CHAPTER X

PROTECTING THE ENVIRONMENT

A. The importance of the environment for development

There is a strong link between development and environmental protection. Economic growth may, in the absence of appropriate action at various levels, degrade the environment.[1] At the same time, development offers new opportunities for environmental protection by increasing and diffusing more advanced environmental technologies and management systems and allows for more environmentally friendly consumption patterns. The challenge for developing countries is to take advantage of the latter, minimizing and managing the environmental stress caused by economic growth and maximizing the benefits of their environmental endowments.

Traditionally, moral and regulatory imperatives were the principal drivers of environmental responsibility. These are still relevant today. But they have been complemented by a number of new drivers, which have emerged from a cross-section of stakeholder groups such as non-governmental organizations, employees, consumer groups and local communities, shareholders of companies and financial institutions that lend to firms (box X.1) (Warhurst, 1998). Some of these are quite visible, as demonstrated for example by the campaign surrounding the disposal of the Brent Spar oil platform by Shell. The impact of these driving forces is amplified in a globalizing world economy, with TNC systems serving as an additional conduit.

These new drivers have resulted in two changes in the analysis and understanding of the relationship between environmental protection and development:

- A general understanding of this relationship has evolved. The use of inappropriately priced environmental resources has traditionally been considered a necessary cost of economic growth.[2] Today, however, with economic development (box V.1) defined to involve a broadening of choice, protecting the environment is a major objective of countries.[3] It is now commonly accepted that both - environmental protection and economic efficiency - can, and should, be achieved simultaneously.[4] This approach is being adopted by many actors, including firms, and has resulted in their becoming actively involved in addressing environmental issues.[5]

- The scope of the accepted definition of “environmental damage” has widened. Traditionally, environmental damage was associated with process issues such as industrial pollution (the degradation of air, land and water caused by, for example, chemical plants or pulp and paper mills) or with the excessive extraction of renewable and non-renewable

resources. Today, there is a growing recognition that protecting the environment requires that the entire range of production processes and products be environmentally friendly. Land, water and air are constituents of the environment that, if damaged or exhausted, may affect negatively the health of ecosystems, including human health and well-being. Moreover, these effects are experienced differently depending on the relationship of a stakeholder group to a given project, as the effects will be different for members of the working, local, regional, national or international community.

Environmental protection is increasingly being reinforced by sound business considerations. Investors always seek to reduce their credit risk, which is now increasingly a function of the corporate capacity to manage environmental risk. In addition, firms are finding that environmental protection and competitiveness are not mutually exclusive. It is possible to be eco-efficient, that is to reduce both negative environmental impact and costs of production simultaneously. For example, between 1975 and 1996, 3M reduced its waste released to the environment by 1.4 billion pounds and saved over $750 million (Schmidheiny *et al.,* 1997). Similarly, between 1992 and 1998, SC Johnson reduced its waste output by 420 million pounds and, by so doing, reduced its costs by $125 million (WBCSD, 1999).

Moreover, consumers in some countries are now more environmentally conscious in making their purchasing decisions. This is creating both a market for "green" products and opening another avenue by which firms can be pressured to respond to environmental concerns (Schmidheiny *et al.*, 1997). Companies are called upon to be more careful in identifying the environmental damage caused not only by their core activities, but also activities generated by their backward and forward linkages. For example, companies selling household products have found that their environmental impact is largest outside their direct activities, including their supply chain as a whole, the raw materials they use and the disposal of their products.

In response, a growing number of firms are concerned with their "environmental footprint". This encompasses the entire life cycle of a product, from the design stage (e.g. ensuring that a product makes a greater use of recycled material and uses production processes that minimize environmental damage) to its disposal. The demand for change from firms with regards to their effects on the environment is also reflected in the increased stringency of national environmental regulations in a growing number of countries. This concern has also found its way into international commitments. Perhaps most prominently among them is Agenda 21, the call for action from the 1992 United Nations Conference on Environment and Development, which contains a number of provisions across five chapters directly addressed to TNCs (annex table A.X.1).

These changes are positive. But, on their own, they are not sufficient to ensure an equitable intergenerational access to the world's resources. The responses by governments, firms and consumers vary across countries and by level of development. Protecting the environment therefore remains a challenging task. This is particularly so because the fundamental tension between the profit motive of private firms and the public interest in protecting the environment has by no means vanished, and because market failures continue to persist in the use of environmental resources due to such factors as the inability to define property rights properly, bargaining costs between relevant parties, or the valuation of the environmental damage (UNCTC, 1992; World Bank, 1992). In addition, firms may be locked into older vintages of technology that were developed prior to regulatory upgrading (Warhurst, 1992).

Policy decisions are still often taken in response to immediate employment and output objectives. The pressures of delivering high economic growth rates and securing FDI, especially in developing countries, may in some instances tempt them to accept environmentally risky activities. Developing countries have dealt with such situations in a variety of ways, sometimes with the assistance of development agencies. But they often lack the resources[6] and technical expertise in inspection, monitoring, enforcement and prosecution needed to implement appropriate environmental legislation, and the ability to work collaboratively with those they regulate to improve environmental performance. This chapter analyses the role played by TNCs in developing country efforts to meet these challenges and the policies by which host countries can maximize the positive contribution of TNCs to environmental protection.

Box X.1. TNCs and the new context in the mining industry

Much of the focus of the early debate on the environmental performance of TNCs in developing countries was placed on mining companies. The highly visible and localized environmental impacts of mining were no doubt among the reasons for this attention. Another reason was the presence of mining TNCs in developing countries already at the early stages of FDI expansion in these countries. This presence resulted from the fact that mining faced fewer and less important obstacles to TNC entry into host countries; it also has market access in importing countries and is less dependent on the presence of a skilled workforce and a well built up infrastructure in host countries. In other instances such as the Brazilian Grande Carajás project to exploit large mineral reserves in the southeastern Amazon, in the 1980s a major factor was the role played by OECD donors and the World Bank (Kolk, 1996, 1998). The dependence of the mining industry on one specific locational factor - the presence of high-quality mineral deposits - reduces the relative weight of other factors.

Accordingly, when international attention began to focus on the performance of TNCs with respect to the environment, mining companies had operations in place in developing countries that in many cases had been present for years or even decades. The environmental impacts of mining are largely determined at the development stage, when the basic layout of the operation, including the location of shafts, pits and tailings dams, is defined, and it is almost impossible to undertake radical changes later. It has proved possible to reduce the environmental impact of these older operations significantly through incremental changes to operations. Examples of such changes include improvements in ore processing technology which have reduced airborne emissions, increased re-use of processing water and improved dust control. Nevertheless, there is still a marked difference between older mines and newer operations with respect to environmental performance, particularly where the physical layout of operations make changes difficult to undertake. Examples of such differences are the rehabilitation of mined-out areas and the management of groundwater impacts from mine pits and tailings dams. In more recently built mines, factors such as improved environmental management techniques, new technology, lower costs of environmental mitigation and rehabilitation, and the introduction of planning for closure from the start of a project, have all contributed to a reduction of environmental impacts during and after operation. Only in exceptional cases, however, is it possible to achieve "zero impact", which requires restoring the mined land to a state close to the original one with no need for continued surveillance.

Due to the broad age distribution of operating mines, the environmental performance of mining companies has sometimes been assessed on the basis of capital investments of a much older vintage than for enterprises in other industries. This may have led to a more negative public perception of mining TNCs than would otherwise have been the case. The public image of mining TNCs has been further affected by a number of recent widely publicised incidences of spills from tailings dams, e.g. in Guyana in 1995, the Philippines in 1996 and Spain in 1998. While none of these resulted in loss of human life, a less publicly noticed collapse of a tailings dam in South Africa in 1994 resulted in 17 deaths (Ostensson, 1999).

Individual mining TNCs have reacted to public criticism both by improving environmental management practices and, in many cases, by establishing industry-wide guidelines or codes of conduct, also covering the performance of sub-contractors. For reasons given in the main text of this chapter, most mining TNCs apply environmental standards in new projects that are in conformity with their home country standards. Efforts to establish industry-wide guidelines, while successful in individual countries such as Australia and Canada, have not yet succeeded at the global level. The only set of guidelines applying to a large group of international mining companies is the Environmental Charter of the International Council for Metals and the Environment (ICME) (UNCTAD, 1996e). The ICME Charter is considerably less ambitious than the guidelines applied by many individual mining companies and it does not provide for monitoring or sanctions. Part of the reason for the lack of ambitious, industry-sponsored international guidelines is probably the aforementioned co-existence of mines of different vintages, which complicates the introduction of a common set of standards.

While governments generally rely on "command and control" type policies for regulating the environmental impact of mining operations, economic measures are gaining importance. This is the case in particular when it comes to financial guarantees against environmental damage. Governments commonly require the establishment of a trust fund or other guarantees that can be used to mitigate environmental damage or compensate those affected by it. The most important objective of such guarantees is to provide sureties that mine sites will be restored after operations have ceased, even if the operating company no longer exists.

Source: UNCTAD.

