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Contributions to this document have been made by Professor A. Wad, Director, Technology Programmes, Mr. Timothy Lavengood and Ms. Monica Scallon, all with the International Business Development Programme, Northwestern University, Evanston, Illinois, United States of America.

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INTRODUCTION

1. The focus of this paper is on ecologically sustainable industrial development (ESID) in developing countries and the potential role of international cooperation to achieve ESID.
2. The period following the Second World War has seen a tremendous growth in industrial activity. As the Brundtland report pointed out, 25 years ago the world was manufacturing one seventh of the goods it does today and was extracting one third of the minerals. This pace of industrialization has had serious effects on the environment and on the global natural resource base.
3. Conversely, industrialization has brought with it many benefits in terms of improved economic growth and most developing countries are eager to accelerate their processes of industrialization, even though this historically has resulted in higher environmental degradation.* Though its share of total industrial output is still quite low, it is expected to rise to 15 per cent of total world industrial output by the end of the century. 1/ Furthermore, developing countries are expected to continue to gain a larger share of the "smokestack" industries as tighter environmental standards in the industrialized nations given a comparative advantage to developing countries with less stringent environmental controls. UNIDO estimates that during the period 1980-1985, the manufacturing value added (MVA) of 15 traditional industries generally regarded as heavy polluters (e.g iron and steel, industrial chemicals, footwear, petroleum refineries) grew at least twice as fast in the South as in the North.

A. What is ESID?

4. Whereas the exact definition of sustainability will probably continue to be debated for some time to come, in this paper, the "strong" definition discussed in Working Paper I is accepted. This definition emphasizes the non-substitutability of certain environmental resources and the maintenance of an adequate, or threshold, level of environmental resource endowments, in particular, those that are essential to supporting life on Earth.
5. The practical manifestation of ESID is ultimately in the specific actions and behaviours of individual enterprises. This is the "bottom line" for ESID, that firms in developing countries implement manufacturing, R and D, design

*Furthermore, there are indications that the rate of environmental degradation is higher than that of industrialization. For example, in the case of hazardous waste generation, Hirschhorn and Oldenburg find that, when highly industrialized medium-income and developing countries are compared, an increase of 25 times in gross national product (GNP) per capita is accompanied by an increase of 150 times in per capita hazardous waste generation. They also note that the big increase in hazardous waste generation occurs in the early stages of industrialization. See Joel S. Hirschhorn and Kirsten U. Oldenburg, Prosperity without Pollution (New York, Van Nostrand Reinhold, 1991).

and overall management strategies based on the principles of environmental sustainability. Factors both internal and external to the firm can influence such behaviour. Internal factors such as management style, skill sets, "corporate culture", motivation, technological "intelligence", business goals and profit and market-share considerations clearly can only be addressed through direct action by the management and ownership of the firm. In this sense, the orientation of firm-level action towards ESID will depend ultimately on the extent to which environmental soundness and business profitability are seen to coincide.

6. The external factors include national and international policies and contexts that impact upon industry, the general business climate and infrastructure and relevant socio-political conditions.

7. The internal factors are discussed in working paper III, and working paper IV analyses the role of Governments in promoting ESID. This paper examines the international dimension.

B. The international dimension

8. The international dimension is of critical importance for the achievement of ESID in these respects:

(a) Financial resources: The mobilization of financial resources is vital to ESID, as it is to the environmental problem in general, and international sources of financing, particularly the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD), play a positive role. Two key issues here have to do with the mobilization of additional resources and the linking of financial support with environmentally sound industrial development. Also important is an examination of the variety of potential sources for financing, both public and private, that could be mobilized for ESID:

(b) Technology: A key to successful ESID is what the World Resources Institute refers to as "technological transformation": the development, transfer and utilization of environmentally sound technologies ("clean" technologies) by industrial firms. A great portion of these technologies and the related technological capabilities reside in industrialized countries and corporations based in those countries. Furthermore, specific issues involved in technology acquisition, such as intellectual property rights, involve international negotiations and cooperation. On another level, international collaboration is an important mechanism for technology development. For example the Consultative Group on International Agricultural Research (CGIAR) has been very successful in agricultural research, and the Eureka Program for collaborative research by European countries may also offer some useful guidelines. International technology cooperation along South-South lines may also be important for ESID by enabling the sharing of experiences, resources and capabilities for mutually beneficial purposes. Tighter standards, as in the European Community, can provide an incentive for improvements but can also adversely affect the competitive advantage of products from those countries. The entire issue of environmental standards is a complex and sensitive issue;

(c) International trade: There is increasing concern over the linkages between trade and environment, both in terms of how trade policies may impact adversely on environmental concerns, and in terms of how environmentally sound action may cause distortions in trade patterns. Issues relating to protectionist policies, product and process standards and specifications, foreign direct investment flows, structural change etc. need to be addressed at the international level. Developing countries' exports to industrialized nations may suffer adversely as result of stricter environmental standards and regulations.

9. In all these areas - financing, technology and trade - both developing and developed countries need to take proactive stands based on a sensible assessment of the environmental problem and its implications at the global, regional and national levels. The effects of industrial activity are experienced at these levels and responses also need to be at these levels, depending on the nature of the problem and the resources available.

10. For example, ozone layer depletion and the greenhouse effect are problems of a global nature, though they originate in local activities such as the use of chloro-fluoroarbons (CFCs) and industrial pollution. The pollution of lakes and rivers is often a problem at the regional level, but it also has a strong local component. Solid waste disposal and recycling are issues of primarily a local nature, but the issues of transborder flows of toxic waste and the need for R and D to improve recycling technologies are such that they lend themselves to global action.

11. The form of response is also a function of how specific the problem is. The Montreal Protocol on Substances that Deplete the Ozone Layer addresses a very specific issue on which there is general agreement and is a global response to a problem that needs to be addressed at the local level through reduced use and production of CFCs. In other cases, especially where the main effects are felt locally, local initiatives and commitments are essential. The involvement and commitment of both the public and private sectors at the local level become important in this respect.

12. International cooperation can play an effective role at all these levels. The Global Environment Facility (GEF), for example, aims at supporting local environmental problems that can alleviate global problems. Environmental problems such as desertification, water pollution, acid precipitation and air pollution lend themselves to regional cooperation. Some problems, such as improved recycling programmes, industrial pollution control and waste treatment need to be addressed at the local level, though international cooperation can play an important role.

C. The need for a strategic approach for UNIDO

13. All of this entails international cooperation of both a North-South and South-South nature. Within this context, an appropriate role and programme needs to be defined for UNIDO which builds on its strengths and constitutes a logical extension of its capabilities and experiences for the promotion of ESID. In particular, UNIDO's status as an international organization, its years of experience in industrial development in developing countries, its extensive network of experts and field offices, and its role within the United Nations, which gives it the mandate for industry, should be the foundation for its approach to and involvement in ESID.

14. A strategic approach of addressing ESID issues should be a priority of technical cooperation. For example, the industrial rehabilitation programme of UNIDO can result in both economic gains and environmentally positive results. Assisting developing country firms in attaining certain environmental standards can help them to become more competitive in international markets and to overcome environment-based tariff and non-tariff barriers.

15. A strategic approach for UNIDO activities with respect to ESID must be built upon an assessment of UNIDO's particular strengths and capabilities, a realistic appraisal of the demand for ESID-related services and assistance, the resources available, and the particular "niche" where UNIDO can have the most impact. Building on existing programmes would be a wiser strategy than creating totally new programmes.

16. The rest of this paper is devoted to an analysis of the financial, trade and technology issues and concludes with a set of recommendations on international cooperation for achieving ESID and the potential role of UNIDO.

I. FINANCIAL SOURCES, FLOWS AND REQUIREMENTS

17. A key question for ESID is the extent to which the financial resources are available and needed to achieve the desired goals and with the appropriate mechanisms for mobilizing and deploying those financial resources. Unfortunately, this is precisely an area where there is very little information of any systematic nature, and the best that can be done is to make rough approximations based on whatever is available. DAC is presently attempting to compile statistics on environment-related development assistance, but there are apparently problems due to the reporting procedures used by DAC members.

A. Potential sources of financing

18. The first issue has to do with the current financial flows and resources directed to ESID, or potentially available for ESID, and the extent of the needs.

19. While it is not possible to estimate the total financial resources that would be needed for ESID with any degree of accuracy, the amount is likely to be quite large, and it is useful to examine the sources from where these resources might come.

20. DAC is one major source, and there is a clear case to be made for additional resources from the development assistance community. Within DAC, increasing portions of bilateral official development assistance (ODA) are being directed to environmental projects. For 1990, the United States Agency for International Development (USAID), for example, increased its financing for environmental protection to 22 per cent, which amounts to \$368 million for this fiscal year (compared to \$287 million for the previous year). 2/

21. At present only 5.5 per cent of official ODA is designated for industry and this figure has been declining in recent years.

22. Developing country Governments themselves should be another source, on the order of about 1 per cent of gross domestic product (GDP) for environmental purposes broadly defined, as has been suggested by the Economic Commission for Latin America and the Caribbean (ECLAC) and by the World Resources Institute.

23. Private sector investments in ESID-related projects will make a positive contribution, but only if the economic environments in developing countries make such investments attractive either through appropriate policy measures or other inducements. However, there are many examples in industrialized countries of pollution prevention projects that have been implemented with payback periods ranging from a month to three years. 3/ This last scenario is an ideal win/win case, since such technological improvements would also enhance the competitiveness of those industries. Several large corporations in industrialized countries are making their own investments in environmental technology and programmes, and an ECLAC report entitled "Sustainable development: changing production patterns, social equity and the environment" (LC/G.1648(CON.80/2)), cites several Latin American corporations which have implemented environment-oriented programmes.

24. Revenues generated by fines and fees levied on industry based on a "polluter-pays principle", added foreign investment resulting from relaxed investment codes and relaxed profit repatriation policies for environmentally sound projects could also be included in the calculations of financial resources available for ESID.

25. Debt for nature swaps, an additional source, has been used to a limited extent for conservation projects. The external debt of developing countries is about \$1,000 billion. A modest portion of this debt, if converted for ESID purposes, could make a significant contribution.

26. Redirection of military expenditures, currently estimated at \$US270 billion per year for the developing world, could also result in additional resources.

27. Manufacturing productivity improvements can also release resources for ESID while improving productivity. Advances in computerized controls for manufacturing, chemical catalysts and process engineering which improve industrial productivity also enhance environmental efficiency.

