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TRADE, ENVIRONMENT AND DEVELOPMENT
LESSONS FROM EMPIRICAL STUDIES:

The case of Colombia

Synthesis report prepared by the UNCTAD secretariat

* This synthesis report is based mainly on D. Gaviria, R. Gómez, L. Ho and A. Soto, Reconciliation of Trade and Environment Policies: the Case Study of Colombia. National Planning Office, Universidad Externado de Colombia and Ministry of Foreign Trade. Bogota, May 1994. It also draws from two other relevant studies cited in the introduction.

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I. INTRODUCTION

1. In the framework of the UNCTAD/UNDP project on "Reconciliation of Trade and Environment Policies", a study on trade and environment linkages in Colombia was completed in 1994. The study, funded by the Government of Colombia, was conducted by a small research team, working under the coordination of the National Planning Department. Building on the study, a number of other empirical studies were subsequently carried out in Colombia under UNCTAD's programme of technical cooperation in the field of trade and environment. These studies, which provide a first appraisal of the theme trade and the environment from Colombia's perspective, cover a large range of issues. This report provides a synthesis, prepared by the UNCTAD secretariat, of the following studies:

- (a) D. Gaviria, R. Gómez, L. Ho and A. Soto, Reconciliation of Trade and Environment Policies: the Case Study of Colombia. National Planning Office, Universidad Externado de Colombia and Ministry of Foreign Trade. Bogotá, May 1994.
- (b) L. Ho, D. Gaviria, X. Barrera and R. Sánchez, The potential impact of European Union eco-labelling programme on Colombian textile exports. Paper prepared for the UNCTAD seminar on "Eco-labelling and International Trade", Geneva, 28-29 June 1994.
- (c) E. Uribe and Y. Medina, La Pequeña y mediana industria y su relación con las regulaciones y las instituciones ambientales en Colombia. Bogotá, June 1995.

2. Trade and environment linkages in Colombia should be considered in the context of developments in domestic policies as well as of international developments. With regard to domestic policies, since the beginning of the 1990s, Colombia has embarked upon a process of economic liberalization. Greater openness is expected to intensify linkages between external and domestic environmental policies and international competitiveness of Colombia's industry. Of key importance to the study are the effects of domestic and external environmental policies, standards and regulations on international competitiveness of Colombia's exports and on its development process.

3. During the economic liberalization process, economic growth so far was based principally on rapidly increasing imports and production of non-tradable goods. Thus, the Colombian study pays considerable attention to the possible links between import liberalization and the environment. Secondly, Colombia is strengthening its environmental policies and institutions. Currently, environmental regulations in Colombia are generally quite stringent, but enforcement is difficult. One of the key issues in environmental policy-making in Colombia, as will be reflected in several parts of this report, is how to ensure that environmental legislation becomes better attuned to local environmental and developmental conditions and priorities, with a view to achieving a higher level of enforcement, while at the same time responding to environmental requirements emerging from external markets, with a view to maintaining export competitiveness.

4. As to international developments, the implementation of the results of the Uruguay Round provides Colombia with improved access to developed country markets through the reduction of tariff and non-tariff obstacles to trade. A key question is whether environmental requirements could potentially erode gains in market access (for example, in products such as fruit and textiles). With regard to international environmental issues, factors such as the trade and competitiveness effects of rights and obligations under multilateral environmental agreements, such as the Montreal Protocol on Substances that Deplete the Ozone Layer or measures which may be contemplated under the Framework Convention on Climate Change are relevant, and are addressed in the study.

5. The study also addresses structural factors which are of particular interest in the context of the development problem, such as the special circumstances of small and medium-size enterprises and the expansion of

production of primary products, which are produced almost entirely for exports.

II. STRUCTURE OF INTERNATIONAL TRADE

6. In recent years, Colombia's foreign trade has grown considerably, largely as a result of an economic liberalization process initiated in the late 1980s. A large share of exports goes to OECD countries, the United States being the most important export market. However, regional markets such as the Andean Group, and the recently consolidated G-3 (Colombia, Mexico and Venezuela) represent an important trade potential and are indeed growing in importance. Venezuela is Colombia's second largest export market (representing 10 per cent of the value of total exports in 1993).

7. Colombia's exports are also becoming increasingly diversified in terms of product composition. The share of food and other agricultural products in total exports decreased from 76.5 per cent in 1980 to 34.4 per cent in 1993, while that of manufactured products went up from 19.6 to 39.8 per cent over the same period (see Table 1). There has been a sharp increase in the exports of fuels (in particular oil and gas) in the 1980s.

8. With trade liberalization, imports have been increasing rapidly, the industrial sector being the principal importer. Imports of agricultural, fisheries and forestry products have also increased significantly.

Table 1
Total exports and imports by main commodity groups, 1975-1993
(millions of dollars)

Commodity groups:	1975	1980	1985	1990	1991	1992	1993
Imports:							
(in value)							
Total	1494.8	4662.6	4130.7	5588.5	4967.0	6683.9	9840.8
Food and agr. products	203.7	678.4	554.4	592.9	507.3	858.2	996.1
Fuels	15.3	567.7	484.4	337.3	300.8	365.9	377.3
Ores and metals	54.1	147.0	129.0	193.4	193.0	247.6	269.8
Manufactured goods	1214.0	3236.8	2872.2	4278.7	3806.7	4968.6	7489.2
(share, in percentage)							
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Food and agr. products	13.6	14.6	13.4	10.6	10.2	12.8	10.1
Fuels	1.0	12.2	11.7	6.0	6.1	5.5	3.8
Ores and metals	3.6	3.2	3.1	3.5	3.9	3.7	2.7
Manufactured goods	81.2	69.4	69.5	76.6	76.6	74.3	76.1
Exports:							
(in value)							
Total							
Food and agr. products	1646.9	3945.0	3551.9	6765.0	7268.6	6915.8	7454.7
Fuels	1050.5	3019.7	2302.0	2513.4	2735.4	2724.7	2562.5
Ores and metals	105.6	112.4	578.3	2495.8	2091.0	1969.0	1888.3
Manufactured goods	3.2	9.3	14.7	11.4	20.2	17.7	30.9
	305.5	775.1	601.2	1698.9	2421.2	2202.9	2970.2
(share, in percentage)							
Total	100.0						
Food and agr. products	71.7	100.0	100.0	100.0	100.0	100.0	100.0
Fuels	7.2	76.5	64.8	37.2	37.6	39.4	34.4
Ores and metals	0.2	2.8	16.3	36.9	28.8	28.5	25.3
Manufactured goods	20.9	0.2	0.4	0.2	0.3	0.3	0.4
		19.6	16.9	25.1	33.3	31.9	39.8

Source: UNCTAD, based on COMTRADE.

Note: For analytical purposes and/or incomplete time series, the following countries are not included in the group of OECD countries: Austria, Iceland, Mexico, Norway and Turkey.

III. DOMESTIC ENVIRONMENTAL POLICY-MAKING

9. Although Colombia covers less than 1 per cent of the earth's land surface, it is very rich in natural resources and possesses 10 per cent of the world's species (flora and fauna). In fact, Colombia is the second largest country (after Brazil) in terms of the total number of species living within its borders.

10. Colombia possesses large hydrological resources. The country's aquatic resources are highly valuable as a source for food, energy and wildlife. However, 40 per cent of the population has no access to supply of water for domestic use.¹ The environmental infrastructure for the treatment of waste water and solid waste is insufficient. The rapid process of urbanization and industrialization has been one of the many causes of environmental deterioration in Colombia.²

A. Environmental legislation in Colombia

11. Environmental policies, standards and institutions in Colombia are being strengthened, in particular through Law 99 of 1993 which, *inter alia*, created the Ministry of the Environment and the "National Environmental System".

