

CEPAL

REVIEW

NUMBER 55
APRIL 1995
SANTIAGO, CHILE

ANIBAL PINTO
Director of the Review

EUGENIO LAHERA
Technical Secretary



UNITED NATIONS

CONTENTS

A summary of the ECLAC proposal <i>Eugenio Lahera, Ernesto Ottone and Osvaldo Rosales</i>	7
Post-conflict peace-building: a challenge for the United Nations <i>Graciana del Castillo</i>	27
Decentralization and democracy: the new Latin American municipality <i>Eduardo Palma</i>	39
The political economy of protection after the Uruguay Round <i>José Tavares</i>	55
Trade policy and international linkages: a Latin American perspective <i>Marta Bekerman and Pablo Sirlin</i>	65
Capital movements and external financing <i>Benjamin Hopenhayn</i>	81
The impact of exchange-rate and trade policy on export performance in the 1980s <i>Graciela Moguillansky</i>	95
The present state and future prospects of the environment in Latin America and the Caribbean <i>Nicolo Gligo</i>	109
Youth expectations and rural development <i>Martine Dirven</i>	127
Transnational corporations and structural changes in industry in Argentina, Brazil, Chile and Mexico <i>Ricardo Bielschowsky and Giovanni Stumpo</i>	143
El Salvador: industrial policy, business attitudes and future prospects <i>Roberto Salazar</i>	171
Technological change and structuralist analysis <i>Armando Kuri</i>	191
Guidelines for contributors to CEPAL Review	199

The present state and *future prospects of the* environment in Latin *America and the Caribbean*

Nicolo Gilgo

*Coordinator, Joint
ECLAC/UNEP
Development and
Environment Unit.*

Most studies of the region's economy say little or nothing about the status of its environment and natural resources; few references are made to the environmental quality of population centres or to fluctuations in natural resource stocks, especially of renewable resources, despite their crucial importance for the region's development options. The no more than moderate pace of the region's absorption of technical progress, the intensification of its international trade and the declining value of the region's products in the international marketplace have all brought increased pressure to bear on its resources. Consideration of these phenomena, in conjunction with the growth of the region's population and the expansion of domestic demand, leads to the conclusion that the region's environment and natural resources constitute the weakest link in its development strategies. These ideas are explored in detail in the following essay, together with statistical data and conceptual analyses which may help to explain why the region's prevailing development modality is so environmentally unsustainable.

I

The present status of the environment and of natural resource stocks in the region

An assessment of the overall environmental situation leads to the very definite conclusion that the modes of development pursued thus far by the countries of the region are, for the most part, highly unsustainable in environmental terms. This is not to ignore all the efforts made over the past two decades to alleviate this situation. Specific policies and strategies have in some respects helped to reverse processes that cause environmental deterioration and to promote systems and technologies that minimize environmental impacts. Nevertheless, virtually throughout the region, the balance between environmental degradation and environmentally appropriate changes has tipped towards the former. The current status and trends of the region's major environmental processes will be analysed below.¹

1. Rural areas

a) Soil erosion

In a region where most of the countries' economies have an agricultural and agro-industrial base, erosion is one of the greatest scourges of all.

It is therefore somewhat surprising that fewer and fewer comprehensive studies on soil erosion are being conducted in the countries of the region; perhaps the experts are simply shying away from the appalling figures. The most widely used figure puts the amount of land subject to anything from moderate to very severe erosion at approximately 210 million hectares, or 10% of the region's territory.

Table 1 provides a summary of what little information there is on erosion in South America. It shows that, in the 1980s, 155.1 million hectares of South American land were subject to erosion and that, with few exceptions, these processes were growing more severe.

¹ The arguments presented here are based on the assumption that the reader is familiar with the main documents issued by ECLAC over the past decade concerning the relationship between development and the environment: Sunkel and Gligo, 1980; UNEP/MOPU, General Secretariat for the Environment, 1990; and ECLAC, 1990.

TABLE 1

South America: Erosion, 1980-1989
(Millions of hectares)

	Water erosion	Wind erosion	Total
Loss of soil	95.1	22.7	117.8
Land deformation	18.1	18.4	36.5
Soil blown away	-	0.8	0.8
Total	113.2	41.9	155.1

Source: Latin American and Caribbean Commission on Development and Environment, 1991, table 19.3.

TABLE 2

Argentina: Erosion, 1986
(Millions of hectares)

	Slight/moderate	Severe/very severe	Total	% of total
Water erosion	15.4	9.6	25.0	11.0
Wind erosion	7.0	14.4	21.4	20.0
Total	22.4	24.0	46.4	31.0

Source: Argentina, 1991, table 6.

Almost all the available data on the countries of the region come from studies conducted 30 or 40 years ago. In 1957, 61.1% of Chile's farmland exhibited some form of erosion, and 13.2% of it suffered from moderate to severe deterioration in this respect, while in 1965, 35% of Uruguay's farmland suffered from moderate to severe erosion, and in 1976, 45% of the land in El Salvador was eroded (Gligo, 1986).

Among the few up-to-date country studies in existence, the study on the Argentine Republic is perhaps the most thorough (Argentina, 1991); the figures it cites, which attest to the extremely serious nature of the problem (see table 2), are from 1986 and cover an area of 229 million hectares (80% of the country's total territory). Water erosion affects 11%

of this land and wind erosion another 20%. The total of 31% illustrates just how disastrous this process is, although it should be noted that the figures vary widely from one region to another, depending on how prone to erosion the different types of soil are and on the production systems in use.

A recent study on Mexico indicates that, according to data obtained using a makeshift methodology for evaluating soil degradation, water erosion affects 85% of the country's territory, to differing degrees. This is the most serious problem in terms of soil conservation. Wind erosion, for its part, ranging from moderate to very severe, affects 80% of the national territory.

The acceleration of erosive processes in Latin America and the Caribbean is attributable to the phenomena mentioned earlier, especially the expansion of the agricultural frontier and the overuse of land. The expansion of this frontier, especially in the Andean highlands, has led to the use of ecosystems whose altitude and gradient render them particularly fragile. The overuse of land, especially in the form of single-crop farming, has damaged the soil structure and left the land vulnerable during periods when it lacks plant cover.

Erosion has been closely associated with deforestation, especially along the fringes of the rain forest in tropical zones.

b) *Deforestation*

Since 1960 more than 200 million hectares of forests have been destroyed. According to FAO estimates, the region's rate of deforestation during the 1980s was 5.9 million hectares of dense forest per year and 1.1 million hectares of other types of woodlands and shrublands. In addition, another 3 million hectares of timberland are harvested annually. This means that a total of 10 million hectares of woodlands are being altered each year (FAO, 1988). This figure has been on the rise but may begin to decline in the future, not as the result of specific policies but rather as a consequence of the depletion of some areas and the inaccessibility of others.

The amount of land that is being deforested varies greatly from one country to the next. The countries of the Amazon basin and Argentina are, in absolute terms, the ones with the highest figures (see table 3).

In most of the countries, deforestation is primarily caused by the expansion of the agricultural

frontier, which is itself the outcome of a number of factors. One such factor is the expulsion of peasant farmers from traditional farming areas as the modernization of agriculture brings about marked changes in the demand for manpower. Another has to do with large-scale settlement programmes (Rondonia, for example, in Brazil), some of which are very ambitious. Most of these programmes have been oriented towards agricultural production and have thus led to the deforestation of vast tracts of land. A third factor has been the use of tax exemptions to promote the expansion of stock-raising activities in the "legal" areas of the Amazon region, which has entailed the conversion of forests into rangeland (Brazil, CIMA, 1991).

