



Chapter 9

Globalization and environmental sustainability

Economic globalization has multiple implications for environmental sustainability. The interactions are so numerous and so complex that it would be simplistic to affirm that the two are in conflict. Indeed, there are neither theoretical reasons nor adequate or conclusive empirical evidence to show that the relationship between globalization and environmental sustainability is unidirectional or unidimensional (ECLAC/UNEP, 2001).

One thing that is unquestionable, as the scientific evidence makes clear, is that the growing and cumulative scale of human activities has produced environmental effects of a global nature (“global public bads”) that are not reflected in the markets but that affect global common interests transcending national perspectives. There has clearly been an increase in environmental interdependence and vulnerability among countries, whatever their degree of development. This gives a special character to the third phase of globalization, which took place in the last quarter of the twentieth century.

This chapter presents some of the major changes in environmental management and sustainability in the region associated with globalization, recognizing that the main channels through which globalization affects the environment are shifts in trade, investment and technology flows. It identifies the new challenges for international cooperation that stem from the recognition of this increased environmental interdependence among countries.

The new and shifting imperatives of global environmental management were brought to light by the various world summits and conferences held and the multilateral environmental agreements signed in the 1990s. These processes and agreements have had two main effects: they have prompted national governments to take a more proactive international approach to cooperation with a view to protecting and administering global public goods on the basis of innovative multilateral systems, and they have fostered greater equity in the way the responsibilities and costs of reversing environmental damage are shared out between rich and poor States.

In the 1990s, a new ethical and political framework emerged, embracing new international legal principles for the environment and development. The most relevant of these is Principle 7 of the Rio Declaration on Environment and Development regarding “common but differentiated responsibilities”, which implicitly acknowledges the environmental debt that the developed countries have accrued with the rest of the international community by submitting the environment to an array of cumulative global externalities during the industrialization process. It reflects the differences between countries as regards their historical participation in the generation of these environmental externalities and, most importantly, it provides the political basis for remedial action in which each country’s involvement is matched to its financial and technological capacities. This means that industrialized countries have to take on greater commitments than developing ones under multilateral environmental agreements.

Accordingly, the environment will be increasingly important as an issue for negotiations between Latin America and the Caribbean and the industrialized countries. The importance of the global environmental services that the region provides, such as the storage of carbon dioxide (the main generator of climate change through the greenhouse effect) in its large forests, and its enormous wealth of terrestrial and marine biodiversity, mean that the region has the potential and the opportunity to play a key role in helping to solve global problems.

I. The impact of productive restructuring on sustainable development

The environmental effects of productive and technological restructuring may be direct or indirect. The environmental implications of globalization are different from the economic ones, in both time and space. The environmental consequences are generally longer-term, with dynamic, cumulative characteristics that are difficult to measure because they are associated in some cases with qualitative parameters. Furthermore, many of these implications are not necessarily reflected in markets. Some examples of such implications are cross-border pollution, effects on global goods, effects on landscape and the loss of scenic beauty, the extinction of species and the loss of biodiversity (ECLAC/UNEP, 2001).

Direct environmental effects are generated by the use of new technologies for agriculture industry and energy, by the exploitation of hitherto untapped renewable and non-renewable natural resources, by the creation and dispersion of new biological forms and by the release of new substances into the environment. Indirect environmental effects are generated by the social, economic, political and demographic adjustments driven by the wave of new technology, which has resulted in changes in prices and demand, the social organization of work, production systems, employment, the international division of labour, services and the location and nature of human activities and settlements.

Environmental implications associated with a general redefinition of comparative advantages are difficult to anticipate, given the possibility that new and unsuspected advantages may arise and the likelihood that the factors that determine comparative advantages and their volatility will multiply (Gallopín and Chichilinsky, 2001). The decline in the raw material/output ratio, and the replacement of traditional materials by new ones as part of the new technological and economic

paradigm, will affect more directly those countries that have based their capital accumulation process on their mineral or forestry resources. New technologies, and particularly biotechnology, are already affecting traditional farmers by transferring revenue and the control of production and marketing to the major transnational chemical and pharmaceutical corporations and large marketing firms. The increases in agricultural yields in the advanced countries due to the new technological development, together with agricultural subsidy policies, are reducing the edaphic and climatic comparative advantages of Latin America and the Caribbean.

A range of comparative advantages could emerge in the countries of the region, with widely varying environmental consequences. These advantages include those deriving from access to cheap energy sources, those associated with lower transport costs because of proximity to natural resources, those of location offered by lax environmental or health legislation (a perverse advantage) and those represented by the opportunity to benefit from local environmental or climatic conditions or components. In ecological terms, this shifting mosaic of comparative advantages in the region's countries could pose the risks of increased pressure on fragile or remote areas or ecosystems with little human intervention, the sudden increase in the value of particular ecological elements or functions (and a decline in the value of others) and the introduction of new biological forms or even exotic ecosystems in the region. In the absence of social regulation, these developments may lead to overexploitation and degradation of regional ecosystems (and the loss of such comparative advantages as may be associated with them), but if well managed they could generate new sustainable sources of prosperity and lead to a positive redefinition of comparative advantages in the global context.

The development and spread of new technologies in the region, particularly biotechnology, has the potential to produce significant environmental implications (Gallopín, 1995). It is possible to anticipate that these changes will have a significant impact on Latin American and Caribbean ecosystems. These alterations could entail, for example, major effects on the environmental sustainability of production activities, alterations in subregional water and nutrient cycles, changes in agricultural yields, the disappearance of some ecosystems and the appearance of new ones, changes in the environmental supply of natural resources and alterations in limiting factors and ecological restrictions.

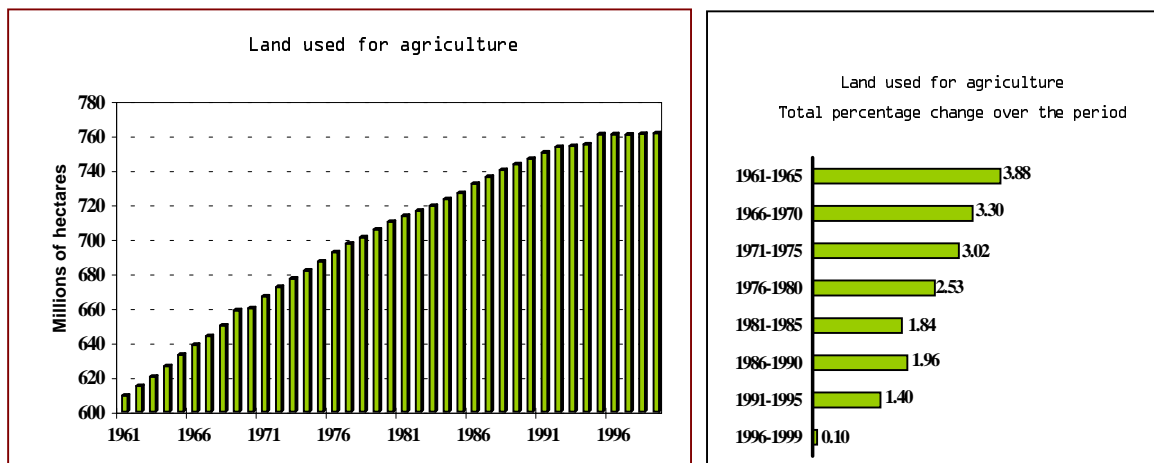
In any event, there is now greater technical potential than ever before to move towards the sustainable management of ecosystems in the long term. This includes better control, monitoring and reduction of environmental pollution, diversification of the uses of ecological resources and development that is environmentally sustainable in the long term.

Nonetheless, the direction in which the new technological and economic paradigm is moving suggests that this technical potential will tend to be realized only in the more advanced countries. That is, the region will risk becoming a focal point for the perverse effects of the technological and economic revolution, unless the countries pursue the structural changes that are needed in the social, economic and technological spheres by adopting active, sustained, endogenously determined, shared strategies that command support among social actors.

II. Changes in the production structure and their effects on environmental sustainability

The changes undertaken by the economies of Latin America and the Caribbean in recent decades have resulted in a sectoral recomposition whereby services have increased their relative weight in the economic structure, while that of primary and industrial production has diminished proportionately. The implications of these trends for sustainable development need to be assessed. The relative decline in the value of primary and industrial production has not alleviated direct environmental pressure on the resource base or environmental damage, as the agricultural frontier has continued to expand and the volume of mineral, forestry and fishery resources extracted has maintained an upward trend (see figures 9.1 and 9.2).

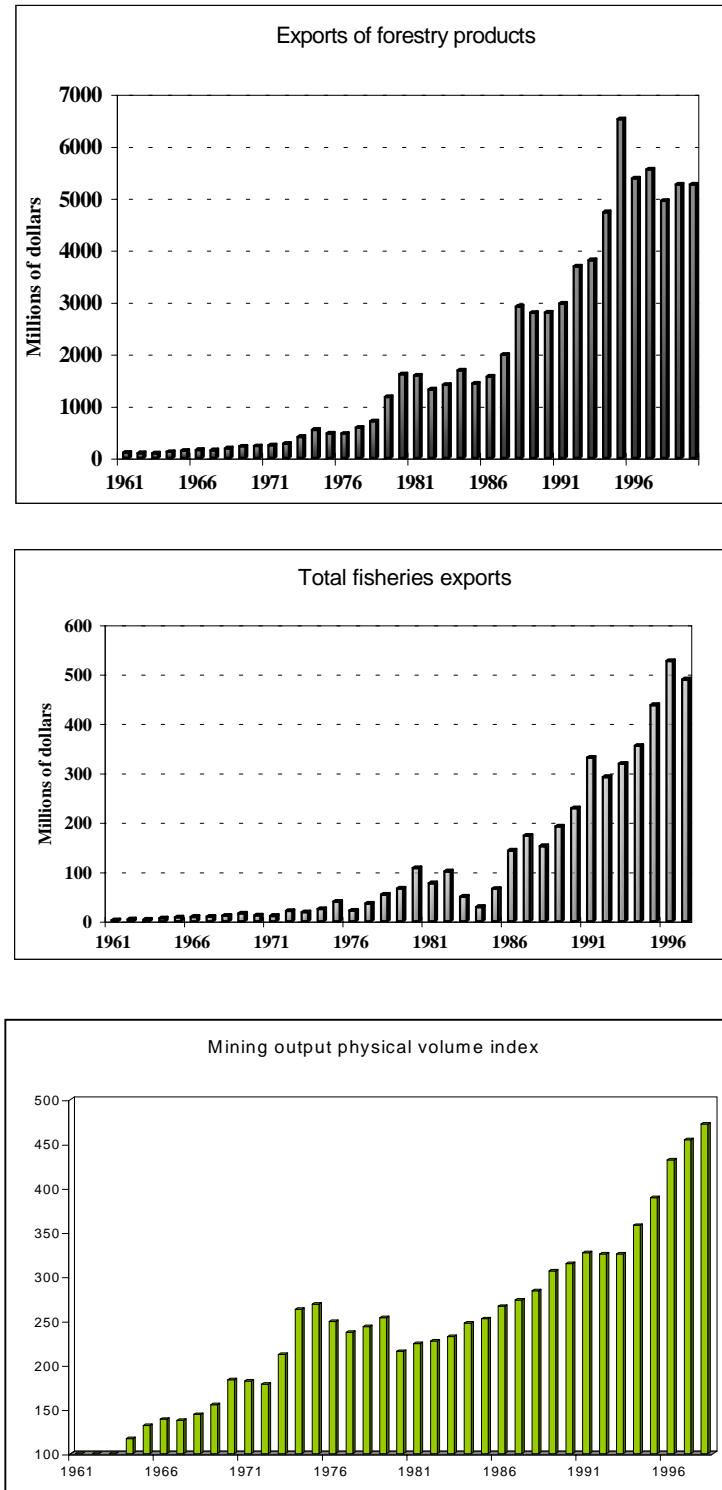
Figure 9.1
EXPANSION OF THE AGRICULTURAL FRONTIER, 1961-1999



Source: Food and Agriculture Organization of the United Nations (FAO), "FAO Statistical Databases (FAOSTAT)" (www.fao.org), 2001.