12. Law 99 also called for the liquidation of the Colombian Institute of Renewable Natural Resources and Environmental Resources (INDIRENA), decentralization of environmental policies through the restructuring of the Autonomous Regional Corporations and the creation of new environmental authorities in cities of over one million inhabitants; public participation, as well as the creation of sources for financing for environmental management. As a result of these reforms, environmental policy-making is going through a period of transition.

13. Environmental regulations in Colombia are generally based on stringent standards, but enforcement is difficult. A general problem is that most relevant environmental regulations are based on foreign standards, which ignore the economic, social and environmental conditions of Colombia. New environmental standards are being developed on the basis of a comprehensive study undertaken over a period of several years.

B. Environmental legislation and competitiveness

14. In order to assess industry's awareness of domestic and external environmental requirements, as well as its ability to comply with them, a questionnaire was sent to exporters and business associations from different types of industry.³ The research team received 74 answers. More than 100 additional interviews were conducted.

15. The survey revealed that awareness about environmental requirements emerged to a greater extent from domestic rather than from external environmental requirements. About one third of the respondents had experience with domestic environmental requirements and pressures. Of these, 24 per cent felt that compliance with domestic environmental standards affected their competitiveness positively, and only 4 per cent said such requirements affected their competitiveness negatively (the remaining did not know). Half of the respondents thought that the recent creation of the Colombian Ministry of the Environment⁴ and the consolidation of national environmental policies, norms and institutions would affect their competitiveness positively (8 per cent thought these factors would affect them negatively and 38 per cent did not know).

IV. ECONOMIC IMPACT OF EXTERNAL ENVIRONMENTAL POLICIES, STANDARDS AND REGULATIONS ON COLOMBIAN EXPORTS

16. This chapter analyses the significance for Colombian exports of existing external environmental requirements in general, based on the survey mentioned above, which covers various sectors. In addition, it examines the economic effects of specific environmental policy measures, such as the German Packaging

Ordinance, eco-labelling programmes, and United States trade measures related to tuna and shrimps. It also reflects on trading opportunities for "environment-friendly" products.

17. Given the product composition and geographical distribution of Colombian exports, only a relatively small proportion of exports are already affected by environmental requirements in the OECD markets. Environmental requirements in sectors which constitute Colombia's traditional exports, such as coffee, are scarce or non-existent. Non-traditional exports to European countries, where new environmental requirements are emerging in sectors such as textiles, are relatively small. Indeed, in 1993 only around 9 per cent of the exports of manufactured products went to the European Union (this share was less than 6 per cent in the case of textiles and only 11 per cent for leather and leather products). A large share of Colombian exports goes to the United States (40 per cent of the value of total exports in 1993) and Central and South American markets. To a large extent this explains why two thirds of the respondents to the survey conducted among industries and industry associations were not aware of environmental requirements emerging from export markets.

18. However, the survey indicated that in specific sectors, such as fruit, external environmental policies, standards and regulations had at times resulted in a more significant adverse impact on the competitiveness of firms. Fruit exports, representing US\$463 million in 1993) had to comply with environmentally related requirements regarding inputs and packaging, and some exporters reported associated cost increases, ranging from 1 to 15 per cent. Fruit exporters were concerned that environmental standards were becoming more stringent, including in the United States (around 86 per cent of Colombia's fruit exports went to this market in 1993), e.g. with regard to the use of pesticides.

19. Exports of fish and crustaceans are also vulnerable to external environmental regulations. For example, exports of tuna and shrimp are vulnerable to unilateral trade actions under United States environmental laws. Concern has also been expressed about the possible effects of eco-labelling initiatives in sectors such as flowers, as well as campaigns by certain non-governmental organizations (NGOs) concerning sectors such as coal and flowers. While these campaigns may have had little effects on sales, the Colombian Association of flower growers (ASCOFLORES) was reportedly worried that such campaigns might put pressures on European governments not to prolong certain tariff preferences granted to Colombia. As far as coal exports are concerned, campaigns had been advanced by British unions against a Colombian mine, even though the mining company in question reportedly complied with environmental norms and adhered to international environmental standards. Thus, certain NGO campaigns raise the issue of accountability, as imprecise and incorrect campaigns could prejudice the foreign trade of another country.⁵

20. The survey did not find many instances where environmental requirements emerging in sectors such as leather and textiles had significantly affected Colombian exports.⁶ However, some textile exporters stated that they were unable to meet the requirements of their German importers to substitute certain dyes which were not allowed under private eco-labelling schemes in Germany. The Colombian exporters concerned had decided to bypass such requirements by diverting exports to other markets. However, given the importance of the German market, in the longer run they planned to adjust their production processes to the requirements of this market.

Table 2

Exports by commodity groups and markets, 1993
(millions of US dollars)

	World	Selected DMEC countries				Develop-ing countries
		Total ¹	United States and Canada	European Union	Japan	
Total	7454.7	5143.0	3074.8	1660.3	238.0	2157.3
	2562.5			1049.2		
Food and agr. products	2134.6	2157.7	898.0	984.5	113.2	322.2
Food	427.9	1779.0	592.4	64.6	111.9	278.6
Agr. raw materials		378.7	305.7		1.3	43.5
	1888.3			353.7		
Fuels		1550.5	1184.0		7.7	303.4
	30.9		16.8	0.3		
Ores and metals	2970.2	20.7			3.6	10.2
	419.8		974.1	256.9		
Manufactured goods	766.5	1412.0	30.2	11.3	113.4	1520.8
Chemicals	85.3	43.7	354.5	62.1	0.1	373.2
Textiles and clothing	78.6	420.1	24.8	18.3	..	344.5
Leather	438.5	43.6	22.3	5.2	0.4	37.1
Footwear	1181.5	28.9	190.3	10.9	1.1	49.6
Machinery and equipm. products		205.7	352.0	149.1	0.8	211.0
Other man. products		670.0			111.0	505.4

Source: UNCTAD, based on COMTRADE.

Note: For analytical purposes and/or incomplete time series, the following countries are not included in the group of OECD countries: Austria, Iceland, Mexico, Norway and Turkey.

A. Unilateral trade restrictions

21. In Colombia there is concern that unilateral measures by developed countries may at least in part be attributed to commercial interests in the importing countries, and that they may force developing countries to invest in measures which are less relevant than others, given domestic environmental conditions and priorities. Colombia has been affected by unilateral trade measures imposed by the United States. Such measures are particularly relevant in the context of the trade and environment debate, as they involve the issue of process and production methods, known as PPMs (relating to marine resources). According to the study, an embargo on tuna fish resulted in significant income losses.

1. Tuna and dolphins

22. As a condition for access to the United States tuna market, Colombian purse seiners fishing in the Pacific Ocean have to comply with certain requirements (i.e. to use certain devices, to engage in certain manoeuvres to rescue dolphins and to carry observers on board). The research team estimated the corresponding compliance costs, as well as the loss in revenues resulting from a United States embargo on imports of Colombian tuna fish under the Marine Mammal Protection Act (MMPA).

23. Compliance costs per fleet (which varied depending on its size and the number of annual fishing expeditions) were estimated at between US\$72,000 and 107,000 in terms of investment requirements, and an additional US\$16,000 to 20,000 in annual operational costs. For large exporters, compliance costs represented approximately 2.5 per cent of the total annual operation costs.⁷ For small exporters of tuna, however, compliance costs could be much higher.