Logging continues to be a major cause of deforestation, due to the extraction of biomass to fuel industrial processes and the gathering of firewood for household use. Timber logged from native forests supplies a significant percentage of the fuel used by industry in the larger countries, while peasant farmers and the inhabitants of rural settlements use firewood gathered from the forests to cook their food. The planting of stands of fuelwood trees has been minimal and has been of almost no help in mitigating the effects of such actions.

Finally, road construction has also contributed to deforestation, especially because it triggers the spontaneous arrival of settlers. This phenomenon has been quite intense in the rain forests, where it has been precipitated by the establishment of access routes as part of settlement programmes or by the construction of roads for oil drilling operations (as in Ecuador).

c) *Loss of biodiversity*

Latin America is the most richly endowed area in the world in terms of biodiversity. The Latin American tropics, in particular, contain an incomparable variety of flora and fauna.

We still have a great deal to learn about biodiversity. The data we have at present are no more than estimates of the animal and plant species in existence. Relatively little is known about the former, but zoologists' estimates regarding vertebrates suggest that their diversity is directly related to the striking figures we have on the wealth of plant life. Latin America has the most varied range of mammals, amphibians and reptiles of any continent in the world and shares with Central Asia the distinction of having the greatest variety of birds.

TABLE 3

**Latin America and the Caribbean: Forestry resources
and deforestation, 1980 and 1990**
(Thousands of hectares)

Country	Native forest (total area)		Deforestation, 1981-1990	
	1990	1980	Annual area	Annual rate (%)
Costa Rica	1 428	1 923	50	2.6
El Salvador	123	155	3	2.1
Guatemala	4 225	5 038	81	1.6
Honduras	4 505	5 720	112	1.9
Mexico	48 586	55 366	678	1.2
Nicaragua	8 013	7 264	124	1.7
Panama	3 117	3 761	64	1.7
Belize	1 996	2 046	5	0.2
Cuba	1 716	1 888	17	0.9
Guyana	18 416	18 597	18	0.1
Haiti	23	38	2	3.9
Jamaica	239	507	27	5.3
Dominican Republic	629	1 426	35	2.5
Suriname	14 768	14 895	13	0.1
Trinidad and Tobago	155	192	4	1.9
Argentina	-	44 500	-	-
Bolivia	49 317	55 564	625	0.1
Brazil	561 107	597 816	3 671	0.6
Chile	-	7 550	-	-
Colombia	54 064	57 374	367	0.6
Ecuador	14 250	14 342	238	1.7
Paraguay	12 859	16 884	403	2.4
Peru	67 906	70 618	271	0.4
Uruguay	-	490	-	-
Venezuela	45 690	51 681	599	1.2
Total	918 115 ^a	1 042 638	7 408 ^a	0.4

Source: World Resources Institute, 1994, table 19.1, and World Resources Institute, 1992, table 19.1.

^a Does not include Argentina, Chile or Uruguay.

There are a large number of estimates on the varieties of plants which exist, including those prepared by Thorne, who puts the number of species in the 50 000 to 60 000 range; by Raven (1976), who estimates the number to be in the region of 90 000; and by Gentry (1982), who gives a figure of 86 000 (cited in Toledo, 1985). The most recent study is that of Toledo, who arrived at a figure of 120 000 species; if ferns, mosses and lichens are counted as well, then the number climbs to 180 000.

The most important point, however, is not the level of biodiversity which exists in the region, but rather how much of it is being lost. The shrinkage of habitats—mainly as a result of deforestation, coastal pollution, the alteration and drying up of wetlands and various other processes—has played an important role in the reduction of the region's biodiversity and continues to do so. Assessments of biodiversity losses are few in number, inadequate and confined to very small areas. As in the case of evaluations of soil

erosion, this lack of information would appear to reflect some sort of tactic, whether conscious or unconscious, to shy away from recognition of the true dimensions of this process, which are alarming in some countries and downright catastrophic in others.

d) Soil depletion

Farming activities, which have been pursued since colonial times but have not included adequate replacement of nutrients in the form of fertilizers, have diminished the soil's productiveness and led to its degradation (see table 4).

Because it is not readily perceptible, chemical soil depletion has not been accorded due importance, but the figures indicate that it is a problem in 68.2 million hectares in the region, or 28% of all its degraded areas and 3.9% of the land under cultivation or with natural plant cover; on 43.7 million hectares, chemical soil depletion is rated as being from moderate to severe.

TABLE 4

South America: Amount of land affected by nutrient loss between 1945 and the late 1980s
(Millions of hectares and percentages)

	Millions of hectares	Area degraded (%)
Slight loss	24.5	10
Moderate loss	31.1	13
Severe loss	12.6	5
Total	68.2	28

Source: World Resources Institute, 1992, table 19.3.

The region suffers from a chronic shortage of research in the field of agriculture. Many of the formulas used for fertilization are not the outcome of scientific research but are instead drawn from estimates based on the components of the technological package in use and on a number of visual indicators or deductions regarding the geology and geomorphology of the areas concerned.

Despite increased use of fertilizers, the depletion of the region's soils has continued. Fertilizer use has been very selective and has been concentrated in certain traditional crops, such as cotton, coffee, wheat, maize, soybeans, bananas and fruit orchards. In contrast, nutrient replacement has been insufficient in the region's vast tracts of annual field crops and artificial pastures.

e) *Soil salinization*

About 11% of the region's farmland is under irrigation; if fallow land is included in the total, then the figure drops to 8%. Much of this area suffers from serious problems of salinization as a consequence of the use of unsuitable technologies or faulty drainage. It is estimated that around 40% of the irrigated land suffers from some degree of salinization. According to the Ministry of Agriculture and Water Resources of Mexico, in 1980 a total of 560 000 hectares (12.4% of the irrigated land area) in Mexico were partially or totally salinized (Gligo, 1986; Mexico, Comisión Nacional de Zonas Áridas, 1994). In Peru, the National Office for the Evaluation of Natural Resources (ONERN) surveyed 750 000 hectares in 52 coastal valleys and 200 flat plains, and found 306 000 hectares affected by salinization and 150 000 hectares with drainage problems (Peru, 1992).

Salinization is not a problem only on irrigated land. Many areas in the region, especially in the

River Plate basin and some of the smaller Pacific basins, exhibit severe salinization due to lack of natural drainage and changes in plant cover. The soil map published by FAO and UNESCO in 1964 showed 130 million hectares in South America with problems of this sort.

f) *Silting of watercourses*

Latin America's watercourses have undergone significant changes, primarily as a result of erosion.

Deforestation has diminished the water retention capacity of highland river basins, leading to sharper fluctuations in stream flows.

Many watercourses and other bodies of water have also been affected by silting; this is especially true of the Atlantic and Caribbean basins, due to their extremely slight gradients. A striking increase has been seen in the amount of silt flowing into naturally sedimentary areas, such as the Mato Grosso marshlands, as a consequence of the establishment of farms and ranches in upland basins.

Hydrographic systems have also been altered by the construction of large dams; the most notable changes of this type are to be seen in the River Plate basin. These investments run a serious risk of having their useful life curtailed by the rapid inflow of silt.