The traditional effects of primary activities, particularly changes in land use, are now being concentrated in smaller, more fragile areas that are of greater ecological significance, inasmuch as the ecosystems concerned are critical to the conservation of national, regional or world biological diversity. In other words, they are becoming concentrated in places that are environmentally more sensitive, and perhaps more vulnerable. This is compounded by the fact that the region's rural population is not expected to fall significantly over the coming decades, despite continuing urbanization trends, which means that the degree of population pressure on resources is unlikely to change.

Figure 9.2
**TRENDS IN SELECTED NATURAL RESOURCE SECTORS IN
 LATIN AMERICA AND THE CARIBBEAN**



Source: Food and Agriculture Organization of the United Nations (FAO), "FAO Statistical Databases (FAOSTAT)" (www.fao.org), 2001; ECLAC, *Foreign Investment in Latin America and the Caribbean, 2000 Report* (LC/G.2125-P), Santiago, Chile, April 2001. United Nations publication, Sales No. E.01.II.G.12.

Many of the region's key environmental problems are linked to land use changes, especially the conversion of forests to agricultural land uses.¹ As figure 9.1 shows, between 1961 and 1999 over 150 million hectares were incorporated into agricultural production in the region, and much of this land was converted from forest. Although the agricultural land area is still increasing, the rate has slowed, especially in the last few years. Two thirds of the land brought into agricultural use corresponds to increased production of livestock, mainly cattle. In the region, the livestock boom has been the most decisive factor behind the decline in forest cover that has occurred, especially in the humid tropical zones (Tudela, 1990). This process, which first became significant in the 1950s, was encouraged by governments through infrastructure, subsidized credit and land titles.

Where livestock expansion is concerned, the economic reforms carried out in the region over recent decades have involved the elimination of subsidies and of colonization projects that induced human settlement in new areas. Even so, the deforestation rate has dropped only slightly in South America in recent years, according to FAO data.² It is interesting to note that, contrary to what might be expected in the light of growing specialization in manufacturing, the pressure on forested areas in Mexico and Central America has not diminished. The FAO data show an annual deforestation rate of 1.2% in the period 1990-2000, which is much higher than the South American rate.

Economic reform has also had the effect of modernizing the region's agriculture, making it more intensive, with the positive result of reducing pressure on natural areas. It does, however, mean greater use of fertilizers and pesticides, which also cause environmental problems. Furthermore, in some cases, expansion of the agricultural frontier is directly linked to strong growth in external markets, with a tendency towards specialization and monoculture in the most favoured areas. This is the case with soya, whose growing area and export volumes have risen steadily over the last 30 years (Vera, 2001).

The period 1980-1999 also saw an increase in the volume of exports from sectors with a recognized environmental impact. Figure 9.2 shows the evolution of exports derived from the region's forestry, fishery and mining sectors. In addition, there has been growth in external sales of products from polluting manufacturing industries, as the next section details. Cleaner production processes mean that primary activities may now be causing less environmental damage per unit of output. For this reason, there may be wide variations in environmental performance in each sector depending on the characteristics of producers, environmental regulation in the countries and the environmental requirements of markets. In any event, the resource base has been steadily declining, especially in countries whose international trade has been based on natural resource-intensive exports. In some activities, the overexploitation of resources has already had direct impacts on output. This is the case with sea fishing, as catches have continued to decline, and efforts to switch to alternative activities are still posing risks to fragile ecosystems (see table 9.1).

¹ Deforestation is the main cause of biodiversity loss and land degradation in the region. It affects the availability and regulation of water resources, and represents the region's main contribution to global warming.

² The FAO data show that the forested area was reduced at a rate of 0.5% a year in South America between 1990 and 1995, and 0.4% a year over the decade as a whole (1990-2000). The annual deforestation rate in Central America held steady at 1.2%, while in the Caribbean an annual loss rate of 1.7% in the first period was reversed, with forest cover increasing by some 0.3% a year in the second period (FAO, 2001a).

Table 9.1
LATIN AMERICA AND THE CARIBBEAN: SELECTED ENVIRONMENTAL INDICATORS
(Cumulative percentage growth rates)

Physical indicators	1989/1980	1999/1990
Arable farmland area	7.3	6.3 a/
Volume of agricultural output	26.8	28.3
Total fertilizer consumption	5.3	42.2 a/
Livestock	7.4	0.8
Volume of industrial roundwood production	25.4	18.1 a/
Firewood and coal production	12.3	0.4 a/
Marine fisheries production	17.9 (1985-1990)	-24.3 a/
Marine fish farming production	165.0 (1985-1990)	116.0
Physical volume of mineral production, including oil	25.9	43.1
Physical volume of mineral production, excluding oil	46.2	67.6
Carbon dioxide (CO ₂) emissions	22.9	37.1
Carbon monoxide (CO) emissions	23.5	28.4
Cumulative percentage population growth	21.93	17.0 b/
Cumulative increase in gross domestic product (dollars)	13.95	33.22

Source: Based on ECLAC, *Statistical Yearbook for Latin America and the Caribbean, 2000* (LC/G.2118-P), Santiago, Chile, February 2001. United Nations publication, Sales No. E.01.II.G.1; and United Nations Environment Programme (UNEP), "GEO. Estadísticas ambientales de América Latina y el Caribe", San José, Costa Rica, University of Costa Rica, 2001, forthcoming.

a/ 1998/1990.

b/ 2000/1990.

It is undoubtedly in the secondary sector of the economy that a structural change with positive implications for the environment, and thence for production quality, is taking place. In most branches of industry, better processes, quality requirements, environmental administration systems, certification mechanisms, staff training and other features associated with technological change and globalization have acted in synergy with the consolidation of national environmental policies, better enforcement of laws and regulations, the operation of new management instruments, growing awareness among businesses, greater demands from society and other factors to reduce the environmental impact of industry.

This change is mainly taking place in large firms, particularly those that have links to transnational corporations or are involved in their production chains. Foreign direct investment may thus have positive implications for the environment, insofar as foreign firms tend to employ cleaner technologies in their production processes. The spread of these to small and medium-sized enterprises (SMEs) is barely beginning, although many SMEs are already modernizing and introducing environmental quality practices. There are gaps in the information available, however, which could be remedied by better assessment mechanisms.

This process is clearly having positive repercussions, but it has not yet gone far enough to reverse some worrisome trends. For example, certain greenhouse gas emissions are now growing faster than before. The need to expand production over the coming decades, in a regional context in which participation in the world economy is growing and more employment needs to be created, makes it more urgent to devise sustainable energy policies that can address these disturbing trends (see the fourth section of this chapter).

In the service sector, some highly dynamic activities that are quite relevant, particularly in certain subregions, are contributing to economic growth but are also adding to environmental

pressures. This is the case with large-scale beach tourism, especially in the Caribbean. Meanwhile, the reorientation of certain services has emerged as an opportunity to find more sustainable ways of profiting from natural resources, such as ecotourism. The increasing dissemination of information services is likely to provide the basis not just for enhanced knowledge and improved communication, but for more effective environmental management systems as well.

If accurate, systematic knowledge of these trends and pressures and their interrelationships with economic processes is to be obtained, it is imperative to continue to collect and systematize data, devise operating systems to ascertain the economic value of natural resources and environmental services, develop integrated economic and environmental accounting systems and improve natural resource accounts, as a basis for policy integration.

To sum up, the region is at a contradictory stage where the environment is concerned. Some economic and technological trends are beginning to be favourable for the environment, especially in manufacturing and services, but also in some emerging activities in the primary sector. At the same time, pressure from old production and land-use processes is continuing to build up, while the rapid expansion of production remains a pressing need. These problems are compounded by emerging environmental tensions resulting from increased vulnerability to global environmental processes and the growing environmental demands of export markets. The region needs to act more urgently to adopt sustainable production and consumption patterns and less environmentally vulnerable ways of participating in the world economy.

III. Economic globalization and the environment

1. The environmental impact of exports and foreign direct investment

The reallocation of resources that took place in most of the region's countries as a result of the economic reforms of recent decades has in many cases boosted investment, production and exports of natural resource-intensive products. In addition, the increasing competitiveness of world exports is raising the opportunity cost of leaving natural resources unexploited at faster rates than their natural regeneration. This has led to the emergence of strong economic forces that are driving a number of countries to exploit their natural resources.

According to ECLAC studies, the changing composition of the export structure is a sign that the reallocation of resources has tended to steer a large group of countries, especially in South America, towards more natural resource-intensive areas of specialization. In this context, it is worth noting that natural resource-based branches of manufacturing producing highly standardized intermediate industrial goods such as iron and steel, petrochemicals, non-ferrous minerals, pulp and paper, copper and aluminium turned in a better economic performance in the South American countries during the period analysed. These are industries that the World Bank categorizes as environmentally sensitive,³ consisting of branches where pollution abatement expenditures exceeded 1% of total sales in the United States in 1988 (Schaper, 2000; Schaper and Onffroy, 2001).⁴

The results of the studies also suggest that there is no direct link between trade liberalization policies and environmental protection. The enormous diversity shown by the indicators and data for each of the national economies is evidence of the extreme complexity of this relationship. The environmental implications will depend on each country's situation in terms of its institutional

³ Essentially, this is a group of 40 industries at the three-digit level of the Standard International Trade Classification (SITC, Rev.1).

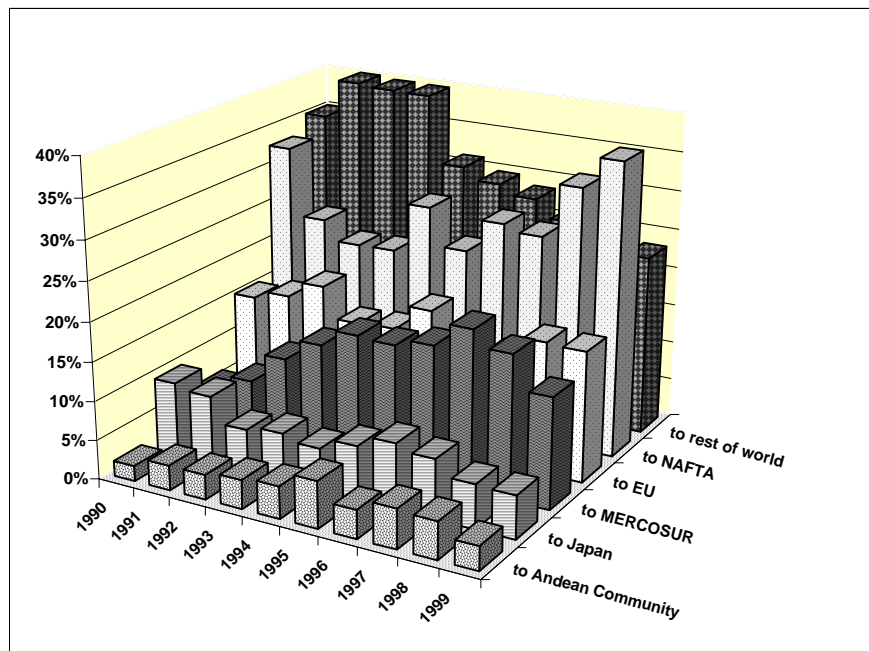
⁴ The studies concerned cover Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Jamaica, Mexico, Paraguay, Peru, Uruguay and Venezuela. Of these, only Mexico showed a contrary tendency.

structure, its trade composition, its income distribution, the enforcement of environmental regulations, the power of interest groups, the geographical density of its economic activity, the education levels of its population and the income elasticity of the demand for environmental quality.