24. Alleging that two Colombian fleets had not complied with the MMPA requirements and considering that the country had therefore violated the dolphin safety dispositions, in March 1992 the United States placed an embargo on all imports of Colombian tuna fish. The embargo became effective in March 1993.

25. While it was difficult to determine the precise economic effects of the embargo (tuna fish exporters were reluctant to disclose information on income losses), its impact was certainly substantial. The United States was the primary export market for Colombian tuna fish, representing 32 per cent of the total exported volume in 1992. According to one estimate, provided by the National Fishing Agency, INPA, the embargo reduced Colombian tuna fish production by 20,000 tons, representing a loss of US\$20 million.⁸

26. According to the study, this measure was questionable on several grounds. First, it was considered a unilateral and extraterritorial application of a United States domestic environmental policy, which was in violation with international trade rules. Secondly, it was considered a non-tariff barrier (NTB), in particular since even when the Colombian fishing vessels had adopted the required measures, the United States had continued to apply the embargo for a considerable time (the embargo was lifted only in May 1994). Thirdly, it was considered that the embargo was unnecessary and that the prescribed "dolphin safe" methods were ineffective or even counterproductive from an environmental point of view. For example, while measures to protect dolphins while fishing for tuna may protect dolphins, they may endanger other species and hence have other ecological costs.

2. Shrimps and turtles

27. As a condition for access to the United States shrimp market, the US Government generally requires shrimp trawlers to use Turtle Excluding Devices (TEDs), to minimize the by-catch of turtles. In May 1993, the US State Department required installation of TEDs on Colombian trawlers (on 30 per cent of Colombian vessels initially and subsequently on all commercial vessels, to obtain 1994 certification). If Colombia had failed to obtain the necessary certification, United States' shrimp imports from Colombia would have been embargoed.

28. TEDs are manufactured and installed in Colombia, using the specifications provided by the United States government, at a cost of US\$100 to 400 per net. Since a fishing vessel typically operates four nets, the cost per vessel ranges from US\$400 to 1600. Compliance costs are thus insignificant. (The Colombian case study makes no mention of possible losses in productivity as a result of the use of TEDs.⁹)

29. According to the study, as in the case of tuna, this measure was questionable on the ground that it was a unilateral and extraterritorial application of a domestic environmental law of the United States and because it was not necessary from an environmental point of view: 1992 study by INPA had revealed that only very few marine turtles were captured in shrimp fishing. In fact, the real danger to turtles may arise from other sources which are not addressed by the international community.

B. Packaging requirements

30. The questionnaire and follow-up interviews gave some indication of the possible effects of emerging external standards and regulations in the area of packaging, in particular in Germany, on Colombian exports.

31. In certain sectors, e.g. the fruit industry, significant compliance costs were reported. Perhaps more importantly, packaging requirements had created uncertainty, in particular with regard to the type of packaging materials that would be acceptable to importers. Many Colombian export firms had little understanding of what exactly was required, and did not know where such information could be obtained. For example, Colombian banana exporters stated that they had insufficient information and reported uncertainty, e.g. relating to the permitted use of staples and glue in packaging materials. The problem of the lack of precise and timely information was aggravated by the differences in requirements among importing countries.

32. Colombian exporters had at times incurred costs, delayed decisions or shifted to other materials because of perceptions rather than of precise

information regarding the requirements in the importing countries. New packaging policies had, in some cases, induced exporters to substitute certain materials for others. The reason was that importers preferred materials which were more easily recyclable, given existing recycling facilities in the importing country. At times, the preference for easily recyclable materials had also created obstacles for packaging using a mixture of different materials. In general, however, initial problems with new packaging requirements had been resolved after some time.

33. According to the National Federation of Coffee Growers (FEDECAFE), it appeared initially that the Packaging Ordinance would not allow the use of jute, which was not considered easily recyclable. There was concern that jute sacks would have to be re-exported to Colombia. (It was feared that incineration would be allowed only in exceptional cases under German legislation.) Exporters had started to shift to plastics as a packaging material. However, the German Ministry for the Environment confirmed that recycling facilities for jute, as well as a market for recycled jute, existed in Germany.¹⁰ Colombian coffee exporters confirmed that jute packaging had indeed been accepted in the German market. For economic reasons, however, exporters had started to use metal containers.

34. FEDECAFE nevertheless feared that packaging requirements in external markets created potential problems for exporters of processed (roasted and ground) coffee. Unlike the green variety, processed coffee was packed in aluminum packages with plastic lining. Although the exporters had not yet been required to implement any changes, it was feared that there could be a conflict between environment-related packaging requirements and product-quality requirements.

35. Conversely, ASOCOLFLORES, the association of Colombian flower producers, stated that producers had not been forced to implement major modifications to comply with the Packaging Ordinance. Some of the changes that had been made included: reduction in the amount of packaging material; elimination of staples, hooks, other metals, and rubber; as well as the use of uniform packaging materials for all kind of flowers, to facilitate recycling. According to ASOCOLFLORES, packaging accounted for only 7 per cent of total production costs of flowers; as adjustments had been minor, compliance costs had not been significant. Moreover, most of the costs at the German side had been assumed by the importer. ASOCOLFLORES had not heard of cases where flower exports had been rejected on account of packaging conditions.

C. Eco-labelling

36. Eco-labelling has generated some concern and interest in Colombia. The research team conducted two studies on the possible effects of the introduction of an European Union eco-label for certain textile products on Colombian exports (see box 1). Preliminary work has been undertaken in Colombia to analyse the feasibility of establishing a national eco-labelling programme (see box 2).

37. Given the composition of Colombia's exports by products and markets of destination, a priori it is to be expected that only a relatively small portion of Colombia's exports is potentially affected by eco-labelling in the developed countries. Considering the major export products, it would appear that coffee, oil, carbon, precious stones and chemicals are not probable candidates for inclusion in eco-labelling programmes. There is concern, however, that flowers might become exposed to the effects of eco-labelling in Europe. With regard to the other major export products, eco-labelling potentially affects leather (as a material used for the production of shoes) and textiles. Colombian exporters of bananas have been contemplating the advantages and disadvantages (from a commercial point of view) of private eco-labels, in particular in the framework of the SMART Banana programme sponsored by the Rainforest Alliance.

38. As mentioned above, two studies were undertaken on the possible competitiveness effects of an European Union eco-label for certain textile products (T-shirts and bed linen) on Colombian exporters. The first study was undertaken for UNCTAD in 1994. More recently, a follow-up study was carried out

Box 1**European Union eco-labels for textiles and Colombian exports**

Information on the possible effects of eco-labelling for textile products (T-shirts and bed linen) in the European Union was obtained from three sources: (a) the larger survey based on a questionnaire and follow-up interviews (9 of the 74 respondents were textile producers; all of them relatively large firms); (b) more recent interviews with representatives of textile firms in Medellin and Bogota; and (c) meetings with several large textile industries, organized by ASCOLTEX (the association of textile producers).

Textile producers had made some investments in pollution control in response to national legislation. In fact, four out of nine had invested resources in environmental protection. National legislation, however, emphasized end-of-the-pipe air and water pollution control, as distinct from requirements regarding energy consumption and the use of chemical inputs. Although Colombian producers had not yet made significant investments in response to external environmental requirements, they were conscious that such requirements were becoming more stringent; they feared this might have an adverse effect on their competitiveness (The average share of exports in their total production was 28 per cent).