2. Urban areas

The environmental problems facing the region's urban centres have a direct bearing on the population's quality of life. Nevertheless, the assertion that the urban environment is deteriorating is not a generally applicable statement, since the majority of the urban population settled in the cities under substandard conditions and never did have a suitable environment in the first place. There are, however, segments of the urban population (mainly in middle-income strata) that have indeed witnessed a deterioration. Moreover, some processes –such as air and water pollution and traffic congestion– affect all urban residents alike.

a) *The growth of poor, substandard settlements around urban areas and water pollution*

The spontaneous growth of fringe settlements around large and medium-sized cities in the region as a result of rural-urban and inter-urban migration has been –and to some extent continues to be– a notable feature of the region.

Two aspects of this phenomenon are especially noteworthy. The first is that new settlements often lack even the most rudimentary basic services. They have no sewerage systems, and the population does not have ready access to drinking water but must instead obtain it from community outlets or fountains or, in extreme cases, must buy it from tank trucks. Most of these settlements lack roads and sidewalks, during the rainy season their thoroughfares turn into quagmires, and the usual way of obtaining electricity is by tapping into transmission lines via illegal hook-ups.

This pathetic situation is common in all the region's capital cities and large urban centres. The figures are dramatic. In some cities, the people living under these types of conditions outnumber those who enjoy decent living standards; in such urban centres, groups living under second-rate conditions actually seem to be doing quite well, by comparison.

In the majority of the region's cities, piped drinking water supply is not available to 100% of the population (see table 5), and the mounting demand for drinking water has transformed its supply into a serious problem. Lima, for example, which is situated on the Pacific coast, has to go all the way to the Amazon basin for drinking water.

In some large urban centres, water is obtained by tapping into local aquifers. Buenos Aires and Mexico City take the water for their populations from surface aquifers. In the Buenos Aires metropolitan area, around 55% of the population draws water from these strata, and those closest to the surface are believed to be heavily polluted with both organic matter and chemicals. Two-thirds of Mexico City's water comes from wells drilled into surrounding aquifers. The chief problem at present is that there is a 40% deficit in the recharge of these aquifers, since the rate of water extraction for urban use is 40 m³/second while the recharge rate is estimated to be 23 m³/second. The cost of supplying water to Mexico City is soaring as it becomes necessary to draw water from distant basins such as those of the Amacuzac watershed.

The supply of drinking water continues to be a financial and technological challenge for the countries of the region. In Brazil, fewer than 14 million out of 25.2 million dwellings had piped-in water in 1980. According to data for 1988, less than 50% of Bolivia's 1.3 million dwellings and only 480 000 of

Honduras's 762 000 housing units had water hook-ups. Haiti represents the most dramatic case, however: according to data for 1971, out of a total of 864 000 dwellings, slightly less than 3% had piped-in water (Beccaria, Boltvinik, Feres, Fresneda, León and Sen, 1992).

If piped water supplies are inadequate, sewerage systems are even more so. Although information on the region is incomplete, it is enough to provide a clear picture of the situation. The statistics show that in Brazil in the mid-1980s, out of a total of 25.2 million dwellings, 14 million had piped-in water but fewer than 7 million had sewerage connections. The corresponding figures for other countries were: Mexico, 10.2 million out of 16 million dwellings (1990); Bolivia, only 300 000 out of 1.3 million (1988); Costa Rica, 328 000 out of 500 000 (1984); Ecuador, 716 000 out of 2 million (1990); and Paraguay, 55 000 out of 579 000 (1982). It can be deduced from these data that the region's indexes of water pollution must be very high indeed. The tendency for malaria to become endemic is an outcome of this state of affairs (ECLAC, 1993a, table 374).

b) *Air pollution*

Thus far, air pollution is a problem only in large cities and in industrial and mining centres and therefore does not yet affect a majority of the population. However, the region's high urban growth rates, in conjunction with its continuing industrialization, pose an increasingly serious threat in this regard.

Two main factors are causing an increase in urban air pollution: the mounting number of motor vehicles in operation, and the expansion of industrial activity. In some cities, an increase in intra-urban power generation is another factor.

The number of motor vehicles has climbed steadily in almost all the countries of the region. The use of hydrocarbon fuels rose by 5.8% per year between 1970 and 1980, and by 3.6% per year between 1980 and 1990, since when it has continued to expand at the latter annual rate (ECLAC, 1993a, table 53).

The growth of industrial activity has been especially marked in the larger countries and major cities. The manufacturing sector expanded at a rate of 5.7% between 1970 and 1980; its growth rate dipped to only 0.3% between 1980 and 1990, but since 1991 has shown clear signs of recovering (ECLAC, 1992).

TABLE 5

**Latin America and the Caribbean: Drinking water
and sewerage services in selected cities**

Country	City	Population (millions)	% of population with drinking water	% of population with sewerage service
Argentina	Córdoba	1.1	69	19
	Buenos Aires	11.5	66	55
Bolivia	La Paz	1.2	75	29
Brazil	Rio de Janeiro	10.7	83	30
	Sao Paulo	17.4	83	30
Chile	Santiago	4.7	98	92
Colombia	Bogotá	4.8	96	84
	Cali	1.6	96	76
Costa Rica	San José	1.0	100	69
Cuba	Havana	2.1	83	39
Ecuador	Guayaquil	1.7	58	48
	Quito	1.2	62	-
Haiti	Port-au-Prince	1.0	15	82
Mexico	Guadalajara	3.2	92	41
	Mexico City	20.2	97	59
Nicaragua	Managua	1.0	86	12
Peru	Lima	6.2	60	39
Dominican Republic	Santo Domingo	2.2	27	76
Uruguay	Montevideo	1.2	99	68
Venezuela	Caracas	4.1	78	...

Source: ECLAC, 1992.

Total energy inputs rose by an annual rate of 9.5% between 1970 and 1980 and 5.1% between 1980 and 1990, and have continued to expand steadily since that time (ECLAC, 1993a, table 55).

The lack of urban planning—or, more accurately, the chaotic growth of the large cities—has resulted in extremely high levels of air pollution. Mexico City, Sao Paulo and Santiago, Chile—whose metropolitan areas, taken together, are home to almost 40 million people—have astronomical pollution indexes. Buenos Aires, Bogotá, Rio de Janeiro and Caracas are not free of this problem either, although, thanks to their geographic locations and climatic conditions, they are less seriously affected. Other cities, some of which are not so large but are poorly located, are following in the polluted footsteps of the above-mentioned centres: La Paz, Quito, Minas Gerais, Salvador de Bahia, Córdoba, Medellín, Cali, Rio Grande, Rosario, Guayaquil, Concepción, Montevideo, Guatemala City, Guadalajara and others are registering disturbingly high levels (ECLAC, 1993b).

In Mexico City, both the weather and the topography hamper the dispersion of the enormous vol-

umes of pollutants that are emitted into the air, especially during the dry season. Ozone levels are far higher than in most cities of the world, and are in fact comparable only to the concentrations seen in Los Angeles and Athens. The following data serve to illustrate the situation: in 1988, between January and October, concentrations exceeded existing standards 62% of the time; 2.8 million automobiles circulate in the city and consume 80% of the gasoline used in the urban area but carry only 18% of all passengers, and this already difficult situation is exacerbated by industrial pollution, especially from sulphur dioxide.

