agriculture' and 'Town and Country Plan'. More specifically, relevant projects under agriculture were initiated under agricultural infrastructure. There were also anti-drought measures. Specific soil conservation measures included contour bounding, terracing, check damming and drainage systems. Anti-drought measures included tree planting and afforestation projects and the establishment of shelter-belts.

Trade growth in Nigeria

Between 1962 and 1968, Nigeria's major foreign exchange earner was the agricultural sector. However, even though trade was liberalized during this period, agricultural exports declined and the sector did not benefit from the relaxed trade environment. Thus the kind of liberalization at that time (which favoured import substitution and consumption of foreign made goods), reduced the threat that an expanding agricultural exports sector may have had on the environment.

Restrictive trade policies began to emerge between 1976 and 1978, and intensified in the period between 1978 and 1980. These included such policies as :

- general ban on non-essential imports, especially food imports;
- tariff increases on some items;
- new duties on certain items not hitherto taxed;
- imposition of compulsory advance deposit on some classes of imports;
- industrial raw materials which were previously under open general license were placed under specific import license;
- export bans were imposed on certain items;
- export tariffs were reviewed upwards for some other items;
- centralized marketing of agricultural products was reinforced through the formation of Commodity Boards which handled specific crops.

Again there was no specific linkage between environmental policies and trade policies during this period. Environmental policy statements in the plan were not based on any kind of empirical findings or policy analysis.

Trade reforms in Nigeria's agricultural sector were aimed at expanding the export capacity of the sector through increased domestic production of export crops, increased domestic production of tradable semi-manufactured goods from agricultural raw materials, increased import of agricultural inputs such as fertilizers, agrochemicals, farm implements, farm power, and increased import of agro-industrial inputs, and finally a relative increase in resource allocation from non-tradable to tradable crops in agriculture.

This period of trade liberalization was accompanied by a sizeable boost in the agricultural sector. However, the period also witnessed a better-packaged environmental policy agenda. Notwithstanding this development, environmental policy formulation did not have a direct link to considerations regarding the consequences of trade liberalization policy. A national policy on environment that encouraged land-use and soil conservation and a more rational use of agricultural chemicals, was introduced perhaps as a result of the general increase in awareness related to the Rio Summit.

Integrated assessment of trade liberalization

Environmental impacts

Trade liberalization policies as they affect agricultural commodities, often bring about the tendency to concentrate on the increase in economic returns through increases in production and output prices. This section examined the impact of trade liberalization on the soil resources through the assessment of soil degradation processes

such as loss of topsoil, terrain deformation, loss/excess of nutrients, acidification and soil compaction and pesticide residue.

Characteristically, the land for the growth of export crops such as cocoa, rubber and palm oil are in general carefully chosen. The loss of nutrients and organic soil matter usually occurs frequently under low-input agricultural systems practiced in Nigeria on poor or moderately fertile soils. The total nitrogen (N) content also compares well, with medium values for mineral soils, except in Abia and Cross River States, which possess higher values. The nitrate-nitrogen (NO_3N) values of the surface soils of cocoa (1.70 to 37.54 mg kg^{-1}) were within low to medium range levels for soils. Since the farmers claimed that they did not apply fertilizers, the source of the high NO_3N values in these soils could be traced to the mineralization of the high organic matter of the cocoa soils in that state. The concentration of phosphorus (P) in Ogun State cocoa soils, was very high. The nutrient contents of soils under rubber crops followed the same trend as in cocoa soils. The values of available phosphorus in rubber soils are high to very high except in Cross River State where the values are extremely low.

The effluents from the rubber-processing factories contained higher concentrations of phosphate, potassium, zinc and total petroleum hydrocarbons than the stream water samples.

A mean of 1.83 ppm^1 (range 0.49 to 2.34 ppm) nitrate (NO_3) was obtained for streams in or near cocoa farms. The adjacent stream to a rubber-processing factory contained 6.62 ppm NO_3 , that is about three times the nitrate concentration of streams near the cocoa farms.

The sodium (Na) content of effluent samples (mean = 0.32 ppm; range 0.05 to 0.47 ppm) was observed to be lower than that of the stream water samples in or near cocoa farms (mean = 9.40 ppm; range 1.31 to 16.46 ppm). A value of 7.73 ppm of potassium was obtained for the adjacent stream near the rubber-processing factory.

This clearly shows that the trade liberalization policy has not resulted in any metal pollution of surface waters in the study area.

The effluent samples from the rubber-processing industries showed a slightly high concentration of total petroleum hydrocarbon (mean = 27.17 ppm) when compared to the results obtained for the stream water samples (8.88 ppm). The mean result obtained for the effluent samples is higher than the FEPA's effluent limit -20 ppm (Osibanjo, 1996) for discharge into surface waters. The results of water analysis show that there were trace concentrations of nitrate, phosphate and metals in the water samples obtained from the study area. Consequently, the present farming systems can still accommodate the use of higher levels of agrochemicals.

¹ Parts per million.

Economic impacts

The average annual cocoa output in Nigeria fell continuously during the pre-SAP period and witnessed an increasing trend in cocoa output in the post SAP period.

Rubber output was about constant in the pre-SAP and it recorded an upward trend in the post SAP regime. The rise, which was still very small was, however, increased sharply in the SAP policy period. **This shows that SAPs had serious effects on rubber and cocoa output in Nigeria.**

New areas planted to cocoa and rubber in Nigeria

This sharp increase soon gave way to a sharp decline in new plantings to cocoa during the SAP period as farmers took care of all their existing cocoa farms. **These figures do not represent all the cocoa trees planted in Nigeria during the reference periods.** However, authoritative sources from the National Tree Crop Development Unit (NTCDU) in Benin city, Nigeria, puts the figures released as representing about 90 per cent of new cocoa plantings in Nigeria. This implies that about 90 per cent of the increase in acreage of cocoa could be attributed to the cultivation of abandoned farms.

For rubber, the average annual new plantings in the post SAP period was far more than was obtained in the SAP period. The reason for this is that farmers intensively tapped (slaughtered-tapped) during the SAP period to obtain the highest return consequent to improved prices, and hence plantings took place post SAP to replace the destroyed trees.

Agrochemical use

Insecticide importation, on the other hand, declined sharply in the SAP policy period and stabilized. Fertilizer imports rose consistently over the pre-SAP and post SAP policy periods. The rise from period to period was progressively sharper.

However, it is very clear from the results obtained in this study that pollution of the surface water as a result of trade liberalization has not occurred, at least not on a persistent basis, given the number of years SAP was in operation. This confirms the information provided by the tree crop farmers at various RRA meetings. They claimed that they have not been using fertilizers and pesticides on their farms. This was mainly due to the prices of the agrochemicals, which were high relative to the prices of cocoa and rubber. Any effort to subsidize the prices of agrochemicals may result in over-use. The danger of excessive agrochemical use can be countered by proper advisory services on its use.

Input-output responses to trade liberalization policies

Exports/agricultural exports ratio

The average annual value of cocoa exports to agricultural exports ratio increased in the 1974-1979 policy period relative to the 1970-1973 period (0.49 to 0.82). SAP policies, however, resulted in a significant decline in the ratio from 0.89 to 0.68. The decline continued in the post SAP period to about 0.42. The average annual cocoa output declined significantly in the 1974-1979 period relative to the 1970-1973 period. The trend is similar for the 1980-1985 period relative to the 1974-1979 period, but rose significantly in the 1986-1993 period relative to the 1980-1985 period, and insignificantly in the post SAP relative to the SAP period.

In the SAP period, the rubber sector experienced a significant increase in the average annual output, which stood at 202.5 thousand tonnes relative to 80.7 thousand tonnes for the preceding policy period (1980-1985). The increase experienced in the post SAP period was however not statistically significant.

Input responses

The insignificant increase and outright decreases in agrochemical imports in the SAP and post SAP periods may have resulted from the drastic decline in the demand for agrochemicals by farmers due to the substantial relative increases in prices of these inputs on account of devaluation. The farmers (cocoa and rubber) stated that most of them would not return to the use of fertilizers unless the prices fall back to between ₦ 200–₦ 500 per 25kg bag. According to cocoa farmers, 1 tonne of cocoa, which sold for ₦ 100,000 in 1994/95 now, sells for about ₦ 70,000 (Rapid Rural Appraisal, September 2000).

