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Natural resources: *the current* debate

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This essay identifies the main points in the natural resources debate. After highlighting the issues of sovereignty, distribution of benefits, deterioration in the terms of trade, and the institutional structure of world markets, which have been particularly important over the last forty years, it suggests that the debate should now get away from demands and counter-claims and concentrate instead on questions of sustainability and competitiveness. In conclusion, it proposes a regional initiative to strengthen the capacity to manage the natural heritage and resources and promote the wider spread and incorporation of technical progress.

I

Introduction

When the value attached to the national heritage and natural resources in developing countries was only viewed in terms of external demand, patterns based on extraction for sale predominated, but when more endogenous considerations prevailed this made possible closer links with domestic production.

In the developed countries, the decision to establish such production activities depended initially on the availability of natural resources and above all their competitiveness compared with other supply options. But it was without doubt their capacity to generate technical progress which enabled them to advance towards stages involving greater added value and to project themselves abroad in order to overcome physical limitations and obtain the natural resources needed to build up their productive structures. The developing countries, for their part, played the role of primary suppliers, without worrying too much about the impact of these resource exploitation processes on the diversity of their natural heritage.

At the same time, the segmentation of production facilities and the terms of the trade synchronization between the primary processing phases and those involving more advanced forms of manufacture meant that the amount of value retained within the developing economies was only small and the sharing of benefits was unequal.

The international economic cycles and the advance of technical progress, for their part, gave rise to constant fluctuations in external demand which repeatedly affected the terms of trade and undermined the natural advantages of some areas of extraction.

The market position or status of natural resources depended on how functional they were to the economies which controlled the store of knowledge, while the shares of the suppliers were dictated by the quality of the resources and their extraction and transport costs. The control of knowledge conditioned the values of the use and trading of natural resources, while the dynamism of such resources depended on the secondary effects of booms in activities involving more highly processed products.

Exploitation of their natural advantages gave the resource-extracting economies the capacity to buy more highly-processed goods, whereas fully integrated economies controlled trade in both directions (primary resource exploitation - trade - added value - trade).

The circulation of goods with unequal levels of added value brought out the segmentation of technical knowledge and established various forms of discrimination which further increased the unequal sharing of the benefits of international trade.

Natural resources with a lower degree of processing were traded primarily in oligopsonic markets or intra-firm trade circuits and their value was usually fixed under the rules of a "buyer's market", whereas products with a higher degree of processing were valued on a "seller's market".

Consequently, the bargaining power of economies depending on the extraction of natural resources was seriously restricted, and much of the income that they should have received from their operations was transferred to the economies which controlled the production chains transforming those resources into more highly processed goods.

II

The natural resources debate from the 1950s onward

Much of the natural resources debate from the 1950s onward was taken up with questions of sovereignty, sharing of benefits, deterioration of the terms of trade, and the institutional structure of world markets.

In many countries of the region, the State was gradually taking on a dominant role in resource exploitation, and this trend became even more marked in the 1960s and 1970s, when foreign interests in the fields of agriculture, mining and petroleum were nationalized.

In other countries, the exploitation of certain natural resources was reserved for nationals of those countries, or preference was given to forms of operation in association with the State, against a background of frequently conflictive relations with foreign investors.

These conflicts concerned the sharing of benefits. Those who supported policies of State ownership demanded absolute control of operating revenue, while those who took a more flexible stance nevertheless insisted on the application of arrangements which guaranteed the national economies a bigger share. The incorporation of foreign firms in domestic structures of production was also questioned because of the purely extractive nature of their activities, often converting them into virtual enclaves. These

criticisms generally favoured greater government intervention, on the assumption that State control would guarantee greater sectoral and spatial integration and better terms of access to world markets.

Against this background, the countries of the region sought to change the institutional structure of the markets by participating in various concertation and cooperation schemes and denouncing discriminatory and protectionist trade practices. Some of them adopted the so-called "minimax" approach, through agreements between producers and consumers, while others took "zero-sum" positions which reflected only the interests of producers. The "minimax" options assumed that it was possible to strike a balance between what was minimum for some and maximum for others, and vice versa, while the "zero sum" options adopted an attitude of confrontation: what was good for some was bad for others, or in other words, some won while others lost.

Little by little, experience showed that such options were not viable. Today there are very few agreements between producers and consumers which are really working, while producers' organizations have been unable to secure changes in the practices and institutions of the markets.

III

Main lines of the natural resources debate in the 1990s

In the 1990s the debate has centered on the patterns of exploitation to be adopted in the context of the tendency towards the internationalization of environmental questions. Conflicts with the transnational corporations have diminished, and hopes are placed on a new form of cooperation based on mutual benefits. However, price fluctuations and a decline in some of their natural advantages continue to affect the coun-

tries of the region, while natural resources are steadily losing their relative position in world trade.

1. The new form of cooperation with transnational enterprises

A substantial change has been taking place since the 1980s in the relations between transnational corpora-

tions and the developing countries. Most of the countries of the region have been abandoning Statist attitudes and defensive positions in general, since they considered that foreign direct investment (FDI) was the most important manifestation of a process of transnationalization from which they could not and indeed ought not try to escape.

World FDI had been concentrating in the developed nations and the newly industrialized countries, while the region had been gradually losing its share of international flows of risk capital. This was a negative development, as FDI was the main vehicle for the spread of technical progress and the most promising way of diversifying export markets.¹

Among the factors responsible for this change of attitude was the low level of capital formation in the exploitation of natural resources; the perception that Statist policies tended to exclude the countries of the region from the benefits of technical progress; the lower level of interest that the region was attracting compared with other developing countries, and the need to expand exports in order to cope with the heavy external debt service commitments.