For the Andean Community and the Southern Common Market (MERCOSUR), for example, the results suggest that in the 1990s there was a significant rise in the export volume of products with an obvious environmental impact.

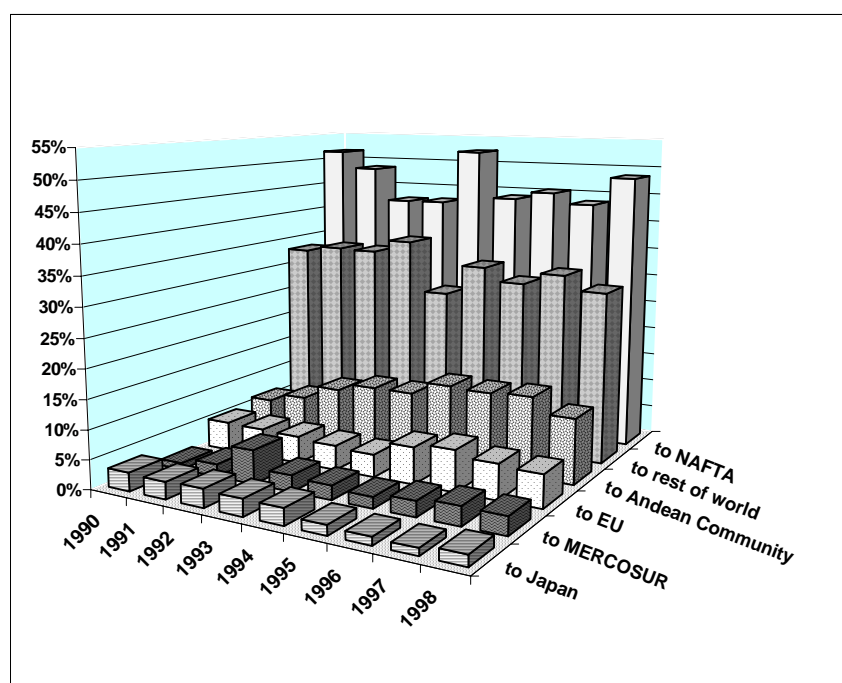
Figures 9.3 and 9.4 show the distribution by destination of the total volume of environmentally sensitive exports. It is interesting to note not only the increase in the volume of exports, but also the fact that for both the Andean Community and MERCOSUR, the main destinations by volume for environmentally sensitive exports were the three countries of the North American Free Trade Agreement (NAFTA), namely Canada, Mexico and the United States. For Chile, by contrast, the predominant destination for environmentally sensitive exports is Japan. Although this was still the largest market towards the end of the 1990s, its share fell from 50% in 1991 to 28% in 1999, with destination markets such as the European Union and NAFTA becoming more important.

Figure 9.3
MERCOSUR: EXPORT VOLUMES OF ENVIRONMENTALLY SENSITIVE INDUSTRIES, BY DESTINATION MARKET



Source: Based on information from the ECLAC Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL).

Figure 9.4
ANDEAN COMMUNITY: EXPORT VOLUMES OF ENVIRONMENTALLY SENSITIVE INDUSTRIES, BY DESTINATION MARKET



Source: Based on information from the ECLAC Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL).

Another important finding is that, in the 1990s, export volumes in environmentally sensitive industries within the MERCOSUR and Andean Community areas grew at faster rates than flows to countries outside the region (see table 9.2). However, the level of these exports in the early 1990s, started at very low levels, compared to the volume exported to other regions.

Table 9.2
AVERAGE ANNUAL GROWTH IN ENVIRONMENTALLY SENSITIVE EXPORT VOLUMES, BY DESTINATION
(Percentages)

	From MERCOSUR 1990-1999	From Andean Community 1990-1998
To MERCOSUR	19.6	34.2
To Andean Community	16.5	15.9
To NAFTA	4.9	7.0
To EU	4.0	12.6
To Japan	-3.0	1.8
To rest of world	1.9	6.9

Source: Based on information from the ECLAC Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL).

Overall, while most of the countries show an increase in the volume of environmentally sensitive exports during the 1990s, it is interesting to note that the relative share of such exports diminished in terms of value, and also experienced a relative loss of competitiveness in international markets. The latter is reflected by the revealed comparative advantage (RCA) indices that are shown in table 9.3 for the Andean Community and MERCOSUR countries and Chile.

Table 9.3
REVEALED COMPARATIVE ADVANTAGE (RCA) INDICES FOR THE GROUP OF ENVIRONMENTALLY SENSITIVE INDUSTRIES

Region/country	1990	1998
MERCOSUR	1.37	1.11
Argentina	1.19	0.72
Brazil	1.55	1.35
Paraguay	0.11	0.24
Uruguay	0.29	0.41
Andean Community	1.69	1.58
Bolivia	0.89	0.58
Colombia	0.66	0.71
Ecuador	0.36	0.37
Peru	2.14	1.71
Venezuela	2.26	2.48
Chile	2.94	2.71

Source: The author, on the basis of information from the ECLAC Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL) and the United Nations International Commodity Trade Database (COMTRADE).

Note: The RCA index is calculated as $RCA_{ij} = (X_{ji}/X_{jt})/(X_{it}/X_{tw})$, where j = a product or industry (SITC code, revision I), i = country, w = the world and t = total. It measures changes in a country's exports of a product j as a share of world exports of that same product j , comparing them to changes in the country's total exports; as a share of total world exports; i.e., considering the country's relative weight as determined by its size. If the RCA index >1 , the country has a comparative advantage in the product; i.e., its share of the world market for this product is higher than its overall share of world exports. If the RCA index <1 , the country does not have a comparative advantage in the product.

The results in table 9.3 show that environmentally sensitive industries in both MERCOSUR and the Andean Community have lost export market share, but remain competitive ($RCA > 1$). These aggregate figures, however, mask large differences among groupings, countries and products. While MERCOSUR exports stand out as very competitive (RCA of between 2 and 5) in pulp and paper, iron and steel and aluminium, for Andean Community exports this is the case in copper, aluminium and petroleum products (RCA of between 2 and 10). Chile's competitiveness, on the other hand, has declined slightly across this whole group of industries. It is, however, very competitive in pulp and paper ($RCA > 14$) and inorganic chemicals ($RCA > 4$). Although it is very competitive in copper, its RCA shows a downward trend over the decade.

In these circumstances, the countries face a number of challenges. The most important one has to do with their specialization in potentially polluting, natural resource-intensive industries, which places them in a very vulnerable position as regards the environmental requirements and demands they will have to meet in developed-country markets.

From the scanty available information it is difficult to get a precise idea of the environmental impact of foreign direct investment (FDI), which depends on multiple factors, such as the corporate

strategies of individual firms, the sectors in which they operate, their relative efficiency, corporate environmental policy, the technologies they use and the characteristics of the recipient country's environmental regulations and institutions. On the one hand, FDI plays an important role in defining major natural resource projects for export (Mortimore and Peres, 2001),⁵ which may result in greater pressure on natural resources. On the other hand, transnational corporations can facilitate the transfer and use of environmentally friendly technologies and improvements in environmental management (OECD, 1999).

In any event, the few studies that do exist indicate that the presence of foreign-owned firms, together with a large share of exports in total sales, increase the likelihood of firms carrying out environmental investment (Young and Roncisvalle, 2001). Furthermore, the larger a firm, as measured by its number of employees, the longer-established it is, the stricter the environmental controls applied and the greater the pressure from local society, the more environmental investment is likely to rise (Ferraz and Seroa da Motta, 2001). According to reasonable estimates, private-sector environmental spending in Argentina reaches 0.17% of GDP, while environmental investment spending in Brazil is estimated to have averaged 0.8% of net operating revenue in 1998.

Table 9.4 is derived from a survey held in 1996 among a wide range of firms in the state of São Paulo, Brazil. As can be seen, in this case the level of concern of firms for environmental considerations is determined by external demand.

Table 9.4
FIRMS INVESTING IN THEIR PRODUCTION PROCESSES FOR ENVIRONMENTAL REASONS, 1996

Investment in production Processes for environmental reasons	Ownership of capital (as of 31/12/1996)			
	Domestic	Foreign	Mixed	Total
Yes (%)	18.2	43.10	35.50	18.70
Exports/revenues (%)	1.54	12.91	8.83	2.00
No (%)	81.80	56.90	64.5	81.30
Exports/revenues (%)	0.60	6.14	5.53	0.68
Number of firms	39,968.00	582.00	259.0	40,809.00
Exports/revenues (%)	0.77	9.06	6.69	0.93

Source: Carlos Eduardo Young and María Cecilia Junqueira Lustosa, "Meio ambiente e competitividade na indústria brasileira", *Revista de Economia Contemporânea*, vol. 5, special issue, 2001.

In the case of Argentina, (Chudnovsky, López and Freylejer, 1997), while recognizing the difficulty of accurately classifying the reasons for investment, the findings indicate that while some investment is carried out to comply with national environmental regulations, the need to comply with export market requirements, the existence of more stringent internal company policies (transnationals), the environmental "image" of the firm or the scope for reducing operating costs through environmental management are determining factors in environmental investment decisions.

Furthermore, the growing international competition resulting from globalization has led to greater concern about and efforts to comply with international environmental standards and to a quest to differentiate products and processes; this is the thrust of the ISO 14001 standards and the concept of eco-efficiency in production processes. Subsidiaries of transnational corporations have

⁵ In the primary sector, investment by transnational corporations has gone mainly into oil and gas exploration in Argentina, Bolivia, Brazil, Colombia and Venezuela and mineral prospecting in Argentina, Chile and Peru.

greater opportunities to incorporate uniform environmental management standards into their strategies, especially in operations aimed at the international market. These environmental management systems at the company level are now covered by the ISO 14001 scheme. This certification, like the ISO 9000 quality management certification, has gradually become established as a necessary credential for leading firms, particularly exporters. In line with this trend, a growing number of the region's large firms, whether foreign or locally owned, have invested to obtain ISO 14001 certification for their environmental management systems.

In the last three years, the number of firms with ISO 14001 certification has increased substantially. In 1998, 7,887 firms in 72 countries around the world had ISO 14001 certification. By March 2001, the number of firms had more than tripled to reach 27,509 in 96 countries. In the region, although the absolute number of firms certified is still small, it rose by 44% over the same period. The first place is held by Brazil with 270 firms certified, followed by Mexico with 188 and Argentina with 114 (between 2000 and 2001, the numbers increased by 81%, 27% and 14%, respectively). As of March 2001, Colombia and Costa Rica had 20 firms certified; Chile, 11; Peru and Uruguay, 10; Venezuela, 7; Barbados, 3; Honduras, 2; and the Dominican Republic, Ecuador, Guatemala, Paraguay, Saint Lucia and Trinidad and Tobago, 1 apiece.

2. Changes in the international economic context and the environment

Globalization has brought to light the interdependence between international trade and the environment. This has happened in an international context where concerns about the environment are becoming increasingly strong, particularly in the developed countries. In Latin America and the Caribbean, by contrast, slow economic growth and the problems of poverty that represent a more immediate threat to human life and health have given precedence to short-term priorities, to the detriment of environmental considerations or slower-maturing production efforts that take account of environmental quality.

