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THE ENVIRONMENTAL DIMENSION IN DEVELOPMENT PLANNING

Main issues in Latin America

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SUMMARY

The efforts to incorporate the environmental dimension to development planning have originated mainly from the evidence of the growing environmental problems affecting the Region. However, from a broader and more positive approach to the environmental dimension, it is indispensable to add to mere concern over environmental deterioration some formulations that may give the chance of making the most of environmental supply by means of an adequate management.

The Latin American crisis of the last years has had some influence on the search for new development options and it is within this context that the incorporation of the environmental dimension gives planners the possibility of discovering new approaches.

However, although there is awareness of the need to increase the potential of environment, deterioration continues to be the process that generates the greatest concern. This process has been the result of, mainly, the overutilization and, in some cases, exhaustion of natural resources, the inadequate transformation of ecosystems and the wasteful use made of the environmental supply. The conflict between the short-term policies that do not incorporate this process and the long-term strategies has become more serious. Moreover, the financial difficulties of the different productive actors of the capitalist modality and the survival problems of other modalities, as is the case of peasant farmers, result in a performance that goes against environment. All this contributes to the fact that private interests in the short and even medium term, should not, in most of the cases, coincide with social interests.

Latin America is, possibly, the region with the best prospects for the

development of its environment and is, at the same time, the region undergoing its most serious financial crisis as a result of its staggering foreign debt. Latin America is a region that needs to take advantage of its vast supply of natural resources and prevent the loss of its rich natural patrimony. Moreover, the accumulation achieved in previous periods has permitted the Region to have a constructed environment that must be preserved and, hopefully, expanded.

Many of the development objectives of different countries in the Region are based on the utilization of natural resources, which implies transformations of a generally high environmental cost. Concern for the environment, if existing, does not have the necessary authority to modify the negative trends and the high environment costs of the transformation processes. For this reason, the need to incorporate the environmental dimension to the development processes of the Region is quite urgent.

The development planning systems of the Latin American countries are also undergoing a crisis. There have been important advances to try and make these systems be efficient. However, the very connotation of indicative planning that most of them possess make the results be rather feeble. Despite all this, the Region undertakes development planning either through the established systems (ministries, secretariats, planning offices) or through the decision-taking agencies of investments and basic policies (ministries of Economy, central banks, ministries of Agriculture, industries, development corporations, regional corporations).

The results obtained with the incorporation of the environmental dimension to global plans in general have not been transferred to or translated into effective policies for other levels and have become dead letter. Better results have been obtained in planning at the level of locations, areas and regions

and in sectorial planning.

The reduction of the incorporation of environment to mere impact evaluations has not been a useful criterion since it has only influenced in a very limited way some of the great transformation works, without altering the traditional processes of the development dynamics that condition the use of resources. There has been some degree of confusion between what is involved in a strategy that incorporates the environmental dimension and the use of some quantitative instruments imported from other countries.

In the relationship between development planning and environment in Latin America some aspects of the strategies and policies appear to have priority over criteria that reduce this issue to the mere perfecting of quantitative instruments. There is a misleading tendency to believe that the environmental problems will be solved by simply applying environmental impact assessments and cost-benefit analyses, whose limitations are widely acknowledged.

The possibility of incorporating the environmental dimension is centred on the adequate evaluation of the articulations of the environment and the productive process and the compatibility that may be reached between the environmental requirements and the development strategy.

In this context a real importance is assumed by the time location of the strategies to incorporate the environmental dimension, particularly, vis-a-vis the present crisis and its future projections.

The present document, which approaches the environmental issue from the perspective described above, must necessarily be introduced by considerations on the development crisis that the Region is undergoing and its consequences on the crisis of planning and environment.

The text has been divided into six chapters, each of which corresponds

to themes that must necessarily be studied in depth to look for efficient forms of incorporating the environmental dimension to planning.

The first chapter, therefore, posits which are the ways that stand a better chance of incorporation in Latin America and which are the most relevant aspects that need improving so as to contribute to the incorporation of the environmental dimension.

The second chapter analyzes the constant problem of the public institutional organization and of the present efficiency of the juridical dimension. Both approaches outline some recommendations on policies.

The third chapter analyzes how research and management of natural resources may be adequate instruments for the incorporation of environment. This chapter does not go into research methods, but presents a critical analysis of traditional methods and also suggests criteria to overcome the constraints that the planner normally has to contend with at different levels of action.