Other additional factors were the lower availability of credits for State operations, doubts and criticisms regarding the projects undertaken, the financial difficulties of public enterprises, management problems, and fiscal restrictions.

The new policies adopted with regard to natural resources assign special importance to the participation of transnational corporations for at least three reasons: because these corporations provide capital for exploiting new resources and expanding and modernizing existing operations; because they permit the expansion and diversification of markets with, where possible, an increase in the degree of processing; and because they make it possible to take advantage of technical advances in the identification and exploitation of natural resource endowments.

Sovereignty over such endowments is of vital importance in the new form of cooperation with transnational corporations, but this does not mean that it is considered necessary to have direct control over the operations. What is important is that the

presence of such corporations should help to gain more dynamic positions in the world economy and that the fair sharing of benefits should be guaranteed.

Thus, the 1990s marks the beginning of a new stage in which the participation of transnational corporations in the exploitation of natural resources could regain the leading position it occupied before the 1960s.

2. The dynamics of world trade

The growth rate of international trade in natural resources has been slackening for several decades. Thus, the share of agricultural and mining products in the total value of world trade dropped from 48% in 1960 to only 26% at the end of the 1980s, while world primary commodity trade increased by a factor of only 12 between the mid-1950s and the end of the 1980s, whereas trade in manufactures grew by a factor of 55.

Moreover, the developed countries have been accounting for an increasing proportion of trade in primary commodities (excluding fuels), raising their share from 56% in the mid-1960s to 65% at the end of the 1980s. In contrast, the region's share of world primary commodity exports (excluding petroleum) went down over the same period from 14% to 11%, representing 42% of the total loss of participation of the developing countries as a whole.

This combined with the deterioration in the terms of trade, which was 25% lower at the end of the 1980s than at the beginning of the decade.

3. The deterioration in natural advantages

Natural resource exploitation has suffered not only from the slower growth of international transactions but also from a rapid process of substitution and a decline in the weight of such resources as components of more highly processed goods.

The less intensive use of natural resources has naturally tended to weaken demand for them, and it is estimated that the content of natural resources per unit of industrial production is now only 40% of what it was at the beginning of the century (ECLAC, 1988).

Consequently, an outstanding feature of the new technological pattern now prevailing is that the restructuring of production will involve not only the development of new materials but also changes in the previous conditions of resource exploitation.

¹ In the mid-1980s, 75% of the annual flow of FDI was concentrated in the developed countries, and the developing countries only received the remaining 25%. In the case of Latin America and the Caribbean, their share of world FDI had gone down from 12% in 1975-1980 to only 10% in the five-year period from 1981 to 1985.

The weakening of natural advantages has been due not only to the rapid displacement of conventional materials, however, but also to the very limited capacity for incorporating new technologies. In this respect, it is true that technical progress also offers a certain margin for the reduction of costs, which highlights the importance of proper management of relative prices, but income-elasticity nevertheless indicates that a higher degree of development is accompanied by lower demand for primary commodities.

Technical progress therefore stands at the centre-point of the debate (ECLAC, 1991c). Efforts should therefore be made to seek closer links between the natural resource endowment and research and development activities, with a view to the incorporation of new technologies which will make it possible to revive some comparative advantages and discover new potentials.

4. Net contribution and sustainability

The most recent debates on these issues have helped to bring out the importance of resource accounting and the possibility that it may give rise to qualitative changes in exploitation patterns, in view of the implicit costs involved in use of the natural heritage (ECLAC, 1991c). What has been proposed is that in calculating total income account should be taken of the depletion of the stock of natural resources, thus severely questioning short-sighted resource use criteria.

Since the Brundtland Commission defined sustainable development as the capacity to satisfy present needs without jeopardizing the resources of future generations, the debate on sustainability has revolved around this central idea (London Environmental Centre, 1989).

What this approach means is that societies should satisfy their needs without adversely affecting their environment: this involves the need to place limits on growth, either by controlling the demand for natural resources or by managing the supply, with the problem centering on the relation between technology and the environment.

Thus, sustainable development should permit a harmonious relationship between satisfaction of needs and preservation of biodiversity. This position is based on the assumption that development will foster its own weaknesses unless it protects the structure, functions and diversity of natural systems. Since the human race, and all other living beings, depend on these systems, loss of biodiversity would reveal

an imbalance between human needs and the natural environment in which they are satisfied. Natural resources must therefore be protected and used in an equitable manner, without reducing their variety or affecting the existing habitats and ecosystems: in other words, taking care of nature so that it will take care of the human race.

These proposals are linked with other views that take up the debate on growth and development once again, concentrating on the relationship between production systems and the natural heritage. For those holding these views, the problem is not so much in growth itself as in the form it assumes, its content, its spatial location, the distribution of its benefits, and its ecological rationale (Fajnzylber, 1992b). Advocates of this approach take a historico-structural view, giving special attention to styles of development, which are responsible for the state of the environment and the specific ways the natural heritage is used, and they conclude that the international division of labour is not based on an ecological rationale which takes account of the sustainability of growth and the equitable distribution of its benefits.

The most economicistic approaches hold that societies should be capable of living within their income and not using up their assets: an attitude deriving from their own definition of income as the maximum resources which can be demanded without reducing future consumption (Gómez Lobo, 1991). They stress the limitations of the market in terms of ensuring that there is a balance between the interests of producers and the sustainability of development, and they emphasize the risks involved in the internalization of benefits and the externalization of costs. In this respect, appropriation without payment of environmental goods belonging to society as a whole is not taken into account by the market mechanisms.