Although thorough measurements of other pollutants have not been taken, some of the major contaminants, in addition to ozone, are particulate matter, lead, cadmium, aerosols, acids, hydrocarbons and sulphur oxide. Mexico City's air pollution also includes organic substances, including wind-borne fecal matter from open-air latrines.

The severity of this problem has led to the adoption of drastic measures in recent years. The massive elimination of polluting industries, large-scale invest-

ments in road infrastructure and strict controls on motor vehicles have brought down pollution levels in recent years, especially of sulphur, carbon monoxide and nitrogen oxide.

In Sao Paulo, vigorous efforts have been made to combat pollution, but the situation is still well-nigh catastrophic. Between March and August, stationary-source emissions fill the air, and carbon monoxide regularly exceeds the permissible levels. Cubatao, a municipality located within the Sao Paulo metropolitan area, provides an example of the extremes that can be reached, but it also serves to illustrate the viability of appropriate problem-solving techniques. Because of the effects of this municipality's pollution levels on human health, it had been nicknamed "Death Valley". Fortunately, however, by 1988 it was able to bring 78% of its pollution sources under control and, as compared to 1984 levels, suspended particles had decreased by 70%, nitrogen oxide by 14% and sulphuric anhydride by 37%. Accomplishing these reductions cost US\$220 million. The challenges yet to be overcome in order to rehabilitate the valley continue to be formidable, however.

In Santiago, Chile, a threefold increase in the number of motor vehicles in operation in the space of just 15 years, the intensive development of industry, and problems of urban management—in combination with adverse weather and orographic conditions—have all contributed to the metropolitan area's high air pollution indexes. Particulate matter and carbon monoxide levels frequently exceed acceptable standards. Chemical contamination is less of a problem but, given the rapid growth of the city's industrial sector, the trends in this regard are disturbing (see ECLAC, 1991).

A requirement that all new motor vehicles operating within the city must be fitted with three-way catalytic converters, the auctioning of bus route permits and the reorganization of the mass transit system, the expansion of the subway system and the application of exceedingly strict emission controls to public transport vehicles give some reason for optimism. Nevertheless, the city's rapid economic growth rate means more motor vehicles, more power use and more industrial investment. According to the experts, the ground won by means of these measures has been cancelled out by the ground lost as a result of the city's vigorous economic expansion during the past three years.

c) *Refuse disposal*

This problem, which generates land, water and air pollution, is found in all Latin American and Caribbean cities and is mainly attributable to their inability to dispose properly of urban, industrial, hospital and other waste.

This problem has various causes. One is the inability of municipal bodies to dispose of the garbage that is generated or to create (and strictly supervise) a privatized system to do so. Another is the absence in the region of a general awareness of the need for waste management; instead, the tendency is for people to just learn to live with it, as part of the landscape.

The most common waste-disposal procedure is to pick up garbage in special trucks but then dump it in an open waste-disposal site, which adds to the existing pollution. Some cities in the region do have sanitary landfills, but unfortunately this practice has not become as widespread as one might hope.

Few cities have organized recycling systems. The most common recycling method in use is to allow poor people to simply enter the dumps and sort through the garbage. Some pilot projects involving differentiated classification of garbage in the home have yielded excellent results. In Santiago, Chile, considerable use is made of household garbage to generate gas: indeed, 38% of the city's piped gas is produced by this means.

d) *Hazardous wastes*

Only the largest countries in the region—Brazil, Mexico and Argentina—have industrial waste management policies in place and have undertaken the corresponding investments. A number of Brazilian cities (particularly Sao Paulo, Rio de Janeiro, Minas Gerais and Salvador de Bahia) maintain supervised industrial waste dumps. In fact, Brazil is by far the most advanced country in this respect. Similar initiatives are being launched, although less aggressively, in Argentina and Mexico.

The problem of hazardous wastes continues to cause great concern. Day in and day out, new and highly active chemicals are being developed, and nobody knows where they will eventually end up. Many of these chemical wastes wind up in the sewerage system; others are dumped on the ground, where they break down and seep into the soil and water table or evaporate into the air.

Pollution from hazardous wastes is increasing at an alarming rate in the region. In rural zones, and

particularly in the case of the more "industrialized" crops, pesticides do serious harm to the peasant populations living in the vicinity. Pesticide use is especially heavy in the case of cotton-growing, where pesticides may sometimes be applied as often as once a week.

The pollution caused by pesticide use in rural areas is compounded by the effects of mine tailings and the contaminants given off by the smokestacks of blast furnaces and similar installations. The pollution in the coastal valleys of Peru, the impacts of the tailings generated in Bolivia and Chile and the severe pollution associated with gold mining activities in Brazil and Ecuador all deserve special mention in this connection.

In urban areas, a variety of hazardous wastes impact the population. In addition to industrial wastes, there are the wastes generated by hospitals and clinics, old engine oil from motor vehicles, and domestic articles such as batteries. These types of waste are not separated out or treated in any special way. There have also been many instances of contamination from the radioactive materials used in medical facilities. One such episode that received a great deal of attention occurred in 1983 in the city of Juárez, Mexico, where the use of a discarded X-ray machine as scrap iron caused the direct contamination of 200 people. In 1987, a similar event occurred in Brazil, where four people died and another six were seriously injured by discarded radiological materials.

The transborder movement of hazardous wastes into the region is a disturbing development, especially because the region lacks systems for monitoring and assessing the impacts of such materials. The most frequently advanced argument for the introduction of such wastes is their potential for use as raw material.

The largest proportion of hazardous wastes coming into the region does so under the terms of agreements entered into by the United States and Mexico; in fact, as of 1988 Mexico had accepted 30 000 tons of such waste for industrial recycling (ECLAC, 1993c).

Fortunately, the implementation of the Basle Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, together with initiatives undertaken by the countries of the region to prohibit the entry of hazardous wastes, make for a more promising outlook in this field.

e) *Disasters associated with urban sprawl*

High urban growth rates, in combination with the failure to institute proper management of the areas around cities, have triggered catastrophic events in the region, and will continue to do so in the future.

The high cost of land in many cities and the absence, in many cases, of a transparent real estate market have often led to the use of unsafe areas and, consequently, to large numbers of casualties when natural disasters occur, the most common such disasters being landslides caused by heavy rains in steeply sloping areas and the flooding of low-lying areas.

The expansion of poor urban sectors has led to the settlement of hillsides (Bogotá, Quito, Rio de Janeiro, Caracas, Mérida, Medellín, Guatemala City, Tegucigalpa and a great many Andean cities) or floodplains (Belén, Manaus, Guayaquil, Resistencia, Asunción, Formosa, Buenos Aires). The spontaneous nature of these new human settlements (as in Rondonia and Acre in Brazil) highlights the serious lack of urban planning in the region.

3. Mining and power generation

Although mining and power generation activities are undertaken in rural and urban areas alike and are therefore a factor in both types of zones, their environmental impacts are highly localized; these activities are very costly from an ecological perspective but are also highly productive in economic terms. Notwithstanding the recognized need to invest in these sectors, many of the investments made in the region's mining and energy sectors could have been done in such a way as to mitigate these activities' adverse impacts.

Copper, tin, gold and iron-ore mining operations are major sources of pollution. Chile, for example, has serious difficulties in connection with its copper mines because of the arsenic content of the ore (between 0.2% and 0.8%). Based on this percentage, it is estimated that Chile's smelting plants release around 12 000 tons of arsenic trioxide each year.