Farmers stated that they still believe that agricultural inputs are important for increasing output. It is important to note that the National Policy on Agriculture during the SAP and post SAP periods emphasized self-sufficiency in food production. Even so, the increased trading activities during the SAP period favoured practices such as adulteration of both inputs and outputs in the export sector.

New areas planted to cocoa and rubber in Nigeria

The second implication of the increased production of export crops in the post SAP period relative to pre-SAP is the loss of biodiversity and degradation of soil through expansion of hectares cultivated. The average annual new hectare plantings to cocoa actually declined in the SAP and post SAP period relative to the pre-SAP period, implying that farmers concentrated more on maintenance of existing farms, with new farms increasing at a decreasing rate during the periods under consideration.

Available secondary data seem to support the conclusion that the average annual expansion in hectares planted to cocoa and rubber in the post SAP period were respectively lower than that of the pre-SAP period for cocoa and not different from that of pre-SAP for rubber.

Impact on farm size

Survey data analysis shows that male farmers, representing 97.1 per cent for cocoa and 92.86 per cent for rubber, predominantly produced the two crops. About 26 per cent of the cocoa farmers have non-farming activity as their main occupation. The figure is 19.44 per cent for rubber growers. Those with more than primary education were 19.7 per cent for cocoa and 12.5 per cent for rubber.

The average cocoa farm size increased from 4.35 hectares in 1985/86 to 4.50 hectares in 1992/93 and to 4.53 hectares in 1999/2000. The total farm output of the average farm increased from 2.19 tonnes in 1985/86 to 2.80 tonnes in 1999/2000. The farm size and levels of output therefore responded positively to trade liberalization policies.

Output response analysis

In general, the price of fertilizer relative to the output prices declined from 1985/86 (0.141 for cocoa and 0.18 for rubber) to 1992/93 (0.027 and 0.12) but rose sharply in 1999/2000 (0.413 and 1.78 respectively). Pesticides were not used in small-scale rubber farms.

The elasticity coefficient for the response of cocoa output to increase in farm size was 0.66 in 1985/86 (pre-SAP period), 0.51 in 1992/93 (SAP period) and 0.56 in 1999/2000 (post-SAP period). The output price elasticity coefficient estimate was not significant at the 5 per cent level for all three periods. Thus cocoa output did not respond significantly to price changes. Secondly, the result implies that liberalization did not alter the existing situation of low responsiveness of cocoa output to price increases. The elasticity coefficient of cocoa output response to pesticide use is 0.46 for the pre-liberalization period, but rose to 0.77 and 0.85 in the SAP and post SAP periods.

The report shows that the most important factor in the determination of pesticide demand in cocoa production in the pre-liberalization period are cocoa farm size and age of cocoa trees. That is, 0.96 for farm size and 1.09 for age of trees. During this period, cocoa and pesticide prices did not play much role in pesticide demand. In the post-liberalization period (SAP and post SAP periods) however, the price of pesticide became a significant factor in the determination of pesticide use in addition to farm size.

The prices of agrochemicals have played a significant role in the low response of output in the export crop sector to trade liberalization in Nigeria. Thus it can be said that the effects of trade liberalization on the environment through the export crop sector could have been greater if input prices had not increased relative to output prices.

Impact on profitability

The report shows that the profitability ratio for the SAP period was higher (5.67 and 5.09 for cocoa and rubber) than the pre-SAP and post SAP periods, which were

1.46/4.32 and 3.41/1.65 respectively for cocoa and rubber. Generally, profitability was seen more in cocoa farms than in rubber farms, especially in the post SAP period. This is largely due to the sharp decline in rubber prices in the post SAP period.

Valuation of trade liberalization

Economic valuation

The gross margin can be estimated to be ₦ 40,890 x 1,000,000 = ₦ 40.89 billion which can be assumed to be the economic benefits from cocoa. Also rubber contributes ₦ 2, 029 x 236,000 = ₦ 0.478 billion. The total is ₦ 41.37 billion. If the possible increases in output arising from improved management and environmentally suitable practices are sustainable, as pushed by the Institutes, these could lead to about 50 per cent rise in economic benefit i.e. ₦ 41.37 x 1.50 = ₦ 62.055 billion.

It is observed that at a 35 per cent discount rate, the net present values (NPV) and benefit-cost ratios are lower than those at a 10 per cent discount rate for both cocoa and rubber. The summary of the results of the sensitivity analysis presented in the report show that if cost should increase by 30 per cent, both cocoa and rubber production will not be profitable at 35 per cent discount rate except when rubber is 'slaughter' tapped.

Environmental costs

A scenario can be established in which, given the interest of the Federal Government of Nigeria (now a democratic government) in agriculture, some incentives including price subsidies may be put in place. This high possibility could lead to:

- increased use of pesticides
- higher level of demand for fertilizer
- expansion of cocoa and rubber hectareage.

These assumptions are hinged on the premise that civilian governments often yield to pressures for agricultural support more than the military governments. The second reason is that there is a greater need for foreign exchange earnings in Nigeria than before, and hence greater incentives could be given to the Nigerian farmers that will also enhance farmers' income.

The totality of these possibilities is that there could be increased acidification of the soil, significant soil degradation, and water pollution with attendant adverse consequences on the flora, fauna, aquatic and human beings.

The actual cost implications in terms of capital and recurrent expenses for high producing states for five years may be difficult to determine, but should be in the neighbourhood of the figures stated below:

ITEMS	Capital costs (₦'million)	Recurrent costs (₦'million)
• Effective monitoring	25	67.5
• Capacity building	--	368.5
• Publicity and enlightenment	--	180.0
• Research and popularisation of cocoa pod husks	5.0	50.0
• Product development and marketing arrangement		37.5
• Extension/mobilization/environmental issues		25.5
• Pilot scheme on integrated pest management	--	150.0
• Logistics, meetings, travels, etc.	7.5	10.0
	--	--
Total	37.5	889.0
Grand Total		₦926.50 million

Social valuation

This is based on estimates of the cost of curing adverse health effects that populations could be subject to on account of higher pesticide usage. Out of the 22 million export crop producers, 10 per cent could be said to suffer from skin ailments i.e. 2.2 million. As palm oil, costing ₦ 60/bottle is normally used for skin ailments, a crude estimate based on the assumption that each person uses up to half a bottle of palm oil, works out to ₦ 30 x 2.2m = ₦ 6.6 million.

Net impacts

The net impacts could be estimated by comparing the existing benefits and potential costs. The economic benefits are actual based on revenues and discounted at 10 and 35 per cent, whereas both the environmental and social costs are potential.

Estimated net impacts (monetary)

	Benefits (₹ 'billion)	Costs (₹ 'billion)	Net benefits (₹ 'billion)
Environmental	20.1103	8.3206	11.789
Economic	62.055		62.055
Social	6.6	6.6	-
Net impacts			73.844

Policy package

In order to mitigate the identified negative impacts, the following steps are necessary:

- There should be a control mechanism to advise on and monitor the rate of expansion of export crop farms, giving incentives to the replanting of old trees so as to dissuade farmers from unprofitable and environmentally degradable practices.
- There should be an effluent charge on pollutants arising from the activities of rubber processing industries to minimize or eradicate the untreated petroleum hydrocarbon generated by their factories.
- A Farm Development Advisory System (FDAS) should be evolved to advise non-producers of cocoa and rubber on appropriate environmentally friendly profitable enterprise combinations of new/other exportable crops that can raise their incomes and minimize income disparities in communities and among genders.
- Health centres should be established in cocoa and rubber producing areas, to assist in the treatment of ailments, and include a good community health division to provide advice against the dangerous misuse of agrochemicals such as treating tooth-ache or stomach-ache ailments and the like.
- There is a need to revert to the establishment of a supervisory marketing agency that can monitor the sale and promote the production of cocoa and rubber in an environmentally friendly manner, and oversee the supply and use of only appropriate and unadulterated agrochemicals. This body could be 'quasi-government', with substantial representation from cocoa and rubber producers' associations, researchers and financial institutions.
- There should be a product development and marketing programme on the use of dried cocoa pod husks (so as to avoid the inoculum causing black pod disease), which can be used as raw materials for traditional soaps, manure and livestock feed.
- Conservation and rehabilitation programmes should be organized in areas where degradative processes are about to set in. Also, uncontrolled felling of rubber trees should be checked and farmers encouraged, through appropriate pricing mechanisms, to replant the cleared land and rehabilitate the old rubber plantations

with disease resistant and early maturing varieties, such as those now available at the Rubber Research Institute of Nigeria, Benin City.