This approach is diametrically opposed to that which considers that it should be the market which gives the signals favouring substitution, variations in relative prices, and technological changes.

5. The internationalization of environmental questions

Environmental issues have transcended national frontiers to become one of the basic items on the international agenda.

It is considered that present forms of growth are generating an eco-environmental and eco-political

crisis which is likely to jeopardize the stability of present-day civilization because it is connected with the progressive exhaustion of some resources, the lower recovery capacity of ecosystems, and the power factors determining their exploitation (ECLAC, 1992c).

This is beginning to give rise to the increasing currency of positions favouring an international environmental order which could have substantial repercussions on the trade in natural resources. Since it is considered that the process of changing production patterns cannot be halted and that moreover this is one of the aspirations of the developing countries, precautions must be taken to ensure that sustainability is not imperilled (Schaper, 1991).

Within this context, the relations between trade liberalization and protection of the environment have formed a central part of the debate. GATT has come out against the establishment of environmental trade barriers, and for the critics of free trade this amounts to questioning the power of governments to use trade in support of environmental policies (GATT, 1992).

These critics have proposed alternatives along four lines: that the least restrictive standards should be brought in line with the severest ones; that imports from countries which use production techniques harmful to the environment should have to pay compensatory duties; that producers should be subsidized to cover the extra costs caused by more restrictive environmental standards, and that, in extreme cases, it should be forbidden to import products which harm the environment in their countries of origin.

GATT, however, holds that trade liberalization would increase national income and also promote greater absorption of technology, thereby giving countries more resources for protecting the environment, and that there is no reason to assume that such increased income might not be used for that purpose. The establishment of trade barriers, in contrast, would have harmful implications for the environment because it would reduce trade opportunities, and giving way to such pressures would merely foster a new type of protectionism on top of the existing one.

The question has now arisen in the debate as to whether a new environmental order is being constructed or not. The answer would appear to be in the affirmative in view of the 127 multilateral agreements on the environment which are now in force, together with the 211 notifications under the Agreement on Technical Obstacles to Trade provided for in the Tokyo Round, which regulate protection of the environment and of human health and safety in various areas of ecological interest.

While the globalization process may further the construction of a new environmental order, for this order to be equitable it must be based on a reasonable balance between the various options for changing production patterns. Thus, countries which are so advanced technologically that they enjoy higher levels of well-being and are in a position to assign greater relative importance to protection of the environment should not do so to such an extent that they adversely affect countries which are not leaders in technological change and have high levels of poverty.

IV

Natural resources and changing production patterns

The debate was to take on new significance with the proposal for "changing production patterns with social equity", which assigns a central role to the incorporation and spread of technical progress (ECLAC, 1990, 1992a and 1992b).

Issues connected with discriminatory trade practices and the deterioration in the terms of trade will continue to receive attention, as they are recurring phenomena. However, giving priority only to trade-related demands could lead to the evasion of domes-

tic responsibilities and of aspects connected with sustainability and competitiveness.

In order to define this new significance and understand its real content and projections, certain concepts need to be clarified.

1. The natural heritage and natural resources

The natural heritage covers all the elements of nature and all the natural processes taking place in a given

space. This concept includes the soil, the subsoil, air and water, and in more general terms biotic and ecosystemic diversity, as well as the interrelations of all these factors and their capacity for reproduction and self-sustainment.

Each physical space has a corresponding set of laws of configuration and functioning defined by the existing natural systems, as well as a heritage bequeathed by earlier generations, so that the concept of natural heritage also has historical dimensions.

In contrast, the concept of natural resources stems from the use human societies make of the various natural elements and processes with the aim of increasing their value in terms of their use and trade.² This concept therefore involves the idea of tangible or intangible usefulness as a result of the application of technical progress. This makes it possible, firstly, to identify and place a value on those resources, and secondly, to collect and process them in line with the state of science and technology and the prevailing patterns of life.

Thus, the variables of time and space mean that both the natural heritage and natural resources have a relative value which depends on technical progress. Although the natural heritage has an intrinsic value, the values of use and trade generated by its exploitation are relative and variable in time and space. Consequently, natural advantages should always be treated as dynamic and not static factors.

2. Changing production patterns

The concept of changing production patterns is also relative and variable in time, since it depends on the degree of technical progress attained. It should therefore be associated with the accumulation of knowledge on natural elements and processes and on the exploitation processes created by human societies.

This consideration is very important, because if the concept is linked solely with the exploitation processes it would be restricted to the idea of industrialization. A fuller definition of the concept of changing production patterns should therefore include the investigation and conservation of the natural heritage, the identification and use of natural processes, and the generation and application of exploitation pro-

cesses in order to obtain resources which can be incorporated into the areas of production, circulation and consumption of goods which are increasingly highly processed and increasingly differentiated from each other through the incorporation of knowledge.

The process of changing production patterns should result in greater availability of goods and services in order to satisfy social needs and to investigate, evaluate, conserve and manage the potentials of the natural heritage and natural resources. Just as this would enable human societies to find better options for meeting social demands, it would also enable them to choose the best way of interfacing with their natural environment, given a certain level of technical progress.

The main objective of changing production patterns would therefore be to know and master the natural environment so as to manage it in order to give a better quality of life. This would depend not only on access to increasingly highly processed and better distributed goods, but also on the impact of such management on the natural heritage.