28. The rapidly emerging environment industry offers entrepreneurs the opportunity to profit by developing capabilities in it. The estimated market for such goods and services was \$200 billion in 1990, and the industry is expected to grow at a rate of 5.5 per cent per year over the next decade. New manufacturing techniques such as chemical vapour deposition (CVD) can yield significant environmental benefits. Even incremental improvements in recycling processes or waste collection and processing can offer a source of business opportunity while also contributing to environmental priorities.

B. Financial requirements

29. On the demand side, institutes such as Worldwatch have estimated that between \$10 billion and \$40 billion per year will be needed for environmental purposes over the next ten years. It is not clear how much of this will be for ESID, however, these figures being based on broad "guesstimates" that mainly serve to indicate the magnitude of the need.

30. At a more specific level, a recent study on Thailand estimates that the cost of treatment of hazardous waste from all industries except basic metals would be of the order of 600 million baht annually, or 0.3 per cent of the annual GDP produced by those industries. For biodegradable waste, the estimate is 1 per cent of their annual GDP or 361 million baht for achieving 70 per cent treatment of the current level of biochemical-oxygen-demand (BOD). However, it is important to note that in countries such as Thailand, structural change in industry is leading to new types of pollution problems associated with high technology industries, where the clean-up costs can be considerably higher and where the environmental implications are not well understood.

31. In the industrialized countries, studies show that the pollution abatement costs (PAC) for the heaviest polluting industrial sectors range from 1.92 to 2.89 per cent of total output cost. 4/

II. OVERVIEW OF DEVELOPMENT ASSISTANCE COMMITTEE APPROACHES TO ECOLOGICALLY SUSTAINABLE INDUSTRIAL DEVELOPMENT

32. In broad terms, the development assistance agencies in the industrialized countries have begun to give increased attention to environmental concerns in the design of their assistance programmes. The Development Assistance Committee (DAC) of OECD has issued guidelines for assessing the environmental impact of assistance projects and has called for an increased commitment by member countries to assist developing countries in reducing poverty and controlling population growth in developing countries.

33. Although it is evident that concern within the donor community for improving the environmental soundness of projects is increasing, there is less evidence to indicate that a common understanding is emerging of what environmental improvement actually means. Improved cooperation between DAC members, the United Nations, the World Bank and other assistance agencies will require a common understanding of the relationship between environmental protection and industrial development, and the means by which both can be achieved simultaneously.

34. In this regard, several issues crucial to ESID have yet to be resolved or even addressed by the international community.* There is no code of conduct for multinational corporations to guide them in their foreign investment decisions, in spite of the continuing efforts of the United Nations Centre for Transnational Corporations (UNCTC); no global mechanism for monitoring the use

*Though, in some cases, efforts are under way, e.g. the Centre for Transnational Corporations Code of Conduct, the Basel Convention, Standard-setting in the European Economic Community (EEC), the Guidelines for Business established by the International Chamber of Commerce.

and disposal of toxic exports, in spite of the Basel Convention on the Control and Transboundary Movements of Hazardous Wastes and their Disposal; no consistent regulation of high-risk technology transfers, and no mechanism to facilitate the harmonization of national environmental standards for products and processes.

35. UNIDO, given its mandate on industry, could play a special role in contributing to the establishment of common guidelines and principles for ESID among the various organizations involved.

A. Bilaterals

36. DAC members are currently developing a common policy orientation, harmonizing the environmental impact assessment (EIAs) of aid-supported projects, and exploring ways to address environmental issues for each industrial sector that receives assistance. There is also general agreement on three basic components in aid policy as it affects the environment. These are described below.

1. The need for additional projects which have as their primary purpose the upgrading and rehabilitation of the environment to improve long-term economic growth and sustainable development

37. New programmes have apparently increased rapidly in recent years, but most of them deal with forestry and soil conservation and greatly resemble projects that were once categorized as "rural development". It is not yet clear whether these projects actually represent new initiatives, or whether they are simply a reclassification. Genuine "additionality" will require a net increase in total assistance funds available to developing countries in their pursuit of ESID. The critical lack of capital in most developing countries does not permit a net gain in environmental sustainability without a real increase in assistance programmes and investments.

38. As the objectives of environmental protection and industrial development begin to converge under the heading of "sustainable development", the issue of additionality may become less central. Additional funds for ESID are required only to the extent that ESID is distinguished from other forms of industrial assistance. The development of more and cheaper clean production technologies, and the improved availability of these products for developing country firms, will narrow the gap and reduce the need for additional funds to prevent environmental damaging resulting from industrial activity.

2. Measures to strengthen the ability of developing countries to deal with environmental issues

39. This raises the related question of a policy dialogue and technical support in which both donors and recipients assume certain obligations. Development assistance agencies and banks that provide ESID-related resources for developing countries in need of capital would discuss with recipients, for example, how emissions can be kept below a certain threshold in industries receiving funds.

40. But it is also important to realize that "strings" attached to funding significantly increase the complexity of negotiating for funding and that conditions agreed upon between developing countries and outside funding sources are less likely to become internalized within the local society.

41. Furthermore, bilateral aid has in the past been tied to the purchase of donor country goods and services, which can result in the export of technologies not best suited for the recipient country's environmental needs.

3. EIA procedures that can be incorporated into traditional development projects

42. All DAC members have adopted some form of EIA for assistance projects and are in various stages of establishing institutional structures to carry them out. Some have identified a particular point in the project design process where the environmental impact is formally assessed. Others have chosen to treat the environment as a cross-cutting issue requiring input at all stages of project appraisal. In the case of the former, environmental offices or departments have been established within the agency bureaucracy. In the latter, individuals with environmental impact expertise have been placed throughout the organizations.

43. As of this writing, eleven DAC members have established formal procedures for implementing EIAs for their activities. Others are currently designing procedures. There is increasing harmony among the emerging approaches. Procedures generally involve an initial screening of projects to identify those that have the potential to impact the environment. However, there is some divergence in the criteria used to determine such impact. If the potential for impact is significant, there is an initial environmental examination of the project to determine whether a more extensive EIA is necessary. If an EIA is conducted, the project must incorporate measures to decrease environmental impact and procedures for monitoring impact must be included.

44. OECD, in its 1985 Council recommendation on environmental assessment of development assistance projects and programmes, recommends EIA for projects that involve: substantial change in renewable resource use, i.e. converting land to agricultural use, or forest into pasture land; changes in farming or fishing practices; infrastructure; industrial activity, particularly extractive industry; and waste management and disposal.

45. The DAC members that have not yet established formal guidelines intend to use these guidelines as a model. But even among those members that have formalized procedures, experience in implementing them remains very limited.

46. The analysis of development assistance agencies in the OECD countries does not reveal a significant increase in projects that are designed specifically to promote ESID. Rather, the trend is toward preventing negative environmental impact from projects that are otherwise as close to conventional as possible.

B. Multilaterals and financing institutions*

47. By the nature of their organization, multilateral agencies such as the United Nations, the World Bank and the regional banks provide a focal point for the development of international cooperation strategies to promote ESID. Following are brief descriptions of the relevant activities of several of these groups.

1. United Nations Environment Programme

48. UNEP was established in 1972 to coordinate the environmental activities of the United Nations in environmental assessment, management and support measures. Initiatives in these areas are based in the UNEP Earthwatch programmes, which include the Global Environment Monitoring Systems and the Global Resource Information Database (GEMS/GRID), which coordinate activities of other monitoring systems and fill gaps as needed; INFOTERRA, a database of environmental information from around the world; and the International Register of Potentially Toxic Chemicals (IRPTC), which supplies information on potentially hazardous chemicals to local authorities responsible for environmental protection and public health.

49. In natural resource management, UNEP provides expertise in the planning and design of United Nations development activities that may impact a developing country's natural resource base and assists countries in developing responsible standards and regulations. For industry, UNEP provides a variety of services through its Industry and Environment Office.

50. UNEP also has a library to promote environmental education and has training programmes to assist policy makers in analysing the environmental consequences of various public policy alternatives. Since 1980, UNEP has been assisting several multilaterals in developing environmental criteria and procedures for assistance projects.

2. United Nations Development Programme

51. UNDP initiatives are aimed at developing and implementing a holistic environmental approach to development. UNDP has cooperative arrangements with several Governments and organizations. With the World Meteorological Organization, UNDP has developed monitoring systems to assist countries and regions in assessing climate change and air quality. The joint UNDP/World Bank Energy Sector Management Assistance Programme (ESMAP) has been promoting the use of natural gas as an energy source instead of coal or hydrocarbons. This initiative has significance for ESID not only because natural gas burns more cleanly, but because considerable but underused gas reserves exist in many developing countries.

52. In addition to these initiatives, UNDP provides many training programmes and basic technical assistance to developing countries, including country-specific workshops. In 1990 UNDP introduced the Sustainable Development Network (SDN), in which all 113 field offices coordinate the promotion and management of environmental programmes.

*This section draws heavily on the DAC 1990 Report (Organisation for Economic Co-operation and Development, 1990) and World Resources Institute, Natural Endowments: Financing Resource Conservation for Development (Washington, D.C., 1989).

53. Annex I contains more details on the role of UNDP in the environmental area.

3. World Bank

54. The World Bank established in 1987 an environment department and four regional environment divisions to promote environmental activities within the Bank. About one third of the Bank's loans in 1989 were for projects that had environmental concerns built in. The Bank is also conducting in-depth studies of key environmental issues on a continuing basis, including country-specific action plans which include suggestions for Governments. Several of these plans are currently under way, including environmental policy development, investment strategies and criteria for prioritization.

55. The Bank has also instituted codified procedures for environmental assessment to screen projects with potential environmental effects and to enhance borrowers' capabilities to deal with environmental issues, often through institution-building.

56. Annex II describes environmental activities of the regional development banks.

C. Limitations of current approaches

57. As the above descriptions indicate, multilateral and bilateral agencies have been treating the environment as a special, high priority issue for only a few years in most cases. Very few projects now being implemented have ESID as their primary objective. Rather, sustainability is being incorporated into projects through EIA, conditionality structures that promote clean technology use, reductions in population relocation requirements etc. The projects themselves, however, continue to be categorized under traditional industrial development headings. It is therefore difficult to measure financial flows specifically for ESID.

58. It also appears that little attention is paid to indirect environmental effects that may result from training and education projects, even though it is clear that the information communicated to individuals in the public and private sectors of developing countries regarding the management of public utilities and production facilities can have a significant impact, either positive or negative, on the environment. USAID categorically exempts all training projects from any form of EIA. The World Bank requires some form of environmental assessment for all water supply and sewerage projects, but not for public sector management projects.