To enhance the positive impacts, the following are recommended:

- The Federal Government should ensure that there is only a small margin between the producer prices of exportable crops and world prices, so that farmers can benefit substantially from international trade. This will entail the propagation of market prices on a regular basis via electronic and print media in English and vernacular.
- The Government should legislate on the processing of cocoa beans to increase the value added and generate employment opportunities at the grassroots level.
- There should be increased government support for agriculture through the construction of rural roads, rural electrification, development of seed and fruit nurseries as well as primary and secondary schools to improve the level of literacy of the rural population.
- The Government should increase the research and training funds that concern the environment, agriculture and trade, so as to have detailed information about what is happening in these sectors on regular basis. Such research should be on disease resistant high yielding varieties in order to minimize the use of agrochemicals, etc.
- Farmers' Associations should continually enlighten their members on environmentally degrading practices through training, workshops, seminars, etc., and educate the farmers on sustainable tapping techniques in order to avoid slaughter tapping as currently practiced.

Plan of action

- Organization of a National Steering/Stakeholders' workshop to present the report and enlighten the public on the findings of the study.
- To forward the recommendations of the workshop to the National Assembly for consideration and possible adoption.
- Sensitization of policy makers on the merits of the report.
- To publish the report for circulation to stakeholders and international organizations including the International Cocoa Organization, UNDP, WTO, etc.
- To organize training workshops/seminars on environmental economics to enhance the capacity building of researchers/lecturers, extension agents and leaders of Farmers Associations.
- To attend various related seminars and workshops on trade, agriculture and the environment at the national and international levels.

It must be emphasized that the estimated costs could rise by 25 per cent or fall below the projected values. In other words, the proposed policies may cost between ₦926.5 million and ₦1158.125 million

Conclusions

This study on export crop promotion in Nigeria has raised some issues regarding the sustainability of Nigerian agriculture. The study shows that the advantages of trade liberalization should be weighed against the possible environmental and social costs of production.

The major conclusions of this study are the following:

- Export crop promotion, through trade liberalization and trade-related policies, has enhanced the contribution of agriculture to the GDP of Nigeria and raised the foreign exchange earnings of the non-oil sector.
- The high level of output for cocoa during the SAP period was due to the cultivation of abandoned farms and high output price than the use of agrochemicals. In fact, after the SAP period (1986-1993) farmers used little or no agrochemicals.
- The relatively high rubber prices during the SAP period led to ‘slaughter’ tapping, particularly after the SAP period, leading to dry rubber trees and abandonment of rubber farms.
- Whereas no form of erosion or soil loss was observed on cocoa and rubber farms, the over tapping (slaughter tapping) of rubber trees portends a dangerous opportunity for soil degradation and erosion given the absence of canopy on the rubber farms.
- Mainly because very small quantities of agrochemicals were used by farmers during the post SAP period (1994-2000), in consequence to poor output prices relative to the price of agrochemicals, the nitrate, phosphate and metal concentrations in water and soil samples were low. However, any improvement in the relative prices in favour of cocoa and rubber could lead to serious consequences in the use of agrochemicals by farmers if not properly guided and monitored.
- Export crop farmers were better off than other farmers in their communities largely due to trade liberalization. The cost-benefit analysis shows that the economy would have been better off if sustainable management approaches to the use of land had been adopted. The study has shown the weaknesses in just adopting trade liberalization without putting in place appropriate policies to guide its adoption. There is the need for a guiding and monitoring system, which would minimize the negative impacts of trade policies at the grassroots level. Such policies and programmes could be in the form of developing disease resistant and early maturing varieties of cocoa and rubber, educating and sensitizing the Farmers’ Associations and developing rural infrastructures (roads, water supplies, health

centres, schools, etc.). These will improve the living standards of the rural people that produce these crops.

Areas for future study

One important area for future study that emanates from this work is an evaluation of the amount of agrochemicals that can be used by Nigerian tree crop farmers without leading to environment losses. This is an important task give that current levels of agrochemical use are far below the recommended rates. With a greater availability of information and a more open economy, farmers may have greater access to these chemicals in the future. It is important therefore that the safe limits be determined far ahead of such situations. The strategies to ensure that such a situation would be properly managed must be thoroughly evaluated.

Also, a close look at the fish and shrimp sector, the petroleum sector, as well as the forestry and wildlife sectors of Nigeria may well reveal significant environmental damage arising from world trade activities in these sectors. Hence, they are worthy of investigation for the purpose of capacity building and whatever other appropriate measures need to be put in place to minimize damage by other sectors.

THE FISHERIES SECTOR IN SENEGAL

Introduction

The socio-economic importance of fishing: a multipurpose

Fish is a major source of protein for the Senegalese population. Fishing plays a dominant role in the Government's policy towards generating employment. It currently generates about 100,000 direct jobs (fishermen) for nationals, of which more than 90 per cent are in small-scale fishing. The fishing industry also contributes to Government revenue through different agreements. In addition to associated dues, fishing agreements imply a series of economic, trade and technical counterparts. Under the latest fishing agreement concluded by Senegal and the European Union (1997-2001), direct financial compensation amounts to about CFAF 32 billion.

Despite its economic and social importance, the sector has to face serious disequilibria both in resource exploitation and market supply: the coastal demersal (deep lying fish) stocks with high market value (mostly exported) are fully and even over-exploited, with a serious risk of local market supply shortages looming ahead as the fishing effort shifts from locally consumed species to export-oriented ones.

The main trade policies identified as contributing to the over-exploitation of resources are the following:

- non-reciprocal advantages under the Lomé Agreements, authorizing Senegalese piscatorial products to enter the European market with the exemption of custom duties;
- an export subsidy of 15 per cent, later raised to 25 per cent, first applied to canned tuna and later extended to all piscatorial products;
- fishing agreements concluded with a number of foreign fleets.

This report proposes solutions to over-fishing, taking into account the multipurpose nature of fishing activities.

The trade policies possibly responsible for over fishing

The Lomé Agreement, subsidies, devaluation and fishing agreements encouraged fishing for export markets, which explains some of the current disequilibria in fishery

resources. These policies have also had serious economic consequences on fishing companies.

Lomé Agreement

It is estimated that the European market absorbs up to 80 per cent of Africa's exports of sea products (66 per cent of Senegal's exports of piscatorial products). Senegalese piscatorial exports also benefited from a customs duties exemption regime in the European market under the Lomé Agreement.

European market dependence and devaluation

The system of trade preferences has reinforced the significance of the European market in the distribution of Senegalese piscatorial exports. The Asian market is marginal, although exports of octopuses to Japan reached 13,000 tonnes in 1999. However, the position of Senegalese products in this market improved following devaluation. Since devaluation, African frozen exports have increased steadily, as the export prices of small pelagic fish were more attractive than those offered on the domestic market. Every year, the European market absorbs about two thirds of fish exports. Following devaluation, the exports of frozen products to Europe increased significantly from 21,000 tonnes in 1993 to 58,000 tonnes in 1999. As is clear, exports to Europe represent the biggest share of overall exports. The products of ACP countries enter the European market with neither tariff (customs duties) nor non-tariff (quotas) barriers imposed on other supplying countries.

The diminishing importance of ACP regimes

Out of an estimated global fall of 35,000 tonnes, the share of exports of frozen products to Europe represented 22,000 tonnes. Given this weight of the European market in terms of overall export volume, difficulties in accessing this market are likely to affect the situation of exports as a whole.

ACP countries hold a smaller position in the market for non-processed products than other developing countries, even though they have made some market gains. With regard to their exports of frozen shrimps, ACP countries have lost market shares to their rivals from developing countries.