However, insofar as the countries of the region have opted for a strategy of trade liberalization and export-led growth, they do not have much flexibility for adapting their production systems to the environmental requirements of their main export markets. The way in which this adjustment is bound to take place is largely determined by the type of technological and environmental management prevailing in the developed countries, because they are the ones that dominate world trade and export the largest share of goods and services among themselves (including even raw materials). Accordingly, they will also most likely be determining the pattern of production and technology that will prevail in the rest of the world.

As the countries of Latin America and the Caribbean seek higher and better participation in international markets, trade will become increasingly important in shaping patterns of economic activity and the use of resources. However, widespread tariff reductions have increased the importance of national regulatory policies, including environmental policies, owing to their perceived potential to distort international trade. Multilateral trade negotiations have also changed, and are increasingly focusing on national policies that determine conditions of competition. These can be affected when costs vary among countries due to subsidies, intellectual property protection policies or environmental policies, among other things.

Another feature of the international context is that environmental requirements are linked to economic considerations and interests. One example illustrating this link is related to the opportunity to increase exports of the environmental goods and services industry, a new sector whose growth is driven by the world wide adoption of environmental rules, laws and standards. In the United States, for example, the 1992 Energy Policy Act promotes, among other things, the creation of a technology transfer programme to reduce the trade deficit through exports of

environmentally innovative technologies. Similarly, the 1992 Export Enhancement Act was intended to encourage exports of environmental goods and services.

Another phenomenon that combines economic interests with concerns about the environment in developed countries is the rising cost of disposing of waste and products that have reached the end of their life cycle. This creates environmental obligations that are reorienting the ways in which goods and services are produced and marketed. Firms are aiming to implement product life cycle management systems. This concept is creating conflicts in international trade, as it is difficult to put into practice when products are marketed across national borders. Eco-labelling programmes, eco-packaging rules and recycling programmes are examples of this life cycle concept in practice. It is often perceived by outsiders as a potential barrier to international trade, given the heterogeneity of environmental standards.

Furthermore, consumer habits and demands have turned environmental excellence into a new factor of competitiveness among firms and products, and the same is true of environmental assessment of the entire product life cycle. Consumers are increasingly opting for so-called “green products”; i.e., those they regard as environmentally sounder in respect of their contents and the way they are produced. Thus, businesses are also under pressure from consumers to improve the environmental characteristics of their products and processes. Environmental performance is not just important for firms’ marketing efforts, but has also become a relevant factor in capital markets, which reward firms with a proven environmentally responsible attitude.

For Latin America and the Caribbean, these developments mean that stringent environmental criteria will be applied in their main export markets in the coming years. It will be increasingly difficult to argue that environmental restrictions in the developed countries are trade tactics or unfair sanctions. The global nature of environmental problems will in any event give a *de facto* legitimacy to the environmental requirements imposed on exports. These trends will force the region to make major changes in its environmental practices and regimes, not just to heed the signals being given out by international markets, but to ensure the very survival of the production base in the countries of Latin America and the Caribbean.

IV. The environmental repercussions of productive and technological restructuring in the energy sector

In the 1990s, liberalization and deregulation in sectors such as energy and telecommunications unleashed a process in which new technologies were rapidly introduced and businesses were restructured. This process influenced the region’s energy sector in two ways: (a) directly, through a far-reaching process of structural transformation in the infrastructure sectors (particularly energy) involving the entry of new agents, mainly transnational corporations and some large locally owned conglomerates, that gave rise to major changes in the hydrocarbon and electricity production chains; and (b) indirectly, as the energy sector had to adapt constantly and rapidly to changes in the final demand for energy on the part of other production and social sectors (ECLAC, 2001e). These changes affected the evolving energy-environment relationship, through both economic factors (energy intensity) and environmental ones (emissions, energy efficiency and the share of renewable energy sources).

1. Energy intensity

Much of the literature on this subject identifies sustainable development as one of the principles underlying the energy sector reforms implemented in recent decades. Despite this general affirmation and the slow growth of per capita electricity consumption, however, the region’s level of efficiency in energy transformation and use is far from adequate.

Energy intensity is linked to a country's economic development process. It increases in the early stages of development (mechanization and the development of energy-intensive industries), then flattens out (stabilization of these processes) and finally decreases (introduction of technological improvements, know-how, improved yields in energy transformation and consumption).

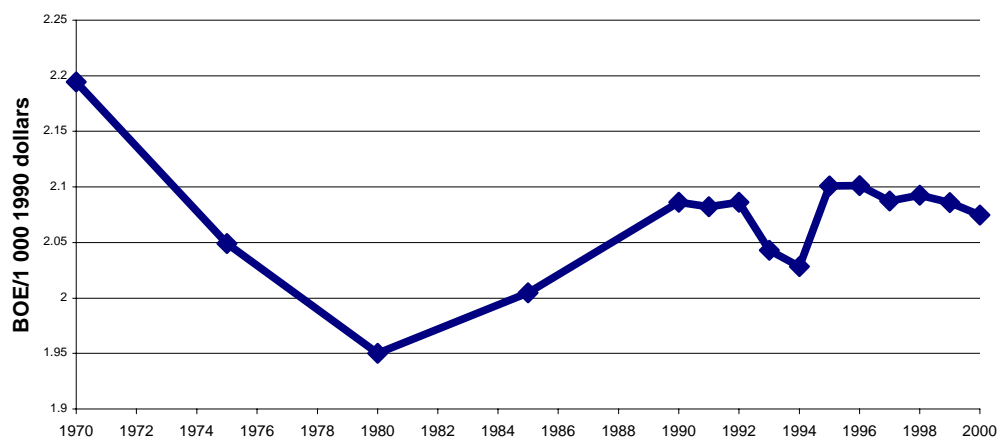
As table 9.5 and figure 9.5 show, the evidence indicates that the reforms did not have the hoped-for effect on energy efficiency. As a result, the subject became the crux of initiatives to achieve more rational use of energy resources in the late 1990s. The data show, in fact, that energy intensity has behaved erratically: after dropping sharply between 1970 and 1980, it began to rise steadily, so that 7% more energy is now consumed to generate the same unit of output than in 1980.

Table 9.5
INDICATORS OF ENERGY CONSUMPTION AND ENERGY INTENSITY
IN LATIN AMERICA AND THE CARIBBEAN

Sectoral share of total consumption	1970	1975	1980	1985	1990	1995	2000
<i>Transport</i>	27.07%	30.90%	32.43%	31.77%	33.04%	35.27%	35.64%
Industry	31.19%	32.00%	34.28%	35.41%	35.63%	34.05%	35.54%
Residential	33.46%	28.17%	24.30%	23.97%	22.18%	20.88%	18.53%
Others	8.28%	8.93%	9.00%	8.85%	9.14%	9.79%	10.28%
Total consumption (KBOE)	1,178,409	1,500,466	1,870,950	1,972,564	2,218,536	2,589,219	2,983,607
Energy intensity (BOE/1000 1990 dollars)	2,195	2,049	1,950	2,005	2,086	2,101	2,075
Index 1980=1	1,125	1,051	1,000	1,028	1,070	1,077	1,064
Per capita GDP (1990 dollars)	1,909	2,303	2,688	2,484	2,442	2,596	2,798
Index 1980=1	0.710	0.857	1.000	0.924	0.908	0.966	1.041
Growth							
1970-1980	4.73						
1980-1990	1.72						
1990-2000	3.01						
1970-2000	3.15						

Source: Based on data from the OLADE Energy Economic Information System and ECLAC.

Figure 9.5
ENERGY INTENSITY IN LATIN AMERICA, 1970-2000

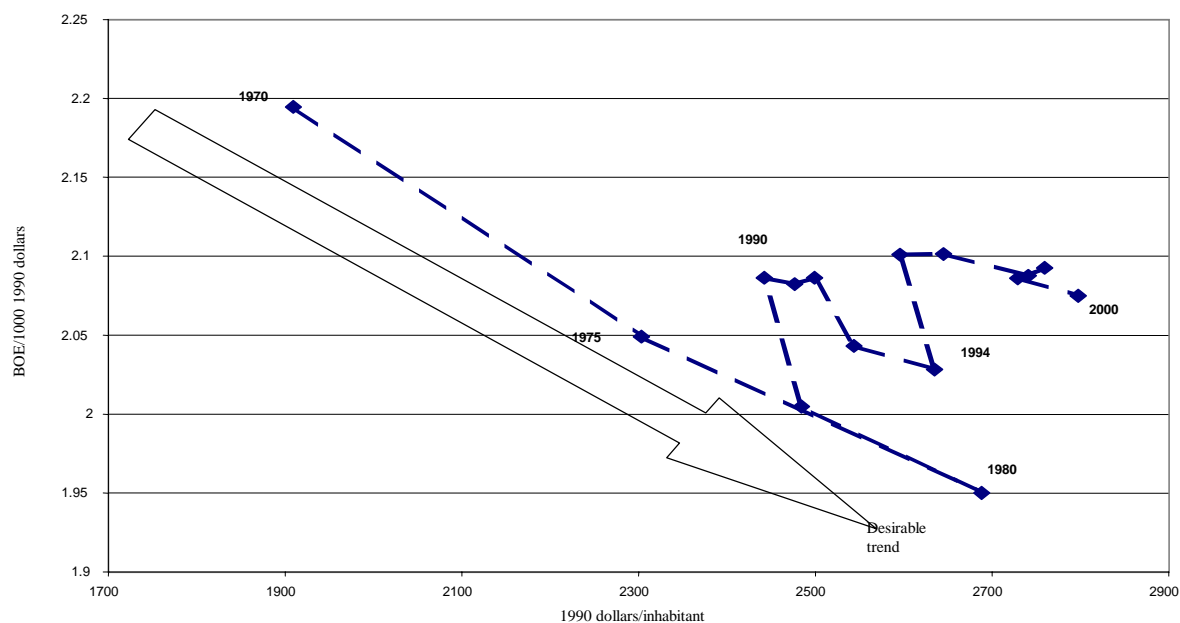


Source: Based on data from the OLADE Energy Economic Information System and ECLAC.

Some components of energy intensity have changed considerably. While the share accounted for by household consumption declined from more than a third of the total in 1970 to just 18% in 2000, the share of the transport sector rose strongly and steadily over the whole period (from 32% to more than 35%), as did that of industry, though to a lesser extent and mainly during the 1970s rather than later (see table 9.5). A shift in the industrial structure of certain countries in the region (particularly Brazil) towards energy-intensive industries, or (again in Brazil) a shift in the composition of exports towards energy-intensive products such as cellulose, led to strong growth in the energy content of the industrial sector, and with it a rise in total energy intensity.

Figure 9.6 plots energy intensity against per capita output. Between 1970 and 1980, a desirable trend is apparent: economic growth accompanied by lower energy use per unit of output (lower energy intensity), indicating improved efficiency and better use of energy resources. This trend was reversed, however, between 1980 and 1985, when per capita income fell back and energy intensity rose, and again between 1987 and 1990, indicating that economic recession in the “lost decade” was not accompanied by better energy use. In the early 1990s a favourable trend was re-established, but this broke off again in mid-decade. The behaviour of the energy intensity/per capita output ratio in the last two decades of the twentieth century was erratic, but the net effect was an overall worsening of the situation.

Figure 9.6
ENERGY INTENSITY AND PER CAPITA INCOME IN LATIN AMERICA
AND THE CARIBBEAN, 1970-2000



Source: Based on data from OLADE/ECLAC.