III. GLOBAL INITIATIVES

A. Global Environment Facility

59. Established by the World Bank, UNEP and UNDP in 1990, GEF is designed to fund programmes that locally address ozone depletion, greenhouse gas emissions, biodiversity and international waters. The objective of GEF is to assist Governments in developing cost-effective ways to address these issues, and to develop institutional capabilities for such programmes. In this endeavour, UNEP will provide overall policy guidance and act as a clearing-house. UNDP will be responsible for operations at the country and

regional levels of the technical assistance and pre-investment phases, the World Bank for capital investment activities. GEF will also provide a framework for providing operational experience in funding environmental aspects of development and for complementary financing arrangements with non-governmental organizations (NGOs), entrepreneurs, bilateral and multilateral agencies and Governments.

B. Montreal Protocol on Substances that Deplete the Ozone Layer

60. Researchers first reported their concerns about the effect of CFCs on the ozone layer in the early 1970s. Widespread publicity in the industrialized countries led to public boycotts of aerosol products that used CFCs as a propellant, leading to a ban on such usage in Canada, Sweden and the United States of America in 1978. For ten years, however, the ban did not spread and aerosol propellant remains the single greatest use of CFCs in the world today. In fact, new uses for the chemical has pushed global CFC usage back above 1977 levels, even in countries with the aerosol ban. In 1984, the Natural Resources Defense Council, a United States-based NGO, filed suit against the United States Government for not conforming to regulatory process. In response, major CFC producers intensified their efforts to find alternative chemicals. Building on earlier initiatives, in 1987 the developed and developing countries adopted in the Montreal Protocol a programme of heavy cuts in the use of CFCs. The Protocol came into force on schedule in January 1989 and was subsequently amended in 1990 in light of new scientific evidence of the acceleration of ozone depletion. The amended Montreal Protocol calls for complete phase out of: fully halogenated CFCs by the year 2000; halons (used in fire fighting), except for essential uses; carbon tetrachloride by the same date; and methyl chloroform by the year 2005. With the announcement by China in June 1991 at the Third Meeting of the Contracting Parties that it would ratify the Protocol, provisions for funding reached \$200 million over a three-year interim period to help developing countries meet their obligations under the Protocol.

61. The Interim Multilateral Fund for the Implementation of the Montreal Protocol is administered from within GEF. It is an example of the linkage between environmental and developmental concerns, developed and developing countries, and the public and private sector, that can be achieved under the rubric of "sustainability". The Conference for the adoption of the Montreal Protocol resulted in an international agreement on an ambitious timetable to reduce CFC emissions and provided an additional flow of funds from the donor community to developing countries. The recipient countries agreed to make important concessions in terms of their rate of increase of CFC usage.

62. While it is still too early to realistically assess the performance of GEF or the Multilateral Fund, there are high hopes within the assistance community that such mechanisms will succeed in addressing key global environmental problems. Other initiatives, such as the Basel Convention, are also seen as models for future efforts to deal with global environmental protection. However, it is important to note that the Basel Convention only occurred in response to a major toxic waste spill, and that the timetable and funding mechanism established by the parties to the Montreal Protocol to reduce CFC emissions were a response to an especially pressing environmental crisis - the development of a hole in the ozone layer and the related risk of global warming. In the case of the Montreal Protocol, the problem addressed was very specific and unambiguous, limited to a single chemical, and the production of CFCs was limited to a handful of companies. It remains to be

seen whether similar agreements can be reached in cases where the exact sources of environmental damage are not known, where they are much more numerous and spread throughout the world, or where the problems are largely of a local nature.

IV. COOPERATION BETWEEN DEVELOPING COUNTRIES

63. Information flows in the developing world tend to be predominantly North-South rather than South-South. Developing countries have very limited information on other developing countries, their institutions, products or capabilities. However, there has been significant development in many of these countries in recent years, to the point where cooperation between them could have a meaningful impact on development generally and on ESID in particular.

64. Economic and technical co-operation in developing countries has been a priority for many years. Arising from a common perception of the causes and solutions to the problems of economic development, a political consensus among developing countries led to many common positions on international development issues. The formation of two groups, the Non-Aligned Movement and the Group of 77, represent the most durable, noteworthy, and the broadest expressions of this co-operation. At another level, regional and subregional groupings have been developed, which address the need for closer co-operation in economic and technical terms, and, increasingly, direct their efforts towards common markets, preferential trade areas, and customs unions, with the objective of a full economic union being increasingly espoused.

65. Significant recent developments in this field have, however, been at the interregional level, with the General System of Tariff Preference (GSTP), which was agreed in 1989 by 48 member countries of the Group of 77. It covers the mutual reduction of all trade control measures (TCMs) affecting trade by the member countries. Virtually all major developing countries in terms of their international trade volume, are signatories. A ratification by 15 states will bring the agreement into force.

66. A further new development at the inter-regional level is the formation of the Summit Level Group of Developing Countries, also known as the Group of 15. This was also formed in 1989 and includes both the non-aligned and other developing countries, especially the larger and more industrialized states, with representation from different regions. At its first Head of State-level summit meeting in June 1990 in Kuala Lumpur, it adopted a wide-ranging statement dealing with many areas in which co-operation would be addressed in practical terms among the members. On the environment, it stressed the need to recognize the special position of the developing countries in the formulation of the international initiatives:

"Any global initiative in overcoming environmental problems required concerted international co-operation based on an equitable sharing of responsibilities which takes into account existing asymmetries between developed and developing countries.

Developing countries require substantial additional resources for pursuing their goals of sustainable development, including access to environmentally sound technology at affordable cost and the establishment of funding mechanisms. The Group recognizes the importance of co-ordinating our positions on issues of major concern to us on the agenda of the forthcoming UN Conference on Environment and Development to be held in Brazil in 1992."

67. The Group of 15 Summit Meeting approved a number of specific projects, with the assignment of responsibility to individual countries for co-ordination and implementation. They include new mechanisms for environmental co-operation based on the new impetus for ECDC and TCDC provided by the Group of 15. The adopted proposal for a South Investment, Trade and Technological Data Exchange Centre (SITDEC) to promote and disseminate information on investment and trade opportunities in the South and on technologies and transfer of technology among developing countries is of special importance.

68. The environmental considerations in trade and technology transfer discussed in this paper would find a useful reflection in the activities of such a Centre. It may also be pointed out that several of the other projects accepted in principle at the Summit included several of directive relevance to ESID, including the establishment of a gene bank among developing countries, and the semi-industrial fabrication of small solar refrigerators. On wider macro-economic concerns which affect ESID possibilities, the participants also agreed to set up a meeting of financial experts on external debt and an advisory group to assist the developing countries in their dealings with multilateral financial institutions on issues of debt and loans.

69. The Summit also agreed to establish a second round of negotiations in relation to the GSTP. This could incorporate specific discussions of ESID issues, especially those related to standards and to technical requirements, quality control and the need to encourage reciprocity and harmonization in international trade, with special reference to ESID and, increasingly, in trade in environmental goods and services.

70. The environmental issue was also dealt with explicitly at a ministerial Conference of developing countries on environmental development, which was held in Beijing, 18 to 19 June 1991. The Conference adopted the Beijing Ministerial Declaration on Environment and Development. One issue raised was that of resources for developing countries to achieve the protection of the environment. A Green Fund was proposed to address problems, such as water and coastal pollution, shortage and degradation of fresh water resources, deforestation, soil loss, land degradation, and desertification, not covered by specific international agreements. It would also cover the costs of the transferring environmentally sound technologies and enhancing national capabilities for environmental protection and scientific and technological research. For other areas of environmental concern, where specific agreements were adopted internationally, the Declaration called for financial support to cover the requirements of developing countries in fulfilling their commitments.

71. Given the commitment to South-South co-operation, and the now considerable institutional framework that has been set up, there are certainly prospects for increased co-operation among developing countries in ESID-related areas. However, the complexity of the issues and considerable geographical dispersion of developing countries means that the best prospects for South-South co-operation in this field will probably be found at the regional and sub-regional level. Organizations which have as their goal the specific integration of the member states due to their geographical proximity and common perception of development goals, are the vehicles most likely to be able to absorb ESID-related activities. The Preferential Trade Area for Eastern and Southern African States (PTA), for instance, included ESID-related projects as part of a wider package of industrial projects. The PTA itself has moved from its initial phase as an organization for the encouragement of free trade among its member states to begin implementing a full programme of economic integration, including the formulation of an integrated industrial programme.

V. TRANSNATIONALS AND PRIVATE CORPORATIONS

72. As sources of a great wealth of information on the use of hazardous materials, environmental management techniques, pollution abatement equipment and cleaner production technologies, and as major producers of environmentally damaging products, by-products and activities, private corporations, more specifically transnational corporations, will be expected to play a major role in the transition to ESID.*

73. Several initiatives have been taken to establish guidelines for corporations with regard to the environment, including UNEP's environmental guidelines, the International Chamber of Commerce environmental guidelines, OECD guidelines on multinational enterprises, the Chemical Manufacturers Association's Responsible CARE programme and the United Nations Centre on Transnational Corporations' Criteria for Sustainable Development Management. (E/C.10/1990/10 Annex I, 11 January 1990).

74. UNCTC has isolated five main areas in which transnational corporations (TNCs) can promote environmental protection without sacrificing development:

(a) Supporting international agreements, laws and policies covering environmental issues;

(b) Contributing to the development of effective means for transferring environmentally sound technologies to developing countries;

(c) Developing and implementing global management strategies that integrate environmental concerns in the economic development process;

*For a more detailed discussion on the role of transnational corporations in achieving sustainable development, see Peter Hansen, "Criteria for sustainable development management of transnational corporations", UNEP Industry and Environment, July-December 1989, and "Transnational corporations and issues relating to the environment: the contribution of the commission and UNCTC to the work of the preparatory committee for the United Nations Conference on Environment and Development", Commission on Transnational Corporations, February 1991.

(d) Education and training for employees to increase environmental awareness throughout the organization and in communities to support the analysis and monitoring of the environmental situation, and to improve the ability of responsible individuals to anticipate environmental risks;

(e) Identifying and providing additional financial resources to expand expertise and technological capability for ESID in developing countries.

75. UNCTC has proposed that TNCs establish an environment fund, to be managed by a United Nations-affiliated financial intermediary, to include voluntary corporate contributions, a for-profit venture capital fund and a for-profit mutual equity fund, with a view to financing environmental projects in developing countries. The proposal is currently on hold due to budgetary constraints.