Direct and indirect export subsidies

Industrial modernization projects in support of small-scale fishing

This policy failed mainly because, despite relatively weak support from the Government, small-scale fishing continued to grow and to remain competitive, which hindered the development of the industrial sub-sector. The free point and free exporting enterprise status and an export subsidy greatly contributed to increased exports from the small-scale sector. Aid made available for pirogue motorization and incorporation of new fishing gear (purse seines) fell in this context. These measures contributed to the expansion of small-scale fishing, the landings of which have recorded a spectacular

increase over the past twenty years. Many fishermen indeed chose to fish for high market value species thus accounting for about 60 per cent of raw material supply to export units.

Subsidies that directly or indirectly favour exports

This included the following:

- reduced tax on fishing gear (motorization), subsidized fuel, and institution of fishing sector financing bodies;
- export subsidy and institution of free exporting enterprises for enhanced competitiveness and deeper penetration of external markets by Senegalese piscatorial exports.

Subsidies through reduced tax on pirogue motors and fishing gear

Motorization considerably expanded the fishing areas for small-scale fishing by increasing access to more remote fishing zones. It simultaneously reduced travel time and extended fishing time, leading to an unprecedented increase in fish landings and consequently boosting trade of fresh products.

Policies of reduced taxes on motors and fishing gear were introduced in response to the crucial role played by small-scale fishing in the development of the sector.

Fuel subsidy

Subsidized fishing fuel made it possible to use more powerful motors, to build bigger pirogues, and to extend the duration of sea trips in order to exploit new fishing areas. It reduced considerably the operating charges of fishing units, which in theory, was expected to maintain the prices of fish landings by small-scale fishing units at a level compatible with the purchasing power of the Senegalese population. However, the fact that small-scale fishing units tend to export their catches raises questions as to who finally benefits from the Government's financial assistance other than foreign industrialists and consumers. From less than CFAF 2 billion in 1986, fuel subsidy in favour of small-scale fishing alone, rose to CFAF 6 billion in 1998.

Free point and free exporting enterprise status

The free point and free exporting enterprise status granted significant advantages to export-oriented processing units. In 1995, this law was extended to cover agricultural enterprises (including fishing companies) exporting 80 per cent of their production.

Export subsidy

Export subsidy is part of a national trade policy aimed at facilitating the penetration of external markets by local products. Initially, export subsidy was not meant for the fishery sector. Its institution resulted in an ever-increasing pressure being brought to bear on the main stocks of exported species and thus contributed to

threatening the supply to the domestic market and the regeneration of coastal demersal species to equilibrium level.

Structural adjustment and devaluation

The development of fishing activities was mainly underpinned by the small-scale fishing sub-sector, which had long been neglected by government regulation.

With structural adjustment policies, the Government gradually withdrew from the fishing sector. It withdrew from input and fishing gear distribution in 1985 and was replaced by the private sector, but it maintained a reduced tax on motors, fishing gear and fuel. By reducing investment costs, this policy made units profitable as it was possible to maintain the prices of small-scale fish catches at a level compatible with the populations' purchasing power, and to enhance the competitiveness of industrial fishing production.

With regard to marketing, the profession of fish and seafood wholesaler was regulated through the CAPAS project (*Centre d'Assistance de la Pêche au Sénégal*). While its objective was to market fish through cooperative unions, fish marketing was liberalized and wholesalers were no longer governed by presidential decree.

Devaluation

In this policy, donors are accorded special attention to fishing, as it seemed to reconcile food security and export requirements. While exports dropped considerably in 1991 and 1993, especially exports of frozen products to Europe, devaluation immediately enhanced their competitiveness.

In the years that followed devaluation, exported volumes did not increase significantly. However, statistics on exports of molluscs clearly indicated that it was the increase in their production that inflated exported volumes. Export prices thus increased by up to 200 per cent. There was also a 30 per cent increase in trawler fishing effort between 1996 and 1997, and a redeployment of pirogue fishing effort towards export-oriented species.

Devaluation benefited both the capture and industrial processing components. However, small-scale processing continued to cater for local markets, and of late, African markets. In so far as catches are concerned, both small-scale and industrial fishing units specialized in the capture of export species benefited from a constant increase in external demand and hence in prices. Marketing channels developed in a specialized way, with local fish and seafood wholesalers selling an increasing share of small-scale production to export-oriented packaging and processing units. Although demersal, small-scale and industrial fishing units saw their operating accounts improve, more as a result of a price effect rather than a volume effect, industrial packaging and processing units on the contrary, had to face severe financial difficulties.

This situation turned out to be favourable to fresh or frozen exports, which required lower investment hence lower charges than processed products. The exports of fresh products to Europe increased in the aftermath of devaluation, from 21,000 tonnes in 1993 to 58,000 tonnes in 1999.

The share of whole, fresh or frozen products in export markets kept growing. While government incentives stimulated exports, an increasing number of operators specialized in the capture of domestic market species, notably small pelagics, turned to coastal demersal fishing. Devaluation not only encouraged shifts in fishing effort to export-oriented species, but also to the export of species previously meant for the domestic market. Small-scale units now process very little fish for the domestic market, essentially only that which cannot be exported as fresh products. Food security is now threatened by supply shortages of locally processed products. Some of the species processed by the women are more directed towards the industrial sub-sector, instead of being consumed locally.

Pressure on resources

The consequences of devaluation visibly influenced the regeneration conditions of export species.

EU/Senegal fishing agreements under the test of time

Fishing ships flying foreign flags were authorized to fish in Senegalese waters either under fishing agreements concluded between Senegal and the state or organization of the flown flag, or when chartered by Senegalese nationals.

Actually, these agreements increased the fishing possibilities for its flotilla and attest to the declining stock of certain species – especially the coastal demersal species – at the national level. Senegal and Japan also concluded a fishing agreement authorizing Japanese professionals to fish in Senegalese waters under certain conditions.

UN Convention on the Law of the Sea and fishing agreements

This Convention was relevant for Senegal as it:

- assessed stock levels per targeted species;
- determined, by subtraction, the balance that is likely to be attributed to foreign fishing boats in the form of licences or fishing rights on specified quantities of targeted species.

Overcapacity and fishing agreements

Certain agreements provided for granting reciprocal fishing rights, but those concluded between powerful fishing nations and developing countries tend to focus on issuing licences or fishing rights in exchange for financial compensation. These powerful fishing nations are criticized for encouraging over fishing, slowing down development, and competing with small-scale fishing. Firstly, the development of Senegal/EU fishing agreements coincided with the increase in small-scale fishing in the 1980s. From this point of time, the landings of small-scale fishing sharply increased from about 150,000 tonnes in the early 1980s, to 250,000 in 1990, and reached 350,000 tonnes today. While coastal pelagic resources were not fully exploited through small-scale fishing, this had nothing to do with productivity or capacity problems but rather with higher capital costs and the attractiveness of export species – especially since devaluation. However, it is necessary to examine whether foreign industrial fishing is crowding out national industrial fishing.

There are two sorts of competition: the first one concerns competition between national and foreign industrial fishing for coastal demersals, crustaceans and cephalopods; the second one takes place between small-scale fishing and industrial fishing (both national and foreign). In fact, there have been long standing conflicts between these two types of fishing, but they have tended to worsen since small-scale fishing has been in the position to compete successfully with industrial fishing boats. The fact is that the development of small-scale fishing has increased the risk of conflict with industrial fishing concerns, whether national or foreign, and the possibility of extending the limits of the reserved zone may even have to be considered.

The question of conflict has a critical role to play in the elaboration of an international legislation for preservation of marine resources. Small-scale fishing has the advantage of being geographically dispersed along the fishing areas, while industrial fishing encourages the concentration of fishing and processing units in certain geographical areas - hence rural migration. Concerning the management of fishing operations, regulations cover not only the conduct of coastal states, but also that of distant waters fishing nations.

Access to markets in exchange for access to resources

Fishing agreements deserve to be reconsidered from the viewpoint of whether developing countries can negotiate access to developed country's markets in exchange for access to their resources.

In the framework of current agreements, Europe acquired 'fishing capacities' in terms of volume of the products fished. According to an FAO evaluation report in 1995, rejections represented 25 per cent of total maritime fish catches. If access to resources were linked to access to markets, the rate of rejection could be reduced substantially, thus encouraging conservation. The high rate of rejection could also lead to conflicts between fishing agreements and new legal instruments on resource conservation being developed by the FAO.

Compliance with WTO rules: trade agreements or disguised subsidies?