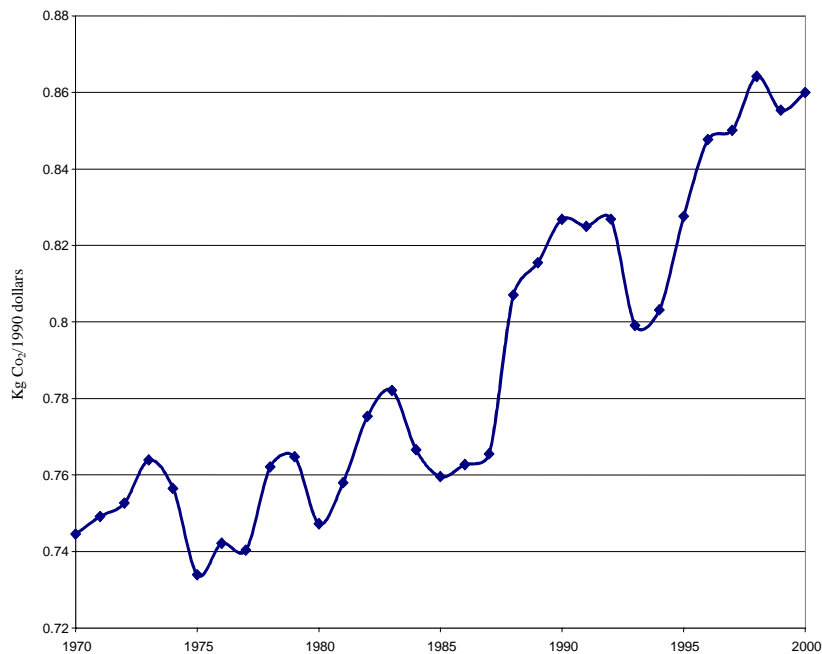
To sum up, in terms of energy intensity, the achievements of the Latin American and Caribbean countries in the last three decades have been modest, and trends in the last two decades have taken an undesirable turn. This outcome contrasts with the progress made by the OECD countries as a group over the past 20 years, with energy intensity falling by 20% thanks to energy policies designed to diversify supply and make energy use more effective by cutting out waste and increasing usage efficiency. This has involved the development of institutions to regulate energy consumption by applying temperature standards in public premises, measuring the consumption of hot water for personal use and household heating and setting technical standards for new buildings.

It has also involved publicity campaigns to combat excessive energy consumption and encourage energy-saving investments through promotional mechanisms such as free diagnosis and financial help for the implementation of improvements, and the allocation of significant research and development funding to programmes to increase energy efficiency and develop new and renewable sources. Latin America and the Caribbean have significant scope for action along the same lines.

2. CO₂ emissions

As a result of the factors described above, the total CO₂ emissions of the Latin American and Caribbean energy sector (not including emissions of biotic origin) have risen steadily since 1970. If this increase is correlated with economic growth using the index of emissions per unit of GDP, it transpires that the 2000 level was 16% higher than the 1970 one, largely because of the steady increase observed since 1985 (see figure 9.7).

Figure 9.7
RATIO OF CO₂ EMISSIONS TO GDP IN LATIN AMERICA AND THE CARIBBEAN



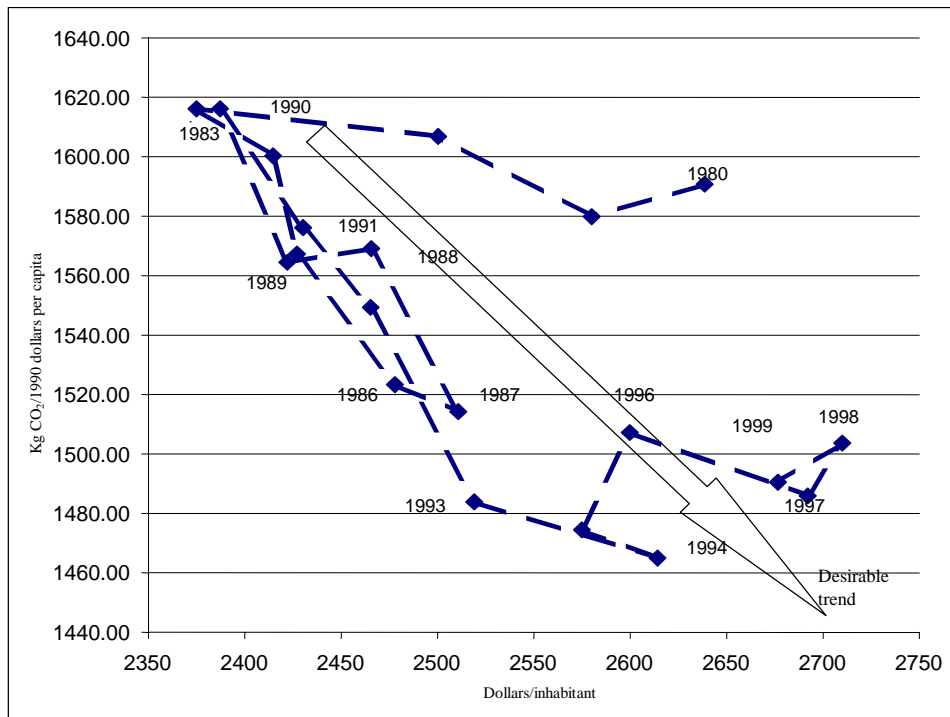
Source: Based on OLADE/ECLAC.

Figure 9.8 plots the emissions intensity indicator (kg of CO₂ per unit of output) against per capita output. As can be seen, the evolution of this emissions indicator does not show any specific tendency, but in recent years the trend has been clearly adverse.

As in the case of energy intensity, the behaviour of this indicator is associated with changes in the region's energy consumption structures (both by sector and by source) and production structures. Perhaps the best way of appreciating the changes that have taken place in the energy sector, and their impact on the environment, is to analyse emissions from electricity generation (see figure 9.9). The push to build hydroelectric generating capacity is reflected by the steady decline in

CO₂ emissions per unit of energy generated, a decline that was virtually unbroken from 1970 to 1993 (with a subperiod of stagnation between 1985 and 1988), but which went clearly into reverse thereafter. In 1993, when the last hydroelectric facilities built over the previous decades were still in full operation, emissions levels were almost 50% lower than they had been in 1970. By 2000, however, levels had risen 17% above that minimum.

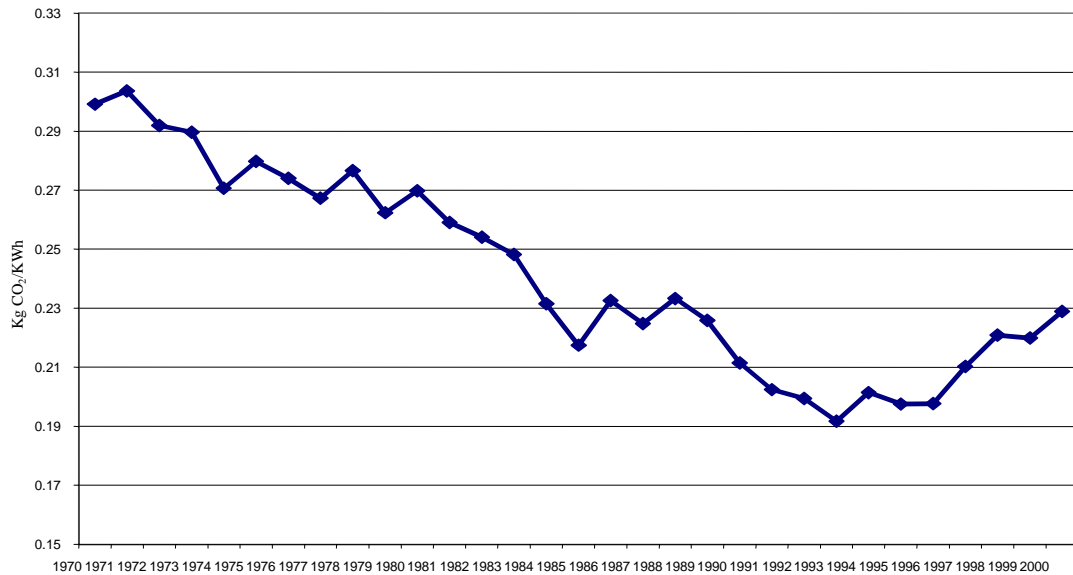
Figure 9.8
CO₂ EMISSIONS, 1980-1999



Source: Based on OLADE/ECLAC.

This substantial increase is connected with the reform process, which resulted in a move to expand generating systems based primarily on conventional thermal power stations. As part of this trend, countries with natural gas reserves built combined cycle power stations that were more efficient and less polluting than the old ones.

Figure 9.9
CO₂ EMISSIONS FROM POWER STATIONS, 1970-2000

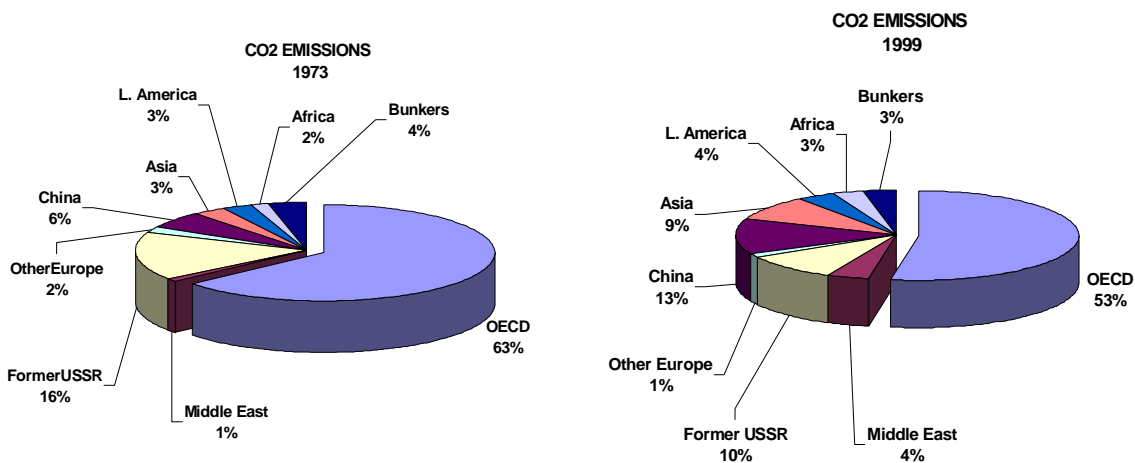


Source: Based on OLADE/ECLAC.

3. The Latin American and Caribbean energy sector and global climate change

In the late 1990s, Latin America and the Caribbean accounted for 8.5% of the world’s population and 4.5% of world GDP. As regards greenhouse gas emissions, total world CO₂ emissions grew by 6.5 billion tons in absolute terms over the 25 years that followed the first oil shock. The contribution of Latin America and the Caribbean to total world CO₂ emissions is still low, but the region’s share of this total grew from 2.6% in 1973 to 3.8% in 1999. The share of other regions has increased more, with that of China doubling from 6% to 12.7% in the same period, while that of the rest of Asia tripled (see figure 9.10).

Figure 9.10
EMISSIONS BY WORLD REGION, 1973-1999



Source: International Energy Agency (IEA), *Key World Energy Statistics*, Paris, 2000.

The forecasts available for the next two decades do not suggest that the situation will change significantly.⁶ It is projected that growth in world energy consumption will be largely confined to developing countries, particularly in Asia and Latin America. Despite this rapid growth, Latin America and the Caribbean will account for only 7.4% of total energy consumption by 2020. As for CO₂ emissions, the developing countries are expected to be producing some 70% of the total by 2020. China accounts for almost 33% of the projected increase.