76. Existing barriers to the transfer of environmentally sound technologies to developing countries include: lack of incentive for TNCs to sell such technologies to developing countries due to their small internal markets, lack of environmental laws in developing countries requiring sound technologies, and the higher cost of these technologies compared to those "polluting" technologies now in place in developing countries.

77. UNCTC has conducted a study entitled "Transnational corporations and industrial hazards disclosure", to identify ways in which developing countries could benefit from the experiences of industrialized countries. Disclosure requirements regarding possible risks to public health, safety and the environment of TNC activities in developing countries is considered one of the most important issues related to TNCs in developing countries. Such disclosures would allow developing country Governments to make more informed decisions about allowing TNC investments, and information on disclosure requirements in industrialized countries would make it possible for such Governments to hold a TNC accountable for risks that exceed those in its country of origin.

78. In 1990, the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting began considering the issue of information disclosure on corporate environmental measures. The Group made suggestions for standardizing environmental auditing relating to both qualitative and quantitative information. As follow-up, UNCTC has begun a project on accounting and reporting standards for sustainable development, which deals with current practices regarding environmental information disclosure by TNCs and seeks to improve techniques for measuring environmental costs and liabilities. The project will also attempt to develop a valuation methodology for determining unreported social costs of non-sustainable industrial activity and to develop internationally comparable standards for environmental auditing by TNCs.

79. Reducing the damage to the ozone layer from CFCs is the most successful example to date of international efforts to protect the global environment. As a result of compelling scientific evidence and persistent public pressure, the Vienna Convention and the Montreal Protocol have achieved broad consensus among Governments in the industrialized world, and companies, confronted with the impending threat of strict regulation, have dramatically increased their commitment to the environment and self-regulation. Private and public sector research into reducing the need for CFCs and internally initiated phase-out programmes are becoming common. Many companies have pledged to meet the Montreal Protocol targets ahead of phase-out schedules.

80. Almost all CFCs are produced by a handful of large chemical companies in OECD countries. One such company alone accounts for 25 per cent of world supply. TNCs are also the dominant buyers of CFCs, especially those that produce air conditioners, refrigerators and electronic products.

81. Although TNCs were initially opposed to CFC regulations of any kind, the position of many of them is that, since restrictions are unavoidable, international regulation that puts all competitors on the same footing is better than a confusing mix of country-specific laws.

82. Several TNCs, including ICI and Rhone Poulenc, have announced their intention to produce HFC134a, an alternative to CFC. Major CFC buyers are moving cautiously toward these alternatives because the switchover is expensive and there are questions about the requirements to redesign products that will be competitive. IBM and Digital Equipment, which use CFCs as solvents to clean electronic parts, have begun to use CFC-free processes for some cleaning operations.

83. Although there is still a long way to go before CFCs are eliminated, the progress achieved to date is a useful example of how Governments, NGOs, business and the public interact to reform industrial practices to protect the environment.

84. Annex III describes in more detail the role of TNCs in global environmental concerns.

VI. ROLE OF INDUSTRY, TRADE, PROFESSIONAL, SCIENTIFIC AND ENGINEERING ASSOCIATIONS

85. Industry, trade and scientific organizations can play a major role in assisting developing countries and small- and medium-sized companies to employ ecologically sustainable technologies and processes and to purchase and produce environmentally sound products. These organizations provide a valuable forum for the exchange of information and the establishment of industry-wide codes of conduct.

86. The extremely high level of activity among trade associations, research and policy organizations etc. is a strong indication of the far-reaching implications of ESID. Although many of the industrial organizations focus on the needs of transnational corporations and developed country companies, many are specifically targeting the needs of developing countries.

87. The International Chamber of Commerce (ICC), as previously mentioned, has developed environmental guidelines for world industry (see annex IV). Through its International Environmental Bureau (IEB), ICC provides technical information sharing on environmental issues to the developing world and seeks to generalize the best existing practices of their members to the business community at large. The World Environment Center (WEC) is directly involved in technology transfer, training, and institutional and factory assessments in the developing world through its International Environment and Development Services. WEC's International Environment Forum, whose membership includes 57 multinational corporations, encourages the inter-sectoral exchange of information and experience and provides assistance in international environmental management and environmental auditing.

88. Many trade and professional associations are taking a leadership role in addressing environmental issues. The International Federation of Consulting Engineers, a federation of national associations of independent consulting engineers, has an environmental mandate designed to enhance professional environmental services and formulate codes of professional conduct. The American Institute of Architects in the United States is currently producing an Environmental Resource Guide, the Chemical Manufacturers Association has its aggressive responsible CARE programme, and the National Association of Manufacturers is currently preparing a seminar on pollution control and energy exports to Eastern Europe and the third world.

89. ESID-related conferences, programmes, mandates and publications are being initiated by the International Council of Scientific Unions (ICSU), the International Institute for Advanced Systems Analysis (IIASA), the Commonwealth Consultative Group for Technology Management (CCGTM), and the Club of Rome, to name a few. In addition, new organizations such as the Global Environmental Management Initiative (GEMI), the International Institute for Sustainable Development (IISD) in Winnipeg, Canada, and the Business Council on Sustainable Development in Geneva are currently in the early stages of their development.

VII. TECHNOLOGICAL CHANGE, TRANSFER, ACCESS AND DEVELOPMENT

90. "Technological transformation", a term coined by the World Resources Institute, is the key to ESID. In the face of increased population pressures, and the continuing need for rapid economic growth, the only viable option to reduce the environmental impacts of economic development is through the development, diffusion and utilization of increasingly efficient and environmentally sound technologies. Such a goal requires international cooperation on an unprecedented scale.

91. Many of the technologies needed to reduce environmental problems exist in industrialized countries; often, they are profitable as well. There is also growing consensus on the need for "clean" technologies rather than "end-of-pipe" solutions. Advances in high technology - microelectronics, biotechnology, advanced materials, energy technologies - further enhance the potential for achieving ESID.

92. On the other hand, there are major changes occurring in the global context of manufacturing itself that have important implications, both positive and negative, for ESID.

A. The changing context for international technology cooperation

1. The major changes taking place in the global marketplace

93. Major changes are generating a variety of pressures and opportunities for firms wishing to compete in this market. Put another way, the goal of achieving ESID must be pursued with due regard to the fact that firms also need to be competitive in the world economy and that nations need to foster such competitiveness among their firms. A firm can be environmentally sound, but this does not in and of itself ensure its competitive success. In fact, many of the initiatives to improve the competitiveness of industrial firms in developing countries may have unintended negative environmental consequences.

2. The new techno-economic paradigm

94. Industry is undergoing fundamental restructuring around the world and a new techno-economic paradigm is emerging based on new forms of manufacturing, competition, inter-firm linkages, market dynamics and the possibilities opened up by technological advances, particularly in the area of informatics and information-based technologies.

95. Global economic growth is slowing and there is a rise of regional trading blocs (e.g. the European Community, North America); commodity prices are falling in most instances and there is an increase in protectionist trade policies.

96. As noted in the ECLAC report prepared for the Latin American and Caribbean regional preparatory meeting for the UNCED, held in March 1991 in Mexico City, "international markets are now clearly in the process of globalization and regionalization. This process has been set into motion by a notable decrease in communications and transport costs, by the ability of some nations to incorporate technological progress and to disseminate it through their system of production, by entrepreneurship and by the incorporation of additional countries, particularly countries in South-East Asia, into the international market" (LC/G.1648(CON.80/2), p. 90).

3. Comparative advantage based on the availability of natural resources is declining

97. Developing countries are therefore increasingly being faced with the challenge presented by a new paradigm and the simultaneous erosion of the basis for their traditional comparative advantages. New forms of competitive behaviour, which enable developing countries to capture key market niches based on their own strengths and to capture a greater portion of the value-added chain are called for, though it is as yet unclear as to whether this is a feasible option for some countries, given their heavy debt burden, weak infrastructure, shortage of human technical skills and lack of access to technology.

4. New principles of efficiency

98. The capabilities a firm needs to become globally competitive are being redefined in ways that offer both challenges and opportunities for ESID. Emerging principles of efficiency such as Just-in-Time, Zero Defect, Total Quality Management and Concurrent Engineering have created financial incentives to reduce waste, improve equipment maintenance and process efficiencies and decrease energy consumption - all of which go hand in hand with the goals of ESID. Common to all these new approaches is a "process focus" which emphasizes continuous improvement throughout the manufacturing process. This is what distinguishes an ESID approach from an "end-of-pipe" approach, where the problem is treated after it has occurred. In this sense, the basic assumptions and beliefs underlying the new efficiency principles for manufacturing are very close to those underlying ESID.

99. In many industries, a new efficiency principle - economy of scope - is emerging to replace economies of scale as the essential means of reducing production costs and enhancing flexibility and responsiveness to market demand.

100. In the industrialized nations, small technologically sophisticated firms are producing more jobs than the manufacturing giants and are becoming increasingly important as sources of innovation and suppliers to larger firms. For many developing countries, the small- and medium-scale sector similarly holds the potential for enhanced job creation.

5. Technological "multipolarity"

101. On another level, technology is proliferating and sources of technical innovation are expanding rapidly. The United States, once the leader in technological innovation, is now sharing this position with other advanced countries such as France, Germany and Japan and other OECD nations. New technologies are also being developed in the newly industrializing countries or areas, and some Eastern European countries, such as Czechoslovakia, Poland and Yugoslavia are also becoming suppliers of technology.

102. At the same time, firms are becoming more aggressive in seeking proper "rents" for their technological know-how, and as such, access to these technologies by developing country firms has not become easier simply as a result of technological "multipolarity" (the proliferation of potential sources of technology). This in turn is reflected in the ongoing debates over international technology transfer and access to technology and the increasing need for mechanisms to facilitate the monitoring, assessment and sourcing of technologies on an international scale by developing countries. However, it is not only a question of the latest technologies. Many of the needed technologies are already available:

"Theoretically, technology now on the shelf could solve these problems. The resources devoted to these efforts, however, are minuscule in comparison to the need. A massive effort to transfer technology from developed to developing countries could contribute more than any other action to environmental sustainability". 5/

6. Intellectual property rights

103. Intellectual property is already a growing issue within the environment context. On the one hand, it is argued that access to environmentally sound technology is essential if developing countries are to achieve ESID. However, the developers of these technologies, in many cases TNCs, seek to receive adequate "rents" for their investments in these technologies - and thus demand appropriate protection of their intellectual property. This translates itself into high costs for acquiring these technologies by developing countries, most of which are already saddled by heavy debt burdens, lack of foreign exchange and poor negotiating capabilities. Add to this the general weakness of technological capabilities in developing countries and the lack of good information on available technologies.