The fourth chapter goes into a subject that has been little explored in the Region and which must necessarily be used to arrive at the full understanding of the environmental dimension: the preparation of natural and cultural patrimony accounts.

The fifth chapter states the conceptual foundations considered by the methods used for environmental impact assessment.

The sixth chapter examines cost-benefit analysis and has some considerations on the premises that lead to the use of this instrument and to the constraints and limitations that it presents.

The six chapters correspond to issues that are of great interest for the Region. The first four are crucial for the incorporation of the environmental dimension to planning. The last two have been included mainly to clear up some confusion that arises from the approaches that promote their use, making them

appear as global methodologies and not with the instrumental value that is their due.

The notes and bibliographical references have been included at the end of each chapter.

I. ENVIRONMENT, CRISIS AND DEVELOPMENT PLANNING

ECLAC has assigned a great importance to the issue of interrelations between development and environment. There are two main reasons for this. The first one is that the destructive effects of development have, in turn, negative repercussions on development itself. The second one is that an adequate consideration of natural resources and the environment by the development strategies, plans and policies constitutes a rich source of opportunities for an improved social and economic development.

In relation with the first aspect, the examples are numerous and well known, in particular, such dramatic catastrophes as those of Bhopal, Cubatao, Mexico City and others which hit the headlines of the media. But there are other less striking but much deeper and serious examples. The deterioration of natural resources and of the land because of deforestation, desertification, erosion, salination and other processes of deterioration contribute to poverty, loss of productivity and rural emigration and aggravate the serious problems typical of underdevelopment.

Both in rural and in urban zones the environmental problems affect in a particular way the poorest sectors, making their precarious situation and social injustice more marked. The exhaustion of high quality non-renewable resources and the deterioration of renewable resources involve the limitation of the possibilities of future development or, at best, higher costs because it is necessary to offset the loss in natural productivity of the said resources by means of artificial energetic subsidies, which are generally imported. Moreover, it will be eventually necessary to make up for the negative effects of environmental deterioration on health and standards of living by means of

subsidies and expanded social services.

Environmental damage and the degradation of natural resources also contribute to stress the traditional external disequilibrium of Latin America. They weaken exports while, at the same time, strengthen imports because of the growing need for energy, inputs and the necessary technology to compensate for the loss in productivity of the resources. This is combined with the inexhaustible demand for imports derived from the imitation of the life styles of the developed countries, which also determines the productive structures and technological designs and patterns.

However, the issue is not restricted to environmental costs and losses, which are the topics on which most of the conservationist and environmentalist literature centres. The ecological approach also opens up an immense fan of opportunities for a better development modality based on an alternative and more rational growth style and on a more intelligent, equitable and endurable exploitation of environment. There are enormous possibilities of extending the utilization potential of resources by means of structural and institutional reforms that may facilitate the access of vast social sectors to natural resources that have been wasted or ignored. It is possible to create and develop "new" resources by means of the transformation of the environment into productive resources by means of scientific and technological research on the potentiality that an adequate management of environmental supply involves. Natural resources are not static geographical data. They are created by society to the extent that it decides and knows how to prospect and use them. Because of the bias of our dependent and imitative development, we have not been creative enough both to avoid waste and to optimize the utilization of our own resources. Our scientific and technological development has not given priority either to the defence of environmental resources or to their adequate management. It has

not devoted efforts to the identification of ignored or discarded resources, or to improve efficiency in the use of raw materials or energy, or their conservation, or even less, the use of waste and residues, all of which may be important potential contributions to development.

Another contribution that the consideration of the environmental dimension may offer for development is the integral utilization of the resources created by sectorial activities, particularly, in the case of large investment projects. The sectorial specialization of public administration, professional disciplines, credit institutions and planning has generated parallel activities that ignore the others, with a great many wasted opportunities for support and complementation in the use of the multiple positive external economies created by these activities and these large projects.

Our approach, therefore, aims at striking the right balance between the positive and the negative aspects present in the development - environment interaction. Traditionally, the environmental issue used to stress only the problems of pollution, erosion, deforestation and deterioration of ecocystems. It is not that these problems are not important or even grave. However, in this work we have wanted to explicitly stress the fact that the wise management of the environment also permits to obtain a series of positive interconnected benefits. Thus, for example, when we protect a forest, we not only ensure supply of wood and lumber and preserve the wild flora and fauna, but we prevent the loss of land, lengthen the useful life of dams, reduce the risk of floods and retain the carbon that would otherwise to to increase the carbon of the atmosphere.