With 8.5% of the world's population, Latin America now produces 5.4% of world greenhouse gas emissions. The region's largest emitter is Mexico, with 356 million tons a year. The emissions of Mexico and Brazil represent 53% of the regional total. Although the combined population of the two countries is close to that of the United States, Mexico and Brazil together emit just 12% as much as that country.

Two thirds of the region's emissions come from the burning of liquid fuels (petroleum and derivatives), with coal accounting for less than 8%. The region's emissions per unit of output are relatively low: 0.41 kg of CO₂ per unit of GDP at purchasing power parity, as against a world average of 0.67 and a figure of 0.61 for the OECD countries. In relation to the total primary energy (TPE) supply, the region emits 2.1 tons of CO₂/TPE. The level of this indicator, which is below the world average, is due to the extensive use made of renewable energy, particularly hydraulic energy, in the regional energy structure. The per capita emissions indicator for Latin America and the Caribbean is very low, at 2.45 tons per inhabitant.

These considerations provide a starting point for formulating some regional energy policy priorities in the light of the world climate change agenda. Although Latin America and the Caribbean make a relatively small contribution to total greenhouse gas emissions, trends in the region have not been favourable in recent decades, and can certainly be improved on. There are opportunities to improve the trend of regional energy intensity through policies to promote energy efficiency and diversify the energy supply. As of 2000, only 15% of the region's hydroelectric potential was being tapped. There has been little development of other renewable energy sources, including geothermal ones.

There is clearly a long-term synergy between the region's energy policies on the one hand, the objectives of which are to improve energy efficiency and the absorption of new renewable and low-emissions technologies, and the consolidation of international efforts to combat climate change on the other. The region also has the potential to be a net supplier of global environmental services in the form of atmospheric CO₂ sequestration projects that could be marketed to countries facing high mitigation costs to offset their greenhouse gas emissions. There is also synergy between these energy policies and the objective of improving local environmental quality, particularly in urban areas; this would have real public health benefits in the region's cities.

In the political sphere, lastly, the region's countries have shown a real commitment to global efforts to coordinate climate change mitigation measures. As of May 2001, 12 Latin American and Caribbean countries had already submitted their first national communications to the authorities of the United Nations Framework Convention on Climate Change. As of late 2001, 17 of the 46 countries to have ratified the Kyoto Protocol were Latin American or Caribbean.⁷

⁶ See International Energy Agency (IEA, 2000). The data are for emissions from the burning of fossil fuels. This publication does not count Mexico as part of Latin America, as the country is included in the OECD category. Mexico's share has been reclassified here as belonging to Latin America and the Caribbean.

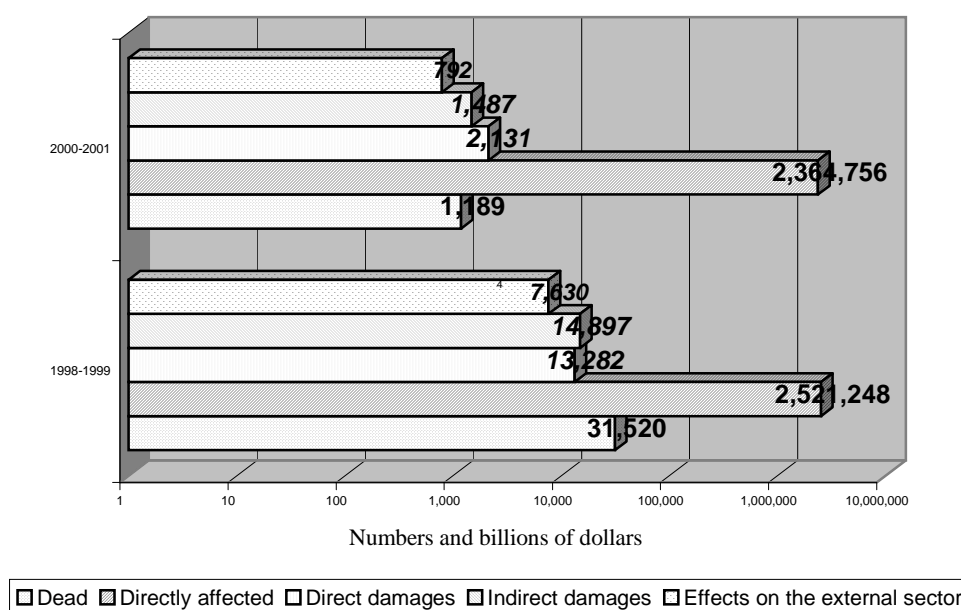
⁷ Antigua and Barbuda, Argentina, Bahamas, Barbados, Bolivia, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Trinidad and Tobago and Uruguay.

V. Changes in the region's vulnerability

Vulnerability, in the sense of a system's internal susceptibility to changes that negatively affect its equilibrium in the face of an external event, is a concept in growing use.⁸ The main fields of application of vulnerability analyses that deal with environmental issues are natural disasters and the research being done by the Intergovernmental Panel on Climate Change (IPCC). The acknowledgement that the damage caused by a given physical phenomenon may vary greatly depending on the development level of the countries affected,⁹ and other variables such as environmental sustainability, is resulting in a new approach to natural disasters in which the idea of vulnerability is a key element.

The Latin American and Caribbean region is highly exposed to potentially destructive natural phenomena such as floods, earthquakes and volcanic eruptions. In combination with the region's high degree of sensitivity and limited capacity for adaptation, this exposure has resulted in a high and rising incidence of disasters caused by natural phenomena (see figure 9.11).

Figure 9.11
LATIN AMERICA AND THE CARIBBEAN: EFFECTS OF DISASTERS CAUSED BY NATURAL PHENOMENA, 1998-2001



Source: ECLAC.

Note: The chart summarizes the effects of disasters that have been evaluated by ECLAC. There is an indeterminate number of events that have not been evaluated by ECLAC, either because the countries did not request it (as in the case of disasters, particularly floods, that have affected Argentina, Bolivia, Brazil and Chile) or because they were "minor" seasonal events. The damage caused by these events could well be double the figure for the damage caused by the events evaluated.

⁸ The vulnerability of a system is determined by: (i) the degree of exposure (the amount of time for which the system is subjected to an external change and the way in which it is so subjected), (ii) its sensitivity (the degree to which the system is affected by an external change) and (iii) its adaptability (ability of the system to adjust to the external change, moderate potential harm and take advantage of the opportunities or cope with the consequences it creates) (IPCC, 2001).

⁹ Of all disaster victims in the world, 90% live in developing countries where poverty and population pressure force growing numbers of the poor to live in dangerous locations (Annan, 1999).

While the reasons for the high level of vulnerability in Latin America and the Caribbean are complex and varied, the pattern of development followed by most of the countries, with high levels of poverty, inadequate infrastructure, socio-economic exclusion and environmental degradation, is a decisive factor (ECLAC/IDB, 2000). Over the past four years, disasters caused by climatic phenomena have been particularly devastating in the region. They have revealed how vulnerable many countries are because of inadequate preparation and limited response capabilities, particularly small island developing States and other small developing countries.

In Central America, which is one of the most vulnerable subregions, the estimates of economic damage (quite apart from the loss of human life) caused by natural disasters that ECLAC has been carrying out since 1972 put the average annual cost at 2% of subregional GDP. In the Caribbean, one of the main variables explaining the volatility of the countries' output is the occurrence of natural disasters (Commonwealth Secretariat, 1997). Because they are islands and small in size, the countries of this subregion suffer from a high degree of economic and environmental vulnerability (ECLAC, 2000a, vol. 3, chap. 4).

These problems have been compounded by the emergence of new threats linked to global warming, such as changes in the distribution and intensity of precipitation and the possible intensification of droughts and flooding associated with El Niño and rising sea levels.

The vulnerability analyses carried out for Latin America and the Caribbean by IPCC allude to the difficulty of identifying common patterns of vulnerability to climate change, mainly because of the region's diversity in terms of climate, ecosystems, population distribution and cultural traditions.

In the Caribbean, low-lying islands and atolls are regarded as vulnerable, as are many of the countries, since much of their population, infrastructure and agricultural land are located in coastal areas. Natural ecosystems such as coral reefs, which are very sensitive to temperature increases, and mangrove swamps may also be adversely affected. It is expected that tourism, which accounts for over 50% of GDP in some of these countries, will be directly and indirectly affected. The loss of beaches (to erosion and flooding), the salinization of freshwater aquifers, damage to infrastructure and the loss of recreational activities (such as diving among coral reefs) could jeopardize the sector's viability and long-term sustainability. Health care systems may be put under greater pressure by the spread of heat-related diseases such as cholera and dengue.

In Latin America and the Caribbean, possible changes in the El Niño cycle may have negative effects on agriculture and fisheries in a number of the region's countries. Changes in precipitation patterns could reduce the availability of water resources in some areas that already face shortages, with negative implications for agriculture, the drinking-water supply and energy production. Other effects mentioned by IPCC include possible declines in the yields of important crops, which would jeopardize subsistence agriculture in some countries, and the spread of certain infectious diseases (malaria, dengue, cholera), with all the extra stress this would put on the countries' health care systems.

Vulnerability may be increased by cumulative events, such as recurrent or cyclical disasters, or when multiple pressures reduce the ability of human or environmental systems to withstand or adapt to change (Clark and others, 2000). Considering the poverty and inequality that characterize the region, and the importance of natural resources for its production and exports, the effects of the economic globalization process will be key in reducing vulnerability to environmental threats. If this process results in less poverty, exclusion and inequity in the countries and enables the region to use its natural resource endowment sustainably, Latin America and the Caribbean will be better able to adapt to the environmental changes it will face in this century, and vulnerability may diminish as a result. If the region's economic, social and environmental conditions worsen, however, environmental change may have very adverse effects on the most vulnerable communities, which are the most sensitive to such events and the least able to adapt and respond to them.

VI. Changes in national and regional environmental management institutions and governance

1. Institution-building

Efforts to create modern environmental institutions in the region were given their initial impetus by the 1992 United Nations Conference on Environment and Development, or Earth Summit. Subsequently, the countries felt the need to establish higher-ranking environmental authorities in the form of ministries or authorities of a similar level created from existing coordinating committees (ECLAC/UNEP, 2001). This need for a national institutional framework to oversee compliance with sustainable development commitments also influenced existing subregional partnership and integration arrangements, as well as emerging ones. As a result, the quest for environmental protection and sustainability has gradually been adopted as a political objective of regional and subregional processes, under different institutional structures.

The 1980s were a period of great difficulty for environmental management. The adjustments resulting from the economic crisis that struck the region affected its recently created environmental institutions, which were weak to begin with, leaving them with great responsibilities but few resources with which to address them. In the 1990s, the region underwent an intense democratization process in parallel with economic reform.¹⁰ In almost all the countries, furthermore, civil society became an important counterpart for government institutions in areas such as health, the environment and human rights. The environment became a grass-roots social issue involving many volunteer groups at the local, national, regional and world levels. As a result of this ever-increasing environmental awareness, national approaches to the issue were reviewed and adapted. The Earth Summit strengthened internal debate about the different aspects of sustainable development, in the light of the negotiations on Agenda 21, the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa. Scientists and public-sector, private-sector and social organizations mobilized and participated to an unprecedented degree (ECLAC, 2000a).