The process of changing production patterns begins, then, with a proper knowledge of natural elements and processes—which calls for a complex set of non-natural goods and processes which will further both their understanding and their use—followed by the interrelation of both types of processes to generate goods of growing added value.³

Because of its relative nature, the process of changing production patterns assumes that there are no limits on knowledge of the natural heritage or on the future interrelation of processes and goods. It therefore includes the idea of movement and depends on considerations of time and space.

3. Competitiveness, competitive position and efficiency

In simple terms, competitiveness could be defined as the capacity to occupy the most dynamic areas of the market to an increasing extent. In the proposal for changing production patterns, this concept also includes the ideas of sustainability and equity, which means that the use of resources should not adversely affect the natural heritage or belittle the effective contribution of labour.

² In order to gain an idea of the true magnitude of the natural resources of Latin America and the Caribbean and the proportion of total world resources which they represent, see the appendix at the end of this article.

³ Natural processes are a datum of the real world and reflect the various interrelations of the elements which make up nature and their capacity of reproduction and self-sustainment. Non-natural processes, on the other hand, are the result of human action and vary with the degree of knowledge attained.

Consequently, a form of competitiveness based on over-exploitation of the natural heritage, wage levels below those of labour productivity, or the application of subsidies will be of a spurious nature and will therefore be dependent on circumstantial factors which cannot persist in the long term. In contrast, however, competitiveness will be truly authentic if it guarantees the sustainability of the natural heritage and contributes to greater equity.

Competitiveness is an ongoing, systemic process and involves a set of situations linked with the concepts of competitive position and efficiency. Competitive position means the greater or lesser dynamism of transactions in goods and services, while efficiency refers to the proportion of the market obtained by the agents of production.

The evolution of competitiveness will therefore depend on the various permutations of competitive position and efficiency. If the natural heritage has advantages which mean that it can be used and converted into resources that gain a significant and growing share of the market, then an optimum level of competitiveness will have been reached.⁴

4. Natural advantages and technical progress

Technical progress can have a two-sided effect on natural resources: positive when it makes possible the use of fresh potential, but negative when it reduces or destroys existing advantages.

Natural advantages are therefore not static factors. Their heightening, decline or recovery are dynamic phenomena which depend on the state of science and technology.

Technical progress can open up undreamed-of opportunities for making use of the natural heritage. In this respect, while it is true that natural resource-based exports have registered lower growth rates, it is also true that in recent years there has been considerable diversification of such exports, especially in the agricultural and fishery sectors.

⁴ If the competitive position were favourable but the market share were only small, this would be a situation of missed opportunities. If the opposite were the case, then there would be a situation of vulnerability. Finally, if both competitive position and market share were unfavourable, this situation would lead to withdrawal from the market.

The dynamic nature of natural advantages may be illustrated through the new opportunities that biotechnology has been opening up in the areas of agriculture, agroindustry and preservation of the environment. These advances have made it possible, for example, to use living organisms or parts thereof for the generation or modification of plants, animals and various products, as well as for the development of micro-organisms for specific purposes, thus facilitating the replacement and improvement of agricultural and livestock species and contributing to better linkages between agriculture and industry.

The deterioration of natural advantages should therefore not be viewed with unrelieved pessimism, as this phenomenon is an inherent part of changing production patterns.

Natural resources have a useful life which may be either prolonged or shortened by technical change, but which is generally longer than that of many manufactured products. What is important is to preserve the natural elements and processes which have an ongoing useful life. Although technical progress may cause some advantages to decline over time, their value as determinants of the equilibrium of physical spaces is permanent.

The maintenance and generation of new competitive advantages should therefore be based on the development of endogenous capacities which will promote a high degree of knowledge and proper management of the natural heritage, eschewing short-sighted simplifications. The preservation of natural balances, for its part, could come to be seen as a more valuable economic asset, since competitive advantages are likely to be increasingly based on the differentiation of physical spaces.

5. Physical spaces and competitiveness

Competitive advantages based on the differentiation of physical spaces are variable over time. Classical approaches saw the advantages of these spaces as being static, for they did not take account of the role of technical progress in overcoming spatial difficulties.

Thus, for example, advances in means of transport and processes for the conservation of natural products (packing, refrigeration, etc.) mean that differences of season between one region and another are now very important: something which was not the case when transport to the centres of consumption took a long time, so that it was impossible to market perishable goods.

At the same time, progress in engineering has made it possible to overcome natural obstacles and open up new productive spaces through better physical planning, while genetic engineering has made it easier to handle natural processes and improve the quality of natural species by giving them new qualities and adapting them to different environments from those of their place of origin, thus permitting the wider spread of consumption patterns, so that products which are consumed on a massive scale in spaces which enjoy natural advantages can also be consumed in other parts of the world at prices much higher than those paid in their places of origin.

6. Natural resources and competitiveness

The competitive advantages of natural resources are closely linked with knowledge of the natural heritage and the capacity for the absorption of technical progress. The level of competitiveness is higher when the national environment is such that it allows enterprises to develop innovative strategies.

Strategies for increasing the competitiveness of natural resources have some special features connected with the way the markets are organized, however. Basic commodities are obliged to accept the prices offered on the international market, so that strategies for increasing their competitiveness are linked to their cost structures and stability and timeliness of supply, rather than to price management proper or product differentiation. Since the prices of these products correspond to ho-

mogeneous levels of processing or quality, there is less leeway for improving their competitive position or efficiency than in the case of manufactures.