B. Environmental strategies of TNCs

Environmental resources are an input into the production process. The extent of their use or damage by TNCs ranges across mining and other natural resource industries to manufacturing industries and services. The response of TNCs to environment issues differs in one important respect from that of uninational firms: in addition to managing the environment through pollution - abatement practices, environmental management systems, education and training, TNCs must also manage these issues in relation to their affiliates across international borders. Hence, an added dimension for them is cross-border environmental management, which is a key issue in assessing their impact on the environment in host developing countries.[7]

When it comes to managing the environment, TNCs have at their disposal the same type of strategies available to other firms. They can be end-of-pipe, where the focus is on "add-on" technology to address disposal and clean-up; or process-oriented, where environmental damage is prevented from the outset. The choice of option may reflect different business perceptions of environmental challenges, they also are indicative of the options available by virtue of the different products and processes involved. The perspective that addressing environmental issues is a burden, or where there are constraints related to resources or technology, can result in an end-of-pipe strategy. In contrast, if environmental protection is perceived to be a challenge and is integrated into decisions regarding business profitability, firms tend to pursue process- and product-oriented environmental management strategies.

The way in which the range of environmental management approaches is handled within a TNC system has implications for host developing countries. Again, a range of options exists. One is a decentralized strategy. Some parent firms leave all environmental issues to be addressed at the level of their foreign affiliates. Affiliates here have a commitment to the environment that is defined by the requirements of national law. If the host country does not have strict environmental legislation in place, affiliates can either choose the least-cost strategy or, alternatively, behave pro-actively in a more environmentally responsible manner; where legislation is more stringent, they comply accordingly. Affiliates are aware that they have a legal responsibility for environmental care, and pursue it within the framework of the laws and regulations of the host country.

A second strategy is to centralize environmental decisions for a TNC system as a whole. This would seek to ensure that the environmental performance of a firm is similar in all countries; it would also ensure that the activities of an affiliate in one host country do not have an adverse impact on the reputation of other affiliates or the parent firm. Within this centralization strategy, however, there could be different approaches:

- A parent firm could establish a framework within which affiliates are required to optimize their environmental performance, with due regard to domestic laws. The framework could include, for example, principles of environmental performance, reporting requirements and managerial responsibility.

- A parent firm could establish uniform environmental standards across the entire TNC system, compatible with each host country as well as the home country. Thus, the highest national level of all the countries in which the TNC operates sets the standards. One variation of this approach is to set standards higher than those in any of the countries in which the firm operates. Another is that the standards are minimum, with affiliates in countries with higher standards being required to deviate upwards.

- A parent firm could establish comprehensive uniform environmental standards across not only the entire TNC system, but also across input suppliers, regardless of ownership.

The choice of strategy depends on a complex mix of considerations. Some factors are:

- The environmental impact of the activities of a particular TNC. If it is low to begin with, there may be less of an incentive to pursue a centralized strategy.

- The implications for competitiveness of the affiliates and the TNC system as a whole. This goes beyond the direct costs of environment technologies and management. However, they need not deter the adoption of a centralized environmental strategy: other incentives may exist, national or international, to adopt clean technologies.

- The threat of liability. This is a major consideration for TNCs in implementing environmental protection. The potential liability of environmental litigation can be more important to firms than the cost of clean technology implementation (UNCTAD, 1996f). In addition to the public embarrassment of being caught deploying poor environmental technology or inefficient managing the environmental technology in place, and the threat of consumer boycotts, there is even a possibility that company executives could be extradited to face trial in the host country.[8] All this can have serious consequences for the reputation of a firm and its brand names, with immediate implications, for instance for the firm's stock market valuation (UNCTAD, 1998h).

- Uncertainty with respect to host government policy. While implementing less stringent technology in an affiliate may seem appropriate where it meets existing host country legislation, this could be short sighted. A host country government could later introduce more stringent regulations, requiring the affiliate to upgrade its technology and incur the costs of complying with the new regulations (Hansen, 1998; Adams, 1997). Moreover, it may be cheaper to anticipate the upgrading of environmental legislation by installing the latest technology.

- The role of consumer markets. In some cases, the shift towards a centralized strategy is due to the perception that there are competitive advantages in being "green". For example, the following products are now being advertised as being environment friendly:

  - household products such as cleaners that are phosphate free;
  - packaging of consumer products that require less landfill; and
  - consumer electronic equipment (such as computers) that is energy efficient, uses more recycled material for input, and creates less waste when being disposed of.

- Home country regulation. TNCs have been shown to be strongly influenced by home country regulations (UNCTAD, 1993c). This is due to a combination of factors, which include greater shareholder accountability, the potential embarrassment of having higher environmental performance in the home country than in host countries and, in the case of a number of countries, greater public demand for a better environment.

- The nature of costs also matters, especially in the application of environmentally sound technologies and environmental management systems; in particular, it is important to distinguish between the size and type of costs (Adams, 1997). Fixed costs such as the costs of installation of equipment to reduce emissions have a different effect on the choice of strategy than variable costs such as compliance checks or the use of more costly inputs. The existence of fixed costs means that there are scale economies in implementing clean technologies. Thus, it may be cheaper for a TNC to implement the same clean technology across its entire corporate system than to tailor the technology to each affiliate (Hansen, 1998). A distinction, however, has to be made between cases that use process-based technology or end-of-pipe technology. The incentive in the former to implement the same high-level technology is higher.

In sum, a TNC can pursue a wide range of environmental strategies, from comprehensive ones that ensure that its worldwide environmental costs are increasingly internalized, to those that focus on ensuring compliance with local regulations. The environmental implications for host countries depend on the type of strategy followed by a TNC and the public policy framework within which the strategy is pursued.

C. The impact of FDI on the environment in host developing countries

Environmental degradation in host developing countries is a consequence of both production and consumption patterns within countries and of its export markets. Apart from regulations and corporate strategies, the environmental effect of FDI depends on a combination of macro and micro issues. At the macro level, the issue is the profile of FDI, i.e. the type of industry in which FDI takes place and, especially, the extent to which it involves pollution-intensive activities. At the micro level it is the specific decisions that TNCs make with regard to their management of production activities and the application and diffusion of environmentally sound technologies. Each of these issues is examined in this section with specific reference to the question of whether or not foreign or domestic ownership matters.

1. An environmental profile of FDI

The effect that production processes can have on the environment depends considerably on the industry involved. Some industries are classified as potentially highly polluting in the sense that they can have large negative effects on air, water and land, while others have minimal effects. Studies to identify these industries use different criteria, but arrive at similar conclusions:[9] traditionally, industries classified as potentially highly polluting include chemicals and allied products, mining for minerals and metals, pulp and paper, fabricated and non-fabricated metals, cement, glass and ceramics (table X.1). However, data shortfalls do not allow testing for a precise correlation between the potential pollution intensity of industries and FDI. It is important to note therefore that the subsequent discussion is based only on an approximation of the pattern of TNC participation in pollution-intensive industries. In addition, there may be substantial foreign control of some activities without direct foreign equity participation, for instance via subcontracting or licensing relations. It is then difficult to distinguish the real environmental profile of TNCs: foreign affiliates may have high environmental standards while suppliers or licensors may not. The substantive issue is the environmental footprint of the activities of a given TNC.

Table X.1. Environmental impacts of selected industries

Industry	Air	Water	Soil / land
Chemicals (industrial inorganic and organic compounds, excluding petroleum products).	• Many and varied emissions depending on processes used and chemicals manufactured. • Emissions of particulate matter SO_2, NO, CO, CFCs, VOCs and other organic chemicals, odours. • Risk of explosions and fires.	• Use of process water and cooling water. • Emissions of organic chemicals, heavy metals (cadmium, mercury), suspended solids, organic matter, PCBs. • Risk of spills.	• Chemical process wastes disposal problems. • Sludges from air and water pollution treatment disposal problems.
Paper and pulp.	• Emissions of SO_2, NO_x, CH_4, CO_2, CO, hydrogen sulphide, mercaptans, chlorine compounds, dioxins.	• Use of process water.	• Emissions of suspended solids, organic matter, chlorinated organic substances, toxins (dioxins).
Cement, glass, ceramics.	• Cement emissions of dust, No_x, CO_2, chromium, lead, CO. • Glass emissions of lead, arsenic, SO_2, vanadium, CO, hydrofluoric acid, soda ash, potash, specialty constituents (e.g. chromium). • Ceramics emissions of silica, SO_2, NO_x, fluorine compounds.	• Emissions of process water contaminated by oil and heavy metals.	• Extraction of raw materials. Soil contamination with metals and waste disposal problems.
Mining of metals and minerals.	• Emissions of dust from extraction, storage, and transport of ore and concentrate. • Emission of metals (e.g., mercury) from drying of ore concentrate.	• Contamination of surface water and groundwater by highly acidic mine water containing toxic metals (e.g. arsenic, lead, cadmium). • Contamination by chemicals used in metal extraction (e.g. cyanide).	• Major surface disturbance and erosion. • Land degradation by large slag heaps.