The global conventions concluded since 1992 have also resulted in a number of important institutional changes and innovative cooperation mechanisms. For example, most of the countries have set up specific bodies such as commissions, institutes or national programmes on biodiversity in response to the convention on this subject. New types of environmental assessment are being carried out, such as the national communications on greenhouse gas inventories submitted by each country in accordance with the United Nations Framework Convention on Climate Change.

Regionally, the countries' environmental authorities have set up the Forum of Ministers of the Environment of Latin America and the Caribbean, which consists of the 33 ministries or equivalent authorities. The work of the Forum of Ministers is strengthened by the support of the Inter-Agency Technical Committee created in 1999 by ECLAC, UNDP, UNEP, the World Bank and IDB, whose main task is to support the recommendations and objectives that the member countries of the Forum have accepted under the Regional Plan of Action agreed upon in Lima in 1998.

Subregionally, three processes can be distinguished. The first is the inclusion of sustainable development in economic integration agreements, as reflected in the resolutions of the Andean

¹⁰ Acuña (2000) reveals that in nine of the region's countries no direct relationship of cause and effect can be identified between economic reform and changes in environmental regulations. Nonetheless, there are some instances of positive change in the regulatory and institutional frameworks governing environmental issues. These occurred primarily in countries that began reforming later or where democratic government was restored.

Community, MERCOSUR, the Central American Integration System and the Caribbean Community (CARICOM).

Secondly, there are the subregional treaties whose aim is the conservation of shared natural resources and which include sustainable development considerations; examples of these include the Regional Seas Programme, the Treaty for Amazonian Cooperation and the agreements arrived at by the Central American Commission on Environment and Development (CACED) (ECLAC, 2000a).

Thirdly, the Programme of Action for the Sustainable Development of Small Island Developing States, adopted in Barbados in 1994, deserves particular attention. The special characteristics of these States prompted the United Nations to draw up a programme of action for making sustainable development viable in such countries. The Caribbean countries gave strong support to this new instrument and established their own model for applying the Programme of Action, giving substance to the agreements adopted at the 1997 Caribbean Ministerial Meeting on the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. The subregion thus decided to develop and implement mechanisms that would help overcome the financial, technical and other barriers identified as obstacles to the achievement of sustainable development in the island States of the Caribbean, with particular attention to vulnerability.

2. Challenges for the future

The institutional development and environmental management capabilities achieved by the countries so far, however, have not been enough to contain the environmental costs of economic expansion and urban concentration on the scale and of the nature seen in the region over recent decades. The countries still need to enhance their institutional platforms and capabilities considerably if they are to achieve effective control of the negative externalities affecting the regional environment as a result of the current development style. This observation should sound a warning about the challenges involved in building the political consensus needed to underpin stable economic growth. This consensus should embrace the need for greater investment, resource allocation, improvements to policy instruments and innovations in public-sector management to rectify the major shortcomings identified above and to halt existing patterns of environmental degradation. In view of the trends that have been documented, the countries of the region will be unable to prevent a steady decline in the quality of their environment and natural resources unless they make a systematic effort, and allocate more resources, to improve the effectiveness of environmental management in the years ahead.

Given these institutional shortcomings in the environmental sphere, it is disturbing to note, at the same time, the tendency of some countries towards policy failures such as tax competition¹¹ to attract investment in primary sectors such as mining. This competition has even led some countries to give tax relief on economic rents associated with the exploitation of non-renewable resources, matching the tax treatment of these primary sectors with that of the rest of the economy. Tax relief for rents associated with the exploitation of non-renewable resources is a distortion that may exacerbate the concentration of economic activity in primary and natural resource sectors. Distortions of this nature may have perverse environmental effects for the region, as they could lead to yet greater specialization in environmentally sensitive sectors at a time when the region still does not have a system of environmental institutions that is fully able to deal with the negative externalities of this phenomenon.

¹¹ "Tax competition" may occur among countries, among states in a federal system or even among municipalities, when they compete to attract investment by offering favourable tax treatment.

3. Changes in environmental financing

Although there are differences among countries, total environmental spending by both the public and private sectors generally does not exceed 1% of GDP, and national public-sector environmental spending rarely tops 3% of total public spending. As a result of administrative decentralization, many environmental expenses are now met by provinces or states, whose environmental budgets may represent a slightly higher percentage of the total than is the case nationally. It is at the municipal level, however, that the environmental budget is particularly important, as it is usually municipalities that are responsible for collecting household waste, treating sewage, etc. (ECLAC/UNDP, 2001).

Public-sector environmental budgets have fluctuated sharply over the past decade and in many cases have shown a tendency to fall, mostly because of the position of public finances and the weakness and discontinuity of environmental governance. Budget deficits and the need to generate resources to meet external obligations have generally resulted in budget cuts, to which environment-related areas are extremely vulnerable. Dependence on credit for financing has also lowered the quality of the environmental budget by increasing the proportion of financing costs in the total.

Furthermore, the need to obtain fresh resources to finance environmental spending means that the environmental agenda is permeated by the interests of donor or lender countries or institutions. Thus, the “green” agenda in Brazil receives far more funding than programmes to solve urban environmental problems. In Argentina, the five jurisdictions most favoured for environmental investment are the ones that attract the most international tourism.

The impact of international donations and loans on the public-sector environmental budget varies greatly among the region’s countries. In the largest ones, their amount is generally very small in comparison to locally generated resources, and is tending to decline (Colombia is an exception, however). In smaller countries, though, and particularly in the Caribbean, external assistance is essential both for public-sector environmental agencies and for the non-governmental organizations that often play a vital role in environmental initiatives.

An important development in the region, lastly, is the appearance of private funds specializing in environmentally friendly projects that combine economic or monetary interests with “green” ones.

VII. Changes in international environmental governance

Economic globalization is creating a new relationship between the market and the State, and this is having major effects on world environmental management by creating new imperatives that oblige States to cooperate in administering global public goods and to improve the coordination of their regional and national environmental policies. Furthermore, “global civil society” and transnational corporations are playing a more prominent role in some of these multilateral processes.

Two types of international environmental regulations can be distinguished: those aimed at protecting the supply of global public goods and those aimed at incorporating environmental clauses into other types of international agreements. In the first group are multilateral environmental agreements (MEAs) on various issues, such as biological diversity, climate change and protection of the ozone layer. The second group includes environmental regulations associated with free trade and integration agreements, such as the environmental agreement linked to NAFTA and the environmental rules of the European Union.

In contrast to the multilateral trading system, the management of international environmental affairs is weakly structured and lacks coherence. In the past 20 years there has been a huge

proliferation of intergovernmental institutions within and outside the United Nations system. This process accelerated after the Earth Summit, when new bodies were established within the system. These included the Commission on Sustainable Development and the secretariats of the conferences of the parties to at least five multilateral conventions (the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention on Persistent Organic Pollutants), as well as the Global Environment Facility¹². The expansion of multilateral environmental treaties and the proliferation of forums and secretariats for these treaties and of intergovernmental bodies set up to monitor them underscore the need to rationalize the international governance of sustainable development.

To this end, countries are considering the advisability of carrying out a gradual evaluation with a view to harmonizing different processes that have similar subjects and objectives, such as biodiversity, the chemicals agenda and the ozone layer, among others. Analyses of the scope for linking together environmental agreements negotiated prior to the Rio Summit (such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Wetlands of International Importance Especially as Waterfowl Habitat and the Convention on the Conservation of Migratory Species of Wild Animals) within broader frames of reference (the Convention on Biological Diversity) have been carried out and should be considered as one approach to achieving greater consistency and avoiding duplication among agreements with converging objectives. The agreements on the protection of biodiversity (species and ecosystems) are a particularly clear instance, since they all overlap in geographical terms as well (ECLAC/UNEP, 2001).

One of the most controversial proposals is for the creation of a world environment organization with powers of sanction like those of the World Trade Organization (WTO). Proponents of this idea claim that an organization of this type would ensure compliance with international environmental agreements and relieve the growing pressure on WTO to take responsibility for environmental matters. Arguments against the proposal include, on the one hand, the lack of international political will to undertake an initiative of this kind and, on the other, the risk that such an organization might widen the gap between environmental issues and economic and social ones, which is the opposite of what the international sustainable development agenda has been seeking since the first half of the 1990s.

The international financial support and domestic resources mobilized for sustainable development have clearly been inadequate. The concessionary contributions made by GEF and the Multilateral Fund of the Montreal Protocol obviously provide only a fraction of the resources needed to solve global environmental problems. Moreover, the official development assistance pledged at the Earth Summit to support the most vulnerable countries has dwindled greatly. It consequently needs to be reaffirmed that the transition to sustainable development will require new and additional resources and innovative and stable financial mechanisms that can facilitate the development of endogenous capacity and the transfer of innovative technologies to developing countries.

The negotiation and implementation of international environmental agreements has also been heavily influenced by economic factors. The cost of implementing them, the way this cost is distributed and the effects it may have on the competitiveness of particular countries have hindered the full implementation of the Kyoto Protocol to the United Nations Framework Convention on

¹² The Global Environment Facility (GEF) was set up in 1991 to enable developing countries to fund the additional expenses they must incur to address environmental problems of worldwide impact (loss of biodiversity, climate change, depletion of the ozone layer and other problems connected with international waters and desertification).

Climate Change. The relationship between environmental agreements and trade agreements is also a source of problems. During the negotiations on the Cartagena Protocol on Biosafety, which regulates cross-border movements of genetically modified organisms, one of the most controversial subjects was the relationship between the Protocol and global free trade agreements, and the question of which would prevail if they were incompatible. Neither this Protocol nor other international environmental agreements have any global mechanism for resolving the conflicts with trade agreements that are arising with increasing frequency (Brañes and Rey, 2001).

Developing countries are also under growing pressure to incorporate environmental components into trade agreements. In the region, this tendency has manifested itself most clearly in the environmental agreement paired with NAFTA and in the Canada-Chile Free Trade Agreement; despite resistance from the Latin American countries, it has also emerged in the Free Trade Area of the Americas (FTAA) negotiations. As mentioned in an earlier section, environmental issues are now strongly represented in subregional integration agreements.

The main objectives of including environmental issues in trade and integration agreements are to prevent the emergence of competitive advantages deriving from lax environmental standards (“environmental dumping”) and to ensure that environmental legislation is not used for protectionist purposes. In relation to the first of these issues, it has been argued that the pressure to sustain competitiveness, to which countries are subjected by globalization, may prevent governments from taking steps to internalize environmental costs and improve environmental performance if this entails higher costs for domestic producers (Zarsky, 1997). These disputes are of long standing.¹³

The only international organization competent to deal with the interaction between trade and the environment is the WTO Committee on Trade and Environment. Since its establishment in 1995, however, its environmental debates have remained purely analytical—and even defensive—in nature, to prevent the emergence of trade barriers based on environmental issues,¹⁴ and it has not fostered any initiatives to achieve positive synergies between trade, the environment and the promotion of sustainable development (Panayotou, 2000).

Nonetheless, the recent adoption of the Doha Ministerial Declaration launching a new round of WTO trade negotiations has increased the scope and depth of the environmental issues that will be considered within WTO. In fact, unprecedentedly for WTO, the new Declaration provides for immediate negotiations on three environmental issues: (a) the relationship between WTO rules and specific trade obligations under MEAs; (b) the development of procedures for regular information exchanges between MEA secretariats and the relevant WTO committees; and (c) the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services.

Meanwhile, the Committee on Trade and Environment and the Committee on Trade and Development were mandated to act as a forum to identify and debate development and environmental aspects of the negotiations “to help achieve the objective of having sustainable development appropriately reflected” in the negotiations. The members also agreed to broaden the mandate of the Committee on Trade and Environment to authorize it to make recommendations to the next Ministerial Conference with respect to future action and possible negotiations on the effect of environmental measures on market access, relevant intellectual property rights issues and eco-labelling requirements.