There are a number of factors, however, which influence competitiveness on both an *ex ante* and an *ex post* basis. *Ex ante* factors furthering competitiveness include identification of the natural heritage potential (geological maps, cadasters, agro-ecological zoning, etc.) and registration of the geographical location of resources and the level of equipment of the territory (roads, energy supplies, financial systems, telecommunications, public services, etc.). *Ex post* factors, for their part, include the criteria for determining prices and charges for use of the infrastructure, customs and financial restrictions, the tax burden, and other aspects having an incidence on the cost structure.

All these factors also affect the competitiveness of more highly processed goods. In this case, strategies place greater emphasis on product differentiation, market segmentation and price management, and factors influencing the cost structure. Thus, for example, measures could be taken to promote both natural advantages (geographical location, seasonal factors and quality) and acquired advantages (genetic management, contacts with centres of consumption, transport, packaging, preservation, etc.). The biggest limitations, however, are encountered in the areas of market knowledge, volume and timeliness of supply, and trade barriers affecting more highly processed products.

V

Natural resource management

Although the prevailing international order and the deterioration in the terms of trade are inescapable aspects in this connection, it is important to center the debate on the capacity for natural heritage management.

Thus, it is important to see to what extent the countries of the region have endogenous capacity to generate, absorb and adapt knowledge which will permit them to identify natural elements and processes and conserve, use and manage them for the purpose of changing production patterns. It is also important to determine to what extent these countries are in a position to achieve a dynamic combination of

sustainability and competitiveness with a view to generating, spreading, homogenizing and leading patterns of production, circulation and consumption on the basis of an endogenous capacity for enhancing and making use of their natural heritage.

The necessary integral management of the natural heritage and resources should form part of a systemic concept stemming from the linking together of the various public and private attitudes and actions on the basis of values, organizational criteria and codes of conduct conducive to increased sustainability and competitiveness (Fajnzylber, 1992a and 1992b).

This would allow the behaviour of the various actors (the State, the business community and the population at large) to follow the same general lines, while at the same time ensuring the compatibility of the strategies, policies and measures applied in the legal sphere (rights and obligations regarding access and ownership), in the economic field (the market versus intervention), in the area of physical or natural considerations (knowledge, conservation and use of resources), in science and technology (generation and absorption of knowledge), in the area of education (dissemination and training), in cultural matters (preservation and transmission of values), in social affairs (participation and mobilization), and in the field of organization (functions and aims of institutions).

The systemic approach assumes that it is possible to advance towards the objectives of sustainability and competitiveness simultaneously rather than in a sequential manner, and this undoubtedly raises an enormous challenge (ECLAC, 1991d). It involves, on the one hand, facing up to the deterioration of natural advantages, and on the other, recovering or discovering new natural potentials, which can only be done through greater spread and incorporation of technical progress. Although this would have some disturbing effects on certain natural advantages, it would at the same time make it possible to reduce operating costs, generate new uses and applications, and spread new patterns of production and consumption based on the use of natural resources.

1. The new main lines of the debate

From the standpoint of the objective of changing production patterns with social equity, the debate should be centered on four main items: human capital, natural capital, compatibility between natural processes and those aimed at the exploitation of resources, and the diversification of natural resources.

a) *Human capital*

In natural resource management, special importance should be assigned to the development of human capital, since education and training facilitate the spread and incorporation of technical progress, while at the same time creating favourable conditions for increasing sustainability, competitiveness and equity.

Special attention should be given to sectors which are in a situation of extreme poverty, which are associated with the phases of lower productivity, less incorporation of technical progress and greater

degradation of the natural heritage. In order to tackle the vicious circle of natural and social deterioration it will be necessary to redefine the spatial location of certain human settlements by promoting migration to more favourable spaces; to stimulate educational programmes adapted to the needs of the natural environment; to promote the spread and adaptation of appropriate technologies; and to foster a new appreciation of traditional species and techniques, as well as the values of native cultures.

To this end, efforts must be concentrated on the spaces suffering from the greatest natural degradation. Although conditions vary greatly from one country to another, the general diagnosis would appear to indicate that priority attention should be given to the human capital in marginal peasant economies, whose interaction with their corresponding natural systems leads to frequently irreversible losses of the productive capacity of the soil and of biodiversity.

b) *Natural capital*⁵

Greater incorporation and spread of technical progress should ensure better identification and evaluation of the natural heritage, as well as a fuller understanding of the factors behind its configuration. It is not just a question of having increasingly broad and comprehensive inventories, but also of gaining fuller knowledge of the mutual relations between natural elements and processes.

The preparation of natural capital accounts would undoubtedly be an essential tool for gaining an idea of the impact of changing production patterns on the physical environment: it would make it possible to measure the costs in terms of the natural heritage and form an idea of the probable tendencies in its long-term exploitation. In this respect, it would be essential not to take account only of the short-term income, because this would mean evading the need for sustainability and basing the evaluation on a spurious form of competitiveness, since the depletion of the resources would affect income in the more distant future.⁶

⁵ All the figures on renewable resources in sections b) and c) are taken from FAO, 1988, 1992a, 1992b and 1992c.

⁶ In this respect, it is necessary to take account not only of the marginal operating cost but also of the opportunity cost, which is equal to the difference between prices and marginal costs. From this point of view, the market configuration and the price formation mechanisms could become a significant obstacle to ensuring sustainability, if prices were lower than the marginal cost.