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Table X.1. Environmental impacts of selected industries (concluded)

Industry	Air	Water	Soil / land
Iron and steel	• Emissions of SO_2, NO_x, hydrogen sulphide, PAHs, lead, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, zinc, organic compounds, PCDDs/ PCDFs, PCBs, dust, particulate matter, hydrocarbons, acid mists. • Exposure to ultraviolet and infrared radiation, ionizing radiation. • Risks of explosions and fires.	• Use of process water. • Emissions of organic matter, tars and oil, suspended solids, metals, benzene, phenols, acids, sulphides, sulphates, ammonia, cyanides, thiocyanates, thiosulphates, fluorides, lead, zinc (scrubber effluent).	• Slag, sludges, oil and grease residues, hydrocarbons, salts, sulphur compounds, heavy metals, soil contamination and waste disposal problems.
Nonferrous metals treatment,	• Emissions of particulate matter, SO_2, NO_x, CO, hydrogen sulphide, hydrogen chloride, hydrogen fluoride, chlorine, aluminum, arsenic, cadmium, chromium, copper, zinc, mercury, nickel, lead, magnesium, PAHs, fluorides, silica, manganese, carbon black, hydrocarbons, aerosols.	• Scrubber water containing metals. • Gas-scrubber containing solids, fluorine, hydrocarbons.	• Sludges from effluent coatings from electrolysis cells (containing carbon and fluorine) soil contamination and waste disposal problems.
Coal mining and production	• Emissions of dust from extraction, storage, and transport of coal. • Emissions of CO and SO_2 from burning slag heaps. • CH_4 emissions from underground formations. • Risk of explosions and fires.	• Contamination of surface water and groundwater by highly saline or acidic mine water.	• Major surface disturbance and erosion. • Subsidence of ground above mines. • Land degradation by large slag heaps.
Refineries, petroleum products	• Emissions of SO_2, NO_x, hydrogen sulphide, HCs, benzene, CO, CO_2, particulate matter, PAHs, mercaptans, toxic organic compound odours. • Risk of explosions and fires.	• Use of cooling water. • Emissions of HCs, mercaptans, caustics , oil, phenols, chromium, effluent from gas scrubbers.	• Hazardous waste, sludges from effluent treatment, spent catalysts, tars.
Leather and tanning	• Emissions including leather dust, hydrogen sulphide, CO_2, chromium compounds.	• Use of process water. • Effluents from the many toxic solutions used, containing suspended solids, sulphates, chromium.	• Chromium sludges.

Source: WRI, 1998, p. 52, based on WHO, 1997.

An examination of the industrial composition of *outward* FDI stock data from selected countries shows that the share of pollution-intensive manufacturing industries in total outward FDI stock did not exceed 16 per cent in 1996, reflecting the importance of the services sector (table X.2); it also appears that this share has been fairly stable since 1990. The share is higher when only manufacturing is considered, being highest for Germany at 40 per cent. This compares to a share of less than 6 per cent[10] for the same industries in total domestic investment of the same countries, and up to 40 per cent if put in relation to manufacturing only. When it comes to the primary sector, the share of FDI in the total has declined; however, this is due more to an increase in the share of FDI in the services sector. Outward FDI in the primary industry sector has increased in nominal terms for France, Germany, the United States and United Kingdom.

Examining FDI stock is but one way to measure the environmental profile of foreign affiliates. One can also use the share of value-added by majority-owned foreign affiliates engaged in selected pollution-intensive industries in the total value-added of these affiliates. These data, available only for United States TNCs, indicate that the share of pollution-intensive production in total affiliate production has risen slightly over time and is somewhat above the share of the same industries in total domestic United States manufacturing production (figure X.1). However, this picture differs considerably across regions: the share of pollution-intensive production in total affiliate production is the highest in developed countries,[11] and has been so for the past decade and a half (figure X.2**)**. South America and Central America have comparatively high shares, while all other regions have relatively low shares, with West Asia the lowest.

Table X.2. The share of pollution-intensive industries [a] in outward FDI stock and gross fixed capital formation, selected developed countries, 1990 and 1996

	Outward FDI stock				Gross fixed capital formation			
	Share in total stock		Share in manufacturing stock		Share in all industries		Share in manufacturing	
Country	1990	1996	1990	1996	1990	1996	1990	1996
France [b]	14.6 [c]	13.5 [d]	33.5 [c]	36.6 [d]	4.6 [c]	4.0 [d]	28.2 [c]	30.3 [d]
Germany	17.7	15.2 [e]	42.3	39.4 [e]	7.6	4.1 [e]	36.6	38.2 [e]
Japan [f]	7.4	7.6	27.9	25.9	..	..	..	..
United Kingdom [g]	10.4	13.8	26.7	33.0	2.3	2.3	17.3	17.0
United States	12.0	11.6	29.3	32.1	4.5	5.7	30.9	41.0

Source: UNCTAD, FDI/TNC database; and OECD, 1998c.

[a] Pollution-intensive industries are defined as chemicals, pulp and paper, petroleum and coal processing and basic metals industries. For the purpose of this table, the fabricated metals industry could not be included since data on gross fixed capital formation are not separately available. If the fabricated metals industry is included in outward FDI stock, the share of pollution-intensive industries would increase by almost 2 percentage points in all industries and by at most 4 percentage points in manufacturing.
[b] Does not include petroleum and coal.
[c] 1991.
[d] 1995.
[e] 1993.
[f] Notification data. Includes chemicals and manufacture of basic metal.
[g] Includes petroleum and coal, and manufacture of basic metal.

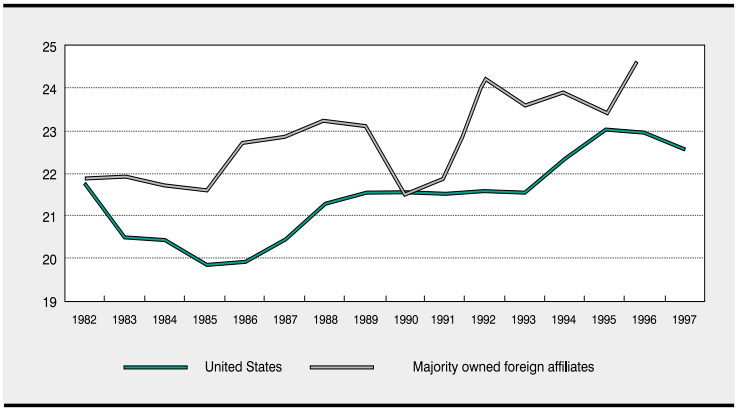
Note: Caution should be exercised when comparing shares among countries due to differences in methodology or data availability.

If *inward* FDI stock data are examined over time for a number of host countries (table X.3), no particular pattern emerges, either for developed or developing countries and either for the share of pollution intensive industries in total FDI or in manufacturing FDI: these shares are going up in some countries and down in others. However, the share of pollution-intensive industries in inward FDI stock appears to be higher than the share of the same industries in domestic gross fixed capital formation.

What the above data suggest is that, when it comes to the industrial composition of investment, the ratio of pollution- intensive industries in FDI stock appears to be higher than that in domestic investment, in both developed and developing countries (tables X.2 and X.3).

Figure X.1. Share of pollution-intensive[a] manufacturing production in total manufacturing production: United States and for United States majority-foreign-owned affiliates

(Percentage)



Source: UNCTAD, based on United States Department of Commerce data.

[a] Pollution-intensive industries are the sum of chemicals and allied products and primary and fabricated metals.

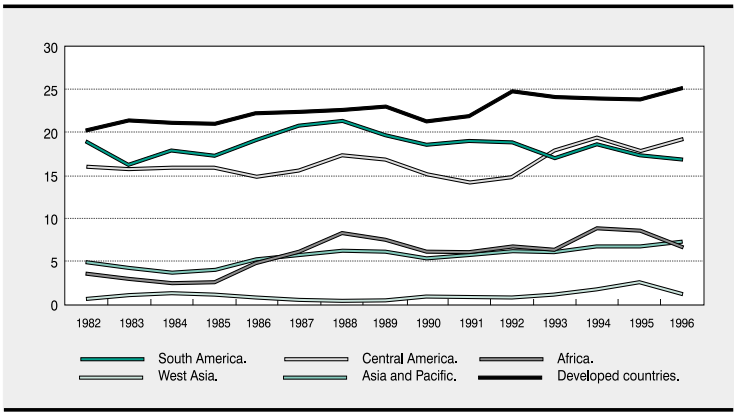
However, considerable caution must be exercised in interpreting these data and predicting environmental outcomes.

- The data may over- or underestimate the share of pollution-intensive activities across sectors and in manufacturing. Also, they do not provide information on the environmental impact of production; that impact varies, depending, among other things, on the type of technology used, the environmental management system in place and the regulatory environment. That there is FDI in pollution-intensive industries at all means that

environmental stress can be one of the consequences of FDI. Moreover, the environmental vulnerability of countries varies too; small island host countries, for example, depend heavily on tourism and a narrow range of primary products such as fisheries (ADB, 1992). Furthermore, there is a negative relationship between economic growth and some pollutants over a range of *per capita* incomes. The data also do not capture the possibility that there are varying *degrees* of environmental damage. Substantial environmental problems can arise in many industries that are not considered heavily polluting overall, for instance, textiles

Figure X.2. Share of pollution-intensive[a] manufacturing production in total manufacturing production: United States majority-owned foreign affiliates, by region, 1982-1996

(Percentage)



Source: UNCTAD, based on United States Department of Commerce data.

[a] Pollution-intensive industries are the sum of chemicals and allied products and primary and fabricated metals.