This is not all. We would not fit into the intellectual tradition of ECLAC if we did not also stress the transcendental international aspect involved in the environmental issue. In this way, we have also tried to emphasize the

interrelations between the national environmental systems and the transnational systems of trade, finance, investment and communications, which are becoming more and more conflictive because of the economic crisis and the overwhelming foreign debt that exaggerate the divergencies of needs, interests and power between countries and groups.

Although we have assigned a leading causal role to the characteristics of the development style, there is in our approach a topic that may not be ignored: population growth. We do not however accept the neo-Malthusian ideas that prevail in such a widespread way, particularly in the North, on this matter. It is not that we ignore the importance of the problem of demographic pressure and growth - which is undeniable - but we believe that it is not possible to treat population growth as an dependent variable that determines environmental problems. Our position is, on the contrary, that the demographic process itself is a variable that depends on the economic and socio-cultural conditions.

This does not ignore the localized existence of excessive demographic pressure, generally sharpened by institutional conditions that restrict access to the land and which determines migration flows towards urban or "colonization" zones and rural marginality. This is one of the reasons why we have studied the peasant economies in the Andean human settlements of Bolivia, Ecuador and Peru. The expansion of the agricultural frontier has been another concern of ours, partly because of the same reason, since we think that a large part of our farming reserves are in tropical or arid or semi-arid zones and this implies severe environmental restrictions. Another theme partly derived from the same concern is that of urbanization and, more particularly, the very serious problem of metropolization.

All the above serves to illustrate in a concrete way the nature of the environment - development dialectics. This has not been adequately formulated

either from the viewpoint of environment or from the viewpoint of development. The latter has carried on as if the destruction and exhaustion of natural resources did not have present and future costs and the former has not acknowledged the inevitability of the transformation of nature. The crucial issue is that the action of development involves an ecologic transformation with present and future costs and that the defence a outrance of the conservation of natural resources and ecosystems also implies present and future costs in terms of the potential goods and services to be obtained from them. On the basis of this mutual acknowledgement of potential costs and benefits it should be possible to strike a balance or reach a compromise to consciously balance present and future social costs and benefits and to originate development policies that will respect, as far as reasonably possible, such ecologic considerations and environmental policies as may also respect, within reason, the demands of development.

As a matter of fact, what society should internalize is that the development process implies the change of natural environment into constructed environment and that the operation of the latter demands the permanent use and extraction of matter and energy from the former. This transformation results in socially desired goods and services, which improve the level of life in certain aspects, but which may simultaneously imply the deterioration and exhaustion of the environmental patrimony and of natural resources, with negative results on other aspects of quality of life, productivity and conservation of the environment which, in general have regressive social effects.

These negative effects may be minimized and the positive effects may be maximized. This requires the creative adoption of technological alternatives, location, scale, organization forms, patterns of production and consumption and of progressive policies vis-a-vis income, employment and access to productive

resources that may set a limit to, mitigate and reduce the pressure on natural resources and the environment. On the other hand, the natural resources patrimony has a dynamic potentiality whose acknowledgment and utilization depends on its better scientific knowledge, a greater technological creativity and a smoother and more equitable access. What is needed, therefore, is the full incorporation of an institutional environmental and resources management to the development strategies and actions in order to minimize the deterioration and exhaustion of the environmental capital, which may replace, maintain, expand and complement resources through the accumulation of scientific knowledge and reproductive capital. In this way, the global, natural and constructed environmental patrimony may grow in a cumulative way and may become a more and more ample and diversified base to reach improved levels of living, production and productivity.

The analysis of the dialectic interrelations between development and environment has finally led us to a conception that originates the fundamental elements of a development strategy which is tenable from the environmental viewpoint.

These guidelines for a tenable development strategy do not, however include the necessary analysis of the basic socio-economic, political and cultural forces that move development and which, therefore, condition the way in which development interacts with environment. These forces are fundamental because they regulate the consumption and technology dynamics, have an influence on demographic mobility and occupation of space, contribute to determine the location, size and concentration of investments and the international linkages with all these matters and move to action on the part of the State and the other social actors.