Bolivia's tin mines and Peru's copper mines are also faced with similar problems in terms of their emissions of contaminants.

Gold mining, especially in cases where non-industrial systems are employed that involve the use of mercury, is polluting many of the region's rivers. These types of gold mines are found in various loca-

tions in the Amazon basin. Severely impacted areas also exist in southern Ecuador and in the Orinoco river basin in the eastern plains of Venezuela.

One process that has been studied very little but has had a strong impact ever since colonial times is the use of firewood to fuel smelting plants and foundries. During the colonial period, the mining industry devastated entire ecosystems by stripping them of firewood for use in smelting processes; overgrazing by the mule and horse teams used for transport was another factor. With the advent of the railroad, much of the industry's transport needs were shifted to this mode, which also contributed to the area's deforestation. Although this type of activity appears to have diminished, new mines in the Amazon basin are endangering the rain forest. A major ironworks project that should theoretically be using plantations of eucalyptus trees (which, however, have proved to be of doubtful sustainability) appears to pose a threat to the rain forest, since it requires between 90 000 and 120 000 hectares of forest each year to produce the charcoal it uses.

Because of the energy problems they face, the countries of the region give high priority to the production of petroleum, with little regard for its impact. Oilfields located in tropical rain forest areas—in Ecuador, Colombia, Bolivia or Mexico—have even more serious indirect effects than their direct impact. This is because the penetration of the interior by oil companies entails the construction of access roads which are then used by settlers who move into such areas on their own initiative and begin to push back the agricultural frontier. The first thing these settlers do is to clear the land for farming. As a result, extensive tracts of land not included in settlement programmes have been incorporated into highly unstable production systems.

4. The marine environment

Most of the waste generated by human activity in Latin America and the Caribbean ultimately drains into the sea, which is therefore the place where all the above-mentioned processes of environmental deterioration converge. No city on the Pacific has a water treatment plant. Industrial and hazardous wastes flow straight into the ocean, while the river basins act as catchment areas for agricultural wastes,

which then drain into the sea (one well-known indicator being the measurements of DDT found in the bodies of seals and sea lions).

All the above-mentioned impacts of petroleum processing and transport also do severe harm to the marine environment.

A great many of the region's oil refineries do not practice proper waste management, and the pollutants they generate end up in the sea as well. Despite the fact that, on paper (or even judging from the infrastructure they possess), oil refineries appear to be meeting international standards, the majority of them pollute the environment, whether due to cost considerations or poor maintenance.

The most severe impacts are seen in the more closed-in areas, such as the Caribbean Sea and the region's numerous bays.

The wastes generated by oil refineries are not the only pollutants in this sector. The transport of petroleum is another very significant source of pollution. In all the countries of the region, the management of the ports where petroleum is loaded and unloaded exhibits anomalies due to faulty maintenance and operational systems. There is not a single petroleum handling facility in the region that does not suffer from some degree of pollution.

Disasters associated with the sinking of oil tankers have not been so frequent an occurrence as in Europe and Asia, but there have been some oil spills in Latin America and the Caribbean which have created major ecological disasters.

The situation with regard to the biomass of the region's marine ecosystems is also a cause of concern, even though catches are said to be below their potential levels. Currently, the region's total catch amounts to 10.5 million tons, whereas the potential catch is estimated at between 16.4 and 23.7 million tons (Latin American and Caribbean Commission on Development and Environment, 1991). Nevertheless, there are signs that some species of great economic importance, such as anchovetas and tuna, are being overfished. Specialization leads to what are usually defined as "incidental takes" or "by-catches", which fishermen discard because they have no commercial value. As a consequence of this practice, numerous non-commercial species and dolphins are killed.

II

The environmental outlook for the end of the century

1. Environmental deficits in macroeconomic management

The region's current economic outlook includes some signs of a recovery. The gross domestic product (GDP) grew by 3.8% in 1991, 3.0% in 1992 and 3.2% in 1993, while per capita GDP was up by 1.8%, 1.1% and 1.3% in those same years. Urban unemployment, which had climbed alarmingly during the second half of the 1980s, exhibited a slight downward trend and then levelled off in 1991 and 1992. The region's inflation rate plunged from its 1990 level of 1 185.2% to 198.7% in 1991, rebounded to 410.7% in 1992 and then rose further in 1993, reaching 796.6%. The majority of the countries actually managed to hold inflation below 20%, but the strong influence of Brazil's inflation rate (475.8% in 1991, 1 131.5% in 1992 and 2 244.0% in 1993) pushed up the regional average sharply.

The volume of exports climbed by 6.3% in 1991, 9.3% in 1992 and 8.7% in 1993, while the cumulative change in the terms of trade was -28.3% for the period 1981-1992.

The transfer of resources—defined as capital inflows less net payments of profits and interest—had been negative up to 1990, but yielded a positive balance of US\$8.4 billion in 1991, US\$32.8 billion in 1992 and US\$25.7 billion in 1993. The ratio between total interest payments due and exports of goods and services, which had reached 36.6% in 1986, dropped to 22.6% in 1991, 19.2% in 1992 and 17.6% in 1993. Likewise, the region's total external indebtedness, which had been equivalent to 427% of its exports in 1986, had fallen to 294% by 1992 and held to virtually the same level (293%) in 1993.

Some of the region's social indicators are in line with its economic indexes. The variation in per capita consumption, which had been negative almost every year during the 1980s, was 2.2% in 1991 and amounted to around 1.3% annually in the succeeding years. Indexes of poverty and extreme poverty have

remained constant in percentage terms, however, which—given the increase in the total population—means that they actually rose in absolute terms.

Based on the trends in macroeconomic parameters, over the past two years some experts have struck a triumphant note in their analyses of the type of future that awaits the region. For the vast majority of these experts, the region's endowment of natural resources and its environmental situation are merely statistical data which have in general remained constant. It seems somewhat illogical, however, that they should disregard the year-to-year fluctuations in the region's stock of natural capital when annual fluctuations provide the basis for all their economic analyses.

If trends relating to natural resources and the environment are taken into consideration, then a number of questions arise regarding the region's future development. The fact that, at the present point in time, structural changes appear to be something akin to a challenge—and that, in those areas of the economy where such changes have been made, they do not seem to have contributed to an increase in environmental sustainability—would seem to indicate that the factors responsible for the decline in the region's supply of natural resources and the deterioration of the environment are still at work.

The objective of changing production patterns while at the same time fulfilling the imperative of social equity in the region cannot be achieved if the region depletes or degrades the underlying sources of such changes: the environment and its endowment of natural resources. The region's much-heralded technical progress is far from becoming a factor in the structural change of its economies. Technological innovations have helped lessen some types of deterioration, but they have not succeeded in reversing the process of degradation; they have formed part of some highly dynamic production processes, but have failed to have any influence on others. Virtually the whole of the agricultural sector, small and medium-scale industry, small-scale mining and most marine-

based operations are lagging far behind, not only in terms of state-of-the-art technology, but even in what are thought of as traditional technologies. The question as to how to achieve an environmentally sound form of management in the region therefore involves much more than purely technological issues, since, simply by applying technologies that are widely in use today, a vastly improved form of environmental management could be achieved right now.

2. Demographic trends, food demand and consumption

Despite the fact that the region's rate of population growth places it in what is commonly known as a stage of demographic transition, the simple fact that its annual population growth rate stands at 1.5% demands a greater volume of food production. The difficulty of supplying the populations of the large cities with drinking water has already been discussed. This situation is compounded by the demand for fuelwood and the general urban encroachment on rural areas. It should be borne in mind that most of the region's cities are located on fertile land and that urban expansion has occasioned the loss of substantial amounts of valuable farmland.