Although all firms surveyed considered that they were close to meeting many of the eco-labelling criteria, other criteria would be difficult to meet, for example those with regard to the use of chemicals or certain waste water and noise standards. Relatively large cost increases would arise from the need to monitor residue values in final products. Colombian producers questioned the scientific justification for the very stringent limit values set for a number of criteria. They also perceived verification procedures to be a major difficulty. Firms stated that compliance costs exceeded the expected commercial benefits of an eco-label by far. Meeting eco-labelling criteria would be particularly difficult for SMEs.

Source: L. Ho, D. Gaviria, X. Barrera and R. Sánchez, The potential impact of European Union eco-labelling programme on Colombian textile exports. Paper prepared for the UNCTAD seminar on "Eco-labelling and International Trade", Geneva, 28-29 June 1994.

for the International Trade Centre (ITC). In both cases the research team interviewed representatives of a number of textile firms. In general, large firms were selected. The results were generally compatible with similar studies undertaken in other countries, such as Brazil (see box 1).

39. In the more recent series of interviews, however, the research team found greater awareness of eco-labelling than in earlier interviews: entrepreneurs showed a better understanding of eco-labelling programmes as well as a more positive attitude towards eco-labels. Firms expressed support for a national eco-labelling programme and some of them expressed certain interest in eventually applying for eco-labels used in the developed countries. However, the study mentions that Colombian industry and Government remain concerned about the possible discriminatory effects of eco-labelling and the risk that eco-labels may be used for protectionist purposes. In this context, it was considered suspicious that eco-labels in the developed countries are emerging in sectors which are subject to import competition from developing countries, such as leather, textiles and flowers, rather than in sectors with potentially more harmful environmental effects.

Box 2**Proposals for a Colombian eco-labelling programme**

Colombia is developing a national eco-labelling programme. While modelled on the programmes of Germany and other European countries, the Colombian programme will take domestic conditions into account. The project is spearheaded by the Colombian Ministries of the Environment and Foreign Trade, with the technical support of the National Planning Department. The objectives are:

- (a) to promote environmental conservation in several sectors, addressing a variety of aspects, including emissions, energy use, and natural resource exploitation;
- (b) to provide the domestic industry with means and incentives to increase its competitiveness through the implementation of environmental strategies; and
- (c) to assist Colombian export firms in penetrating external markets.

The programme is thus being designed to address both domestic environmental and export concerns. Specific products to be covered have not yet been defined, but the programme will probably begin working with industries interested in promoting eco-labelling schemes, such as flowers and detergents. According to the study, interest among Colombian companies was large. The national flower association (ASOCOLFLORES) is developing its own eco-labelling programme.

Discussions focus on issues such as (a) whether the label should focus primarily on the product or take its entire life cycle into account; (b) how stringent the criteria should be, in particular as compared to existing legislation. Colombian legislation is stringent at present, but enforcement is difficult and the level of compliance is low. There are also a number of environmental problems, such as ground water pollution, which are not covered by existing laws or standards. Verification is also an important issue. Difficulties could arise from the scarcity of qualified laboratories and institutions which could independently assess compliance with the criteria.

Source: L. Ho, D. Gaviria, X. Barrera and R. Sanchez, op. cit.

D. Trading opportunities for environment-friendly products

40. In Colombia there is interest in exploring trading opportunities for "environment-friendly" products. However, the study notes that in general current world demand for such products is still small. In most cases, shifting to environment-friendly production processes (and the losses in productivity that such shifts often imply), in order to gain access to small markets for "environment-friendly" products would not appear, under the current circumstances, justified from a commercial point of view. Consumers in developed countries are not willing to pay a sufficiently high price to allow cost internalization in the developing countries. In addition, access to environmentally sound technologies required to supply markets for "environment-friendly" products has generally not been forthcoming.

41. There may also be a trade-off between consumer demands for "perfect" products (e.g. in terms of size and presentation) which often requires the use of chemicals, and pressures to reduce the use of pesticides and fertilizers.

42. A market niche exists for environment-friendly coffee. As a major exporter of coffee, Colombia has of course an interest in emerging markets for "environment-friendly" coffee, including for organically grown coffee. The growth in the world market for organically grown coffee has largely been fuelled by price premiums. For example, in March 1994 the price of organically-grown coffee was quoted at US\$ 1.26 per pound, versus 90 cents for regular coffee. Colombia's participation in the world market for organically grown coffee is, however, small: Colombia exports only around 52 tons per year. According to the study, there is only an incipient and marginal market for environment-friendly coffee.

43. The production of organically grown coffee faces other constraints. For example, certification is difficult to obtain and expensive. Certification costs can amount to more than US\$ 30.000, including annual fees and fees for hiring an expert visitor. Colombia has to rely on a few international certifiers, because national certifiers are not recognized by international buyers. This limits the viability of individual initiatives: the only option for producers is to undertake joint efforts. In addition to certification problems, entering the market for organically grown coffee is largely dependent on price differentials. While, per unit of output, organically grown coffee production is cheaper than traditional and high-input coffee production, the organically grown coffee business involves an economic risk, and experience shows that when prices for regular coffee are high, producers often switch back to regular coffee production.

V. THE CASE OF SMALL AND MEDIUM-SIZE ENTERPRISES

44. Experience from other country case studies shows that firm size is an important factor in the ability of firms to adjust to environmental requirements. In general, small and medium-size enterprises (SMEs) have greater difficulties in complying with domestic and external environmental requirements than large firms.

45. In Colombia, SMEs contribute around 40 per cent to total manufacturing production and 50 per cent of its national employment.¹¹ As a result of their low level of technological development and their characteristics as an "informal sector", SMEs' contribution to total industrial pollution is relatively high.¹²

46. Most SMEs are located around the major urban centres, in particular Bogota (34 per cent of all SMEs), Cali, Medellin and Bucaramanga. It has been estimated that 37 per cent of SMEs are located in urban areas not suitable for manufacturing activities. This situation is particularly relevant for family run enterprises which are often located in areas with deficient public services and infrastructure, thus making it difficult for firms to attain higher productivity levels.

47. General problems of SMEs are related to their limited management capacities, technological obsolescence, insufficient quality control, insufficient access to information and inadequate credit facilities and more importantly inadequate infrastructural facilities. The low level of awareness and lack of information on environmental questions further complicates compliance with environmental requirements.

48. In 1992, the Corporation for Socio-economic and Technological Research of Colombia (CINSET) carried out a study on the environmental problems of SMEs, based on a representative sample of 802 firms. The study found that all SMEs had problems with the treatment of wastes generated in the production process. The study also found a low level of compliance with environmental standards and regulations. The principal environmental problems and the percentage of firms in the sample affected by such problems are shown in table 3 below.

49. Despite its important contribution to manufacturing production and to industrial pollution, the participation of SMEs in the formulation of economic and environmental policies is very limited. Environmental policies in Colombia, which focus on direct control instruments, do not pay attention to the special

circumstances of SMEs. However, the response of different SMEs to environmental policies was found to vary from sector to sector.

Table 3

Environmental problems of small and medium-size enterprises

Environmental problem	Portion of the sample (per cent)
Lack of any environmental management	64
Inadequate treatment of solid wastes	54
Inadequate treatment of liquid wastes	41
Inadequate treatment of gaseous wastes	41
Occupational risks as a result of inappropriate environmental conditions	30

Source: CINSET.