The policies orientated to attain an environmental action which is compatible

and compliant with the ecological laws do not merely depend on the will to apply these policies and their corresponding norms, but on the much harder task of channelling these social and political forces, so that they may operate governed by criteria other than the ones prevailing. The issue is not, therefore, to adopt an attitude of willingness in order to persuade individuals, entrepreneurs and public officials to respect the environment. It is necessary to create this type of awareness, but little would be accomplished by this if it is not possible to modify the criteria underlying the entrepreneurial and public rationales, the systems of values, the economic and social structures, the orientations of technology, the institutional organization and the legal regulations. This is not impossible, as demonstrated by history. However, it is a much harder, more difficult and longer term task, because its roots are in the very rules of contemporary - especially, capitalist-society, particularly, in its underdeveloped and peripheral version.

This society, however, is not static. Despite the relative stability and permanence of the social, power, values and technological structures, they have their own - somewhat troubled - dynamics nowadays. The generational structures and relations are being modified, there are strong migratory currents and new forms of couple and family relations. The values, forms of behaviour, tastes and habits are changing, strongly influenced by the transnationalization of mass media and the generalization of education. The wide margins of unemployment - particularly in the young; the situation of urban massification and growing urban insecurity, particularly with the presence of emerging and multiple demands from the until now relegated popular mass; the decline of long-established ideologies. Also, the challenge to and rejection of the bureaucratization and de-humanization of the social institutions have also contributed to shake these structures.

Something similar occurs with the generalized discredit and disaster of military régimes and the return of democratic experiments and with the bold and shameless resort to the use of force and repression in national and international social relations. The same may be said of the substantial technological transformations taking place or being applied in the fields of communications, computing, robots, electronics and genetic engineering, as well as in environmental problems proper, global, regional and local availability of natural resources of all kinds, made more dramatic by the energy crisis, the urban crisis, industrial disasters, pollution, deterioration of critical ecosystems, desertification, and other well known processes.

All these and other long and medium term phenomena which need not be listed here have been dramatically and overwhelmingly combined with the economic crisis that has been afflicting the Latin American countries in recent years.

The imitative development policies adopted in the last decades and the excessive foreign indebtedness of the late seventies created conditions of extreme dependence and vulnerability in our countries. The outbreak of the economic and financial crisis in 1984 demanded serious adjustments of the recessive type, which became more severe through the joint action of the great international banks and the International Monetary Fund. Their adjustment programmes materialized into strong monetary and financial restrictions and reduction of public spending, which resulted in a fall in the income and expenditure of the private sector. The contraction affected investments and, above all, construction, in a particular way. This, in turn, made unemployment and underemployment more acute and contributed to the fall of real income and wages of all the people and, especially, of the lowest income segments. This has produced the suspension of payments for public services (water, sewerage, garbage collection, electricity, fuel, telephones), as well as delays in the

payment of rents and mortgage loans. The payment of taxes and state and municipal rates is also long outstanding. All this aggravates the fiscal deficit which, in turn, forces the reduction of public spending: an authentic recessive vicious circle.

Despite a feeble recovery of the Latin American economies in 1984, the Region is still sunk in the worst economic crisis it has undergone since 1930. The per capita GDP in Latin America in 1984 was similar to that already reached eight years ago, in 1976. The magnitude of open urban unemployment has grown between 1979 and 1984 in an ostensive way in all the countries on which there is information. Another phenomenon that strikes the urban population, particularly, the wage earning, unemployed and marginal sectors is inflation, which reached hyperinflation proportions in several countries and accelerated markedly in almost all the others.

As a consequence of all this, real salaries have experienced a setback and correspond to those of one and a half decades ago. There has also been an appalling deterioration in food, health and housing conditions as a result of the phenomena mentioned above and the drastic reductions in investments and basic social spending.

The present economic crisis has been compared, because of its depth and extension to the Great Depression of 1929-32. However, there is a basic difference. The Great Depression took place in primitive and rural societies, whereas the present crisis is affecting relatively modern and urban societies, which are characterized by a concentration of metropolitan population and of economic and socio-political activity. Therefore, the severe tensions and conflicts typical of the Latin American scene in the last years should come as no surprise.

Despite the appalling economic, social and political cost of the crisis in almost all the Latin American countries, it seems as if there still is no full awareness of the dramatic present situation. In fact, there seems to persist some kind of mental inertia to continue riding high on the exceptional period of the 50's and 60's and the financial "boom" of the 70's.