Most discussions devoted to fishing at the WTO Committee on Trade and Environment have dealt with subsidies. The Common Fishing Policy is threatened by the rules of international trade. Implemented by the Fisheries Department, this policy covers 4 areas: the preservation and the management of sea resources, relations and agreements with non-member countries and international organizations, structural measures, and organization of the common market for sea products. If stocks preservation do not, *a priori*, pose any problem, structural measures are considered as subsidies to the sea sector, and fishing agreements tend to be considered as disguised subsidies that favour over fishing.

Economic and social impacts of export support mechanisms: trends in the operating accounts of small-scale fishing units

The following is a brief description of the kinds of fishing units used by small-scale fisheries in Senegal.

Fishing units

Many small-scale fishing gear targets coastal demersals. Besides, due to the species scarcity problems, blend-fishing gear has replaced standard ones in each unit. Blend-fishing combines mainly three types of fishing: angling, dormant net and pot fishing (ADNP).

Purse seines

The FAO introduced purse seines in Senegal in 1972 in an effort to put at the disposal of small-scale fishermen, more efficient fishing gear to tap small coastal pelagics.

Surrounding gill nets

Two types of nets are used depending on the hunted species. Big-stitch nets capture ethmaloses while the small-stitch net is more adapted to fishing flat sardinella. The ethmalose net is mainly used between June and October, a period when the hunted species is present in the fishing areas.

Icebox pirogue

The unit icebox pirogue can carry along several types of fishing lines at each tide: scad (*Decapterus sp*, *Trachurus sp*), wreck fish (*Epinephelus sp*, *Serranidae*) and sparidae (*Sparus caeruleostictus sp*, *Sparidae*) hand lines. The ground lines used for demersals fish from a anchored pirogue. Hook size depends on species size.

Dormant nets

There are different types of nets:

- fish dormant nets, some of which are of surface type and target sardinella or grey mullets as well as other demersal species (soles, rays);
- lobster dormant nets.

Depending on fishing type, investments in small-scale fishing consist mainly of purchases of pirogues, motors, fishing gear and accessories. The prices of fishing gear vary according to fishing type.

Operating costs

The cost of food, like fuel, is normally born by the fishing unit, it is not a salary component. Bait mainly consists of sardinella bought from purse seine fishermen or fish and seafood wholesalers.

In small-scale fishing, crewmembers share the economic risks of going out to sea. Between 1993 and 1996, the profits of small coastal pelagics meant for the domestic market increased slightly (from 26 per cent to 45 per cent on average) compared to export-oriented demersals (200 per cent on average) targeted at the export market (European or Asian) where substantial gains were achieved.

In the case of surrounding gill net units, devaluation almost nullified the boat owner's net income, which dropped from CFAF 448,000 to CFAF 47,000. The profitability rate also clearly rose among dormant net and/or angling and/or pot fishing pirogues, from 4 per cent to 29 per cent.

Unlike the fishing units disposing of the bulk of their catches on the domestic market, the financial ratios of icebox pirogues and ADNP clearly improved. The fishermen are the first to profit from this new fish landings price structure.

Impact of subsidized fuel on the profitability of fishing units

A sensitivity analysis shows that the financial profitability of fishing units could be affected if fuel subsidies were to go. Trends in the profitability rates of the different small-scale fishing units have encouraged small-scale fishermen to develop new strategies in the last few years. Fishing effort was noted to have shifted from capture of domestic market oriented species to export species. In *Kayar*, fishermen preferred to fish for red mullet. Cheap fish became increasingly rare as fishing pressure shifted onto priority export species (soles, lobsters, shrimps, *pageots*, sea breams and wreck fish).

The partial redeployment of purse seines and surrounding gill nets' fishing effort towards these priority species disturbed domestic market supply, raising fears about protein deficits, already the case in the countryside. The heavy pressure weighing on the fish trade prevented any significant increase in the landing prices of small coastal pelagics. The costs of fish marketing across the country was relatively high. Instead of immobilising their fishing units, fishermen rather reacted to higher pirogue fuel prices by adopting new strategies:

- purse seine pirogues fished in closer areas or went out to sea with a single pirogue instead of two. In *kayar*, pirogues limited their fishing trips to once a day;
- icebox pirogues clearly extended the fish trip duration, which was likely to impact on the quality of products put on ice;
- some fishing units took exclusively to picking up gastropods and other fish captured by industrial fishing thereby encouraging the latter to operate into the 6 miles area reserved for pirogue fishing. This violation of existing regulations often translated into conflicts resulting in equipment loss or at times, human casualties;
- fishermen organized themselves such that they could make maximum gains from their captures despite the high costs of fishing equipment, by restricting the supply of piscatorial products.

Environmental impact of export support mechanisms: density indicator paths of coastal demersals

Results

The increase in global fishing effort has significantly affected the various species tapped. The fact that the entire flotilla increased their fishing efforts in 1994 was indicative of the strategic adjustment of fishermen with boat ownership, following devaluation. The increase in fishing pressure on export species is in fact a reaction to revived external demand entailed by monetary devaluation, and as a consequence of the different kinds of fishing subsidies outlined earlier.

Trends in density indicators of species captured by deep-sea trawls reflect for all species a sharp decline during the period studied by this report, i.e. 1971 to 1998. Almost all fish species were affected. At period end, *catch per unit effort* was lower than 10 kg/hour for all species. Lower abundance was caused by the strong fishing pressure exerted on the species, especially those with a high market value.

Relative densities as determined from fishing statistics (main marketed species)

The observed paths of mono-specific relative densities reflects progress in trawler fishing in Senegal. In Senegal, trawler fishing for coastal demersal species of the continental shelf started around 1950. The multi-specificity of West African demersal fishing captures led to increased exploitation of a great number of secondary species which, in the case of freezer trawlers, are often thrown back into the sea after capture sorting. The specialization of flotillas tapping demersal resources therefore has an impact on non-targeted species.

Destroying habitats and ‘replacing’ Sparidae (wreck fish) by Cephalopods

The majority of coastal stocks tapped offshore by industrial fishing are fished by small-scale fishing units. Uncontrolled exploitation of these fragile resources by small-scale fishermen through non-selective fishing jeopardizes regeneration of adult stocks and reduces the stock of progenitors expected to supply coastal breeding grounds with juveniles. The decline in relative abundance is therefore not the consequence of industrial fishing units alone.

The Senegalese small-scale fishing now has free access and exploits intensively the coastal band often through irresponsible fishing. It has often been observed that regulatory provisions are not applied to small-scale fishing operators, notably in terms of the mesh size used. Resource scarcity is behind the conflicting competition between the two types of fishing. These conflicts range from sometimes dramatic incursions of industrial fishing units into areas reserved for small-scale fishing, to demand for catches of small-scale fishing by exporting factory owners

In view of the fact that the level of global effort is largely higher than the sustainable rate of exploitation, and efforts of fishing units to break even by increasing fish captures, fishermen are compelled to develop compensatory adjustable reactions. Small-scale fishermen go fishing in increasingly distant zones and associations with industrial fishing trawlers have surfaced. Due to the scarcity of hunted shrimp species, most shrimpers take advantage of their smaller mesh size (40 mm instead of 70 mm) to compete unfairly with fishing boats. Many of them exploit only fish and land very few shrimps on their return from sea trips. The use of shrimp trawls for catching fish entails rejection of great quantities back into the sea, thus contributing to stock depletion. In 1998, the monitoring of the specific composition of landings by shrimpers led the Fisheries Department to ‘downgrade’ many boats that had been issued shrimp fishing licenses, because of the very limited quantities of shrimps landed over a period of several sea trips.

The ultimate measure taken by the authorities in charge of fisheries was to freeze industrial fishing effort.

Main conclusions of the study

Resource scarcity and competition have exacerbated conflicts both within small-scale fishing and between industrial fishing and small-scale fishing.

All those involved in the sector have acknowledged that the increase in global fishing effort and processing capacities have unavoidably led to over exploitation of sea resources as a whole. The following reasons were identified for this phenomenon:

- insufficient measures for planning small-scale fishing which accounts for two-thirds of the total catch and benefits from free access to the fisheries;
- difficult to control industrial fishing;

- the absence of planning for the conservation of sea resources while at the same time fishing effort and processing capacities kept expanding.