Table X.3. The share of pollution-intensive industries[a] in inward FDI stock and gross fixed capital formation, selected economies, 1990 and 1996

	Inward FDI stock				Gross fixed capital formation			
	Share in total stock		Share in manufacturing stock		Share in all industries		Share in manufacturing	
Economy	1990	1996	1990	1996	1990	1996	1990	1996
Developed economies								
France [b]	10.9 [c]	14.6	30.5 [c]	38.0	4.2 [c]	4.1	27.9 [c]	30.3
Germany	19.2	10.3 [d]	36.0	35.4 [d]	7.6	4.7 [d]	36.6	38.2 [d]
United Kingdom [e]	6.8	9.3	18.9	31.9	2.3	2.3	17.3	17.0
United States	21.6	19.5	45.9	43.1	4.5	5.7	30.9	41.0
Developing economies								
Brazil [f]	..	19.0	..	38.0	25.3	9.0 [d]	72.0	54.0 [d]
Hong Kong, China [f]	..	..	15.7	18.4 [g]	1.2	0.4 [g]	15.2	18.4 [g]
India [h]	33.6	28.5 [d]	39.6	33.8 [d]	5.9	7.8 [d]	44.0	42.4 [d]
Indonesia [h]	44.5 [d]	44.9 [i]	65.8 [d]	68.0 [i]	0.9 [d]	1.5 [i]	21.8 [d]	17.7 [i]
Philippines [j]	22.5	23.4 [d]	46.1	44.1 [d]	2.5	5.0 [d]	20.4	36.2 [d]
Republic of Korea [j]	19.3	25.9 [i]	30.9	40.9 [i]	12.5	7.7 [i]	38.6	26.5 [i]
Singapore	..	..	44.2	44.8 [g]	5.6	5.1 [g]	28.7	31.0 [g]
Thailand [j]	12.7	12.4 [k]	28.3	27.4 [k]	4.7	2.9 [k]	8.9	15.9 [k]

Source: UNCTAD, FDI/TNC database, OECD 1998c and UNIDO, 1998.

[a] Pollution-intensive industries are defined as chemicals, pulp and paper, petroleum and coal processing and basic metals industries for developed countries. For the purpose of this table, fabricated metal products could not be included in the case of developed countries as data on GFCF in this specific industry are not available. If the fabricated metals industry is included in the inward FDI stock of the selected developed countries, the shares of pollution-intensive industries increase by about 2 percentage points in all industries and by at most 4 percentage points in manufacturing in developed countries. Pollution-intensive industries in the selected developing countries include chemicals, coke, petroleum products and nuclear fuel, rubber and plastic products, basic metal and fabricated metal products.

[b] Does not include petroleum and coal, manufacture of basic metal.

[c] 1992.

[d] 1993.

[e] Includes petroleum and coal, manufacture of basic metal.

[f] Does not include petroleum and petroleum products.

[g] 1994.

[h] Does not include petroleum and coal, rubber and plastic products.

[i] 1995.

[j] Does not include rubber and plastic products.

[k] 1991.

Note: Caution should be exercised when comparing shares among economies and regions due to differences in methodology or data availability.

and clothing as well as semiconductors.[12] Finally, there are industries that may not be polluting *per se* but nevertheless raise environmental concerns because of their scale. This is the case for example in agribusiness where plantations, run as monocultures, might have a detrimental impact on the environment as could the over-use of pesticides and fertilizers. Also, logging and other forestry activities are increasingly attracting FDI. For example, almost 90 per cent of logging operations in Gabon and Cameroon are foreign owned; and foreign investment from various home countries, including developing East Asia, is going to the forestry sector in Brazil, Cambodia, Congo, Guyana, Nicaragua, Papua New Guinea, the Solomon Islands and Suriname (French, 1998). The total impact of foreign affiliates on the environment therefore depends on the scale of activity, their pollution content and the control measures used. Low pollution-content activities with large outputs and poor environmental control can do significant environmental damage.

If this is the environmental profile of FDI, the obvious question arises: what explains it?

One possible explanation given is the "pollution haven" hypothesis: TNCs shift the location of their pollution-intensive production in response to lax environmental standards. While there are some cases in which firms appear to have shifted their production activities to take advantage of lower environmental standards elsewhere,[13] there is no conclusive evidence whether TNCs *in general* exploit environmental laxity (box X.2). If that is the case, lowering environmental standards – or, for that matter, raising them – should not have a systematic impact on FDI flows.[14]

Box X.2. Testing the "pollution haven" hypothesis

There have been several approaches to testing the general "pollution haven" hypothesis (Adams, 1997). The first has been to correlate outward FDI with environmental standards. The results have found no support for the "pollution haven" hypothesis, i.e. the hypothesis that TNCs direct their investment to countries with lax standards (Leonard, 1988; Repetto, 1995; Lucas *et al.,* 1992, Eskeland and Harrison, 1997; Warhurst and Bridge, 1997). One study (Xing and Kolstad, 1997) does find the predicted effect, but its robustness has been questioned because of the use of sulphur dioxide emissions as a proxy for environmental stringency (Adams, 1997; Zarsky, 1999). The second approach has been to embed environmental regulation in a larger model of locational choice. Again, the studies find that the environmental variable is rarely significant. The most important variables remain the traditional ones of locational choice: factor endowments, infrastructure quality, distance and market size (Eskeland and Harrison, 1997).

There is also a third approach – to use case studies. This approach, which examines specific company decisions, has proved to be more successful in finding cases that support the notion that environmental standards are a factor in TNC location decisions (WWF, 1998). Examples of both - governments failing to enforce environmental legislation and firms acknowledging that lower environmental standards were a factor - were found in Costa Rica, Mexico, India, Indonesia, Papua New Guinea and the Philippines (WWF, 1998 and 1999a).

All three approaches have inherent difficulties. The first two suffer from imprecise measurement of the variables, such as environmental stringency and the difficulties plaguing FDI data and affiliate production data in general; they also rely heavily on data from the United States. The third suffers from selection bias – only firms that have actually shifted are documented.

Source: UNCTAD.

That is not surprising: a range of studies on the principal determinants of FDI locational decisions has shown that, once an enabling regulatory framework is in place, economic factors become by far the most important determinants (UNCTAD, 1998a). In addition, there may be other factors that explain the lack of a correlation between environmental standards and location decisions by TNCs:

- The costs of compliance with environmental regulations in both home and host countries are a relatively small share of total costs, and so do not weigh heavily in the final decision.[15]
- The cost of applying common standards across a TNC system may be lower than the cost of differentiating standards by country.
- The measures used in the analysis of environmental stringency and its impact may be deficient and need improvement.[16]

- TNCs are now more visible, and environmental issues more closely monitored; thus, the risks associated with environmental negligence could be too high for firms to bear, especially in large projects.

- Finally, as was observed in chapter VII, technological advantage, often a function of R&D intensity, is frequently the most powerful determinant of outward FDI. And many R&D-intensive industries are not among the most polluting ones. More broadly, FDI flows have seen a substantial shift towards services, which typically have less potential for direct negative environmental effects.

More generally, it is difficult to isolate the pollution intensity of FDI and international production from that associated with normal industrial restructuring. More importantly, what matters in the context of assisting developing countries to protect their environment is not the fact that TNCs are present, but how environmentally responsible they are in practice, in particular in terms of the diffusion of clean technology and efficient environmental management practices.

2. Environmental management and clean technology

The level of environmental degradation resulting from industrial activity is closely linked to the production efficiency of firms and their capacity to innovate. Environmental damage tends to be greatest in low-productivity operations working with obsolete technology, outdated work methods, poor human resource development, inefficient energy use and limited capital. This suggests that there is much scope for firms to improve their environmental performance by adopting corporate strategies that promote the development and mastery of technological processes and that facilitate the adoption of environmental management systems that optimize process control, continuous improvement and organizational learning (Warhurst, 1999). What this means is that, to a large extent, environmental performance is a function of the use of clean technology within an efficient environmental management framework. The discussion that follows focuses on natural resources and capital-intensive industries as these are the industries with the largest environmental impact (table X.1), although the environmental consequences of other industries are increasingly being recognized as well (von Moltke *et al.,* 1998).

A typical example is the mining industry - particularly important because operations here tend to be large relative to the size of the communities affected. It is characterized by scale economies, high capital-intensity and a dominance by TNCs. The degree of environmental degradation is determined by a combination of clean technology diffusion and management practices and host country characteristics (box X.3). FDI to many countries dependent on the export of minerals is increasing, principally as a result of the fact that they are fast liberalizing their economies to encourage FDI and are also privatizing their state-owned industries which, in many cases, were the traditional vehicle for minerals production. Historically, this state-owned production was particularly polluting on account of obsolete technology, poor human resource development, weak management and an absence of accountability (Warhurst and Bridge, 1997). The modernization of those previously state-owned projects and the inflow of new investment into new projects are leading to enhanced environmental protection overall. After a period of using rather static technology in the mining industry, innovations such as energy-efficient “flash” smelters, biotechnology-based leaching alternatives to smelting, and continuous-concentration processes are substantially reducing the overall levels of use of environmental resources, particularly energy, and damage to the quality of land, water, air and ecosystems. These innovations, plus a growing number of add-on end-of-pipe solutions (such as smelter scrubbers, acid capture equipment, water treatment plants and dust precipitators), underlie the potential that FDI promises to improve the environmental performance of industrial production in host developing countries. The policy framework needs to harness this potential through a range of innovative policy mechanisms and incentives. This is especially the case in mineral development, where new projects are very costly. As investment is financed, as a rule of thumb, one third equity and two thirds debt, environmental conditionality is increasingly being attached to the provision of credit and risk insurance.[17]

Box X.3. Key factors in the diffusion of clean technologies

A recent study evaluated the diffusion of clean technologies in 25 different FDI projects undertaken in a number of countries.[a] Four types of clean technologies were examined: The INCO SO_2 process used in cleaning effluents from gold extraction and milling processes: the Outokumpo flash smelter, an innovative energy efficient technology for smelting sulphide ores; GENCOR's (now called Biliton) BIOX and BIONIC processes which are bacterial-based leaching technologies for extracting gold and nickel from low grade ores; and the Rio Tinto environmental management system. The latter is a systematic approach to the management of environmental effects, combining a computerized system with practices monitoring and reporting procedures.