50. In the leather sector, for example, it was found that it may be very difficult for SMEs to comply with certain environmental standards and requirements. In Colombia, the leather processing and footwear industry obtains its materials largely from the independent tanning sector, a large part of which consists of small, artisan firms using out-dated technologies. One area with many micro-enterprises is the San Benito neighbourhood in Bogota, where 313 enterprises are located. According to a UNIDO study, none of the micro-enterprises complied with effluent treatment standards.

51. The UNIDO study, proposed that a common effluent treatment system at an estimated investment cost of US\$ 6.2 million and annual operational costs of US\$ 2 million, be established to deal with the problem.¹³ It is estimated that annual sales of the San Benito sector are in the order of US\$ 18 million, whereas annual profits are estimated at US\$ 5.4 million. Consequently, tanners would have to spend over 100 per cent of their estimated annual profits to meet the investment requirements, whereas operational costs of effluent treatment would reduce estimated profits by 40 per cent (operational costs alone would increase production costs by as much as 16 per cent).

52. Another case study on the bricks sector showed that there may be a tradeoff between higher variable and higher fixed costs. In Colombia, SMEs supply between 20 and 25 per cent of the domestic market. The principal environmental impacts of the sector are caused by atmospheric emissions. In 1993, an association of small producers (PROTUGRES), presented an environmental action plan. PROTUGRES was developing three pilot programmes aimed at the substitution of coal as the source of energy used by the industry for: (a) the combination of "crudo de castilla"¹⁴ with gasoline; (b) the combination of coal and coke; and (c) propane gas.

53. The first process, using a combination of "crudo de castilla" (73 per cent) with gasoline (27 per cent) requires an investment of US\$ 35,000 per oven. The resulting variable costs would be US\$ 470 per oven. The second process is based on a combination of coal (20 per cent) and coke (80 per cent). This process does not require any investment, but variable costs would increase from US\$ 560 to 900 per oven, or by 90 per cent. While this process would have better environmental effects, the substantial cost increase would rule out this option, unless regulations were implemented and strictly enforced on all firms. The third process, based on the use of propane gas, was clearly the most environment-friendly. However, this process would require an investment of approximately US\$ 40,000 per oven and variable costs would be as high as US\$ 1,520 per oven. It could nevertheless be expected that variable costs may decrease significantly if the ongoing programmes to promote the large-scale use of natural gas, following the discovery of important natural gas reserves were to be successful. Since natural gas was three times as inexpensive as propane gas, in the longer run variable costs could be reduced to US\$ 500 per oven. Processes based on the use of gas would therefore be the most appropriate from both an environmental

and economic point of view, provided that government support could be provided to promote the large-scale use of gas.

54. Another sector examined by the study is the case of printing, where environmental effects primarily arise from effluent resulting from cleaning of the printing equipment. The level of pollution depends to a large degree on the technology used. For example, modern technologies based on automatic cleaning consumed only 30 per cent as much water, and discharge much less waste as compared to obsolete technologies.¹⁵

55. While the volume of effluent generated by each firm is small, and a common effluent treatment system would not be very expensive (requiring an investment of approximately US\$ 20,000 and annual operational costs of US\$ 8,000), the geographical dispersion of SMEs would complicate the use of such a system. Alternatives to the use of a common effluent treatment system consists of promoting the use of more environment-friendly inputs and biodegradable cleaning materials. However, such materials were 30 per cent more expensive than conventional materials.¹⁶

56. The study concludes by pointing to the diversity of the competitiveness effects of compliance with environmental standards for the different sectors in Colombia. However, it points out that in all the three sectors reviewed, environmental problems arise because of different reasons. For example, in the printing press sector, the environmental impact arises more because of the lack of city planning, the dispersion in the location of enterprises which makes it difficult to make joint investments. and because of the lack of control on the part of environmental authorities. In the case of the brick industry, government intervention is needed to support the efforts of the brick industry to comply with environmental standards. In the case of leather industries, innovation is required in order to look for more cost-effective options. Thus solutions would have to be variable.

VI. TRADE AND COMPETITIVENESS EFFECTS OF MULTILATERAL ENVIRONMENTAL AGREEMENTS

57. Colombia is a party to all major Multilateral Environmental Agreements (MEAs). The Colombian case study includes a preliminary analysis of the trade and competitiveness effects of the Montreal Protocol on the Substances that Deplete the Ozone Layer. A study was also undertaken on the possible effects of an internationally agreed carbon tax to reduce the consumption of fossil fuels. Such a tax could become relevant in the context of the Climate Change Convention.

A. The Montreal Protocol

58. As an "Article 5" Party to the Montreal Protocol (MP), Colombia is entitled to a 10-year grace period to implement its obligations under the Protocol. However, Colombia, which has ratified both the London and Copenhagen amendments to the Protocol, has anticipated the phase-out of the consumption of chlorofluorocarbons (CFCs) to 1996 (Colombia committed itself to phase-out the consumption of halon 1211 and halon 1311 by 1994 and of CFC-11, CFC-12 and methyl chloroform by 1996). Colombia does not produce any of the substances controlled by the Montreal Protocol: ozone-depleting substances (ODS) used are imported from the United States, the United Kingdom, Germany and Venezuela. The strategy for the phase-out of the consumption of ODSs has been presented to the MP's Multilateral Fund.

59. Based on an analysis by the Government and the private sector, the possible trade and competitiveness effects of the Montreal Protocol can be grouped as follows: (a) effects on larger firms which have access to the Multilateral Fund; (b) effects on small and medium-size firms, which, according to the study, generally cannot access the Fund; and (c) effects on industries which rely on refrigeration, such as flowers, bananas and meat processing.¹⁷

60. With regard to (a), the country programme indicates that Colombia needs US\$ 55 million from the Multilateral Fund to accomplish the objectives of the CP, of which US\$ 18 million was needed in 1994. Projects for a total amount of US\$ 8 million were approved in 1994. New projects will be prepared for funding by the Multilateral Fund. The Multilateral Fund had enabled larger firms to adapt technologies while remaining competitive.

61. With regard to (b), it should be noted that around 30 per cent of ODS users in Colombia are small firms. In practice, such firms may find it difficult to access the grants to the Multilateral Fund. As a result, the competitiveness of these small firms could be substantially affected by the MP.¹⁸ There is thus a need to conduct studies to determine the costs of projects for small firms.

62. With regard to (c), industries which rely on CFCs for refrigeration¹⁹ could be significantly affected by the MP. The study reports that it was expected that the supply of ODS would be reduced largely in 1995, because two thirds of the ODS-producing plants in the United States and 100 per cent of those in Europe would close down. It was feared that a sharp reduction in supply would cause an increase in the price of ODS, and thus in refrigeration costs of these industries. It was difficult to predict the corresponding effects on the industries concerned. Some of the potentially affected industries, such as the flower industry, were concerned over the potential economic effects of the MP.²⁰

B. Economic effects of a carbon tax

63. A study on the possible effects of a carbon tax imposed on the energy sector in Colombia was commissioned to the research institute FEDESARROLLO. The institute developed a model, based on an analysis conducted on the United States by the American Petroleum Institute, to simulate the effects of an internationally agreed tax levied on the carbon content of fossil fuels. The model assumes that such taxes are levied at the point of production rather than on consumption. For different tax levels, ranging from US\$ 10 to 100 per ton, the study analyses the effects of corresponding price changes for each of the major fuels (coal, gas and oil) on demand and tax revenues, as well as the effects on the major energy consumers in Colombia.