The Senegalese piscatorial sector has stumbled over internal contradictions that arise in most natural resource exporting industries. In a structural adjustment context with poorly performing traditional exports, government interventions encouraged exports of fisheries.

While export-oriented fishing units benefited from high producer prices, lower productivity, however, raised fears that they might also experience operating deficits. Intensified fishing for export breeds raised fears of stock depletion and irreversible biodiversity losses. Despite these dangers, the small-scale sub-sector continued to shun fishing for domestic market breeds and fished export breeds instead. Thus, stocks of pelagic fishing units immediately deteriorated, while critical limits of coastal demersal fishing have yet to be reached.

The liberalization of the international market of sea products took place against this background. Between regulation and market mechanisms, solutions to current constraints should be mindful of resource preservation and product development. This observation applies both to exporting industries and pelagic fishing units or small-scale processing units. As a result of pressures exerted on resources, efforts should focus on increasing product value-added without volume expansion, at least for exports.

Policy recommendations

Irrespective of the role played by external demand, free access to resources implies that export-oriented fishing units were able to exploit the stocks of coastal demersal resources beyond its maximum sustainable yield. This question touches notably on the problematic question of quotas, fishing agreements and capture component support mechanisms.

Small-scale fishing is much less specialized than industrial fishing, which increases the possibilities of rejections, should a quota system be introduced. The issue on the price of access to resources calls into question the fishing agreements concluded with foreign fleets, starting with those binding Senegal and the European Union. Many facilities for the acquisition of fishing units (reduced interest rates, reduced tax on motors and equipment, and subsidized pirogue fuel price) were instituted. While pelagic fishing units should always benefit from these measures in view of their deteriorating operating accounts and their contribution to the country's food security policy, maintaining them for coastal demersal fishing needs to be discussed. Concerning the new regulations, exports of endangered species as whole products might be banned or surtaxed. A freeze on global fishing (small-scale and industrial) effort on coastal demersals also seems to be desirable. As far as small-scale fishing units are concerned, licences might also be required.

All these should be complemented by a programme on the creation of parking areas for fish and seafood wholesalers, as well as organized sites for fish processing. Such a measure would make it possible to improve the working conditions of fish processing women, increase profitability, sanitary standards and product quality. As for support to some fisheries, the revival of semi-industrial sardine fishing would provide more raw materials to high value-added industrial processing (canning, freezing...) without competing with small-scale fishing (products of smaller size). It would extend the range of products exported to Africa. Organizing a system for collecting rejections of industrial fishing with the use of pirogues assembled in secondary coastal surveillance centres, would contribute to increasing the quantities available for domestic markets and small-scale processing. An ice subsidy would reduce the costs of the fish trade considerably and contribute to improving product quality, notably for the rural populations. Market-based mechanisms and economic measures are also likely to increase the value of production.

THE FORESTRY SECTOR IN TANZANIA

Introduction

Implementation of trade liberalization policies has not been smooth in Tanzania, as they have had several positive and negative environmental, social and economic effects. This study attempts to identify and quantify the environmental impacts of trade liberalization in the forestry sector of Tanzania. Quantification of such effects has been difficult because of the lack of consistent and comprehensive data and the related economic variables in almost all sources of forest statistics.

Assessment of the environmental impacts of trade policies has become enormously popular in recent years. Governments, in collaboration with research institutes, universities, the private sector, NGOs, international organizations and other stakeholders have shown a keenness to identify and quantify these impacts. The motivation behind the collaboration and interest is due to the projections and empirical studies which reveal that apart from the possible gains from changes in trade policies, there are adverse effects which, if uncontrolled, may jeopardize not only the country's trade position, but also pose a threat to sustainability both at national level and in some cases globally. This study is one such development in this area. With the financial and technical support of the United Nations Environment Programme (UNEP), the Centre for Environmental Economics and Development Research (CEDR) has undertaken an impact assessment of trade liberalization in the forestry sector of Tanzania.

The forestry sector has a very important role to play in Tanzania's economy. Although in absolute terms, its contribution to total gross domestic product (GDP) is low, it has increased considerably during the past 10 years by about 35 per cent, from 2.6 to 3.4 per cent of GDP.¹ Covering 37.8 per cent of the total landmass, which is about 33.5 million hectares, the country's forests contain such a high level of biologically diverse resources that Tanzania is one of the richest countries in terms of biodiversity in the world and among the 12 most diverse countries. Tanzania has Africa's largest number of mammals, second largest number of plants (10,000 species), third largest number of birds (1,035 species), fourth largest number of amphibians (123 species) and fourth largest number of reptiles (245 species), all harboured by the country's forests. In addition, the forests provide over 92 per cent of the energy resources, support the development of other important sectors (such as agriculture and tourism) through provision of water resources and catchments, maintain hydrological balance and soil protection, recycle atmospheric gases, provide construction materials, employment sources and others.

¹ Due to methodological problems a large part of the activities within the sector are not reflected in GDP figures. Underestimation has been estimated at 35-60 per cent (see Bagachwa, 1992).

Employment is provided through forest industries, forest plantations, government forest administration and self-employment in forest-related activities. Trade in forest products has recently increased, and the sector's contribution to total trade has more than doubled.

Like all economic sectors of Tanzania, the forestry sector has been influenced by trade liberalization policies introduced in 1987. Due encouragement has been provided to private sector participation in various activities in the sector. Increased export of forest products to boost the country's overall export growth has been permitted through policy incentives. Some of the measures implemented in the course of trade liberalization have included: removal of trade distortions in the production and marketing of forest products to ensure effective market-determined prices, removal of fiscal and non-fiscal barriers in forest trade and promotion of forest-related sectors.

From the time when trade liberalization and other policy measures were introduced in the Tanzanian forestry sector, the following has been observed:

Growth in trade of forest products (both domestic and foreign trade) has been rapid, characterized by an increase in share of total trade. There has been increase in the production, distribution and marketing of forest products of Tanzania. Trade and investment liberalization policies in other sectors and a general change in economic activities have also influenced activities in the forestry sector. Construction activities in Tanzania depend upon significant amounts of forest products as input and materials. In recent years, such activities have increased, hence triggering further production of forest products and exerting pressure on forests.

In terms of usage, various estimates have indicated that fuel wood extraction represents the largest use of forest products (estimates average over 60 per cent). Nevertheless there is a need to assess the positive and negative environmental impacts of trade liberalization policies and multilateral trade rules on the Tanzanian forestry sector, while taking into account the social and economic benefits.

This study therefore elaborates country and sector specific methodologies to assess these impacts and suggests a long-term policy development process to address future trade-related environmental and social impacts of sectoral activity. The study also highlights a need to develop a policy package (a set of standards, voluntary private sector initiatives, regulations, economic instruments, or a single economic instrument), to correct the negative and enhance the positive environmental, social and economic impacts of trade liberalization in the forestry sector of Tanzania. It attempts a cost-benefit analysis for implementing the policy packages recommended by the study. It argues that there is a need to further support national capacity building in international trade policy research and strengthen human and institutional capacity in the selection, design and implementation of economic instruments to assist in addressing the negative impacts of trade liberalization policies in the sector. It also advocates enhancing

national stakeholders' understanding of the implications of multilateral trade rules and trade liberalization on national sustainable development and the environment.

Economic impacts of trade liberalization

The analysis focuses on: product impacts, technology impacts, production, management and technology trends, and scale impacts. In undertaking product impacts assessment, changes in trade volumes of products related to the forestry sector were considered. The analysis reveals a positive product impact in the form of an increase in trade in forest products that are environmentally friendly. Prior to the adoption of trade liberalization measures, most forest product export was composed mainly of raw form products, particularly logs. Trade liberalization policies encourage domestic processing of the forest products before they are exported which adds value and discourages the quantity intensive harvesting that has been blamed for increased deforestation.

However, markets for forest products have been variable. According to the FAO report,² global trade in primary forest products has risen substantially, reaching US\$ 126,000 million in 1998. Forest products are among the few products that a developing country like Tanzania can produce at lower domestic cost and easily compete in international markets. The technological impact of trade liberalization can be indicated by the change in type of technology induced by the changes in trade policies. Trade liberalization has also resulted in the increased import of machinery for the forestry sector. However, these new machines have also resulted in increased wastage of wood.