Main findings include:

- Clean-technology innovators/suppliers did not export old, obsolete, polluting technology to developing countries. Rather they sought "rent" and "track records" from diffusing demonstrably cleaner technologies and environmentally-friendly reputations. For that reason, the faster and more efficient the technology implementation process was from the outset, the greater the monetary advantage in terms of generating further opportunities for selling the clean technology.

- The clean-technology suppliers worked intensively to train the recipients to manage and monitor their newly acquired technologies and environmental management systems. In some cases, the suppliers set up "user clubs", supported by investment in technical support from the innovators, to ensure firstly, efficient implementation; and, secondly, that the suppliers were able to capture the learning benefits of recipient adaptation trials and errors, in order to improve the technology further and enhance its successful diffusion worldwide.

- As an incentive to optimize this learning process, suppliers allowed recipients to keep the benefits accruing from modifications and harness the enhanced capacities for competitive advantage. More traditional approaches to technology transfer foster dependency in the recipient by maintaining property rights to secure future rent earning on further incremental innovations.

- It was found that this technological collaboration took place more commonly at the diffusion stage B and not the R&D stage; that it is more successful if it is intensive in training and human resource development; and that the most successful cases of clean-technology transfer were found where supplier-recipient collaboration lasted longest.

Source: Warhurst, 1999.

[a] Recipient sites studied were spread across Australia, Bolivia, Brazil, Chile, Papua New Guinea, Peru, Russia, South Africa and the United States.

The effects of environmental pressures are also quite obvious in such capital-intensive manufacturing industries as pulp and paper, steel and chemicals.[18] There is growing evidence that the pollution intensity of these industries as well as the long life-cycle of plants (typically extending to 20-30 years) renders investment decisions subject to careful scrutiny, initially in terms of financing, but also during the lifetime of the investment. As in the case of natural resources indicated earlier, the sheer size of a new project is often such that a significant degree of debt financing is used, involving an increasingly stringent set of environmental impact assessment criteria on behalf of the lenders. Furthermore, firms that have made the step to undertake process redesign rather than pursue an end-of-pipe approach to environmental concerns are also increasingly worried about any potential liabilities arising during the lifetime of a facility and after its closure. Concerns about future liability (apart from the role of consumers and legislation), for example, have led leading firms in the paper industry to pursue a "closed mill" as a design objective, whereby all of the flows of inputs and by-products would be contained within the facility, resulting in little if any environmentally damaging releases into the air and water. Indeed, the pulp and paper industry has been "greened" to a certain extent (box X.4), with apparently little difference between foreign- and domestic-owned facilities (box X.5).

Developing countries also face an environmental challenge in their traditional area of comparative advantage, namely labour-intensive industries. Although the level of pollution in these industries is comparatively low, there is still a concern over firms' environmental performance. Export-oriented foreign affiliates (and their suppliers) are particularly relevant here, although affiliates oriented towards the domestic markets of developing countries also have to consider their environmental footprint. This brings into context the significant role played by the characteristics of the product such as the level of price competition and the environmental demands of the final consumer.

Box X.4. The "greening" of the pulp and paper industry

Following a first wave of environmental investment in the early 1970s, a second wave of investment was initiated in the pulp and paper industry when concerns about the effects of chlorinated organics in the mill effluent began to emerge in the mid 1980s, particularly in Sweden and Germany. In Germany, Greenpeace campaigned actively for the removal of chlorine in the bleaching process for fear that the residual chlorine in the waste water would combine with organic matter and form highly toxic substances, such as dioxins. The impact of this (market- led) action on the industry was substantial, as it was not possible to allay such concerns though the use of end-of-pipe technology, which in this case would have meant multiple layers of water treatment facilities. Instead, two new processes were developed: the totally chlorine-free pulping process (which eliminated the use of chlorine) and the elemental chlorine-free process (which eliminated the use of elemental chlorine (Cl_2), and replaced it with chlorine dioxide).

Prompted by the importance of the German market to Scandinavian producers, the industry in these countries invested heavily in the new technologies. By the early 1990s, chlorine use in the Swedish and Finnish industries had been reduced 10 and five-fold, respectively. In 1998, the elementally chlorine-free process also became the standard endorsed by the Environmental Protection Agency of the United States. These processes represent the dominant technology on offer from the major equipment suppliers. Mills such as those operated in a joint venture by UPM-Kymmene of Finland and the Indonesian APRIL in Indonesia (1998) and China (1999) are said to meet European emission standards, while APRIL is also working towards achieving ISO 14001 certification for its forestry operations next year.

Source: Lundan, 1996.

Box X.5. Foreign investment and environmental management: evidence from the Chilean pulp and paper industry

Due to the specific structural characteristics of the pulp and paper industry, parent firms have been found not to be important sources of production technology in the Chilean pulp and paper industry. For example, the dominance of outside supplier and equipment firms and consulting engineering companies, who play the key role in mill design for both foreign- and domestically-owned mills, have limited the scope for dramatic differences between them in terms of control and treatment technologies. Export market pressures are also an important influence, with both foreign- and locally-owned firms introducing environmental changes specifically linked to market access (notably decreases in chlorine use in bleaching). Scale is also an issue here, with some smaller mills particularly active in searching for cost-saving environmental measures (fixing leaks, recovering waste streams) to help meet the challenges of competition with larger rivals in a price-competitive, scale-intensive industry. The final issue is the role played by third party lenders in reinforcing environmental standards as a condition of lending. In the cases where mills have sourced funding from international agencies, they have been subjected to similar environmental performance criteria.

Differences between foreign affiliates and domestic firms were found in the area of environmental management. Foreign-owned and joint venture firms are more likely to have a formal environmental policy, and to have designated a specific individual to take responsibility for environmental matters at the plant level. They are also more likely to have pursued (or be pursuing) international certification. These points indicate a more active pursuit of ongoing, incremental improvements in environmental performance in foreign affiliates relative to domestic firms.

Source: Herbert-Copley, 1998.

What is increasingly relevant here - and is a core part of the new context of business - is the environmental management responsibilities of TNCs *vis-à-vis* their suppliers (and consumers). To the extent that suppliers (and consumers) are part of the environmental footprint of firms, pressure can be put on TNCs to take responsibility for their environmental performance, particularly in developing countries. In this case, it is not ownership that matters, but rather that they are related to a TNC system. TNCs have an advantage in assisting their suppliers to upgrade their environmental management practices and consumers to change their consumption habits. Most of the developments in this area relate to increased consumer demand in developed countries for environmentally-friendly products (von Moltke *et al.,* 1998). TNCs can also be conduits for introducing environmentally-friendly consumption products into developing countries (Jha, 1999).[19] They also have an advantage of being able to train input suppliers in changing their production processes to exploit these market opportunities. Notable examples here are the contributions of TNCs to help their suppliers qualify for eco-labelling.[20] If customers place a premium on eco-labelled products, regardless of ownership, suppliers need to meet the certification requirements. TNCs have also assisted their suppliers in the form of technical workshops, training courses and ISO 14000 certification. Intel, for example, insists that its suppliers conform to its rigorous in-house environmental standards. Hewlett-Packard also has a product stewardship programme that embraces the design, manufacture, distribution, use, take-back, disassembly, reuse, recycling and ultimate disposal of constituent parts and materials of all its affiliates and suppliers (von Moltke *et al.,* 1998).

Looking at the manufacturing sector as a whole, there is some evidence - although neither comprehensive nor systematic - to suggest that foreign affiliates may have higher environmental standards than domestic counterparts across the entire manufacturing sector.[21] However, foreign ownership was not a significant factor in the adoption rate of ISO 14000 - a certification that environmental management systems are in place (box X.6) - in Mexico (Dasgupta *et al.*, 1998). Neither are other overseas links through trade, management training or management experience. The most important factors are the skill level of plant managers and staff awareness of environmental issues. Foreign ownership is also insignificant in plant-level abatement practices in South and South-East Asia (Hettige *et al.,* 1996).[22] Key factors are scale, productive efficiency and the use of new process technology. On the other hand when it comes to the consumption of energy and environmentally "dirty fuels" (as a proxy for pollution intensity) and after controlling for other factors, foreign manufacturing plants in Côte d'Ivoire, Mexico, Morocco and Venezuela were found to be significantly more energy-efficient than their domestic counterparts (Eskeland and Harrison, 1997).[23]

Box X.6. ISO 14001 standards for environmental management

The International Organization for Standardization[a] has developed ISO 14001 as a series of tools for environmental management, encompassing standards for environmental management and guidelines for environmental performance analysis and life cycle analysis. ISO 14001 specifies the requirements for an environmental management system (EMS) – the management of those processes and activities that influence environmental impact. An organization might implement ISO 14001 for the internal benefits it can provide, such as reduced cost of waste management; savings in consumption of energy and materials; or clarification of environmental responsibilities within the organization. In addition, the standard may be used as the basis for certification of the EMS by an independent "registration" or "certification" body. ISO itself does not carry out conformity assessment and does not issue ISO 14.001 certificates. An ISO 14001-certified EMS is intended to provide confidence to external parties that an organization has control over the significant environmental aspects of its operational processes, that it has committed itself to comply with all relevant environmental legislation and to continually improve its environmental performance.

Such independent certification is becoming an integral part of environmental management strategies: certification has increased twenty-fold between 1995 and 1997.

Firms seeking certification are required to take the following steps:

- an initial review by management to identify environmental issues of concern (e.g. excessive use of polluting inputs; the potential for a serious environmental accident);

/...