As noted earlier, private per capita consumption rose at an annual rate of 2.2% during the 1980s and 1.3% in the early 1990s. If the latter rate holds steady, then we will see an increase in per capita food consumption, which competes, to some extent, with export crops in terms of land use.

Improving the population's food intake, especially in terms of the calorie- and protein-content of people's diets, is an urgent need that must not be deferred for the sake of other sorts of accomplishments. Social pressures for a higher level of income focus, first and foremost, on an improved food supply; this influences the way in which farmland is used, since it calls for the allocation of less farmland for export crops and more for food production.

3. The globalization of markets and intensification of export activity

The countries of the region appear to be competing with each other to speed up their incorporation into world markets by sharply increasing their international trade in terms of both physical volume and value. All the countries have adopted this strategy as

the kingpin in their efforts to launch a process of changing production patterns. Nevertheless, we also need to look at how this strategy will affect the environment and our natural resources.

The first consideration is the fact that the region is almost exclusively a producer of raw materials. The product categories that generate the most foreign exchange earnings are, first of all, petroleum and, second, petroleum products. The other major export items are: green or roasted coffee and coffee substitutes; refined copper (including re-smelted copper); oil-seed cake and meal and other vegetable oil by-products; motor vehicles; iron ore and concentrates; internal combustion engines; soya (except soybean flour and meal); crustaceans and molluscs; unmilled wheat; unmilled maize; bananas; unrefined beet and cane sugar; unginned cotton; fuels; fuel-oil distillates; fuel oil; lubricants with a petroleum content of 70% or more by weight; natural gas; blister copper and other unrefined copper; footwear; and beef (fresh, chilled or frozen).

All the products on this list except for motor vehicles and internal combustion engines, which are exported intraregionally, are raw materials obtained by tapping the region's natural resources, agroindustrial products or products of the mining industry.

Efforts to lessen the environmental impact of the region's production activities have had some effect in the industrial and mining sectors. However, the region's metal products and machinery industries, tanneries and some segments of its petrochemicals industry have neither modified their production systems nor introduced any significant innovations in the area of waste management. Nor have small and medium-scale mining concerns made any major changes in their approach to environmental management, all of which has been a factor in the failure to reduce the sector's pollution levels.

In the agricultural sector, no substantive modifications have taken place in the land tenure system, and the principal factors underlying this sector's often environmentally unfriendly production system remain unchanged. Consequently, the intensification of crop-farming and of the production of agroindustrial goods for export, coupled with domestic consumers' increased food demand, will hasten the deterioration of the agricultural sector's natural resources. Moreover, a sizeable portion of this sector's output is based on the expansion of the agricultural frontier—particularly in countries located in humid

tropical zones— and any increase in agricultural production will therefore result in further deforestation.

The region's farmland expanded by 18% (23.7 million hectares) between 1980 and 1990, and is expected to grow at a slightly slower rate during the 1990s. Nearly all of this increase in area has been at the expense of forested land. No major changes in this trend are foreseen, except those that may be caused by a lack of access roads into the rain forests, which could slow the pace of their destruction.

Special mention should be made of the livestock industry and of some of the crops that serve as the production base for agroindustrial exports. The amount of land devoted to pastures and permanent rangelands has risen by an average of slightly over two million hectares per year (0.5%), and no significant change in this rate is expected. The ecological cost of the expansion of stock-raising activities in the region is generally quite high due to deforestation and the rapid depletion and deterioration of overgrazed pastures. There is no reason to believe that this situation is going to change. On the contrary, the use of increasingly fragile and vulnerable land for such activities suggests that in the 1990s the expansion of stock-raising activities may generate even more side effects. In other words, when land of this type is brought into use, an intensification may be seen of such environmentally harmful processes as erosion, the depletion or exhaustion of the soil, the encroachment of weeds and harmful plants, an increase in the amount of land covered by sand dunes, alteration of watercourses due to silting, and loss of wildlife.

The land area devoted to coffee production will surely continue to edge upward, especially in the medium-sized and smaller producer countries. The problems associated with this crop have to do with the introduction of new systems which have displaced shaded cluster crops, which are of great value in agro-ecological terms because of the stability they provide.

The region's 18 million hectares of soybeans and 2.5 million hectares of sunflowers also supply basic export components. Inasmuch as no changes in the production systems for these crops are planned, they can be expected to continue to cause erosion and pollution. Pesticide use will tend to increase as these crops become increasingly artificialized and, as the expansion of the agricultural frontier for soybean cultivation slows, single-crop farming may become the predominant system used on many farms.

The amount of land used for wheat and maize production has not changed significantly and is not expected to do so in the future either. The yield of maize crops has been raised through the use of hybrids in the place of local varieties. This trend is expected to continue, thereby jeopardizing the rich diversity of Mexico's and Central America's maize varieties.

The amount of land used for plantain and banana cultivation and these crops' level of output are on the rise. Unfortunately, the boom in the banana industry—traditionally a crop produced by transnational enclaves—is leading to an expansion of the amount of land devoted to this crop on steeply sloping terrain, particularly in Caribbean countries. As a consequence of increased pesticide use, cases have occurred (and will continue to occur) in which people have suffered serious harm from exposure to these chemicals. An additional factor is that plantain and banana crops are very vulnerable to hurricanes, and many of the programmes now in effect may therefore prove to be unsustainable.

The amount of land devoted to sugar cane swelled by more than 30% between 1980 and 1990 despite a sharp drop in international prices for this product, but this expansion is not expected to continue in the 1990s. This increase in land area was due almost entirely to the steady expansion of this crop in Brazil, particularly for use as a source of energy. Thus, future trends in regard to this crop in the region will largely be determined by Brazil's energy policy.

Cotton is the most environmentally costly crop of all, in comparative terms, because it calls for the use of insecticides whose adverse effects on the exposed population in the region have been well documented. The land area devoted to its cultivation has decreased considerably, however, and is very unlikely to return to its former levels. It may be noted that cotton is probably one of the crops that has boosted its yields the most, since even though the area devoted to this crop shrank by 34% between 1980 and 1991 (from 5.6 to 3.7 million hectares), output rose by 5%.

Temperate-climate fruit crops, especially in the Southern Cone, have been steadily winning new markets, but in most cases their environmental impact is minimal.

In short, the prospects for the expansion of crop-farming production in Latin America and the Caribbean are limited because most crops have already

registered the jumps in output made possible by intensive use of agrochemicals. Future increases are thus expected to be smaller. Barring any major technological changes, the adverse effects of pollution from pesticides will grow worse and may eventually act as a severe constraint on exports. The land will probably continue to be abused as seriously as it always has been. The rate at which farmland is being destroyed by erosion, pollution, plant disease and soil depletion will remain more or less constant. In contrast to what has occurred in recent decades, it is unlikely that these losses of cropland will be offset by increased productivity or the expansion of the agricultural frontier. Both of these processes are clearly entering into a stage of diminishing returns due, in the first case, to agronomic factors and, in the second, to physical limitations.

The outlook for exports of forestry products will continue to grow more and more promising, while the logging of fine hardwoods will continue to impoverish the region's forests. Changing export trends appear to pose a very serious threat to forests in temperate and cold-to-temperate climates, as the demand for chips has sparked high extraction rates in native forests of short-fibre species.