64. Given the existing differences between prices on the domestic market and export prices, relative price increases (in percentage terms) following the implementation of a carbon tax will be different for domestically consumed and exported energy. For example, a US\$ 10 carbon tax on coal was estimated to result in an increase in the domestic market price of coal of 34 per cent compared to a 16 per cent increase in its export price. Domestic prices of oil and gas would increase by 4 and 8 per cent, respectively (see table 4). Higher levels of carbon taxes would of course lead to larger price increases. Given the parameters used in the model, the estimated price increases following a US\$ 20 carbon tax would simply be twice as high as those mentioned above.

65. Both external and domestic users will react to these price increases by changing the volume and composition of their energy consumption. It is estimated that a US\$ 10 per ton carbon tax will cause declines of 17 and 7 per cent in the volumes of domestic demand and exports, respectively. Such reductions might be tolerable for the Colombian economy, but at higher tax levels the impact on the demand of coal would become disruptive. At higher levels of carbon taxes, exports of coal, representing US\$ 622 million in 1992 (see table 4), could be significantly affected.

Table 4
Estimated effects of a carbon tax of US\$ 10 per ton

Simulation model

Model results Basic information	Type of energy		
	Coal	Oil	Gas
Model results			
Domestic price increase (percentage)	34	16	4
Export price increase (percentage)			7
	141		8
			n/a
Tax revenues (US\$ millions)	42	213	24
On domestic sales	99	144	24
On exports		69	-
Memorandum items (1992):	Coal (tons)	Oil (barrels)	Gas (cubic feet)
Production (in millions)	23.2	159.6	143.9
Domestic consumption (in millions)	6.9	108.0	143.9
Exports (in millions)	16.3	51.6	0.0
Exports (value, in US\$ millions)	622.0	920.0	--

Source: Gavaria, D. R. Gomez, L. Ho and A. Soto, "Reconciliation of trade and environment policies: the case study of Colombia", 1994.

66. The estimated impact of a carbon tax on domestic industry varies widely from sector to sector, depending on the intensity of the use of fossil fuels. The largest consumer of coal is the cement industry that has annual purchases of more than one million tons. Other large consumers are the integrated stone, glass and ceramics industries. The two industries most directly affected by the tax, i.e. cement and stone, glass and ceramics, are relatively small in terms of their contribution to GDP, compared to other energy-intensive industries. Nevertheless, since these sectors contribute significantly to exports and employment, concerns about international competitiveness are especially relevant. The cement industry is of course an important supplier of the domestic construction industry. The largest consumers of oil and its derivatives is the food, beverages and tobacco industries, with an annual consumption of more than 1.2 million barrels. Although a carbon tax would have a smaller impact on the price of oil than on the price of coal, the effects on these industries could nevertheless be substantial, and competitiveness could be severely affected.

67. On the basis of this preliminary analysis, the study concludes that carbon tax rates above the 10 dollar level could be disruptive to energy markets and to consumers. The immediate policy implication was that such taxes would either have to be phased in over a long time period, or that the tax would have to incorporate some provisions to mitigate its effects, especially on the coal market. At a US\$ 10 per ton tax level, the economic impact of the tax was more manageable, especially if tax revenues accrued to Colombia.

VII. IMPACT OF TRADE AND TRADE LIBERALIZATION ON THE COLOMBIAN ENVIRONMENT

68. The research team reviewed a number of studies carried out in Colombia on the impact of trade liberalization on the environment. One study, commissioned to the Andes University (Universidad de Los Andes), examined the relationship between trade policy and industrial pollution. The research team also drew on existing studies on the relationship between trade liberalization and recycling and on the question of dirty industry migration (see box 3). Several case studies were carried out on the environmental effects of export expansion.

A. Trade liberalization and industrial pollution

Box 3**Dirty industry migration**

Reviewing the Colombian experience, aided by studies which had been undertaken by FEDESARROLLO, the research team rejects the hypothesis that industries with high pollution-abatement costs would relocate from developed to developing countries to take advantage of lower environmental compliance costs in the developing countries. First, although the level of enforcement of environmental regulations in Colombia is admittedly low, environmental legislation is nevertheless quite stringent. Transnational corporations (TNCs) are unlikely to invest in Colombia to take advantage of existing weak enforcement. The creation of the Ministry of the Environment in 1993 has reinforced the expectation that enforcement of environmental legislation will be strengthened. Secondly, the FEDESARROLLO studies had indicated that other factors would make Colombia an improbable candidate for relocation of dirty industries.

Furthermore, a survey of the transfer of environmentally sound technologies also failed to lend support to the hypothesis regarding dirty industry migration. None of the subsidiaries of TNCs appeared to have been established in Colombia to take account of lower stringency of environmental regulations. The majority of the subsidiaries had been established to sell in the Colombian and/or other Latin American markets. In addition, most subsidiaries declared that they would not need to make any significant adjustment in their production process if environmental standards of the OECD countries were implemented in Colombia.

69. In order to examine the linkages between trade liberalization and the environmental impact of industrial production, the Andes University compared index numbers of pollution intensity by industrial sector with indicators of revealed comparative advantage (at the 4-digit level of the Standard Industrial Trade Classification, SITC). Index numbers on pollution intensity per sector were based on data collected by the US Environmental Protection Agency regarding emissions of 320 toxic substances.²¹

70. Ranking industrial sectors in accordance with these two sets of index numbers did not show any significant correlation between pollution intensity and international competitiveness. In the case of only a few sectors did high pollution intensity coincide with a relatively high degree of revealed comparative advantage: cotton products, leather tanning, printing and publishing, woven and final textile products, certain articles of wood and petroleum refinery.

71. The study further examined trends in average pollution intensity over several periods which differed from each other in terms of trade liberalization. The results indicated that the average pollution intensity of industrial production, after having decreased slightly during the 1979-1981 period of import liberalization, increased over the 1982-1992 period, which included the recent liberalization process. Thus, no significant correlation was found between trade liberalization and average changes in pollution intensity.

72. With regard to exports, however, the share of the 21 most polluting industrial sectors in total industrial exports declined from 66 per cent of total manufactured exports in 1985 to 46 per cent in 1990 and 41 per cent in 1991.

B. Environmental impact of imports

73. As indicated in table 1, Colombian imports have been growing substantially in recent years. The environmental effects of increased imports are difficult to assess. On the one hand, there are scale effects: increased imports of automobiles, for example, result in larger consumption of fossil fuels thus contributing to atmospheric emissions and other adverse environmental effects. Similarly, increased imports of electric machinery contributes to increased energy use. On the other hand, there are technology effects: increased imports of capital goods and technologies and stronger import competition facilitate technological progress, thus contributing to reduced environmental impact per unit.

74. It is particularly difficult to ascertain the environmental effects of imports of agricultural products into Colombia. During the initial phase of trade liberalization, agricultural imports soared (see table 1), producing unintended impacts in terms of the reorientation of agricultural activities, displacement of workers and other factors. The liberalization strategy in the agricultural sector has been redefined because of the large social and economic impacts it was producing.

75. In some cases, imports appeared to be displacing polluting and inefficient domestic industries. For example, the basic iron and steel industry, which has traditionally been a heavily protected, inefficient, and polluting activity, lost economic importance as a result of the trade liberalization policies in Colombia. Although the iron and steel industry continued to be protected, trade liberalization resulted in a 25 per cent increase in iron and steel imports between 1989 and 1993. Exports fell by 90 per cent during this same period. With the decrease in iron and steel production, the environmental impact of this industry was reduced. In addition, imports of capital goods reflected a process of technological innovation and industrial reconversion.