¹³ For example, in 1971, during the preparations for the United Nations Conference on the Human Environment, held in Stockholm in 1972, a study which the secretariat of the General Agreement on Tariffs and Trade (GATT) was asked to prepare revealed the concern among trade authorities that environmental policies would become obstacles to trade.

¹⁴ Under this “defensive” strategy, one of the Committee’s main areas of work is the analysis of MEA-related trade restrictions.

VIII. An agenda for action

1. Consolidating national environmental management mechanisms and strengthening institutional capacity to cope with the trends observed

Although the region has made significant progress in developing environmental institutions and laws, there is still a need to further strengthen environmental management capabilities and instruments. As has been argued in this chapter, the countries' efforts to strengthen their environmental management capacity and instrumentation have not kept pace with the challenges raised by Agenda 21 (United Nations Conference on Environment and Development, 1992). This gap is reflected in the persistence of trends towards environmental deterioration in the region. In the 1990s, it became even more urgent to find responses to the new challenges resulting from the productive restructuring driven by globalization. These new challenges are related to the need to develop environmental management capacity to deal with the externalities of growing specialization in natural resource sectors, to control pollution in the fastest-growing sectors, and to introduce new management practices and cleaner production technologies. The countries therefore face the twofold challenge of modernizing their institutional platforms, instruments and management capacity both to achieve the targets set out in Agenda 21 and, at the same time, to face up to the new challenges created by increased participation in the global economy.

To respond effectively to these challenges, the countries will have to invest in improving the capacity of their environmental authorities to implement cost-effective environmental management options, inter alia by formulating clear national agendas, identifying priorities, mobilizing resources and consolidating mechanisms to ensure that environmental management operates on a cross-sectoral basis at all levels of government. There are also opportunities to expand the application of economic and fiscal instruments that give out more realistic price signals to economic agents for the use of natural resources (see below). This requires investment to improve the technical and analytical capacities of environmental authorities to take the lead in designing economic and fiscal environmental management instruments within the government apparatus. Continued efforts are also needed to improve oversight to ensure that existing regulations are complied with and to generate better environmental information and statistics with a view to identifying and prioritizing the problem areas to which national environmental management resources should be channelled, detecting signs of deterioration in environmental quality and anticipating productive restructuring processes that require specific environmental management measures.

2. Developing institutional capacity and mechanisms to reduce the region's vulnerability to natural disasters

Another challenge faced by the region, and particularly the countries of Central America and the Caribbean Basin, is the need to develop institutional capacity and mechanisms to reduce vulnerability to natural disasters. The frequency of extreme hydrological and climatic events has increased over the past two decades. Although there is no scientific certainty that this recent rise in climatic volatility is associated with the increased concentration of greenhouse gases in the atmosphere, the countries must prepare to face scenarios in which events of this type are more frequent, and take steps to reduce their vulnerability accordingly.

Some of the measures that the countries can take are: establishing national vulnerability reduction mechanisms that include monitoring, early warning and response capabilities for extreme natural events; developing the capacity to identify and map areas that are at risk from different types of natural events owing to their socio-economic, hydrological and geographical characteristics; and

taking land-use planning and other measures to reduce vulnerability and properly manage identified risk areas. The countries of the region also need to take a more proactive approach to multilateral negotiations in pursuit of stronger international action to mitigate and adapt to climate change, including the ability to access funds and technical assistance for adaptation and mitigation projects.

3. Developing institutional capacity and mechanisms for the sustainable management of natural and energy resources

Latin America and the Caribbean face the prospect of increasing deregulation in a number of economic sectors. Without prejudice to the objectives pursued by deregulation, in the natural resource and energy sectors there are sound reasons for the countries to undertake analyses of possible scenarios and long-term trends. Some trends will be more desirable than others, depending on each country's sustainable development priorities. Policy directions that are credibly aimed at long-term goals may be useful in giving the desired shape to the current dynamic and subsequent development of these markets.

Actions that the countries could take include developing national capacity and mechanisms to complement the current deregulation processes in natural resource and energy sectors with scenario analyses and assessments of long-term sustainability trends. Developing analytical capacity and formulating long-term policy guidelines nationally and regionally would be particularly useful in sectors such as water management and supply, the region's energy future and the fishing and forestry sectors. Some of the models adopted by the industrialized countries may be helpful for this purpose,¹⁵ but there are also experiences in the region that can provide the basis for a collective learning process.

4. Innovative ways to finance the attainment of sustainable development goals

The achievement of sustainable development goals¹⁶ requires the investment of an enormous amount of resources, which the countries have not succeeded in mobilizing over the past decade. In the current economic environment, the countries will have to launch innovative initiatives to close this financing gap.

Where the mobilization of domestic resources for sustainable development is concerned, the countries must come up with a growing volume of internal funding to finance their goals. If this is to happen, changes to the tax regime to further these goals, as exemplified by the "green" tax reforms already being implemented by a number of countries,¹⁷ will have to play a preponderant role in these efforts in the coming years. The countries of Latin America and the Caribbean have the opportunity to introduce specifically environmental components into future tax reforms. Various options are available: (a) using environmental taxes, charges and tariffs as incentives to prevent environmental damage and internalize the social cost of activities that have an environmental impact; (b) levying environmental taxes and charges for the use of natural resources, for revenue-generating purposes;¹⁸ and (c) designing the tax system in such a way as to encourage optimum use of natural resources.

¹⁵ The European Union has drawn up guidelines for the energy structure that it plans to achieve in 10 years, as a means of encouraging investment in technological development among firms seeking to supply the innovation necessary to meet these policy goals. A similar technological development process took place in the United States in the 1970s and 1980s in response to the goals contained in the Clean Air Act, which led to the development of the catalytic converter.

¹⁶ At the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, it was estimated that to achieve the goals laid down in Agenda 21, the developing countries would have to mobilize an extra US\$ 560 billion a year (United Nations, 1993).

¹⁷ Denmark, Finland, Germany, Italy, Netherlands, Norway, Sweden, Switzerland and the United Kingdom (OECD, 2000, p. 4).

¹⁸ Or earmarking the revenue for environmental infrastructure investment and management activities, in countries that implement tax hypothecation policies.

The experience of the region's countries with environmental taxes and charges is only incipient as yet. The identification of concrete opportunities to introduce and apply these new instruments as part of fiscal and administrative systems will undoubtedly command more attention in the near future.

As regards the mobilization of international resources for sustainable development objectives, the countries could join forces to relaunch the debt-for-nature swap initiative or some other mechanism that eases the financial burden of external debt and frees up resources for uses that create positive global externalities. There is also potential in collective negotiations to give greater political priority to increasing transfers of concessional resources to fund the objectives laid down in Agenda 21, in accordance with the official development assistance (ODA) targets set by the United Nations. Likewise, the countries should work towards common positions in order to participate effectively in multilateral negotiations to consolidate mechanisms for capturing the economic value of the global public goods and environmental services provided by the region, as detailed below.

5. Consolidating international markets for global environmental services and building regional capacity to participate actively in them

Latin America possesses natural resources and ecosystems of global importance, and this makes the region a very important supplier of global environmental services. Examples of global environmental services include the major contribution made by the huge Amazonian forest mass and other regional ecosystems to stabilizing the climatic system by acting as sinks for atmospheric CO₂ in the biogeophysical carbon cycle, as well as the contribution made by Latin American ecosystems, several of which are characterized by the highest level of biodiversity, to the preservation of genetic resources. To date, the absence of markets through which the economic value of these global environmental services can be captured has jeopardized the region's ability to reverse the degradation of its natural capital and secure a flow of resources to offset the opportunity cost of preserving it.¹⁹

The region needs to find mechanisms that will yield a steady flow of international resources to finance efforts to preserve and manage its natural resources and ecosystems of global importance. Without a stable flow of resources it will not be possible to make the investments needed to guarantee the continued provision of these global environmental services. The Clean Development Mechanism is the first international initiative to create an international market of this type. From a strategic point of view, the region should actively work to consolidate this first global initiative to create a market enabling the capture of the economic value from the climate stabilization services the region provides to the international community. This would set an important precedent for future progress in the same direction and for the inclusion of similar measures in new international agreements, particularly those on the conservation of biodiversity.

Countries should play a proactive role in the multilateral negotiations associated with the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, with a view to consolidating suitable mechanisms for capturing the economic value of global environmental services. They should also build their capacity to capitalize on the opportunities opened up by these new market mechanisms through domestic promotion and training efforts focusing on those sectors that have the greatest potential for generating the projects concerned. These efforts require that the State should play an active role, as the economic

¹⁹ When it is not possible to capture economic value from the conservation of these natural resources, the pattern of microeconomic incentives induces countries to devote natural ecosystems to low-profit economic uses such as extensive stockbreeding and subsistence agriculture (see the second section of this chapter). These changes in land use are often irreversible and tend to deplete the natural capital base.

opportunities created by an incipient market of this type are not apparent to national economic agents or to traditional financial institutions. The promotional and catalytic role of seed funding from multilateral and regional organizations²⁰ will be critical in the early start-up and consolidation phases of these markets, until they acquire enough momentum to mobilize funds on their own.

6. Increasing the absorption of cleaner production technologies through existing foreign investment and trade links and domestic investment in research and development

The recent wave of technological innovation represented by new cleaner production technologies, low-emissions transport technologies, energy efficiency technologies and renewable sources, and the new markets to which they have given rise, will exhibit significant dynamism over the coming decades. If the Latin American and Caribbean countries are to be promptly inserted into these markets, they need to seek mechanisms for accelerating the absorption and spread of these new technologies.

Countries can seize opportunities for absorbing clean technologies through existing investment processes and new links with countries at the forefront of these technologies. These objectives should be an integral part of trade and FDI strategies, which should combine environmental impact assessments for new investments with commitments to introduce and diffusion clean technologies. In broader terms, measures should be taken to encourage the diffusion of new cleaner production processes and technologies from the leading firms through each country's production chains (e.g., SMEs, suppliers and consumers). The establishment of cleaner production centres to disseminate information and promote local technological development and pilot demonstration projects in different sectors is another line of action that could be pursued in support of these objectives. A number of countries in the region already have successful models of this type.

7. Strengthening political commitment to sustainable development goals among all social actors nationally, regionally and globally

Finally, it must be recognized that, unless an unremitting effort is made to inform and educate all social actors, the goals of sustainable development will not become a priority on the political agenda of our countries. Progress in meeting sustainable development goals can only be made if the public is informed and civil society is proactive in the pursuit of its right to live in a healthy environment and to halt existing environmental degradation trends. Much effort is still needed to give sustainable development goals greater relevance and importance in the Latin American and Caribbean political arena.

Some of the measures that the countries can take to strengthen domestic political commitment to sustainable development goals are: introducing the concept of sustainable development at all levels of national educational systems; widely publicizing national sustainable development goals and indicators of progress or setbacks in relation to them; giving national sustainable development goals greater weight in the public consciousness as a political objective and a citizen entitlement; investing in research, data generation and analysis of national trends in relation to sustainable development goals, so that public opinion has a factual basis on which to assess national trends and form its own judgements; and continuing to strengthen democracy and channels of communication through which all social groups can assert their priorities and, in a broad sense of the term, their rights.

²⁰ For example, the World Bank's Prototype Carbon Fund and the Andean Development Corporation's financing line for Clean Development Mechanism projects.