Although the region does not export wood for use in the generation of power, the rise in mineral exports will lead to increased use of forest resources for energy-production purposes.

As the region's main export, petroleum will continue to occupy a priority position in its export strategies, and this will spur on increased prospecting and drilling efforts. However, except in Mexico and Venezuela, the region's proven reserves are considerably more limited than is often claimed. The Latin American and Caribbean countries' strategies do not, for the most part, stress overall energy efficiency; instead, they place emphasis on increased oil exports. A real danger therefore exists that a portion of domestic energy use will switch over to firewood, coal and nuclear energy. It must not be forgotten that none of today's techniques for the confinement of nuclear wastes offer an acceptable level of safety, and that the economic and technological resources of the countries of the region are far inferior to those of developed countries; this undoubtedly constitutes a risk factor.

Marine products warrant special mention. The overharvesting of basic species, such as anchoveta and tuna, poses an ongoing threat to the sustainability of the region's fisheries.

Crustaceans and molluscs are being overharvested in most cases as well. In both the Pacific and the Atlantic oceans, many species have become endangered and are now protected by strictly-applied closed seasons. It is therefore considered likely that the expansion of these types of exports will probably be based on shrimp cultivation and on aquiculture, particularly of mussels.

Shrimp farming is a very important activity for some countries and is gradually on the rise. In Ecuador, for example, shrimp sales provide approximately 15% of the country's foreign-exchange export earnings. Shrimp cultivation is a controversial issue, however, because of the high ecological cost of its impact on the biodiversity of the wetlands that are used as hatcheries.

In sum, everything seems to indicate that strategies based on expansion of the region's exports to the First World will not be successful unless they break out of the trap which the region has created for itself by relying on the spurious comparative advantages of cheap labour and undervalued natural resources. If the poverty that underlies the first of these advantages (i.e., inexpensive labour) is not significantly reduced, it will continue to act as the basic structural cause of the region's inadequate environmental management and overuse of natural resources. And if the region, in its capacity as a natural-resource supplier, does not change its production patterns in a way that gradually incorporates more value added and stresses policies designed to promote social equity, its position in the international marketplace will continue to be weakened by the deterioration of its terms of trade and serious problems will arise due to the exhaustion of its non-renewable natural resources and the degradation of its renewable ones. The fact that the public and even the State authorities themselves are generally unaware of how flimsy the countries' development strategies and policies are and of the potentially critical situation of many export sectors could well exacerbate the situation and accelerate the loss of resources.

Unfortunately, the basic economic decisions of the countries of the region are taken—within the framework of the broad political positions adopted by each country—by the technocrats of their ministries of economic affairs or finance or other economic planning agencies. According to the short-sighted approaches employed by these decision-makers, environmental issues and natural resource-related problems

are bothersome externalities that must somehow be overcome without "getting in the way" of their management of the economy. Their failure to evaluate these factors could push these countries' economies over the edge as well as jeopardizing important production processes.

The region's current "export-at-any-cost" strategy will accelerate the environmental crisis affecting the countries of the region. Nothing is gained by continuing to analyse the region's development in terms of GDP growth or increases in per capita income if we say nothing about the status of its natural resource endowment, which is the foundation for that strategy.

4. Investment policy

Within the context of the region's current development patterns, export efforts are closely associated with policies designed to boost each country's investment rate. The idea here, more or less, is for each country to achieve an investment rate that will bring about an overall improvement in its economy, and this calls for the creation of incentives to attract capital, primarily from developed countries.

Herein, however, lies yet another trap that works to the detriment of the region's natural resources and environment.

Developed countries are interested in investing where the social and political situation is stable and, of course, where the returns on investments are high. To ensure this high rate of return, the countries rely on the second spurious comparative advantage referred to earlier: the undervaluation of natural resources and the absence of any environmental commitments.

Accordingly, the countries of the region offer all sorts of inducements to investors by, for example, giving away the right to use certain renewable resources. There are any number of instances of this: the decision to hand over a sizeable percentage of the power generated by a given dam, exclusive rights to the use of wetlands, in-kind payments made in the form of timber by settlement programmes, the sale of public land at reduced prices to attract investment in the exploitation of forestry resources, the leasing of government land for n years for the establishment of agroindustrial concerns, and the award of rights to irrigated land in exchange for the construction of canals.

Although serious difficulties exist in respect of the undervaluation of labour, the problems appear to be even greater when we analyse the inducements

and restrictions applying to investment as they relate to environmental issues.

Although it is often proudly declared that this or that investment safeguards the environment, the fact is that environmental restrictions placed on investors by the Latin American and Caribbean countries are minimal. Indeed, some countries appear to view the non-imposition of such restrictions as an advantage in attracting investment. Fortunately, some subregional accords – such as the agreement existing among the Central American countries, the Treaty for Amazonian Cooperation² and, more recently, MERCOSUR – appear to be working towards the elimination of these types of advantages and disadvantages through the establishment of common standards. Such agreements may not be so easy to reach in other subregions, however, and the urge to attract investment can thus be expected to lead to further assaults upon the environment in the future. Two areas are likely sources of conflict: the chemical industry and investments in the energy sector.

5. Technology transfer

It is often asserted that the region's environmental problems can be solved through technology transfer.

This claim is strongly endorsed by the advocates of the new development modality. Supporters of this view contend that the intensification of world trade, pressure from developed countries and today's technological breakthroughs will make it possible to resolve any environmental problem that arises.

Where this position is in error is in confusing overall environmental issues with environmental questions as they relate to industrial development, thus lapsing into a reductionist view that tends to equate the region's development problems with problems of industrial development.

There are many environmental problems that do call for a technological solution, and technology transfer to deal with environmental variables is of fundamental importance in leading-edge industries. Nevertheless, to believe that environmental problems are simply technological problems is to ignore the realities of the region or to regard Latin America and the Caribbean as if it were part of the developed world.

² The Treaty for Amazonian Cooperation was signed in Brasilia (1978) by Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.

The region's environmental problems can definitely not be solved simply through technology transfer; they are much more complex than that, and their solution calls for a whole array of different approaches: political, social, economic, anthropological, scientific and technological.

Experts in the region are fully aware of existing technologies that would permit the implementation of environmental measures diametrically opposed to those now in place, but technological innovations relating to resource use and pollution control need to be studied on an ongoing basis, and the search for such technologies should be a matter of policy.

The relevant experts in Latin America and the Caribbean have a full understanding of the available techniques for preventing soil erosion through the use of contouring, terracing or retaining systems. They also have a mastery of all sorts of irrigation techniques that will not produce erosion. They know what types of crops will hold the soil in place, when to let the land lie fallow, and how to practise crop rotation. Interesting experiments concerning the retention of sand dunes have been conducted. They fully understand the role played by forests and their ecosystemic functions as they relate to the soil. They have studied the role played by microfauna and the cultivation procedures called for in order to prevent its elimination. Yet despite the possession of all this knowledge, the land continues to be eroded.

The region has access to the necessary technology to stop polluting its bodies of water and to clean up existing pollution. Its experts are familiar with secondary and tertiary water-treatment techniques for eliminating organic pollution. They have mastered the proper techniques for treating industrial and mining effluents. They know the exact causes of eutrophication.³ They have studied the disequilibria that may occur among microfauna.