104. The international property rights (IPR) aspect of ESID is beginning to be addressed in various fora. For example, UNEP, in cooperation with the World Intellectual Property Organization (WIPO), organized a meeting of experts to discuss the role of intellectual property in technology transfer within the context of the Montreal Protocol. ^{6/} Particular emphasis was given to the potential role of compulsory licensing, while noting that Governments did not have the power to compel industry to market products internally or internationally.

B. Access and demand assessment

105. Even where there is a recognition for the need for sustainable industrial activity, the lack of information about alternatives in terms of inputs, technologies and processes remains a barrier for most developing country firms. Improved availability of information on environmentally sound options and alternatives is essential to the achievement of ESID in developing countries, with an emphasis on practical and proven information and technology. In this regard, the clearinghouse role of the International Environmental Bureau in Brussels is a noteworthy initiative.

106. For UNIDO, the experiences and capabilities associated with its own databases and information systems, such as the Industrial and Technological Information Bank (INTIB) could be built upon. Information, along with practical assistance and follow-up (so that the information is used well), is essential for ESID and charts out a specific area where UNIDO can play a role.

107. UNCTC has been developing several interesting options for facilitating access to technology by developing countries. These include international environmental offset programmes, investment programmes, tradeable pollution permits, relaxation of limitations on the repatriation of income derived from environmentally sound technology, tax disincentives to restrain the use of environmentally hazardous technologies, and tariff barriers to restrict trade in environmentally hazardous technologies.

108. On the demand side, there is still little in terms of systematic assessments of the technology requirements in developing countries and there is a need to compile an inventory of technological needs in developing countries vis-à-vis ESID.

C. Policies and regulations

109. There is a need to overcome policy and regulatory barriers to technology transfer and development and to improve the technological capabilities of developing country firms so as to enhance the quality of technology transfer.

110. Environmental regulations should be developed so as to encourage long-term technological innovation and continuous improvement. The traditional focus on "best available technology" is inadequate in itself and can result in non-innovative behaviour. As stated in the World Resources Institute report:

"Regulations have largely been uncoordinated across media (air, water, land), have focused on "end of pipe" pollution controls instead of pollution prevention options, and have provided no incentives for doing better than standards dictate" (p. ix).

111. Similarly, technology policies need to promote the development, diffusion and utilization of "clean" technologies. Innovative mechanisms such as technology incubators, university-industry linkages and technology commercialization centres could be mobilized towards ESID ends. Education policies also need to encourage a greater appreciation and understanding of the environmental aspects of technology and industry.

D. Emerging opportunities in the environmental area

112. Looking at the issue from another perspective, the growing concern with ecologically sustainable alternatives could yield specific but time-bound opportunities for developing countries. A new "environmental" industry is emerging, involving waste treatment, recycling, energy efficient alternatives, etc. This market could offer entrepreneurs in developing countries the opportunity to enter new areas of business. Every new piece of legislation aimed at controlling or preventing environmentally adverse activities leads to a demand for new goods and services. Though precise figures are not available, the United States Environmental Protection Agency (EPA) estimates that in 1985, 1.7 per cent of United States GDP was spent on environmental protection measures. In France, it was 0.9 per cent, in Germany it was 1.5 per cent and in the United Kingdom of Great Britain and Northern Ireland 1.3 per cent for the same year. The global market for environmental goods and services is expected to be around \$200 billion per year and increase at a rate of 5.5 per cent per year over the coming decade.

113. Furthermore, there is an increasing number of trade shows that focus on environmental services and goods and there do not seem to be serious barriers to entry into this industry. Also, a large percentage of firms that specialize in these services are small- or medium-sized and therefore may be suitable for developing countries. In sum, while the dynamics and trends in the environmental business are still not well understood, there are good indications that there may exist specific windows of opportunity for developing countries to participate in this business.

E. Technology cooperation

114. Technology cooperation at the enterprise level is one of the most important approaches to ESID. Given that many of the needed technological resources for ESID are housed in TNCs or corporations in developed countries, and that the market for ESID-type technologies is likely to grow, not only in industrialized countries but in developing ones as well, it would serve the interests of all parties concerned to encourage and undertake technological cooperation at all levels - governmental and enterprise. In a recent paper, the International Environmental Bureau (IEB) emphasizes the importance of company-to-company cooperation for achieving ESID: 7/

"The cooperation process should be such that both parties win - medium and long term - socially and commercially, e.g. by each helping the other to obtain access to new markets and by producing goods and services more efficiently and more sustainably. The most successful cases of technology cooperation in business and industry occur when mutual benefit by both contracting parties is maximized.

"The successes of technology cooperation associated with cross-licensing arrangements, with technology-equity exchanges, with joint ventures and with strategic alliances show how emphasis should be placed upon the long term commercial and strategic strengthening of both partners rather than upon the immediate narrow financial aspects of the deal" (p. 5).

115. Cooperation at a broader level is also important, and the experiences of international technology cooperation programmes such as EUREKA should be examined for their lessons for ESID-based cooperation.

VIII. INTERNATIONAL TRADE, ENVIRONMENT AND INDUSTRIAL DEVELOPMENT

116. Trade is a relevant issue because environmental policies can result in trade distortions and trade policies can lead to environmentally negative results. As in the case of technology, this is occurring in a changing context.

A. ESID and international competitiveness

117. While concern over achieving ESID grows, this is occurring within a context of increasing emphasis on the international competitiveness of firms. As noted in the ECLAC report:

"International competitiveness based increasingly on the incorporation and dissemination of technical progress in a context in which great economic and political value is attached to ecologically sustainable development in many parts of the world will probably be one of the hallmarks of the 1990s" (LC/G.1648(CONF.80/2), p. 89).

118. The new form of competition is based on principles of continuous improvement, flexibility, customer responsiveness, total quality management and new inter-firm arrangements.* The production philosophy underlying these new principles has taken hold more firmly in the industrialized nations, though there are good reasons for developing countries to explore these new options. The Republic of Korea, for example, has made rapid advances by pursuing a mix of policy measures aimed at maximizing their competitive position in key markets and industries in the global economy. But the more general question of whether developing country firms can stand to gain by incorporating these new principles and the enabling technologies remains relatively unexplored. Viewpoints range from those who claim that the advent of the new technologies based on flexible specialization will make it more difficult for developing countries to compete - because access to technology will become more difficult, to those that emphasize the "soft" aspects of the new paradigm of competition, and claim that these new principles are within the grasp of developing countries and can yield relatively large competitive gains. 8/

119. Though developing countries recognize the need for ESID, the means of achieving it in the context of changing patterns of international competition are unclear. The traditional bases of competition for the developing countries, natural resources, cheap labour and large domestic markets, are not completely eroded and will continue to influence industrial activity in the developing countries. And for most developing countries, faced with the need for foreign exchange and burdened by large populations, external debt and declining terms of trade, the pursuit of industrialization based on their traditional sources of comparative advantage is not an option but a necessity.

B. Environmental implications of trade policies

120. Additional difficulties include: lack of access to the technologies and financing needed to undertake ESID-type activities; an international commodities market that continues to work against their interests; and a series of protectionist and regulatory barriers in the industrialized countries that hinder their capacity to develop their export potential in non-natural-resource-based industries.

*Several authors have examined this changing pattern of competitiveness in the global economy, including Michael Piore and Charles Sabel, The Second Industrial Divide: Possibilities for Prosperity (New York, Basic Books, 1984); Carlota Perez, "Technical change, competitive restructuring and institutional reform in developing countries", World Bank, Strategic Planning Review, discussion paper No./4, December 1989; Michael H. Best, The New Competition: Institutions in Industrial Restructuring (Cambridge, Harvard University Press, 1990); and Michael E. Porter, "The competitive advantage of nations", Harvard Business Review, March-April 1990.

121. Important in this context are current patterns of structural change in world industry, which are resulting in the migration of polluting industry to the South, particularly following the world-wide stagflation of 1980-1982, which forced many developing countries to move towards high-technology industries.

122. On the other hand, there does not seem to be any empirical evidence in support of the "pollution haven" hypothesis that suggests that the higher costs of pollution abatement in the North and the weaker environmental regulations in the South encourage polluting industries to move. To further complicate the matter, in certain countries, structural change is leading to a transition from traditional pollutants associated with smoke-stark industry to mico pollutants (toxic chemicals) associated with high technology industries, i.e. semi-conductor manufacturing and biotechnology.

123. What is clear is that in the medium and long term it is in the interests of all parties concerned in the North and South to use "clean" technology in all locations and to pursue environmentally sound trade policies. Because of the uneven nature of the global trading system, however, such measures may be easier to pursue in richer countries than in poorer ones.

124. This problem is further compounded by the fact that environmental costs are not valued properly by the market because of their "public good" nature and that current trade practices do not reflect the variations in the environmental carrying capacities of different countries, their relative environmental endowments or the environmental content of their output.

125. In sum, there is no clear-cut evidence that industrial migration to developing countries is inherently "dirty", but there has been a general pattern of movement of natural resource intensive industries to the South. To address this issue, two broad sets of actions are needed:

(a) Establishment of proper accounting systems that reflect true environmental costs;

(b) Examination of investment promotion programmes, export promotion zones, structural adjustment programmes for their environmental implications.

126. Countries, and even regions within countries, vary in terms of their abilities to absorb environmental externalities, their roles as suppliers and consumers of non-renewable resources, their industrial output of polluting products and their trade policies.

127. As a medium-term objective the market mechanism should accurately reflect environmental costs and benefits so that an optimal pattern of environmentally sound international trade is achieved. In this regard, there are several trade measures that bear consideration in the international context. These are described below.

1. Tariff and non-tariff barriers

128. Tariff and non-tariff barriers, whether intentional or not, can lead to distortions in international trade with negative environmental consequences. For example, restrictions on market access (the quota system) can force countries to increase production of polluting or natural resource intensive goods because they cannot capture other product markets. Coupled with domestic and external financial problems, many developing countries did indeed resort to pollution-intensive sectors during the 1980s. Increased protectionism in the developed countries reduces market access for non-traditional goods from developing countries and hence prevents their diversification into more ecologically sustainable activities.

129. This is especially a problem with respect to process industries, resulting in the over-exploitation of natural resources for export in, for example, the timber industry. It is only recently that countries such as Thailand have taken drastic measures to curtail deforestation caused by timber exports.

2. Production and export subsidies

130. All Governments take measures to enhance the competitiveness of their goods and services in international markets through subsidies for production and export. Environmentally unsound distortions can be caused by encouraging greater production in certain sectors rather than in others which are ecologically more sound. Developed countries continue to subsidize certain sectors such as shipbuilding, mining, steel, textiles and automobiles, even though these are sectors where developing countries could develop a comparative advantage, and through the use of clean technologies, pursue a more environmentally sound alternative.