Like in the furniture sector, trade liberalization in the forestry sector has resulted in an increase in the domestic price of fuel wood and charcoal, partly due to the export of such products. This should have led to a more rational use of these resources.

The impact of trade liberalization on production, management, and technology trends in the forestry sector of Tanzania is another important aspect of economic impacts considered. The analysis looks at the technology and management systems employed by the production units that have been carrying out trade and investment in the forestry sector. According to the study findings, the value added of the forestry sector of Tanzania has been positive and increasing from the time trade liberalization measures were adopted. Apart from the value added, the study also investigated the trends in productivity. Analysis of this trend reveals that labour productivity in the forestry sector has been increasing throughout the period investigated.

Trends in the value of the forestry sector as a percentage of contribution to total GDP is one of the crucial indicators of the change in degree of openness and tradability of forest products over time. This trend has been coupled with an increase in production and trade in forest products. This study reveals that the value of forest trade as a percentage of the sector contribution to GDP has shown a tremendous increase.

² FAO, *Commodity market review*, Rome, Italy, 1998-1999.

In analysing the scale impact of trade liberalization, economic growth, financial gains and the related aspects were considered. The analysis looked at the contribution of the forestry sector to Tanzania's GDP, national employment and investment. The contribution of the forestry sector to total GDP, from the time trade liberalization was proposed in 1987 and its implementation era of the 1990s, indicates an impressive growth of about 35 per cent in overall contribution. However, in overall terms, the forestry sector's contribution is only about 3.5 per cent, having increased from 2.6 per cent. Before the adoption of trade liberalization as well as other reform measures, the sector's total contribution was small.

In analysing the scale effect of trade liberalization, trends in investment growth were considered. Since 1992, the Tanzania Investment Centre has been attracting and approving investment including forestry sector investment. There has been an increase in contribution to national employment due to the new investment growth in the sector. The statistics of the Tanzania Investment Centre reveal that new projects approved generated 883 jobs in 1995, and 1,707 jobs in 1996. In 1997, the new jobs created were 12,213.

It was revealed that forest rehabilitation is mainly carried out by central Government, or local governments depending on who owns the forests. For the forests open to the public there is no specialized agency for rehabilitating forests once damaged.

Structural impacts of trade liberalization measures on the forestry sector were also considered. Such impacts consist of microeconomic effects resulting from the trade liberalization measures. The intention was to analyse whether trade liberalization measures have promoted an efficient allocation of resources and efficient patterns of production and consumption within the forest. It was found that following transport sector liberalization, there are more investors who have joined the transport routes to the forested areas. The economic survey of 2000, reported that during 1999 about 9,104 licenses were issued for new cargo transporters including a number of operators in forest cargo transportation. The Tanzania Zambia Railway Authority currently operates special rail transportation for timber from the southern Tanzania to Dar es Salaam.

This study has confirmed that Tanzania has responded positively to the changed production sphere by adopting new policies and regulations for the forestry sector. The changes started with the National Investment Policy in 1997. The National Environmental Policy was also revised in 1997 to reflect the existing production environment. Apart from these changes, the Government of Tanzania has also adopted the new National Forestry Policy of 1998, which encourages private sector involvement and increased trade in forest products

Environmental impacts of trade liberalization

Analysis has revealed significant environmental impacts of trade liberalization in the forestry sector that include increased rate of forest product extraction thereby

fuelling deforestation. Increasing deforestation has resulted in adverse impacts in the country. Both the consumption and production processes of forest products have resulted in increased atmospheric carbon dioxide, particularly through burning forest products for fuel or as a result of uncontrolled fires during the process of production. In areas surveyed it was found that following liberalization, trade in forest products including charcoal products has increased. The consequence has been increased forest destruction.

Like other forests in the world, the forests of Tanzania play an essential role in the maintenance of hydrological balance. Increased harvesting of forest products has resulted in the sharp decline of forest products in a given area. The survey has revealed that increased activities in the forest have badly affected forest biodiversity. It is indisputable that there is increased rate of deforestation as a result of increased production and trade of the forest products.

During the early 1990s, groups of people invaded the Kazimzumbwi forest reserve which is part of the 'biodiversity rich' coastal forests of Tanzania. These people established permanent settlements inside the forest and initiated various economic activities, mainly forest related activities including charcoal making, harvesting and selling of firewood, farming, hunting etc. Trade liberalization and the related policy changes in the sector have resulted in increased activities in the forests and settlers in the forests are increasingly contaminating the water sources near or within the forests.

The social organization impacts of trade liberalization in the forestry sector of Tanzania were also analysed. With the introduction of trade liberalization measures, an enabling environment for private sector involvement in forestry was created. This involves cooperation between forest administration and relevant private sector associations. Other measures being encouraged are; establishment of forest village reserves, community-based organizations for joint forest management, exchange of information and awareness raising.

Valuation of the effects of trade liberalization

To the extent that quantitative measures of the impacts of trade liberalization policies on the forestry sector can be generated, Tanzania can improve the attractiveness of returns on forest investment that has been encouraged by response to policy change. Specific thrust is given to valuation with a view to meeting the above mentioned objective. Economic, environmental and social valuation of activities in the forestry sector motivated by trade liberalization policies are thus undertaken.

Estimating the value of trade liberalization impacts

Value associated with forestry activities were classified into two categories: change in direct use values and change in indirect use values.

Direct use values include commercial and industrial market forest goods and services (fuel wood, timber, pulpwood, poles, fruits, animals, fodder, medicines etc.),

bio prospecting, and other research activities in the forests. **Indirect use values** of the forests considered are those involving environmental protection.

Valuation of economic impacts

In valuating economic impacts, both economic benefits and costs were analysed. The analysis attempted to provide a monetary value to the changes that have been induced by trade liberalization measures within the forestry sector.

Economic benefits

Export impact

The analysis entails an investigation of change in trade volume influenced by trade liberalization.

<i>Ex ante</i> annual trade value of wood and related products	
Item	(in US\$)
Wood products	1,544,400
Timber and its products	0
Processed wood products	0

Data Source: Trade statistics and Economic Surveys.

<i>Ex post</i> annual trade value of wood and related products	
Item	Value (in US\$)
Wood products	21,110,000
Timber and its products	8,000,000
Processed wood products	2,000,000

Data source: Trade statistics and Economic Surveys.

The net benefit of trade effect is US\$ 41,026,870.

Fiscal impact

In valuating the fiscal effect of trade liberalization on the forestry sector, changes in the annual collection of two major sources of revenue are analysed. The first source is trade tax. Prior to trade liberalization, Tanzania levied an export tax of about 3 per cent, but as part of liberalization, export tax was abolished. Other sources are royalties collected by the central Government from forest products. The net *ex post* and *ex ante* export tax is estimated at US\$ 2,800,042 by this study. The net benefit of fiscal effect is US\$ 3,399,075.5.

The net total benefit

The analysis considered the *ex ante* and *ex post* quantity of forest products consumed in Tanzania. The major consumers of forest products were divided into *wood industries* (including makers of wood and its products, furniture and fixture, and the related products), *wood fuel consumers and construction industries*. The hypothesis behind the investigation was that trade liberalization is one of the policy changes that have triggered the expansion and or intensity of production of forest products, and this can be reflected by increased volume of production and marketing of such products.

While it is also acknowledged that there may be other factors than trade liberalization responsible for the increased volume of production and marketing of forest products, there is substantial evidence that liberalization of the forestry sector has greatly accelerated the production and marketing of various types of forest products.

Wood products consumed by the construction industry

In order to check whether the hypothesis that there has been an increased volume of production and marketing of forest products, the study thus compared the quantity of wood consumed by this sector before and after liberalization. The change in the quantity of wood consumed by the construction sector after trade liberalization is 459,000 m³.

Forest products consumed by the manufacturing sector, such as furniture & fixtures, wood products etc.

The wood industry is part of the manufacturing sector mainly for processing and semi processing forest products. If there is really increased volume of production and marketing of forest products after trade liberalization, then trends in the amount of wood consumed can at least reflect such changes. The change in the quantity of wood consumed by the manufacturing sector after trade liberalization is 551,838 m³.