This approach is particularly important for Latin America and the Caribbean, since although they have significant natural potential compared with other developing regions, this potential is very unevenly distributed and is subject to a series of restrictions. For example, only 3.4% of the arable land could be considered competitive because of the absence of problems of climate, slope and fertility,⁷ and although there are substantial mineral and energy reserves, their effective use would depend on changes in cost/price ratios and in the capacity to absorb technologies capable of lowering those ratios.

In order to tackle these problems, it is necessary to avoid further deterioration of the natural capital while reducing costs and raising productivity, thus underlining once again the importance of incorporating and spreading technical progress.

Efforts should therefore be made to ensure that the income from natural resources is distributed in a manner that reconciles exploitation with sustainability, leaving a margin of revenue that can be deposited in funds for conservation and improved exploitation of the natural heritage.

With regard to non-renewable resources, funds should be made available for surveying, prospection and exploration, so that a better knowledge can be gained of their potential, while part of the income from renewable resources should go to help the attainment of higher productivity of natural elements, genetic improvement of species being exploited, and fuller knowledge and conservation of biodiversity.

The management and conservation of biodiversity are of fundamental importance, since it is the unequal distribution of resources in the world that determines natural advantages and, ultimately, the competitiveness of renewable resources.

It is therefore necessary to promote the use of funds for the identification, description and evaluation of biological diversity and for its conservation, protection and proper management, in order to heighten the advantages offered by natural capital.

The use of such funds should have effects at the genetic level and at the levels of species and ecosystems, through the collection and processing of data on the whole range of genes, plants, animals and

micro-organisms; expansion of our knowledge of living organisms, and the fullest possible understanding of the various habitats, biotic communities and processes of the biosphere.

All this would make it possible to gain a better appreciation of the natural capital, accurately identify the existing competitive advantages, and guide the behaviour of the productive agents by widening the range of tangible assets that could be converted into natural resources while also identifying intangible assets whose use will depend on the future course of science and technology. The tangible assets would be used and traded, while the intangible ones would form a reserve whose potential value would depend on the future advance of knowledge. It should be borne in mind at all times, of course, that the use of the tangible resources should never jeopardize the potential of the intangible assets.

The generation of tangible and intangible assets will depend on the existence of endogenous capacity for ranking and associating, as necessary, such factors as biological variety, the existence of spaces for the conservation of fauna and flora, the potential of river basins, the importance of migratory fauna, the existence of unique vegetable formations, the presence of endemic species, and the geomorphological or landscape value of natural formations.

c) *Natural processes and processes of exploitation*

It is not enough, however, merely to have a knowledge of the natural capital and an inventory of the available natural heritage. It is also necessary to promote greater generation, assimilation and dissemination of technical progress in order to secure increasing compatibility between knowledge of the processes behind the growth of natural capital and knowledge of the means for its use. The debate should therefore center on ways to improve both the conservation and the productivity of natural capital, in view of the fact that its deterioration is reaching alarming levels, as we shall see below.

i) *Deterioration of the productive capacity of land.* It is estimated that two-thirds of the land under permanent cultivation in Latin America and the Caribbean has lost nearly 25% of its productive capacity. The incompatibility between natural processes and the forms of exploitation gives rise, *inter alia*, to the following problems:

—Soil erosion has reached alarming levels in certain parts of the region, where it is estimated to affect between 30% and 90% of the land, depending

⁷ This land is in flat or gently rolling areas with a climate ranging from tropical to temperate, mostly in the Southern Cone countries.

on the country (in the mountainous ecosystems of the Andean and Central American regions, for example, erosion affects nearly 50% of the available land).⁸

—The loss of land fertility is particularly severe in humid and sub-humid areas, but over-exploitation is also reducing the fertility of the available land in less humid climates.⁹

—Problems of compaction, which adversely affect crop growth and yields, usually occur in fertile land as a result of the excessive or unsuitable use of heavy machinery.¹⁰

—Salinization and sodification, which already affected 25% of the agricultural land in the region at the beginning of the 1980s, continue to get worse.¹¹

—Desertification affects 20% of the land in the region, and it is estimated that it may spread to 50% of the land in the future (over 10% of the land in Argentina, Bolivia, Chile, Mexico and Peru is believed to be deteriorating from moderate to severe desertification).

Soil management should be aimed not only at avoiding degradation of the land, but also at recovering the productivity of affected areas, in view of the restrictions on further expansion of the agricultural frontier.

Higher crop yields would not have any significant effect on employment, however, so that although there would be an increase in the value added per unit of labour employed, rural poverty could become even more serious. Consequently, and also in order to comply more effectively with the objective of greater equity, measures should be taken at the same time to promote the execution of programmes of drainage (to solve problems of salinization and flooding), land rehabilitation (to restore lost fertility), and afforestation and reafforestation.

⁸ Erosion reduces the depth of the soil, thus adversely affecting root length and the capacity for storing water and nutrients.

⁹ Loss of land fertility is due to over-intensive or prolonged exploitation using unsuitable crop-farming, stock-raising or forestry techniques which do not replace the nutrients consumed.

¹⁰ Compaction reduces the soil's capacity to retain moisture, makes it harder for roots to develop, and reduces the permeability of the soil, thus impeding the passage of water and air.

¹¹ Excessive content of salts is the main cause of declining productivity in irrigated agriculture. Salinization is particularly prevalent in arid and semi-arid regions, but it is not restricted to them, as it can also be caused by inefficient irrigation.