What happens is that people still hopefully believe that the crisis will soon be over and that we shall soon be back to yesteryear's normal. However, the real prospects do not correspond at all with these expectations. The deterioration of the long term growth conditions of the central economies and of the international economy is such that it is unrealistic to expect that in the remainder of the century it may be possible to return to the expansion rates prevailing in the post-war decades. The position of the international economy vis-a-vis trade, investment and financement is not optimistic either. And, above all, there is the enormous and still growing burden of the foreign debt, whose repayment jeopardizes in a severe way even the possibility of a minimal growth of our economies. The most optimistic projections barely offer grounds to foresee the recovery of the pre-crisis levels of economic activity by the end of the decade.

It is necessary to consider the indebtedness crisis within this context. And to emphasize its gravity, it is also necessary to bear in mind that this crisis has been the culmination of several decades of exceptionally favourable economic growth, of a great abundance of domestic and external, public and private financial resources and of important investment and spending, particularly in the urban areas and, within these, in the metropolitan areas. What hope is there for the future, when the crisis and the problems of unemployment, poverty and inequality - particularly urban inequality - may become more serious if the public and private, domestic and external resources will probably remain unchanged

at, approximately, the present low levels, with no prospects of growth and, what is more likely, with additional restrictions?

We can infer from this that the future situation will be characterized by a smaller growth than in the past, minimal external financment, marked demands for expanding exports, the urgent need to substitute imports, a drastic initial reduction and small further growth of consumption, the need to guarantee the satisfaction of the basic needs of the popular sectors and by severe limitations to the expansion of public spending.

Consequently, the Latin American countries will now be inevitably forced to face the structural crisis of their development, which was already being felt by 1970, but which they were able to put off thanks to the very special financial circumstances prevailing during the seventies. This is the main reason - apart from the very serious social injustices and the severe political tensions - why the short-term adjustment policies will not prove to be a solution. They assume that once the adjustment takes place it will be possible to return to normal. This seems to be a fallacy. The successive adjustments, particularly, with respect to the new international conditions, will lead not to normality but to a new encounter with a long-standing structural crisis, which has become more serious because of the policies that attempted to dodge it for one and a half decades and which has been aggravated even more by the present recessive policies.

In terms of the traumatic experiences of the recent past and the somber prospects for the near future, the main issues around which the Region revolves at this critical moment in history are the debt, the crisis, the appalling social cost of and unduly prolonged recessive adjustment and the need to change this for an expansive adjustment that may also become a transition towards some kind of development that will consolidate democracy and may prove to be tenable in the

medium and long term.

The environmental-ecologic approach, with its stress on the natural and man-made social patrimony, its medium and long term perspective and its approach to a tenable development based, on the one hand, on an austere style with alternative proposals vis-a-vis demand for resources and, on the other hand, on an ecologically rational and integrated management of the patrimonies and the accrued natural and social assets may offer a very interesting conceptual and practical contribution.

It is necessary for this to begin by differentiating between short term flows and patrimonies, assets, stocks or inventories acquired and accumulated in the long term. Within the latter we can distinguish three categories: the socio-cultural patrimony (population and its demographic characteristics, traditions and values, level of education, institutional organization, ideological currents and political systems and régimes); the natural patrimony (the territory, its ecosystemic characteristics and its actual and potential availability of renewable and non-renewable natural resources); and the fixed capital patrimony (installed and accumulated productive capacity and infrastructure or constructed and artificialized environment). Needless to say, these are only extended versions of the classic factors of production: labour, land and capital.

Although this is basically a political economy approach, it has the advantage of bridging the gap between socio-cultural and political issues, spatial-environmental issues and accumulated productive capacity. Because of this, it also acts as a bridge between the evolution of medium and long term flows and annual flows. The latter have to do mainly with short term macroeconomic equilibriums, be they fiscal, monetary, external, employment and income, and their sociopolitical implications and conditioning. Thus, for example, the serious negative external disequilibrium of financial inflows and outflows of

foreign exchange places a severe limitation on imports and produces a considerable underutilization of the accrued potential vis-a-vis the socio-cultural and natural patrimonies and productive capacity. This means that there is a considerable potential of real resources to mobilized (cultural, organization and national resources) to the extent that this mobilization may be made to depend in a minimal way on imported inputs.