They do not lack the know-how needed to halt deforestation, either, and they have studied all the various technologies of forest management in depth. Even so, however, the forests continue to shrink and deteriorate.

They know how to treat urban wastes. They know how to create sanitary landfills and how to treat hazardous wastes. All these techniques are familiar to them. Nevertheless, the cities are surrounded by mountains of untreated garbage, and tragedies caused by the improper management of hazardous wastes are a daily occurrence.

The state of scientific and technological research in the region is more than sufficient to permit a far better form of environmental management than is currently practised.

In the coming years, however, it is more than likely that technological reductionism will be heralded as the solution to the region's environmental problems, thus sidetracking the debate from the true causes of the environmental situation as it now stands.

6. The new role of the State

The role of the State in the region is viewed differently today than in the past. Along with its downsizing as a strategy for cutting the fiscal deficit, the State has been assigned an important role in macro-economic management, while at the same time its control functions have been reduced.

With regard to environmental issues, the State must undoubtedly establish its position as the only entity capable of resolving conflicts between the interests of individuals and of society as a whole and between short- and long-term benefits. It must also serve as the representative for its citizens' concerns regarding the preservation of their natural and cultural heritage. In other words, the State is expected to be strong and to be capable of exercising control, enforcement and leadership functions. The fact of the matter, however, is that it is moving in quite the opposite direction. Many public goods have passed into private hands and are used for personal gain by their owners without regard for any social repercussions, and the countries of the region are increasingly running their economies on the basis of a short-term view while neglecting long-term considerations almost entirely. Thus, either environmental concerns are simply being left out of decision-making processes, or else a political decision is being taken to ignore environmental issues.

The urgent need to attract investment, create more jobs, increase exports and provide a sufficient food supply have filled up the countries' political

³ Eutrophication is understood as the abnormally rapid growth of aquatic plants due to the presence of excess fertilizers in the water.

agenda. The consideration of environmental issues has therefore been deferred, since thus far these issues have not been regarded as an integral component of the countries' urgent matters. If this situation continues and environmental issues do not come to be seen as matters linked to the question of the population's survival and quality of life, then it is quite unlikely that proper environmental management will be practised, and the region's environmental problems will consequently grow worse.

All of this notwithstanding, a number of countries in the region are strengthening the environmental component of their institutional structures by using innovative legal provisions to endow new agencies with different types of resources and powers. These new laws establish, *inter alia*, the concept of environmental offences, the principle that "the polluter must pay", and the concept of an environmental system.

In the coming years, how will these institutions deal with the challenges posed by efforts to achieve the continuing expansion of exports, the quest to attract investment at any cost, and the need to persuade local businesses to reinvest? How will they handle the conflicts that will surely arise?

It is not reasonable to expect a confrontation, for if one were to occur, the lives of these new institutions would surely be cut short. It is foreseeable, however, that they will be given the authority to practise environmental management in the less conflictive areas of national affairs. Environmental agencies will not interfere with economic policy, which will continue to be formulated by the relevant ministries –ministries which pay little heed to environmental considerations now and are unlikely to do so in the future.

Progress may be made in urban areas in connection with the various elements involved in the management of household and industrial wastes, the reduction of water pollution and, in some cities, the abatement of air pollution. Advances in these areas will be achieved through increased consensus-building with the business sector, especially in relation to industrial activities. It may thus become possible to "negotiate" permissible levels of pollution and establish monitoring and supervisory systems. In view of the power of that sector and the problems it habitually faces in terms of profitability, however, it may be supposed that such advances will be only modest in nature.

(Original: Spanish)

Bibliography

- Argentina (1991): *Informe nacional a la Conferencia de las Naciones Unidas sobre Medio Ambiente y Desarrollo*, Buenos Aires, Presidencia de la República, Secretaría General, Comisión Nacional de Política Ambiental.
- Beccaria, L. A., J. Boltvinik, J.C. Feres, O. Fresneda, A. León and A. K. Sen (1992): *América Latina: el reto de la pobreza. Conceptos, métodos, magnitud, características y evolución*, Regional Project to Alleviate Critical Poverty in Latin America and the Caribbean (UNDP/RLA/86/004), Bogotá, United Nations Development Programme (UNDP).
- Brazil, CIMA (1991): *Sobdiários técnicos para elaboração do relatório nacional do Brasil para a CNUMAD*, Brasília, CIMA.
- ECLAC (Economic Commission for Latin America and the Caribbean) (1990): *Changing Production Patterns with Social Equity* (LC/G.1601-P), Santiago, Chile. United Nations publication, Sales No E.90.II.G.6.
- (1991): *Principales emisiones de contaminantes atmosféricos y algunos medios para su control. Elementos para la discusión. El caso de Chile* (LC/R.983 (Sem. 61/5)), Santiago, Chile.
- (1992): *Water Management in Metropolitan Areas of Latin America* (LC/R.1156), Santiago, Chile.
- (1993a): *Statistical Yearbook for Latin America and the Caribbean. 1992 Edition* (LC/G.1747-P), Santiago, Chile. United Nations publication, Sales No. E.93.II.G.1.
- (1993b): *Ciudades medianas y gestión urbana en América Latina* (LC/L.747), Santiago, Chile.
- (1993c): *Hazardous Products and Wastes: Impact of Transboundary Movement Towards the Latin American and Caribbean Region and Possibilities for Preventing and Controlling It* (LC/R.1303), Santiago, Chile.
- FAO (Food and Agriculture Organization of the United Nations) (1988): *Potentials for Agricultural and Rural Development in Latin America and the Caribbean, Natural Resources and the Environment*, Annex IV, Rome.
- Gligo, N. (1986): *Agricultura y medio ambiente en América Latina*, San José, Costa Rica, Inter-American

- Planning Society (SIAP)/Editorial Universitaria Centroamericana (EDUCA).
- Latin American and Caribbean Commission on Development and Environment (1991): *Our own Agenda*, Washington, D. C., Inter-American Development Bank (IDB)/UNDP.
- Mexico, Comisión Nacional de Zonas Áridas (1994): *Plan de acción para combatir la desertificación en México (PACD-México)*, Mexico City, Comisión Nacional de Zonas Áridas/Secretaría de Desarrollo Social.
- Peru (1992): *Perú: Conferencia de las Naciones Unidas sobre Medio Ambiente y el Desarrollo. Informe nacional*, Lima, Comisión Nacional CNUMAD 92.
- Raven, P. H. (1976): Ethics and attitudes, in J. Simons *et al.* (eds.), *Conservation and Threatened Plants*, New York, Plenum.
- Sunkel, O. and N. Gligo (1980): *Estilos de desarrollo y medio ambiente en la América Latina*, Lecturas, No. 36, Mexico City, Fondo de Cultura Económica.
- Toledo, V. (1985): *A Critical Evaluation of the Floristic Knowledge in Latin America and the Caribbean*, Washington, D. C., Report to the Nature Conservancy Program.
- UNEP (United Nations Environment Programme)/Spanish Agency for International Co-operation (AECI)/Ministerio de Obras Públicas y Urbanismo (MOPU), Secretaría General de Medio Ambiente (1990): *Desarrollo y medio ambiente en América Latina y el Caribe. Una visión evolutiva*, Madrid, MOPU.
- World Resources Institute (1992): *World Resources 1992-93*, New York, Oxford University Press.
- (1994): *World Resources 1994-95*, New York, Oxford University Press.