(Box X.6, continued)

- establishment of priorities for action, taking into account local environmental regulations and potential costs;
- establishment of an environmental policy statement, signed by the CEO, which includes commitments to compliance with environmental regulations, pollution prevention and continuous improvement;
- development of performance targets based on the policy statement (e.g. reduction of emissions by a set amount over a defined period);
- implementation of the environmental management systems, with defined procedures and responsibilities;
- implementation reviews, performance measurement and management audits.

Although fairly new, the bulk of the certificates that have been issued are for firms in developed countries. This reflects their demand for environmentally responsible management. Developing countries are starting to obtain a greater share of the certificates being issued. TNCs have a role to play in assisting, first, developing countries to upgrade their abilities to have certification bodies;[b] and, second, domestic firms, especially their own operations and suppliers to meet the certification requirements.

Box table X.6.1. The growth of ISO 14001 certifications worldwide, 1995-1997

Economy	1995	1996	1997
Developed economies:			
Japan	4	198	713
Germany	35	166	352
Denmark	21	96	347
Netherlands	74	119	263
Austria	11	56	198
Sweden	2	25	194
Switzerland		18	170
Finland	10	41	151
Australia	1	53	137
Belgium		8	137
Italy		27	103
Spain		13	92
Ireland	3	8	82
United States	1	34	79
France	3	23	52
Norway	3	13	35
Canada		7	27
New Zealand		3	26
South Africa			21
Portugal		1	7
Greece		1	6
Luxembourg		1	6
Israel		4	6
Iceland			1
Total	168	915	3 205
Central and Eastern Europe			
Hungary		3	12
Poland		8	
Slovakia		1	6
Slovenia		5	
Czech Republic			4
Croatia			2
Total	0	4	37
Developing economies			
Africa			
Egypt		1	7
Mauritius		1	1
Total	0	2	8

/...

(Box X.6, concluded)

(Box table X.6.1, concluded)

Economy	1995	1996	1997
Asia			
Korea, Republic of	19	57	463
Taiwan Province of China	2	42	183
Singapore		37	65
Thailand		58	61
Hong Kong, China		7	46
Indonesia		3	45
Turkey	3	6	44
Malaysia		7	36
India	1	2	28
China		9	22
Philippines		1	11
United Arab Emirates			4
Iran			2
Pakistan		1	2
Oman			1
Total	25	230	1 013
Latin America			
Brazil	2	6	63
Argentina	1	5	28
Mexico		2	11
Colombia		1	3
Barbados		3	3
Uruguay			1
Total	3	17	109
World total [a]	257	1 491	5 017
Number of countries	18	43	53

Source: UNCTAD, based on ISO.

[a] Includes certification not accounted for above.

[a] The International Organization for Standardization, based in Geneva, publishes voluntary standards for technology and business activity.

[b] On the participation of developing countries in standard-setting bodies, see Krut and Gleckman, 1998.

There are also pressures for change in the services sector where cost savings on account of better environmental practices may be higher than in other sectors. In the tourism industry, for example, hotels are seeking to be more environmentally efficient. The Taj Group of hotels, for instance, seeks to promote across its entire chain - at home and abroad - such environmental practices as energy conservation, a reduction of waste and water conservation (box X.7). At the same time, new opportunities arise for eco-tourism. In the air transport and shipping industries, there are pressures to reduce noise and limit the possibility for ecological disaster. New airports, for example, are subject to rigorous environmental impact assessments. The financial service industry is experiencing different types of pressure, for example, as regards the types of projects it finances and preconditions that need to be met for the projects it can finance. The industry is also becoming more demanding in terms of environmentally relevant information that needs to be provided. Indeed, the demand for better environmental reporting is coming from multiple stakeholders. As in other industries, the spotlight is on the leading firms, which are often expected to set examples, be it at home or abroad.

Box X.7. Combining environmental management with eco-efficiency in the hotel industry: the Taj Group of Hotels in India

Several years ago, senior management in the Taj Group of Hotels (a part of the Tata Group of Companies in India) made it a policy to demonstrate the urgent need for environmental protection in a manner that was effective and measurable, and that demonstrated the benefits to others in the industry. The approach used by the company is to combine elements of both a decentralized and centralized environmental management strategy.

EcoTaj, the Environmental Initiative of the Taj Group of Hotels, is an effort to institute, encourage and standardize good environmental practices across the entire chain of over 60 hotels located in nine countries. Its goals are to:

- protect, conserve and enhance the environment for the benefit of present and future generations;
- be an industry leader in the development of sustainable business practices and sustainable tourism;
- simultaneously improve the quality of services while minimizing their impact on the environment.

The initiative consists of the following elements: an environmental policy statement; energy conservation; reduction and treatment of waste; water conservation and treatment; purchasing policy; reduction of emission; avoiding noise pollution; marketing; building a green team and appointing an environmental officer in every hotel. The net effect of this initiative is to reduce the company's environmental footprint, while at the same time remaining competitive. As part of the implementation of its environmental programme, the hotel group was aware of India's environmental difficulties, as well as the fact that, all things considered, a potential customer would prefer to stay at a more environmentally friendly hotel.

An important element of the environmental programme is to give hotel employees training courses on environmental management. While this has had an effect on changing the attitude of its employees, the Taj Group of Hotels is also assisting its competitor hotels upgrade their environmental management skills. This includes providing technical advice on each of the elements above, running training programmes to develop environmental managers, and explaining to individual hotels and to the industry the benefits of being eco-efficient.

Source: UNCTAD, based on information supplied by the Taj Group of Hotels.

* * *

What this discussion suggests is that it is possible for firms and industries to improve significantly their environmental performance (Vogel, 1995). A number of variables appear to be important. Particularly when the leading firms of an industry are from developed countries and are subject to regulatory and other pressures, they comply - or even lead[24] - by developing clean technology. Affluent and environmentally demanding markets can act as beacons for firms and industries. They are aided in this by the fact that most R&D activities are, in any event, concentrated in developed countries (chapter VII), allowing the development of clean technology and environmental managerial systems. Especially where heavy investments with a long life cycle are involved, where firms are highly visible, when high liabilities are possible and where environmental requirements of third-party lenders come into play, clean technologies and environmentally-efficient management practices tend to be used in the corporate system as a whole – not necessarily because firms are particularly environmentally conscious (although this may well be the case for a number), but because it makes good business sense in the new context. Moreover, this can work particularly well in highly integrated industries.[25] Natural resource industries, as well as capital-intensive industries, by their very nature, tend to fall into this category. In labour-intensive industries, an important variable is the degree to which the value-added chain is integrated: the more it is integrated, the more susceptible is the firm to pressures for environmental upgrading. In fact, where upgrading becomes the *de facto* norm of an industry, firms risk being singled out, including by their competitors, if they fail to rise to the new standards.[26]

This is not to say that all firms do - or can - pursue this strategy. Most firms, and especially small and medium-sized enterprise TNCs, take a decentralized line.[27] Some may seek to establish uniform standards but may fail because of a lack of skills or resources; others operate in parts of the market that are not equally affected by environmental concerns. This is particularly true of indigenous firms in developing countries. But it also applies to less prominent firms, whether purely domestic or transnational, in the developed world. And it applies to the large number of small and medium-sized TNCs and suppliers to foreign TNCs who compete primarily on price, and who have neither the resources nor the clear payback guaranteed from making long-term investments in technology and efficient environmental managerial practices.

Foreign affiliates are in an advantageous position to use clean technology and efficient environmental management practices, as they can draw on their transnational corporate systems even if they are not directed from headquarters to do so. Foreign ownership can therefore matter in that corporate systems can become conduits for the transfer of clean technology and environmentally sound management practices, reaching even beyond the corporate system *per se* where comprehensive uniform corporate standards are in place. Indeed, when there are commercial benefits to being environmentally friendly, the use by affiliates of clean technology may spur domestic consumers to acquire such technologies (Wheeler and Martin, 1992). In these instances, the presence of such foreign affiliates in developing countries can help to improve the environmental performance of the industry as a whole. In general, however, it is an unresolved issue whether domestic *vs.* foreign ownership of facilities makes a significant difference when it comes to environmental performance. Other factors – such as size, vintage of plants, skill levels, technology, host country regulation – may well be as important or more so. Moreover, the picture may differ from industry to industry and is further muddied by the fact that some industries (especially in natural resources and capital-intensive production) are dominated by TNCs.

The challenge for TNCs and developing country governments - and the international community - is to devise ways in which a transfer of environmentally sound management practices and clean technology into the domestic industry can be encouraged. This is all the more important to the extent that there are real costs[28] involved in upgrading management practices and technology; and markets increasingly demand environmental-friendly products and processes.

D. Conclusions and policy implications

The environmental profile of FDI, combined with efficient environmental management and the transfer of clean technology by TNCs, are important determinants of their impact on host developing countries. This is particularly the case as TNCs are active in many industries with potentially high environmental impact. TNCs – especially from developed countries – have considerable experience with managing the environmental problems caused by process and product technologies. At the same time, they have developed environmentally friendly processes, products and packaging to conform to standards and consumer preferences in their home countries. The evidence as regards the actual impact of FDI on the ability of host countries to protect their environment is mixed, however. In addition, it is not clear that, in general, ownership matters - i.e. that the impact of foreign firms is significantly different from that of domestic firms. Some TNCs are clearly international leaders in mitigating the environmental impact of their entire range of activities. Others do not use their full potential for environmental protection, especially when using a decentralized strategy. The evidence shows that a large number of factors – in addition to foreign ownership – affect the environmental performance and management strategies of foreign affiliates and domestic firms in developing countries.