More attention should also be given to land zoning according to agro-ecological criteria, in order to ensure land use compatible with bio-physical factors. This would increase sustainability and competitiveness and make it possible to guide the work of dissemination and training more effectively, as well as facilitating the planning and coordination of endogenous research and development capacity.

ii) *Rapid deterioration of forests.* The rapid deterioration of the region's forests shows how little importance is attached in practice to the role played by forests in conserving the environment and promoting orderly use of the natural heritage.

The answer is not, of course, simply to classify forested areas and declare which of them are available for exploitation and which should be protected areas. What is needed is integral management of the existing resources. Thus, the exploitation of forest species should form part of the orderly management of river basins, management of wildlife and agroforestry systems, control of desertification, reafforestation, and forest management for energy purposes.

These actions assume special importance when it is remembered that during the last thirty years over 200 million hectares of woods and forests have been destroyed, nearly half of which was deforested or degraded in the 1980s, when the average rate of deforestation was 8.3 million hectares per year: a million more than in the preceding decade.

From the standpoint of equity, it should be recalled that the deforestation of the arid and semi-arid areas of Latin America and the Caribbean, together with their upland ecosystems, is one of the main causes of the impoverishment of the population and the deterioration of the environment in the region.

The desertification process in arid areas of the region has converted some 20 million hectares of land into outright desert, while over 176 million hectares display high degrees of desertification or are in danger of suffering this fate.

In semi-arid and sub-humid areas, desertification is related with extreme poverty and is due to slash-and-burn practices designed to make way for subsistence crops or extensive stock-raising, since the disappearance of trees and shrubs leaves the soil without any protection against torrential rains and wind erosion.

Moreover, the settlement of lower-lying areas formerly covered with tropical or sub-tropical forests has not only failed to solve the problem of rural poverty but has actually destroyed many such areas, with

extremely adverse effects on the environment. It should not be forgotten that the shortage of energy which directly affects some 200 million people means that much of the timber extracted from these forests is used for firewood and charcoal.

Likewise, the over-exploitation of the forest biomass in areas of precarious ecological balance (arid, semi-arid and upland areas) has been doing away with the protective function of the trees, destroying the productive capacity of the soil and forcing the local population to emigrate to even more fragile land.

The over-exploitation of forest resources is thus a dramatic case not only because of the incompatibility between natural processes and the processes of exploitation but also because of the prevalence of a low level of change in production patterns, accompanied by social inequity.

iii) *Integrated natural resource management.*

The need for compatibility between the natural processes and the processes of exploitation makes necessary the integrated management of the natural heritage resources. Special attention should therefore be given to multiple forms of forest use which involve not only extraction and processing activities but also soil protection, regulation of hydrological cycles, and conservation and utilization of genetic diversity.

Integrated management should guarantee respect for the balance of natural processes and should ensure that processes for the exploitation of one resource do not damage other resources.

In the case of *water resources*, integrated river basin management is of fundamental importance, since water is needed for multiple purposes and the water balance is becoming a significant obstacle to changing production patterns and equity in many parts of Latin America and the Caribbean (ECLAC, 1991b).

Water has the curious characteristic of being a scarce resource in spite of its apparent abundance, because only a small percentage of the water existing on this planet can actually be used by human beings. Lakes and rivers contain only 93 000 cubic kilometres of fresh water, which represents only 0.0067% of the 1 386 million cubic kilometres of water that exist in the world.¹² Out of this total volume of water resources, only a small fraction have the quality, magnitude, and easy and reliable availability needed in order for them to be of use for productive purposes.

As well as the shortage of usable water, there is the uneven distribution of precipitations in both spatial and seasonal terms. This unevenness is one of the most significant constraints on water use, since a quarter of the region's territory consists of arid or semi-arid areas. Thus, the generalized and persistent falling-off of atmospheric currents causes drought in the sub-tropical zones, while the localized reduction of such currents caused by the Andes is responsible for a diagonal belt of arid land extending to Patagonia.

Thus, great expanses of territory are affected by permanent or long-standing water shortages, while other equally large areas are subject to seasonal or random droughts.

The problem is seen to be very considerable when it is borne in mind that over 60 million people live in areas of water shortage where the average per capita income is only 80% of that of the region as a whole.

It is therefore vitally important to order and use water resources through an integrated system of management and to distribute human settlements better over space, as technical progress has not so far been able –and may never be able– to alter the essential role of these resources in production processes and the quality of life of the population.

With regard to *hydrobiological resources*, the preservation of seas, lakes and rivers so as to guarantee conservation of the natural habitat of species and their repopulation should also be the subject of integrated management, since this hydrobiological potential could cover part of the demand for food and open up dynamic demand for species which are in international demand.

This is why priority should be given to the control of water pollution, the preservation of ecosystems and of the hydrobiological mass, and regulations limiting the extraction of the main species and conserving the secondary ones. Failure to do this would be tantamount to incorporating only the most negative aspects of technical progress.

iv) *Diversification of natural resources.* It is clear from the foregoing that although the natural resources debate should continue to express demands for an improvement in the terms of access to world markets, it should not overlook the domestic problems regarding management of the natural heritage and natural resources.

The deterioration of natural advantages should be understood as a process which is inherent to technical progress and is constant in time. Such management should take account of the two-sided

¹² With regard to the question of water, see ECLAC, 1991a and 1992d.

nature of technical progress: on the one hand, by dealing with the changes in technological patterns which affect competitiveness, and on the other, by incorporating new knowledge in order to overcome restrictions and identify new natural potential.