131. Despite general principles adhered to by most countries involved in GATT, subsidizing is still practised and leads to price and market distortions. These include export credits and guarantees, tied aid (conditionality) and offsets. Export supports are particularly important in such sectors as steel, transport equipment and construction, resulting in overcapacity and an uneven geographical distribution of output.

3. Trade agreements

132. Most trade agreements fail to treat the environmental factor adequately. This is true of agreements involving automobiles, steel and textiles that include voluntary export restraints and orderly marketing agreements. It is also true of free trade agreements (common markets, regional agreements etc.) where concerns have been raised about the environmental impacts of trade liberalization measures. While free trade agreements can improve the overall levels of trade, they do not automatically ensure that this is environmentally sound. In fact, they can lead to the movement of pollution-intensive industries to environmentally sensitive areas and can limit the use of economic measures for environmental management. They can also result in the weakening of environmental regulations and standards. In the case of the United States, while the "fast-track" authority sought by the President will allow for more flexibility in trade negotiations, it can also reduce the likelihood that environmental issues will be scrutinized appropriately.

133. Preferential trade agreements between developing and developed countries, for example the Generalized System of Preferences (GSP), the Lomé Convention and the United States Caribbean Basin Initiative (CBI), can also divert trade in environmentally unsound directions and cause environmentally unsound structural adjustment in developing countries.

134. Finally, trade-related investment measures (TRIMs) and trade-related intellectual property rights (TRIPs) need to be assessed in terms of their environmental implications. TRIMs can impede investment in environmentally sound industrial development by discouraging foreign investment through exchange restrictions, local input requirements and profit repatriation restrictions. However, TRIMs can also be used by Governments to encourage environmentally sound investments.

135. TRIPs, similarly, can contribute to encouraging trade in environmentally sound products and technologies. IPRs are designed to encourage innovation and invention and, if properly implemented, could encourage firms to develop and market goods and technologies which are ecologically more sound. On the other hand, IPRs also increase the expense of technologies and make it more difficult for developing countries to acquire them. Corporations can play an important role in this area by taking a long-term view and allowing freer access to their technologies in return for more relaxed investment regulations by developing countries, market access etc.

C. Trade impacts of environmental policies

136. The basic issue is the trade-distorting impacts of environmental policies and regulations, which fall into three categories: regulatory instruments such as standards or norms; economic instruments such as subsidies, charges and taxes; and trade instruments such as export and import controls.

1. Regulatory instruments

137. The main issue here is that of standards, which are of four types: product-, process-, ambient- and emission-based.

138. The lack of acceptable international standards for industrial products and processes, which would enable the "benchmarking" of products and technologies on an international scale, is a complex problem. Uneven standards can lead to trade distortions and "ecoprotectionism". The issue is further complicated by the fact that most environmental standards for manufactured goods apply to the final product itself and not to the process by which it is manufactured. Environmental labelling schemes also tend to suffer from this drawback. As a result, products that prima facie are "green" can appear on the market even though the processes by which they are made have negative environmental effects.*

*There have been some efforts, however, to address this problem. In its "Position paper on environmental labelling schemes (ELS)", the International Chamber of Commerce notes that many programmes include labelling of products to describe appropriate use and disposal practices, emergency response procedures, control of waste disposal methods, training programmes etc.

139. Furthermore, as the OECD countries enact tighter environmental legislation, "one important consequence of this may be the already perceptible emergence of protectionist barriers raised on the assumption that other countries have failed to comply with environmental standards relating to products, manufacturing processes and raw materials" (LC/G.1648(CON.80/2), p./94).

140. Different environmental standards will be appropriate depending on a country's specific circumstances, such as the level of natural resource dependency and endowments and the efficiency of its markets. The value of harmonization, or perhaps, as suggested by the OECD, "coordination", ^{9/} is dependent on the issues involved in a specific situation. For example, agreement on common principles such as the "polluter pays principle" is sufficient to avoid international conflicts of interest. Other issues such as global and transfrontier pollution and toxic waste problems may require stricter policy instruments and clear-cut international standards.

141. The trade implications of environmental standards need to be discussed in fora such as GATT. Within OECD, some attention is already being given to international differences in environmental standards in such areas as automobile products and chemicals with a view to avoiding their leading to non-tariff barriers.

142. In this regard, the position of EPA, as stated in a recent report, is noteworthy:

"Internationally accepted standards to limit the exchange and use of polluting products and technologies could clearly help to achieve the goal of global environmental protection. The Board believes that the U.S. should spearhead a movement toward the adoption of environmental standards, both health and performance based, by all nations, covering imports and exports of products, equipment and processes ... The U.S. government should also stress the need to incorporate sound environmental standards in the agenda for the next GATT round. An effective first step toward a leadership role would be the imposition of such standards on American suppliers". ^{10/}

143. At present, there is wide disparity in standards, stemming partly from differences in industrial structures and environmental goals carrying capacities and endowments. In the developing countries, additionally, the use of standards is hampered by and access to information a lack of required skills, institutional structures.

144. Environmental labelling, discussed earlier, also needs to be standardized and harmonized. In many instances, "green product advertising and environmental labelling have developed in a frequently uncontrolled and misleading fashion". ^{11/}

Differences in labelling schemes can be a source of distortions and problems in international trade and this is an area again where international cooperation is required. In the industrialized countries, industries which have been able to develop products that are environmentally sound or "friendly" have gained a competitive advantage in some areas. On the other hand, poor labelling of products from developing countries can have a negative impact on their attractiveness to consumers in industrialized nations. A standardized system of labelling would be an important step in overcoming such problems. In developing countries, where consumer awareness of environmental issues is generally lower and monitoring of labelling practices is weak, the effectiveness of labelling schemes may be undermined.

145. Perhaps specific guidelines for manufacturing process quality can be established, rather than set standards. The certification of these processes as "green" could be left to private organizations. Large corporations could play a useful role by requiring their overseas suppliers to adhere to certain principles of environmental soundness, much along the lines followed for quality control. In certain specific instances, minimum standards could be established, especially where hazardous or toxic waste is involved. An appropriate role for UNIDO may be to assist firms in achieving these standards and developing the capabilities to meet best operating practice guidelines.

2. Economic instruments

146. The main effect of subsidies, charges or other economic instruments are likely to be on the cost-competitiveness of firms and sectors. Subsidies for environmental purposes can cause trade distortions, a fact already recognized in OECD. Government support for pollution abatement can lower production costs and raw material costs.

147. In OECD, other forms of economic instruments are coming into increasing use: emission charges, product charges, administrative charges, deposit refund schemes, fiscal incentives etc., but the trade effects of these are still not well understood.

3. Trade instruments

148. Three types of trade instruments are being used to implement environmental policies: complementary measures, which are implemented in coordination with domestic environmental measures; coercive measures, which are used to influence environmental practices in other countries; and countervailing measures, which are used to counter environmental policies in other countries.

149. In all cases, the basic issue is the same: what is the net effect on trade of these measures? Some, such as import restrictions enforced to support domestic policies, can be both trade-distorting as well as environmentally positive. Others, such as coercive sanctions against goods from countries with unsound environmental policies, can be politically sensitive, but may be effective in the long run.

150. Not enough is known at present about the net gains from many of these measures. Needed is a deeper examination of the issues involved and their implications for ESID and the discussion of these issues in the appropriate fora.

151. These issues involve:

(a) The setting of guidelines for environmental policies, taking into account the impact on trade, the role of GATT, the points of contention ("sensitive areas") between industrialized and developing countries, the implications at the local and regional levels, and the financial implications thereof for developing countries;

(b) The use of trade instruments for environmental purposes, including such measures as complementary restrictions, coercive or countervailing measures, the multilateral use of trade, potential trade distortions and impacts on competitiveness and the potential role of GATT and other negotiating fora;

(c) The implications of trade liberalization for the environment, with a focus on where environmental and trade interests coincide and where they are in conflict, the special environmental needs of the developing countries and their focus on development and their need, in some cases, to protect domestic industry and to restrict exports.

IX. CONCLUSIONS AND RECOMMENDATIONS

152. From the foregoing discussion, it is evident that the scope for international cooperation to achieve ESID is vast and also complex. Clearly the political will to pursue environmentally sound industrial development at all levels is essential to its achievement. In addition, the proper knowledge base, institutions, infrastructure, skills, regulations and international agreements are needed in order to implement ESID strategies. The United Nations system and particularly UNIDO can play a key role in this regard, but success will depend heavily on the support and cooperation of both developing and industrialized country Governments, private corporations, the donor community and other relevant international organizations.

A. General recommendations

153. Based on the analysis presented in this paper, there are several general areas where international cooperation is needed to achieve ESID:

(a) Research on a variety of aspects of ESID, the extent of demand for and supply of "clean" technology, the economics of ESID etc;

(b) Improved flows of ESID related information, and the more effective utilization of this information so as to achieve practical results;

(c) Improved access to "clean" technology, which involves policy and company-level actions and commitments;

(d) Efforts to develop environmental standards and policies, taking into account the differences between countries in terms of environmental endowments, carrying capacities and comparative advantage;

(e) Mobilization of financial resources from a variety of traditional and non-traditional sources, and from the private sector in both developing and developed countries:

(f) The improvement of the competitiveness and productivity of developing country industry, and continued efforts to remove trade-related barriers to their participation in global markets based on true competitive advantage;

(g) Educational and training programmes to create skill sets and human capital in areas essential for the long-term success of ESID:

(h) Closer cooperation between the public and private sectors in industrialized and developing countries in ESID.

B. Proposed agenda for UNIDO

154. Given its mandate within the United Nations, its considerable experience with industrial development and with research on industry and development, its strong engineering and economics human resources and wide network of field offices and experts, and its "hands-on" approach to industrial development, certain broad parameters for an agenda for UNIDO are suggested. Absent is any great emphasis on addressing the trade-related aspects of ESID, since by and large these tend to lend themselves to international negotiations in fora that already exist (e.g. GATT). (However, UNIDO can play a role in assisting developing countries to meet the standards and requirements, and by industrial sector and branch analysis provide the necessary input to international negotiations and strategy development.)

1. Diagnostic and analytical studies

155. Efforts are needed to improve the understanding of the environmental dimension of industrial development, in terms of better information (on levels of pollution, waste etc.) and more comprehensive analyses of needs in terms of skills, technologies, finances etc. Also important is the development of generally acceptable procedures and guidelines for environmental accounting and auditing, GNP calculations which include the environmental costs and benefits of industrial activity, and improved analytical models of the linkages between the various stages of industrial activity in developing countries and broader environmental concerns.