It is also important to note that, despite the absence of systematic evidence allowing for a general conclusion about the importance of ownership when it comes to environmental impact, an advantage held by TNCs is their basic ability to respond and adapt to change (chapter V). In the changing regulatory framework for environmental aspects of economic activity in home and host countries, this could be an important asset that foreign firms can bring to host

developing countries. Host-country policy measures can be designed in a manner that encourages TNCs to deploy this asset and to utilize more fully the potential they have to contribute to environmentally sound development. The challenge for policy-makers - especially in the presence of intense competition for FDI and the chilling effect this could have on environmental regulations - is to accentuate the positive environmental contributions that TNCs can make while reducing the negative ones. Against this objective, governments must, of course, balance their goals in terms of increased investment, output, exports, technology transfer, and job creation which can differ considerably across countries and levels of development. As is often the case, choosing the right trade-offs is difficult.

1. Admission and establishment

A crucial policy intervention point for governments is at the time of entry of a TNC, especially when it comes to large-scale projects and particularly in pollution-intensive industries. Some studies suggest that some host countries are willing to use the lowering of environmental standards as a tool with which to attract FDI (WWF, 1999a), or hesitate to raise them (Zarsky, 1997). This approach is a problematic response to the competition for FDI, if only because the empirical evidence shows that a number of other factors are more important for FDI locational decisions. In addition, in the new context, there is now an incentive for companies *not* to take advantage of such regulatory inducements.

Host country governments once relied heavily on screening as a mechanism to review the contribution of FDI to their economies. This mechanism, however, is no longer as effective as it once was. In general, governments are moving away from screening and towards providing incentives for entry. Nevertheless, a useful tool for improving the environmental performance of firms, regardless of nationality, is to require environmental screening prior to the implementation of projects. This, however, demands special skills. In any event, governments can require, especially in the case of big projects, that TNCs provide their corporate environmental policy statements and report regularly on their environmental performance.

But there are other ways in which environmental screening can be undertaken. In large natural resource projects, for instance, environmental impact assessment studies have become standard procedures, often financed by the corporations themselves. In fact, large TNCs are quite familiar with the need for environmental assessments in project planning, design and implementation.

In addition, FDI insurance agencies of home countries sometimes require environmental assessment studies before they extend insurance. The Overseas Private Investment Corporation (OPIC) of the United States, for example, which insures investment by United States firms, screens project proposals on the basis of five categories, depending on their environmental sensitivity (OPIC, 1999). All highly environmentally sensitive projects require a full environmental impact assessment or initial environmental audit. Also, prior to OPIC's final commitment to such a project, the environmental impact assessments or initial environmental audits are publicly available for comment. The environmental assessment process is ongoing and continues through the life of OPIC's commitment to a project, involving, in some cases, independent third party environmental audits and corporate self-reporting.

Finally, the Multilateral Investment Guarantee Agency (MIGA) requires, before it issues a guarantee, that an environmental assessment be undertaken.[29] MIGA is particularly important for investors from developing countries because, contrary to virtually all developed countries, developing countries typically do not provide insurance for outward FDI. It is therefore typically the only investment insurance facility available to firms from these countries. But, of course, any firm from any of the 127 developing countries members of MIGA that wishes to avail itself of the Agency's FDI insurance would need to prepare an environmental assessment.

Entrepreneurs from developing countries, however, may often be unfamiliar with the level of analysis and degree of consultation that are standard practice for environmental assessments. SMEs, in particular, can be discouraged by the front-end costs of an environmental

impact assessment for a proposed investment in another developing country, especially when they are often hesitant in the first place to venture abroad. As a result, such firms may be effectively excluded from MIGA support by such barriers and, hence, refrain from undertaking an FDI project. MIGA has, indeed, encountered situations in which its environmental impact assessment and local consultation requirements have discouraged such investors.[30]

To deal with this challenge, one could create a small pilot grant programme, with a total budget in the range of $300,000-$400,000, to help direct investors from developing countries improve their capability to prepare environmental impact assessments, effectively consult with local affected parties, and obtain technical advice in implementing environmental action plans. The assistance could be strictly limited to investors from developing countries with proposed investments in other developing countries where the host country's requirements for environmental assessment are lacking or inadequate for MIGA's requirements. Preference could be given to SME investors and projects in least developed countries (box X.8).

Box X.8. Assisting developing countries' SMEs with environmental impact studies for outward FDI

The criteria for eligibility for grant under this pilot programme should be quite restrictive and the guidelines for the use of the funds should be narrow. Potential criteria and guidelines might include:

Criteria (one of the following conditions should apply):

- The investor should have already made an effort to prepare an environmental impact assessment, but requires help in upgrading the assessment to meet MIGA requirements.
- The investor has prepared an adequate environmental impact assessment and obtained host country approval, but local consultation and disclosure were not adequate for MIGA's requirements.
- MIGA has identified deficiencies in the implementation of approved environmental or corrective action plans, and lack of easy access to good technical advice appears to be an important contributing factor.

Guidelines:

- A grant is not to exceed $50,000.
- A grant is to provide expert technical advice in improving the environmental assessment, assistance in carrying out adequate local consultation and disclosure, or advice in implementing corrective action plans (for upgrading existing facilities) or implementing environmental action plans for new facilities.
- For the specific tasks to be executed under the grant, the investor must carry at least 25 per cent of the costs and provide an appropriate staff person to work with the technical expert (providing a technology transfer component).

Naturally, these criteria and guidelines would have to be discussed in some detail and spelled out further. At the end, this programme should facilitate FDI between developing countries, especially by smaller firms, under conditions that protect the environment and strengthen the human capacity in firms to prepare environmental assessment studies.[a]

[a] This approach does not address the question of the capacity of host developing countries - and especially that of the least developed countries - in evaluating environmental assessment studies. See in this connection the proposal in chapter VI.

2. Operation

Once a foreign affiliate has been established, the type of environmental strategy pursued by TNCs comes into play, as does the general regulatory framework for environmental issues. This includes setting both regulatory and market incentives that favour environmentally friendly production and consumption patterns. These policies need to provide the base for the specific set of policies targeted at the environmental performance of foreign affiliates. They can include:

- pricing policies that more accurately reflect a society's valuation of environmental resources;
- a balanced combination of regulatory, market and voluntary incentives;
- developing a strategic environment impact assessment plan that encompasses an entire region, not just a specific project;
- consultation and cooperation with relevant stakeholder groups;
- reinforcement of the national framework with multilateral aid financing;
- requiring all relevant new investments to have a closure plan;
- requiring a broad-based independent environmental impact assessment.

As TNCs can either pursue decentralized or centralized environmental management strategies, host country governments that so desire can encourage TNCs to follow the same environmental standards in their countries as they do in their home countries or elsewhere. They can also encourage TNCs to extend their environmental standards to domestic subcontractors and suppliers of foreign affiliates and become leaders in the environmental field. The key word here is "encourage", unless, of course, governments prefer mandatory approaches for all firms.

To enhance the environmental performance of foreign affiliates and, in particular, to encourage TNCs (and domestic companies) to reduce their negative environmental impact, the menu of options that governments can consider - many of which may well require extensive discussions to examine their feasibility, and many of which, if not all, are good practices for all firms whether domestic or foreign - includes the following:

- subsidizing the costs, or increasing the tax deductions, of R&D expenditures related to clean technology;
- the same can be done for environmental management training and information technology support;
- encouraging company training and the appointment of a specified environment person to be in charge of all environmental matters;
- reducing visa restriction for persons associated with clean technology and environmental management training programmes;
- providing a duty drawback or concession for capital goods related to environmentally sound technology;
- requiring firms to employ the cleanest technology they have;
- granting accelerated depreciation for clean technology capital goods;
- monitoring the environmental impact of production and requiring annual environmental performance reporting;
- trading pollution permits against FDI (including in joint ventures) by firms possessing clean technology;

- encouraging companies to adopt environmental management systems, such as ISO environmental certification (box X.6). Just as companies advertise in the media and on billboards in front of their factories that they have met other ISO standards (e.g. quality standards), they could be encouraged to advertise their compliance with environmental management systems;
- encouraging foreign affiliates to work with their suppliers and customers to comply with environmental management systems;
- removing disincentives and encouraging TNCs to invest in industries that involve a cleaning up of the environment. For example, TNCs have expertise in waste-to-energy projects and the construction and management of sanitary landfills;
- encouraging TNCs to establish environmental infrastructure such as testing and certification facilities on a commercial basis.

3. The international dimension

Countries also pursue ways to enhance the contribution of TNCs towards environmental protection at the international level. Accordingly, environment issues have been embedded in international investment agreements. The Bolivia-United States bilateral investment treaty, for example, makes reference to the environment (see chapter IV). At the regional level, concern over the environmental affects of liberalized trade and investment led to the establishment of a North American Commission for Environmental Cooperation in the framework of the North American Free Trade Agreement. And the draft OECD Multilateral Agreement on Investment contemplated including provisions on environmental protection (see chapter IV).