The current debate should also consider the question of relative prices, in view of their influence on substitution phenomena. This would mean placing greater emphasis on the cost structure, seeking to raise productivity and diversify product uses in order to boost demand.¹³

In this respect, although technical progress promotes substitution phenomena, it also opens up alternative possibilities: for example, an increase in

the value of resources which had ceased to be competitive or could not be exploited with conventional technology, such as low-quality mineral deposits or very deep-lying mineral or oil deposits. This shows the importance of having endogenous capacity for securing greater dissemination and absorption of technical progress in order to make fuller use not only of traditional resources but also of other natural advantages such as biodiversity.

Such measures could have very favourable effects on equity, since many of the resources used in small communities could enjoy broader demand if suitable conditions were created for the assimilation of technical progress.

VI

The need for a regional initiative

Efforts to raise productivity should be of such a nature as to change relative prices and at the same time permit the absorption of the costs of environmental protection. This approach, rather than a purely commercial view, could facilitate action to further the region's legitimate demands.

The marked tendency towards the internationalization of environmental issues undoubtedly favours a convergence of interests between Latin America and the Caribbean and the developed countries. For example, the region has 42% of the total forested areas of all the developing countries (23% of the world total), and this has decisive importance for the ecological balance of our planet.

At the same time, domestic responsibilities should not be evaded, and there should be a proper awareness of the influence that endogenous management capacity could have on the world ecological balance. In this respect, the environmental emphasis has not always been accompanied by strengthening of endogenous capacity in keeping with the commitments assumed by governments. The development of such capacity should be viewed in the context of a system of management which integrates the efforts

and clearly defines the responsibilities of the public and private sectors.

Sustainability should not be viewed only in the light of aspects connected with natural capital, since this might mean giving preference to a purely conservationist approach which might run counter to the need for changing production patterns. Instead, sustainability should mean a dynamic balance among all forms of capital (natural, human, financial, cultural, etc.), which could only be attained through greater spread and incorporation of technical progress. Such a balance should reflect a dynamic synthesis which would lead to true competitiveness through the strengthening of endogenous management capacity.

In this context, it would be reasonable to call for a regional initiative, which would undoubtedly involve a big domestic effort but which should be able to secure international cooperation in the following tasks:

i) Developing endogenous capacity for identifying, evaluating, using, accounting for and protecting the natural heritage and natural resources by uniting the areas of management, regulation, control, science and technology, education and training, business skills and international negotiation within a system of management of the natural heritage and resources;

ii) Identifying the areas of management depending on market-related factors and those which call for greater State intervention, and proposing appraisal mechanisms which allow the effectiveness of public and private actions to be determined;

¹³ A typical case which illustrates these possibilities is that of the new situation of aluminium production due to the reduction in energy costs. In this case, the availability of low-cost energy sources is a more important factor than the existence of the natural resource itself.

iii) Deconcentrating and decentralizing State functions, strengthening the local and regional levels of State action, and ensuring the participation of users and non-governmental organizations in management bodies;

iv) Promoting educational and training programmes designed to gain a fuller knowledge and make better use of the natural heritage and to select technologies that will ensure sustainability and competitiveness;

v) Incorporating questions relating to the natural heritage and natural resources in multilateral negotiations.

Such an initiative will require an effort of assertion which must go beyond mere declarations, complaints or demands.

(Original: Spanish)

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APPENDIX

Latin America and the Caribbean: Natural resources at the end of the 1980s
(Approximate figures)

Resources	Magnitude	Proportion of world total (%)
1. Territory (millions of hectares)	2 054	15
2. Agricultural land (millions of hectares)	1 176	8
3. Per capita land availability (hectares)	4.4	
4. Grazing land (millions of hectares)	964	14
5. Permanent pastures (millions of hectares)	588	18
6. Forests (millions of hectares)	954	23
7. Wooded areas (millions of hectares)	1 255	24
8. Land reserves (millions of hectares)	890	
9. Flora		
a) Higher species identified	90 000	36
b) Genetic self-sufficiency		
Food crops		44
Industrial crops		28
c) Contribution to world genetic material		
Food crops		36
Industrial crops		34
10. Fauna: species identified		
a) Mammals	800	16
b) Birds	1 700	20
11. Water resources		
a) Average annual precipitation (mm)	1 500	
b) River systems (km)	124 500	
12. Potential fishery catch (millions of tons)	16-24	
13. Mineral reserves (% of total world reserves)		
Lithium		59
Copper		36
Bauxite		27
Nickel		25
Silver		25
Molybdenum		34
Bismuth		25
Iron ore		13
14. Energy reserves (TPE) ^a	68.7 x 19 ⁹	35
a) Total reserves/production (years)	134	
b) Petroleum: total reserves/production (years)	54	
c) Coal: total reserves/production (years)	600	
15. Structure of energy sources (%)		
a) Hydro-power	36	
b) Coal	27	
c) Petroleum	24	
d) Natural gas	8	
e) Others	5	
16. Petroleum reserves (millions of barrels)	123 357	12
17. Natural gas reserves (billions of cubic metres)	7 456	6
18. Coal reserves (millions of metric tons)	21 000	2
19. Geothermal energy: potential generating capacity in the 1990s (MW)	1 200	20
20. Firewood reserves (millions of TPE) ^a	1 226	
21. Solar energy reserves (millions of TPE) ^a	10	
22. Wind energy reserves (millions of TPE) ^a	7	

Source: Estimates based on data supplied by the United Nations Food and Agriculture Organization (FAO, 1988, 1992a, 1992b and 1992c); World Resources Institute, 1990-1992; Latin American Energy Organization (OLADE, 1993), and ECLAC.

^a TPE: Tons of petroleum equivalent.