76. The study further notes that the environmental effects of imports were rarely controlled by the Government. In general, the Colombian Government did not control the toxicity or environmental impact of certain imports, such as pesticides, which were restricted in their countries of origin. As a result, Colombia largely relied on exporting countries to prevent exports of polluting and toxic products. This, however, did not provide adequate protection. For example, vinylum chloride (monomer), which was prohibited in the United States and other developed countries, had been exported to Colombia.

B. Environmental effects of export expansion of selected primary products

77. Case studies on shrimp and on a number of agricultural products which are produced almost entirely for exports, i.e. bananas, flowers and coffee, indicate that there are environmental impacts associated with increased production to satisfy growing international demand. For each of these agricultural products, areas under cultivation has increased significantly over the last 20 years. Monoculture, combined with market forces has stimulated high-input and capital-intensive production methods. Efforts are under way to shift to more environment-friendly production processes, but such efforts may be hampered by economic and developmental constraints.

78. Shrimp is Colombia's major marine resource export item. Colombia occupies only a small part of the world shrimp market, but exports increased rapidly until recent years. Shrimp is mainly harvested in the Pacific Ocean and around 95 per cent of the shrimp production is exported, representing US\$ 77 million in 1993. The United States is the principal export market (US\$ 40 million in 1993).

79. International demand for shrimp may have resulted in overexploitation.²² Shrimp production in the Pacific Ocean peaked in 1989, but fell afterwards. Exports of crustaceans in general had likewise fallen in recent years. The steep rise and subsequent decline in the production of specific types of shrimp suggest possible overexploitation. Indeed, in recent years harvests have largely exceeded the maximum sustainable and potential yields established by the national fishing agency, INPA. In recent years INPA has established annual bans on the capture, exploitation, processing and commercialization of white shrimp and other species.

Box 4

Import liberalization and domestic recycling

As a result of the economic liberalization process, an increased volume of recyclable waste material has been imported into Colombia. These imported materials, which generally are sold at relatively low prices, compete with domestic recyclable waste. The establishment of regional free trade zones with other Latin American countries has also resulted in an increased influx of cheap materials, exerting a strong downward pressure on the price of domestic recyclable materials.

One study by ECSAM Consultants Ltd. concludes that competition from imported materials has created a disincentive for domestic recycling of paper and cardboard waste. According to the study, these materials constituted 30 per cent of domestic waste by weight, compared to only 3 per cent for glass and 2 per cent for plastics (50 per cent of domestic waste comes from biodegradable food residues). In recent years, significant volumes of paper waste collected in the United States (especially from New York), Central America and Venezuela had been exported to Colombia.

While the sanitary landfill of Doña Juana in Bogotá received 3,000 tons of paper and cardboard daily, the paper industry had begun to import almost 30 per cent of the material used for recycling. The largest paper companies in Colombia (among them Smurfit-Cartón de Colombia, Colpapel, Cartón América and Papel Familia) had designed eight investment projects involving the use of recycled paper, but a large part of the materials would come from abroad, rather than from domestic waste.

The Colombian paper industry preferred imported over domestic recyclable paper waste because of the high quality and low prices of imported materials. According to one company, Cartón de Colombia, it was easier and cheaper to import higher quality paper material from the United States than to acquire materials on the domestic market. As a result of increased imports, it was no longer profitable to recycle domestic paper.

The study claims that the social effects were also severe, as the people involved in waste collection, sorting and related activities came from a marginal and economically vulnerable sector of the society. Liberalization had reduced the principal source of income for 50,000 Colombian families, or about 200,000 people. Large and small recycling projects implemented within cities and municipalities became economically unfeasible, resulting in their bankruptcy and failure. According to the study, economic liberalization had thus contributed towards resolving other countries' trash problems, but to the detriment of Colombian environment and society.

Source: ECSAM Consultants Ltd. Effects of economic liberalization on material recycling. Bogota, 1993.

80. According to the study, Colombian coffee is a clear example of a situation where international market forces have shaped the nature of the production process used in export-oriented sectors in developing countries. In Colombia, coffee was traditionally produced in a sustainable way. However, a sharp increase in world coffee prices, caused by a frost affecting Brazilian plantations in the mid-1970s, induced a technological change towards high-input coffee production systems. These high-input systems have environmental impacts, but the shift has been justified on economic grounds.

81. Currently, approximately 30 per cent of Colombia's coffee is produced under

the traditional system, which generally meets the criteria of sustainable development.²³ For the remaining 70 per cent of production, reverting to traditional sustainable agroforestry coffee plantations would be possible under two scenarios: (a) the price premium and market size for "environment-friendly" coffee would have to be large enough to compensate for losses in productivity; or (b) the cost of inputs (fertilizers, pesticides) used in high-input systems would have to increase to a point where the traditional low-input systems, despite lower productivity, would be the best option from an economic point of view.

82. In Colombia, bananas are produced almost entirely for exports. The area under banana cultivation has increased rapidly since the 1970s. Environmental impacts are, to a large extent, due to the production of bananas as a monoculture. Mass production, induced by strong international demand, has led to two types of environmental impacts: (a) deforestation and the elimination of native species, and consequently (b) decreased resistance to pests and diseases, requiring the application of (highly toxic) agrochemicals. The use of agrochemicals has also increased in response to international market requirements related to the appearance of the product (size, colour, etc.).

83. The banana sector produces considerable volumes of (organic and non-organic) solid waste. Several efforts are under way to resolve or mitigate such problems. For example, 60 per cent of the banana producers in Uraba hire labourers to collect plastic robes used to support the banana plant. These ropes are then used to make hammocks, rugs, tapestries, etc., or are recycled in the major cities. Other farmers, however, find this practice too expensive. Research was also under way to find substitutes for agrochemicals and to decompose organic waste.

84. Environmental impacts of banana production, as well as efforts to mitigate such impacts, are driven by international demand and competitiveness considerations. The industry is conscious about ecological impacts and is undertaking efforts to use cleaner production processes. However, addressing the major environmental concerns in most cases requires costly measures.

VII. CONCLUSIONS AND RECOMMENDATIONS

85. In Colombia, industries' awareness of environmental requirements has emerged to a greater extent from national environmental legislation than from external requirements. Colombia has enacted stringent environmental laws, but enforcement has been difficult. With the creation of the Ministry of the Environment, environmental policies are expected to become better attuned to local environmental and economic conditions and better enforced. Special measures are needed to assist SMEs in meeting environmental requirements.

86. So far, Colombian exporters have faced relatively few environmental requirements emerging from external markets, which can largely be explained by the composition and geographical distribution of Colombia's exports. Where environmental requirements have emerged, Colombian exporters have generally been able to adapt their products without major difficulties. In specific sectors, such as fruit, the effects of external environmental requirements have been more significant.

87. Although relatively few exporters have direct experience with external environmental demands, awareness about environmental factors is growing. Industry expects that environmental requirements will become more stringent in the future. A major concern of exporters relates to the lack of timely and precise information. Unintended adverse trade effects of environmental policies should be avoided or mitigated through improved transparency and multilateral and bilateral cooperation.

88. The Colombian Government is especially concerned about unilateral measures with extraterritorial application. As a result of unilateral measures by the United States, in one year the tuna industry has lost 20 per cent of its revenues, or US\$ 20 million.