Another approach that has been taken is to examine ways in which provisions dealing with TNCs can be introduced into intergovernmental policy documents and multilateral environmental agreements. Reference has already been made to Agenda 21 which provides a framework for environmental responsibility that explicitly makes reference to the role of TNCs (annex table A.X.1). The Montreal Protocol on substances that deplete the ozone layer and the agreement establishing the Global Environmental Fund created a fund that provides resources to cover the incremental environmental costs of specific projects in developing countries. The Kyoto Protocol to the Convention on Climate Change, if ratified, would have various financial mechanisms to stimulate climate-friendly investments in developing countries.[31]

The investment dimension of international environment initiatives require careful consideration. How they evolve in the future is difficult to say. It is seems clear that national policy action will increasingly be complemented by international action - a not altogether surprising evolution, given the importance and global nature of this issue.

* * *

In conclusion, the new context requires that both firms and governments reassess their approach towards the relationship between the environment and development and reconfigure their policies accordingly. This needs to be done in a way that recognizes the role of TNCs. TNCs have the potential to assist developing countries to meet the challenges of contributing to economic development while protecting the environment. Large TNCs in environmentally sensitive areas, and those with visible and valuable brand names, are increasingly implementing strategies to improve their environmental footprint. Especially when a country's capacity to regulate is weak, the environmental management systems of TNCs can both make up for this to a certain extent and potentially be a vehicle for improving domestic environmental performance. At the same time, there are a number of cases of TNCs having negative effects on the environment. Governments need to provide a policy framework to promote a reduction in the negative environmental effects of production and consumption, regardless of whether these effects are created by transnational or domestic firms. However, TNCs have a special environmental responsibility which needs to be recognized, given the growing economic importance of FDI and their access to efficient environmental management practices and clean technology.

Notes

1 The achievement of environmental objectives has opportunity costs in terms of goods and services (UNCTC, 1992).

2 This is commonly referred to as an externality, i.e. when the consumption or production decisions of an individual, household, firm or government do not reflect the wider costs or benefits to society. If the price of goods, be they consumption or intermediate goods, does not reflect their value to society, their production and consumption could result in harm to the environment.

3 The work of UNEP and of the United Nations World Commission on Environment and Development (UNEP, 1987) (informally known as the Bruntland Commission) has been important in changing perceptions.

4 There are several considerations concerning a simple tradeoff between growth and environment. Some evidence suggests, for instance, that there is an inverted-U relationship between local air pollution and income per capita (Grossman and Krueger, 1994). Over lower ranges of per capita income, environmental quality deteriorates with growth, but after a threshold level it improves. If the components of environmental quality are decomposed into specific categories of pollutants, there is no aggregate relationship at all with growth (World Bank, 1992). Thus, the relationship can be complex, especially if the definition of "sustainable development" is wider than the traditional one of the depletion of natural resources and waste disposal of firms.

5 Environmental disasters involving TNCs, such as the Bhopal disaster in India (1984) and the oil spill from the Exxon Valdez in Alaska (1989), have contributed to an increased awareness of environmental issues.

6 This issue reflects the income elasticity of demand for environmental protection, which is estimated to be quite high (Mani and Wheeler, 1999). Developed countries are able to demand and obtain better environmental protection than do developing countries. One reason for this is the relationship between per capita income and environmental damage, as discussed in footnote 4.

7 This is not to say that uninational firms are single-plant firms. Uninational firms could not only have multiple-plants, but could also have them in different states or provinces. To the extent that environmental regulation varies across sub-national states, uninational firms also face the dual problem of managing environmental concerns and managing their affiliates.

8 Another related issue is whether or not in cases of environmental negligence a case against an affiliate can be tried in the home country. In 1995, the Supreme Court of Victoria in Australia ruled that negligence claims by landowners in Papua New Guinea against Broken Hill Propriety in connection with the Ok Tedi copper mine could be tried in Australia (Ostensson, 1999).

9 Most of these studies use data from the United States Toxic Release Inventory (TRI). This inventory contains over 200 substances of varying toxicity that can be discharged into the environment. With these data, the emissions intensity of a discharge or transfer can be measured in volume terms. It is important to note that emission intensity is not the same as toxic intensity (Olewiler and Dawson, 1998). The latter measure includes the toxicity of each discharge.

10 The data used to make this calculation is taken from table 3 of OECD, 1998. The low figure is driven by the fact that investment in finance, insurance, real estate and business services is approximately 40 per cent of total domestic investment in these countries.

11 Mani and Wheeler, 1999, find evidence to suggest a downward trend in the production share of some pollution-intensive industries in some developed countries. This is due partly to their definition of pollution-intensive industry. Figure X.1 uses a definition that, although broad, does not include pulp and paper.

12 Textile manufacturers use numerous chemical liquid effluents for washing, dyeing and bleaching in the finishing stage. Semiconductor products, critical to the exports of some East Asian developing countries, contain hazardous materials such as lead, use toxic chemicals in assembly and cleaning, and produce harmful waste and emissions.

13 These are cited in a review of the pollution haven hypothesis in WWF, 1998. Most of the cases have to do with developing host countries exempting TNCs from local environmental laws and the relevant TNCs being denied permission to operate in their home countries. Another area in which the pollution haven hypothesis is likely to be confirmed is in free trade zones (Sierra Club, 1993).

14 There is a debate on this issue that parallels the debate on the effectiveness of fiscal incentives to affect location decisions. The extensive literature on that issue has shown that incentives are not a significant determinant of location (UNCTAD, 1996d).

15 Pollution-abatement capital expenditures are less than five per cent of total investment costs for most industries, though for heavily polluting industries such as petroleum and coal the figure is much higher. Even then, the share of these expenditures in total revenue is very low (Wheeler and Martin, 1992; Low and Yeats, 1992).

16 Indicators of environmental quality used in studies of FDI and investment include ambient levels of selected pollutants (e.g. on sulphur dioxide see Xing and Kolstad, 1997, on air and water emissions see Eskeland and Harrison 1997); indices of the stringency of environmental regulation compiled from surveys (or pollution abatement expenditures) (Jaffe *et al.,* 1995). Zarsky, 1999, notes that none of these indicators is a comprehensive measure of regulatory stringency or environmental quality.

17 For example, the Overseas Private Investment Corporation (OPIC) imposes environmental conditionality on its lending (OPIC, 1999).

18 Empirical evidence of this dynamic in the steel industry can be found in Barton (1997) and in Christmann (1997) for the chemical industry.

19 But switching to environmentally-friendly products can result in an increase in costs that have to be absorbed by either the firms or consumers. Given the low levels of incomes in developing countries, many consumers may simply not be able to afford these products, despite the premium they may place on environmentally sustainable consumption.

20 For example, as regards certificates from the Marine Stewards Council (www.msc.org) and the Forest Stewardship Council (www.fscoax.org).

21 See Leonard (1988) on United States TNCs in Ireland, Spain, Romania and Mexico; and Pearson (1987) on Indonesia, Brazil, the Republic of Korea, Turkey, Mexico, Malaysia and the Philippines. Gentry (1998) reviews five case studies for Brazil, Costa Rica and Mexico, and concludes that TNC affiliates made improvements in their environmental standards and performance. See Eriksen and Hansen, 1999, for Danish firms.

22 That foreign ownership makes little difference in relative environmental performance has been suggested by Huq and Wheeler, 1993; Pargal and Wheeler, 1996; Jenkins, 1999.

23 But these studies need to be interpreted with caution. They are point-in-time estimates, and do not identify when environmentally sound technologies or management practices were implemented. This may overstate the positive environmental impact of affiliates.

24 Firms can of course choose to become first-movers in the environmental arena and to develop innovative solutions to address these concerns. In practice, this appears to be a niche strategy, due to the uncertainty related to the market payback from consumers, who have so far not paid high premia for green products (e.g. Lampe and Gazda, 1995), and who may find it hard to discriminate between products or between competing eco-labels.

25 The results of a survey of 169 companies with sales over $1 billion indicate that 43 per cent have an international environment policy; 58 per cent have standardized procedures for international audits; 30 per cent conduct international environment accounting and 45 per cent have formal arrangements between the parent firms and foreign affiliates for the allocation of environmental management (UNCTAD, 1993c).

26 Industry guidelines and codes of conduct help in this respect. Some of them have been assessed positively. For example, the industry guidelines for the International Councils on Metals and the Environment and the Canadian Chemical Producers' Association compare positively with the Agenda 21 provisions; in some cases, they require the application of standards above those required in a host country (UNCTAD, 1996e). Moreover, independently of whether or not industry norms exist, TNCs may have an incentive to ensure that all firms in the industry follow state-of-the-art environmental practice to shape the image of an industry as a whole; this could even lead them to assist domestic competitors, not just subcontractors or supplier firms (box X.7).

27 Out of 112 Danish TNCs responding to a survey, mainly SMEs, only 17 per cent had centralized approaches (Eriksen and Hansen, 1999).

28 In cases where the switch to environmentally sound technology raises costs, both foreign and domestic firms will attempt to pass this increase on to consumers in the form of higher prices. On the other hand, when firms are able to be eco-efficient, cost savings may not necessarily be transferred to consumers. The extent of this pass-through depends on the market structure of an industry and also on the application of competition policy.

29 Environmental assessment is the process of evaluating a project's environmental risks and impacts and identifying ways of providing, minimizing, mitigating or compensating for adverse impacts. The scope of work and approach to environmental assessment varies from project to project, depending on the nature of the project and its environmental and social setting. MIGA's board of directors recently approved a new environmental assessment policy, effective 1 July 1999 (www.miga.org).

30 Communication from MIGA.

31 For a discussion of the clean development mechanism under the Kyoto Protocol to the United Nations Framework Convention on Climate Change, see UNCTAD, 1999t; UNCTAD/UNDP/UNEP/UNIDO, 1999 (forthcoming) and Vrolijk, 1998).