156. Specifically, a variety of studies are required to establish a sound knowledge base upon which ESID strategies can be built:

(a) Diagnostic studies, which assess the "demand" aspect of ESID in various sectors and countries, in terms of technological, financial, human resource, infrastructural and institutional needs would be useful. These studies could be conducted for different "scenarios" of industrial development, based on different assumptions of growth, resource availability, national objectives, market conditions and technological development. Such scenarios would provide developing countries with the basis for designing and implementing appropriate industrial development strategies to achieve ESID. Such an effort would also be useful as an input into the developmental assistance programming of donor agencies;

(b) Analytical studies, which examine in-depth the implications of ESID strategies and actions for international trade and technology transfer, natural resource flows and financial flows, would be useful in improving the understanding of how ESID is likely to impact on important international issues for developing countries and would also serve as a basis for discussions in international fora such as GATT. Also important in this regard is the development of methodologies for natural resource accounting and GNP calculations that incorporate realistically the environmental costs and benefits of industrial activity. This would be valuable for making inter-country comparisons, development assistance programming and national industrial policy formulation. A complementary effort that is required is the preparation of guidelines and methods for firm-level accounting and auditing of environmental costs and benefits for use by firms in developing countries.

2. Information exchange and follow-up

157. There is a clear need to improve the quality, flow and exchange of information between countries and at the enterprise-to-enterprise level on environmentally sound technologies, management experiences, resources, skills etc., and to ensure that this information is used well.

158. UNIDO could consider joining with key clearing-house networks such as the ones operated by UNEP/IEO, to facilitate the exchange of information on experiences of individual firms trying to improve the sustainability of their operations. Case studies focusing on technology acquisition, R and D, employee training and strategic management would be helpful to developing-country enterprises interested in reducing their environmental impact but lacking the experience needed to do so effectively. The International Environmental Bureau (IEB) of the International Chamber of Commerce, which helps small- and medium-sized businesses obtain information to improve their environmental performance, offers a useful model in this regard.

159. Important in this regard is UNIDO's own INTIB system and its broad experience with information collection and dissemination.

160. Equally important in this respect would be the development of a "follow-on" service to assist firms in making the best use of the information provided, whether it be related to technology acquisition, capacity building, training, or firm-level cooperation.

3. Mechanisms and policies for technology transfer and development

161. It is necessary to improve the terms and conditions which influence the access to environmentally sound technologies by developing countries, and to develop science and technology policies at the national and international levels which would encourage the generation and use of such technologies at the local level.

162. Trade barriers and conflicts over intellectual property rights and patent protection are impeding the flow of these technologies into the developing world, which poses a serious threat to ESID in these regions. If technologies that reduce greenhouse gases are not accessible to developing countries, the continued depletion of the ozone layer caused by industrial activity in these countries will impact the quality of life in all countries. No single country can achieve a sustainable global environment on its own, so the technological tools that promote ESID must be spread as widely as possible.

163. To promote the international flow of ESID technologies, UNIDO could play a role in cooperation and consultation with other international organizations by:

(a) Assessing firm needs in developing countries for sustainable technologies and identifying sources and emerging R and D trends in relevant technology areas. This effort should build on existing information systems such as the Network for Environmental Technology Transfer (NETT) in Brussels, which identifies potential matches between vendors and purchasers, and the International Cleaner Production Information Clearinghouse (ICPIC) at the UNEP/IEO. (Industry and Environment Office);

(b) Assessing modalities of technology transfer (i.e. joint ventures, licensing, distribution agreements) and trade policies affecting them (i.e. intellectual property rights, tariffs and patent protection) for their implications for ESID, and providing advice to member States and enterprises in these areas;

(c) Assisting developing countries in a review of technology policies, with an emphasis on guidelines and criteria for ESID technology development, and improved integration of science and technology policies with other national policies, particularly those that foster industrial development;

(d) Identifying the financial, scientific and human resource requirements for the domestic generation and utilization of ESID technologies in developing countries and taking initiatives for international technology development for ESID, for example, a system of R and D institutes possibly modelled on the CGIAR system for agricultural research;

(e) Initiating dialogue with TNCs about prospects for technology transfer to developing countries, factors impeding such transfers and steps that could be taken to alleviate barriers.

4. Assisting member States in achieving international environmental norms standards

164. Wide variations now exist in the product standards and specifications of different countries. To some extent this is inevitable, given the unique circumstances of each country in terms of economic development and international trade relations. However, because of the inherently transnational nature of the environment, and therefore of ESID, standards that relate directly to environmental products need to be harmonized to some degree

to permit the widest possible distribution of environmentally sound products and processes. Currently, clean technologies developed in one country have limited application in many other countries, in part because of variations in standards and the rapid rate at which they are changing. This limits the market for such technologies, which in turn reduces the incentive for firms to invest in the R and D required to improve the environmental soundness of industrial products and processes. Firms making transnational purchases of clean technologies are often forced to make extensive modifications, which places developing country firms with limited technological capability at a disadvantage.

165. UNIDO already works closely with Governments and firms to assist them developing national standards and quality capabilities, as well as in improving product and process quality so as to come closer to internationally agreed upon standards. Such technical assistance will, if it takes fully into account the emerging trend toward environmental regulation, prove invaluable to many developing countries.

5. Financial mechanisms

166. UNIDO can play a useful role in the identification of innovative mechanisms to improve the level and quality of financial resources available for ESID-oriented development.

167. Innovative financing mechanisms such as eco-venture capital funds and other innovative mechanisms to encourage the growth of an "ESID supply sector" and to provide financial resources for ESID projects and programmes could be promoted by UNIDO. Much of the technological and managerial changes that promote ESID in firms present profitable business opportunities for small- and medium-sized local suppliers, particularly those capable of providing custom equipment. Mechanisms such as the Nordic Environmental Financing Corporation (NEFCO), which serves as a source of venture capital for the financing of joint ventures between Nordic and East European companies, and the World Resources Institute's "Ecovest" concept, should be studied for their relevance to developing countries. The Trust Fund mechanism operated by UNIDO also promotes a flexible mechanism by which funds may be channeled for development at the firm level. Again, UNIDO's investment promotion activities, including investment fora and the Investment Promotion Services, could be utilized to mobilize finance for such ventures.

6. Identification of key areas of opportunity for developing country industries

168. The global concern with environmental issues could conceivably offer some "windows of opportunity" for developing the emerging international market for environmental goods and services. UNIDO could play a useful role in identifying those specific areas or "niches" where developing countries may have a competitive advantage (e.g. in certain parts of the materials or product loops referred to in Working Paper I, in activities that are inherently labour-intensive, or small-scale in nature) and assist developing countries in taking advantage of these opportunities. This again would build on UNIDO's extensive experience in pre-investment studies, including opportunity studies and pre-feasibility studies, as well as wider sectoral studies at the national and international levels.

7. Training and education

169. The success of ESID will depend heavily on the availability of the proper sets of skills at all levels. Efforts are therefore needed to develop technical and managerial skills in developing countries through training programmes, changes in curricula in schools, vocational training institutes and universities and the development of educational materials for dissemination to industry. Executive seminars designed to show industrialists the business benefits that can be derived from environmentally sound activities would be particularly useful on topics such as Environmental Auditing, Environmental Quality Management, Technology Acquisition and Licensing etc. The training aspect of UNIDO's existing work on feasibility studies and on technology acquisition are already significant, and the new activities could build on them.

8. A dynamic public: private partnership for ESID

170. The active involvement of the private sector, including both small and large enterprises, is essential to ESID. Efforts are needed to develop dynamic mechanisms that promote the participation of the private sector in ESID efforts of Governments and international agencies.

171. UNIDO could contribute in this area by taking the initiative, perhaps in collaboration with other organizations such as the ICC.

172. A specific initiative may be the development of industry liaison mechanisms to engage industrialists in dialogue with governmental officials at the policy level. The strengthening of relevant national industry associations through training, technical assistance and financial support for improving their capacity to promote environmental concerns among their memberships is another potential role for UNIDO.

9. Promoting industrial efficiency

173. Underlying all of these suggested recommendations, however, the importance of efforts to improve the efficiency, broadly defined, of industrial activity in developing countries must always be recognized. Enhanced productivity and efficiency and balanced industrial development in developing countries is a principle that must be followed in order to achieve ESID and equitable growth in the long term. The contributions of new management techniques and "soft" technologies for productivity enhancement within the context of ESID need to be more fully explored. In this regard, the activities of organizations such as the Global Environmental Management Initiative (GEMI), with its focus on applying Total Quality Management principles to environmental management, are particularly relevant.

174. UNIDO's own industrial rehabilitation programme could serve as the basis on which an ESID-focused industrial productivity improvement programme could be built.

Notes

1/ United Nations Industrial Development Organization, Industry and Development: Global Report 1990/91 (UNIDO publication, Sales No. E.90.III.E.12).

2/ "Options to increase transfer of environmentally sound technologies to developing countries on favorable terms". United Nations Centre on Transnational Corporations, New York, 23 April 1991. Draft mimeo.

3/ George Heaton, Robert Repetto and Rodney Sobin, Transforming Technology (Washington, D.C., World Resources Institute, 1991).

4/ James A. Tobey, "The effects of domestic environmental policies on patterns of world trade: an empirical test", KYKLOS, vol. 43, 1990, pp./191-209.

5/ Heaton, Repetto and Sobin, op. cit., p. 30.

6/ United Nations Environment Programme, "Meeting of Experts Organized in Cooperation with the World Intellectual Property Organization on the Role of Intellectual Property in Technology Transfer as Provided for Under the Montreal Protocol". Geneva, draft report, 26-27 April 1990. Also, World Intellectual Property Organization, "Basic notions of industrial property and licensing" (WO/INF/51), Geneva, 20 April, 1990.

7/ International Environmental Bureau, "Technology cooperation for sustainable development", paper presented to the Second World Industry Conference on Environmental Management, 11 April 1991, Rotterdam.

8/ See, for example, Kurt Hoffman, "Technological advance and organizational innovation in the engineering industry", World Bank Industry Series Paper, No. 4, March 1989.

9/ "Guidelines for the Application of Economic Instruments in Environmental Policy", Environment Committee Meeting at Ministerial Level Organisation for Economic Co-operation and Development, Paris, January 1991.