89. The Colombian industry, as well as the Government, are also concerned over the lack of transparency and objectivity in eco-labelling schemes, even though Colombian exporters have not yet been significantly affected by this instrument. The developed countries' use of eco-labels in sectors where they find strong import competition, such as flowers, textiles and footwear, is considered suspicious and it is feared that eco-labels may be used for protectionist purposes. Eco-labelling and other voluntary measures should be non-discriminatory, transparent and based on an open process. Transparency should include the participation of developing countries in the design of criteria in product categories of export interest to them.

90. Multilateral cooperative approaches have to be preferred over trade restrictions, from both an economic and environmental point of view. For example, the Multilateral Fund under the Montreal Protocol has assisted larger Colombian firms in phasing out the use of ODS. However, smaller firms have in practice not been able to benefit from the Multilateral Fund and their competitiveness could be seriously affected. There is a need for additional funds and a more flexible operation of the Multilateral Fund in favour of small firms.

91. Trade liberalization has resulted in both positive and negative environmental impacts. It has not been possible to establish any link between trade policy and average pollution intensity of industrial production. During the recent period of economic liberalization, there has been a large influx of potentially contaminating products, such as cars and pesticides. On the other hand, there had been a continuous increase in imports of new technologies, facilitating the technological modernization and industrial reconversion which are expected to generate positive environmental impacts. Some polluting industries which used to be protected against import competition, such as iron and steel, have lost economic significance. On the other hand, imports of cheap waste paper have significantly affected recycling of domestic waste, resulting in adverse environmental and socioeconomic effects.

92. Case studies on shrimp and a series of agricultural products which are produced almost exclusively for exports (i.e. bananas, flowers and coffee) indicate that production expansion in response to international demand has resulted in adverse environmental impacts. Such adverse effects are due to the technologies used, in particular monoculture and high-input production technologies.

93. There is sometimes a contradiction between product quality and environmental requirements. For example, markets compel banana and flower producers to produce high-quality products in terms of size and colour. However, achieving such product quality frequently requires the use of fertilizers and pesticides.

94. While Colombia is exploring trading opportunities for "environment-friendly" products, the small size of the market and the existence of other difficulties, such as high certification costs, indicate that such opportunities could make only a relatively small (albeit important) contribution to mitigating such effects. More far-reaching measures are needed aimed at ensuring that consumers in developed countries pay the environmental costs associated with their consumption patterns.

95. Possible adverse environmental effects of trade liberalization and export expansion should not be used as an argument against trade liberalization. Such effects should be addressed through appropriate environmental policies, based on the conditions and priorities of the producing countries, as well as policies aimed at allowing developing countries to incorporate to a greater degree environmental costs into export prices.

Notes

1. Presidencia de la República, Departamento Nacional de Planeación, El Salto Social. Bases para el Plan Nacional de Desarrollo 1994-1998.
2. E. Uribe, Competitiveness and market access: Trade and Environment Issues. Presentation at the Workshop on Trade, Environment and Sustainable Development in the Americas. Ottawa, 18-19 October, 1994.
3. The questionnaire was distributed by the Department of National Planning (DNP), the Ministry of Foreign Trade, ANALDEX and ACOPLASTICOS to various export sectors.
4. By Law 99 of 22 December 1993.
5. Manuel Rodriguez Becerra, Some annotations on sustainable development: trade and the environment. The impact of trade-related policies on export competitiveness and market access. Presentation at UNCTAD's Trade and Development Board at the first part of its forty-first session.
6. Restrictions on the use of pentachlorophenol (PCP) in Germany and other European markets had little or no effects, simply because the Colombian industry generally did not use PCP.
7. Total operation costs of a large tuna fishing vessel (more than 400 tons of gross registry) for 70 days (making four fishing trips) amounted to approximately US\$ 1.3 million.
8. El Espectador, "Colombian tuna embargo is raised", 13 May 1994, page 2-B.
9. Recently, the United States imposed an embargo on imports of shrimp from Trinidad and Tobago following the discovery that some trawlers, despite being equipped with TEDs, had removed these devices at the high sea. Press reports from Trinidad and Tobago indicate that according to some trawlers TEDs had reduced the shrimp catch by 30 per cent. The same reports, however, also quote studies indicating that there should be no reduction in the shrimp catch. Press reports also pointed out that the embargo had detrimental effects on the local shrimp industry. Because of the embargo, for many trawlers it was no longer profitable to initiate fishing expeditions. Local press reports, 22 and 23 May 1995.
10. The Ministry recognized that jute, if processed with vegetable oils (as was the case in Colombia), was a natural and environment-friendly product.
11. In Colombia, micro-enterprises and small and medium-size industries (SMIs) are defined by Law 78 of 1988. Micro-enterprises are independent economic units of a family type, in the manufacturing, sales, construction or services sector, which employ no more than 20 persons, and with assets of no more than 15 million pesos (approximately US\$ 39,000 in 1988). SMIs are manufacturing enterprises, which employ no more than 199 persons, and with assets of no more than 300 million pesos (approximately US\$ 781,000 in 1988). For reasons of consistency with other reports, the term small and medium-size enterprises (SMEs), rather than SMIs, is used in this report.
12. E. Uribe and Y. Medina, La Pequeña y mediana industria y su relación con las regulaciones y las instituciones ambientales en Colombia. Bogotá, June 1995.
13. UNIDO, Asistencia de la Zona Industrial de Curtiembres de San Benito, Colombia, July 1994.
14. A heavy hydro carbide with a high content of sulphur and heavy metals, which is a residual of the oil-refinery process.

15. Solid waste (paper waste, zinc plates and negatives of photography) are generally donated or sold for recycling and cause less environmental impact.
16. Environment-friendly tintas (without heavy metals) costed US\$ 8 per kilo. Conventional materials costed US\$ 5.6 per kilo. E. Uribe and Y. Medina, op. cit.
17. In addition, according to the Country Programme, the Government would forego revenues from duties collected on imports of ODS in an estimated amount of US\$ 184,000. Nevertheless, a large part of this loss in Government revenues could probably be compensated for by import duties collected on substitute substances.
18. However, it should be noted that special provisions are being designed for small users of SMEs, e.g. through providing funds to foundations which can then channel investments to SMEs. See, UNCTAD, The policy debate on trade, environment and development. Report TD/B/WG.6/10. Geneva 12, September 1995.
19. In accordance with the strategy set out in the CP, refrigeration and air-conditioning equipment that had an important fraction of their life-span remaining would be serviced and maintained, whenever possible, through recycling of CFC-12 and CFC-11 or HCFC-22, thus allowing the reduction and eventual elimination of imports of these ODS, in accordance with the chronogram set out in the CP. If recycling were not possible, equipment would have to be adapted for operation with substitute substances authorized by the Protocol.
20. However, it is to be noted that at the Executive Session of the Montreal Protocol held in the second half of August, 1995, it was reported that the supply of CFCs may actually exceed the demand for it.
21. Data on emissions of 320 toxic substances into the air, water and land and the solid wastes, from 15,000 plants in all industrial sectors of the United States in 1987. LINHUM is the Lineal Indicator of Sharp Toxicity against Human Health and the Ecosystem.
22. Increasing world demand of shrimp coupled with diminishing yields induced fishermen to turn to less sustainable production methods, depleting the resource even further. Around 1985, fishermen started to use electronic nets. The use of these nets, which were produced in an artisan fashion at a relatively low cost, spread rapidly. In the period 1984-1988, the number of fishing boats increased five times, while shrimp production diminished by 50 per cent. The use of electronic nets led INPA to establish annual bans.
23. According to the study, FEDECAFE has not tried to market this coffee as sustainable, as it fears that this may affect the marketability of the remaining coffee production.