Fuel wood consumed

Fuel wood consumption forms an important proportion of the forest products consumed in Tanzania. The change in production intensity and marketing of forest products can therefore partly be reflected by an increased volume of fuel wood consumed and marketed. The change in the quantity of the fuel wood consumed in Tanzania is estimated at 900,000 m³. (The statistics for fuel wood are not reliable due partly to the lack of mechanisms to trace the scattered users in rural and urban areas, and the lack of a common unit of measurement. The figure included is thus based on projected commercially transacted fuel wood.)

Analysis of environmental costs

In assessing the environmental costs of trade liberalization, the analysis was based on estimating the opportunity cost of increased trade volume of wood and its products after trade liberalization was implemented. Change in the rate of deforestation was estimated by comparing the deforestation rate *ex ante* and *ex post*, and isolating

deforestation due to other activities such as clearing for agriculture and demand increase due to population increase. Estimation results in a conservative estimate of about 45,000 hectares of deforestation directly and indirectly attributed to trade liberalization.

Economic value of environmental costs

Estimation of the value of increased deforestation is arrived at using the standard established estimates of return per hectare. The total cost arrived at is about US\$ 40,500,000. However, the deforestation due to increased exportation of timber and other wood related products is estimated at an annual total cost of about US\$ 8 million.

The net impact of trade liberalization on the forestry sector

The impact of trade liberalization on the forestry sector on average indicates a significant positive economic benefit.

Cost-benefit ratio, optimal level of trade liberalization and cost externalization

Notwithstanding the possible negative environmental impacts, trade liberalization has had significant positive impacts, and countries including Tanzania would not be rational to discourage trade liberalization. This ratio has been used in various policy assessments to capture the potential impact of trade liberalization. Policy makers are thus encouraged to pursue trade liberalization until marginal environmental damage equals marginal benefit of trade liberalization. The policies proposed are those aimed at improving the environmental, economic, social and legal, as well as the institutional sphere under which the production and trade of forest products is undertaken.

Policy implications

Given the significant positive impact (estimated at over \$100 million by this study) of trade liberalization on the forestry sector, there is a need to ensure that their use is economical and sustainable. Given the observation that there is a tendency of actors in the forestry sector to 'externalize' the environmental costs, policies for inducing 'internalization' of environmental costs in rapidly expanding forestry activities need be adopted. Innovation in such areas is absolutely crucial in order to mitigate pressure on forest products while encouraging sustainable production and consumption, vital for achieving optimal trade liberalization policy impact in the sector. Successful implementation of trade liberalization policy will depend on the laws governing land use and human settlement. It is also worth noting that the design and implementation of an effective environmental management policy framework for the forestry sector is crucial for attaining sustainable forest production. An effective legal and regulatory system is necessary for sustainable forest management that will enhance the positive impacts of trade liberalization and at the same time minimize the negative ones. For a long time now the Forest Ordinance, Cap. 389, has been the principal law safeguarding the forests of Tanzania. In total there has been rampant encroachment on the forests. This is one of the reasons why the new environmental policy and the

forestry sector policy have specified the need to introduce other management approaches such as economic instruments and others.

Economic instruments in the forestry sector

The Forest Ordinance, Cap. 389 of 1957 empowers the ministry responsible for forest management to collect various revenues in the form of forest fees, penalties and forfeitures, hunting licenses, tour operator services and other related charges.

Design of the economic instruments for forestry sector management of Tanzania

In order for forest management to be in line with the existing production and ownership structure, economic instruments are proposed. In the design of such policy instruments, the environmental quality or desired forest quality standard should be defined.

Information requirement for determination of forest quality

- accurate marginal deforestation produced by economic activities in the forestry sector
- marginal benefit obtained from economic activities in the forestry sector
- type and number of activities involved in the forestry sector
- number of persons affected by the damage and those who benefit.

To arrive at an environmental tax in the forestry sector of Tanzania, it is proposed that the tax be based on the current marginal damage and benefit.

Implementation strategy for recommended policy packages

Given the nature of the institutional framework and the administrative structure in the forestry sector, a participatory approach is crucial for implementing any serious policy change for environmental management and sustainable production. It is also necessary to review various policy action proposals for forest management, including the economic instruments.

Advice on the design and implementation of the recommended policy instruments for forestry management

The Forestry Department is the key government institution in charge of forestry sector policy formulation, planning, monitoring, law enforcement and general management and administration. Since this department is mandated to manage forests including revenue collection in the form of royalties and fees, it is an important

implementing agent for this study's proposed plan and strategy for forestry sector management.

Enforcement of the proposed policy instruments

- Formulation of policy on environment
- Environmental planning
- Advising the Government on effective forest management based on the proposed implementation strategy.

The major tasks of the private sector and actors in the sector

The successful implementation of the proposed plan for forest management will depend on the participation of actors in the forestry sector, particularly traders, distributors, local government and manufacturers of forest and related products. Their role will be particularly crucial in promoting investment in environmentally sound production technology in the sector and in facilitating sustainable harvesting and utilization of forest products.

Implementation plan

The first crucial stage is to identify and define the environmental problems associated with trade liberalization policies and other trade-related measures, quantification of the problems and in the same way identify the positive environmental impacts of the same policies.

Stakeholders

Broadly, stakeholders (as defined in the National Forestry Policy) will include the forestry and beekeeping authorities, local communities, non-governmental organizations involved in forest management, the private sector (especially operators in the sector such as loggers, exporters, manufacturers of wood products etc.) specialized agencies, local government, and other relevant government institutions.

The benefits of implementing the proposed policy actions

In arriving at the community benefit of forest conservation, this study undertook a contingent valuation method. The method was used to estimate the value of the forests from the perspectives of the local communities around the forests where proper management is instituted. The individuals sampled were asked their maximum willingness to pay (WTP) for an increase in the quality of the forest through

sustainable management of the forest. Mean willingness to pay for the improved forest quality containing all the forest resources was US\$ 16 annually per head.

Benefit from realization of the market value of the forest products

Well managed forest harvesting, sustainable production and marketing will allow the flow of products through the official market channels.

Total Economic benefit	=	
Community-based benefit	=	\$ 21,608,176
Recovered market value of charcoal	=	\$ 84,000,000
Recovered market value of timber products	=	\$ 51,940,000
Total market value	=	\$157,548,176

Economic consequences and price elasticity of demand of wood products

The economic and environmental impact of introducing economic policy instruments for forest management is estimated using the price elasticity of demand. The price elasticity of demand for forest products in Tanzania has been estimated in a few studies in this area. The value for the products estimated was between -0.1735 and 0.82 . This shows that the price elasticity is very low and thus price increases would not result in decreases in consumption. This implies that while revenue generated can be increased by increasing prices, this will not lead to more rational use of forest resources. Thus it points to the limitations of the use of economic instruments, especially of price based incentives.

Conclusions

The implementation of trade liberalization policies in Tanzania has been marked by both positive and negative social and environmental impacts. On the positive side, trade liberalization policies in the forestry sector have encouraged the expansion of production and trade in forest products in Tanzania, thereby accelerating the macroeconomic contribution of the sector. Prior to trade liberalization for example, the sector's contribution to total trade was 3 – 4 per cent of total exports, but after adoption of trade liberalization, the contribution has jumped to about 11 per cent of the total country's exports. Other aspects of the positive results of implementing trade policy changes and the related measures are increased importation of inputs, growth in sector investment, value added increase, increase in GDP, and employment contribution.

The specific policy instruments that will ensure Tanzania's successful implementation of trade liberalization are such instruments as; pollution control agreements, forest product charges, control of licenses given to operators in the forests, forest product certification, and other measures such as use of fines and penalties etc.

The field survey of this study has confirmed that the forestry sector needs a more coordinated institutional framework that will enable the implementation of policy management tools to ensure sustainable sector development. Forest access and ownership is also one of the factors in the adverse impacts of trade liberalization policies. The forest areas open to the public are like a common resource, and even in the reserved forests, mechanisms to control forest use is inadequate. Under valuation of forest products is another problem that perhaps causes less attention. There is a saying that the forest is the heart of Tanzania's economy, because all the major economic sectors of the economy: agriculture, tourism and human resources very much depend on the forests. In sum, there are positive and negative impacts of implementing trade liberalization policies on the forestry sector of Tanzania. Given the existing institutional framework of the forestry sector, this study proposes that the Forestry Department with the technical guidance of UNEP, and a national stakeholders' Task Force work should implement the policy packages and other recommended measures to ensure proper forest management.