10/ United States of America, Environmental Protection Agency, "Final Report to the Administrator of the U.S. Environmental Agency from the International Environmental Technology Transfer Advisory Board", Washington, D.C., 1990, p. 15.

11/ Organisation for Economic Co-operation and Development, The State of Environment (Paris, 1991), p. 274.

Annex I

THE ROLE OF THE UNITED NATIONS DEVELOPMENT PROGRAMME

1. The recommendations of the World Commission on Environment and Development provide the basis for the recent and future activities of the United Nations Development Programme (UNDP). More specifically, the Commission's concept of sustainable development is at the core of UNDP's collaboration with other United Nations specialized agencies, regional commissions and development banks, and independent sector organizations. UNDP's work with these groups has covered wide geographic and topical realms in promoting the integration of economic development and the environment.

2. In 1989-1990, UNDP concentrated on increasing the efficiency of policy, technical, and management support from the Bureau for Programme Policy and Evaluation and the regional bureaux. Each project considered by UNDP was tested for compatibility with the sustainable development concept. The overall operationalizing of sustainable activities in UNDP activities was accomplished by strengthening of the coordinating body, the Environmental Action Team. The Environmental Action Team promoted public awareness through the use of videos and various workshops, which led to reports and recommendations. During this time, UNDP also advocated the creation of the Sustainable Development Network (SDN), which would reinforce the connections among their 113 field offices. The soon to be finalized UNDP Environmental Management Guidelines offer advice on how to incorporate the principles of environmental management and sustainable development into daily activities. UNDP's Human Development Reports attempts to incorporate environmental considerations into their assessment of economic development. Again, workshops and seminars served as the vehicles of dissemination.

3. These UNDP activities facilitated international cooperation between developed and developing countries. The main issues of these activities were technology transfer in areas of urban transport, renewable energy sources, coastal management, combating desertification, sustainable management of tropical forests, maintaining soil productivity, waste management, chloro-fluorocarbons, biotechnology, atmospheric data collection, and natural resource accounting. The approach to handling these issues revolved around environmentally sound, equitable economic growth. Some specific actions include an assessment of the implications of China's participation in the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, a pilot project for involving youth in environmental activities in the Dominican Republic, community-level and non-governmental organization networks in Africa and in Latin America, and collaboration with the World Meteorological Organization on climate change.

4. UNDP has supported numerous regional efforts to adapt specific recommendations of the Brundtland Report. These projects identify the needs of specific ecosystems, like the regional project for Amazonian cooperation. Regional projects exist in Africa, in the Arab States, and in Europe. Other specific actions included work with UNEP, UNESCO, and UNICEF on the World Conference on Education for All in March 1990 and a joint effort with the World Resources Institute to produce "World Resources 1990-91: A Guide to the Global Environment". UNDP is the lead financing agency for the Tropical Forestry Action Plans as well.

5. For 1991 and beyond, UNDP plans to continue with the projects and goals described above, while intensifying existing connections with other United Nations specialized agencies, especially UNEP. A stronger emphasis on community and grassroot projects will be followed through the arms of the 113 field offices. UNDP is actively involved in the Global Environment Facility, a clearinghouse and policy-guidance centre, along with the World Bank and UNEP. Further financial contributions by UNDP in research and development, technology transfer, mobilizing other resources and strengthening the technical and scientific human resources and policy frameworks at the country level will all be fully compatible with the complete union of development and the environment.

Annex II

DESCRIPTION OF ENVIRONMENTAL ACTIVITIES OF REGIONAL DEVELOPMENT BANKS

1. The Environment Division of the Asian Development Bank (AsDB) examines all AsDB projects for environmental soundness, in close cooperation with Member States and other international organizations involved in development. The Division is directly involved in the implementation of projects dealing with natural resource use and training of Bank staff. Since 1989, AsDB has been involved in institution strengthening programmes to enhance environmental protection in Bangladesh, Fiji, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Western Samoa and Vanuatu.

2. The Environmental Unit within the Central Projects Department of the African Development Bank (AfDB) has a small staff responsible for coordinating all technical aspects of programmes related to the environment, developing environmental assessment guidelines and training other AfDB staff. Since 1989, AfDB policy has mandated a greater emphasis on environmental concerns in lending programmes in agriculture, transportation, industry, and health and education.

3. The Environmental Management Committee of the Inter-American Development Bank (IDB) embarked on an Environmental Work Plan in 1987 to propose environmental protection and mitigation measures for IDB programmes and can propose abandonment of projects it believes will result in serious environmental damage. IDB and the Organisation of American States (OAS) work jointly on feasibility studies of watershed management projects in the region and with the Pan-American Health Organization on projects related to health, water and sewage. In addition, the IDB provides training to public agencies in developing countries of the region in the areas of conservation and natural resource management.

Annex III

TRANSNATIONAL CORPORATIONS

1. The United Nations Centre on Transnational Corporations (UNCTC) recommends that decision makers in transnational corporations be required to prepare public environmental impact statements before instituting policy regarding transportation, energy consumption, waste disposal, or anything else that may affect the environment. Such a requirement would lead to the consideration of a broader range of alternatives than would be derived from the short-term profit motive alone. In the long term, including environmental concerns in strategic decision-making could lead to more efficient, cost-effective operations and could preclude the need for large investments later on to comply with ever-increasing environmental protection standards.

2. To the extent that additional investment is required, various incentives and regulations must be in place to establish a competitive environment in which "mortgaging the future" for the sake of short-term profit is an ineffective business practice.

3. Global environmental problems such as the greenhouse effect or acid rain deserve special attention from TNCs because, unlike local pollution problems such as unsustainable solid waste disposal, degradation of the atmosphere cannot be cleaned up by human intervention in most cases. Public and corporate policies do not yet take full account of the gravity of this risk.

4. In terms of public regulation and incentive policies to control emissions, there is as yet no policy - or even a mechanism for establishing policy - to regulate or impose liability on companies that contribute to the greenhouse effect. At present, public policy is limited to national borders. The best hope may therefore lie in the development by the private sector, primarily TNCs, of alternatives to chemicals such as CFCs. Regulation, whether it is global or not, will not be able to reduce destructive emissions and at the same time promote industrial development unless viable alternatives are available. Even now, UNCTC reports that many companies are saving money by using new processes that are more cost-effective and clean than those using CFCs. Major CFC producers that warned only a few years ago that the elimination of CFCs could mean the end of modern necessities such as refrigerators and personal computers, now consider the Montreal Protocol's goal of a phase-out of CFCs by the year 2000 to be achievable.

5. TNCs are under no general obligation to assess the environmental impact of their activities or to make such information public. Disclosure laws are now limited almost entirely to the need to demonstrate compliance with a few laws. Most countries have a number of laws related to local environmental concerns such as waste disposal, but no laws require TNCs to take account of the global environmental effects of their activities. Under these circumstances, companies that choose to disclose information only increase the likelihood of litigation and risk putting themselves at a disadvantage relative to companies that do not disclose. Systematic disclosure rules are therefore needed to encourage the exploration of clean alternatives to present practices.

6. UNCTC has developed "Criteria for Sustainable Development Management" to establish a foundation for stimulating management thinking on sustainable development. TNCs are asked to continuously evaluate their products, production processes and corporate objectives in light of environmental and public health, and then create a sustainable development policy that integrates their findings with other corporate objectives.

7. Industrial associations can assist in the creation of these policies by establishing environmental and energy use standards in the same way that they now set quality and production standards needed to maximize market performance. These associations have extensive experience, especially in the industrial world, in setting and enforcing responsible standards. There is no logical reason to assume that their role cannot be expanded. Standards for vehicles, lighting systems, cogeneration of energy and recycling are all potentially achievable.

8. For individual products, UNCTC recommends that TNCs prepare "generic environmental impact statements" to include estimated impacts of the products under normal use; an assessment of alternative production approaches; and a cost-benefit analysis that is quantified as much as possible, but which includes qualitative discussion of environmental externalities. For production facilities, an environmental impact statement should be specific to each plant and include comparative data on plants of similar size producing similar products.

9. Because TNCs do business in many countries, there is a need for a central agency to review these statements and file them in a database, which could be accessed by any country considering accepting TNC foreign investment. This information would also be invaluable in the development of local industries with limited technical resources.

10. Some attempts have been made to calculate the costs of global warming, including the EPA report, "Policy Options for Stabilizing Global Climate Change". However, a far more useful measure is an estimate of the costs of reducing greenhouse gas emissions compared to the cost of not doing so. However, the cost of inaction is practically incalculable. Even if the analysis is restricted solely to the costs of rising sea levels, the task is unmanageably large and it would be of little value because it would not include the still more enormous impact of changing seasonal cycles and increased exposure to ultraviolet radiation on the food supply and public health. However, it can be said that significant sea level elevation would hit TNCs particularly hard in monetary terms, given their investments in shipping, offshore drilling and coastal storage facilities.

Annex IV

INTERNATIONAL CHAMBER OF COMMERCE GUIDELINES

1. In November 1990, the International Chamber of Commerce adopted its Business Charter of Sustainable Development, which includes a set of Principles for Environmental Management to guide enterprises in their efforts to improve their environmental performance and to foster sustainable development by mobilizing managerial, technical and financial resources to resolve environmental problems. The Charter was one of seven projects initiated by business leaders from the industrial world at the Bergen Conference in May 1990 and was first publicly announced at the Second World Industry Conference on Environmental Management (WICEM II) in April 1991.
2. The Principles were prepared to demonstrate to companies that sound environmental management is a key determinant in sustainable economic growth and to strengthen the voice of business in the public policy debate over the environment by demonstrating to Governments and the public that business recognizes its environmental responsibilities and is formulating practical procedures to meet them.
3. The Principles recommend that firms need to remain informed about the increasing depth of scientific understanding regarding the environmental impacts of industrial activity and the technological developments that can help to use this research as a guide in modifying their activities. Where significant hazards cannot be eliminated, companies should have detailed emergency preparedness plans developed jointly with relevant authorities and local communities. When significant technical or managerial solutions are developed, the Principles encourage companies to disseminate them as widely as possible and contribute their new knowledge to the development of public policies and educational programmes.
4. Environmental impact assessments made before a new activity is initiated will encourage the development of new products that have minimal destructive effects, particularly if producers increase their efforts to advise customers on the use, transportation, storage and disposal of their products.
5. In designing facilities, care should be taken to ensure the efficient use of energy and material, recycling wherever possible and disposing of remaining waste safely. For operating facilities, the Principles encourage companies to continuously measure and improve their environmental performance through environmental audits.
6. Companies are also encouraged to promote these Principles among their suppliers and contractors and to use their leverage to ensure compliance.