This conception may also help to clarify the issue of the transition from a recessive adjustment to an expansive adjustment and transition towards development. A recessive adjustment consists mainly in the manipulation of the short-term economic policy instruments directed to restricting the global demand by cutting public expenses, reducing investments, applying cuts to income, restraining monetary growth and devaluing. All this is done with the purpose of reducing imports but has serious effects on accumulation, production, wages, employment and use of accrued social patrimonies. The expansive adjustment, rather than solely stress the restriction of demand and imports should combine a restrictive selective policy for demand and a selective policy for the expansion of supply, making the most of these idle productive patrimonies. The idea is to change the composition of both aiming at their reciprocal adjustment.

What is suggested is a first stage that would attempt to use these available idle sociocultural, natural and capital potentials, and a second stage - to be undertaken in the medium or longer term - for the application of investment, institutional and sociocultural policies orientated to changing the deep-rooted style of the dependent and polarized structure of these social, natural and capital patrimonies. Whereas a recessive demand policy relies on the market to impose selectivity, with the resulting well-known regressive effects given the income and power structure, a combined policy of selective restriction of demand and selective expansion of supply would have to make ample use of state

planning and intervention. This raises the whole issue of the State, its effectiveness and representativeness, but also provides the bases for a democratic political concert to the extent that the costs and benefits of the said selectivity are equitably distributed.

There is a mass of knowledge, experiences and proposals of a macroeconomic and sociopolitical nature, as well as more detailed knowledge of the sectorial type and of specific programmes. All of this justifies to attempt the formulation of concrete proposals for a reactivating adjustment through the available battery of selective measures and programmes. These, which are social, urban, rural and productive programmes for the large, medium and small scale enterprise and informal activities have a stress on mitigating poverty, give employment, generate exports, substitute imports and satisfy both basic needs and the respective macroeconomic programme with its selective components of demand, taxation and public spending aspects, credits, subsidies and suitable policies for the whole of the vast public sector.

Among the measures, the following are worth noting: labour-intensive employment programmes for housing, sanitation works, infrastructure and installation of communal facilities in popular settlements, construction and maintenance of the roads infrastructure, public works and human settlements in general, defence against floods and other natural catastrophes, reforestation, building of terraces in erosion-prone areas, cleaning and protection of rivers and canals, drainage and irrigation works, incorporation of new land, repair and maintenance of public buildings, machinery and equipment and other productive activities. Similarly, it may be possible to consider policies to stimulate savings and substitute fuels and other inputs whose cost is high.

On the other hand, it may be possible to consider the alternatives advocated by different groups, which have different approaches with respect to integrated

productive systems, combined technologies, ecological development, etc., centred on production aiming at the satisfaction of basic needs through the utilization of know-how, labour, natural resources, waste and residues, which may be combined with other techniques.

These activities are very suitable for fostering massive employment and organization of labour at a low cost and it is for this reason that they should be resorted to in the present situation. However, at the same time, they imply a criticism of the prevailing development style in that they revalue the labour process orientated to the satisfaction of basic needs and to a greater dynamism of the workforce and other underused potentialities, making a more reduced use of scarce factors such as capital and foreign exchange. Furthermore, because of the multiple links between these activities and specific geographical factors, daily experience, local knowledge and culture, ecosystemic relations, long term prospects and demands of scientific and technological development, they may become the "carriers" of a new development style and a more vigorous and open cultural identity.

These possibilities are not susceptible of automatic realization. On the contrary: there is a tendency to adopt this type of measures within the framework of emergency. It is crucial, therefore, to use this period of crisis that began in 1982 to identify and promote these activities and, above all, to foster such conditions as may produce a more permanent and widespread re-orientation of the labour process and to make the multiple links mentioned above become more easily perceived and valued.

These are, in most of the cases, activities related to collective consumption or productive infrastructure which do not generally appeal to the private sector. The reasons for this are varied. They may be investments involving long term profitability; these activities generally favour the low-income and reduced

effective demand sectors, or they may involve the creation of external economies or avoid external diseconomies that the private investor is not capable of capturing. In other words, these are tasks and activities that normally fall within the sphere of the responsibilities of the public sector.

Another principal characteristic of these works, activities and projects is their local geographical specificity. Both the issues of unemployment and of conservation, protection and improvement of the environment only make sense when they are related to concrete locations in space and not when they are considered in abstract terms. This is, therefore, a public activity area which is particularly suitable for decentralization and participation of the community; they are priority issues of a particular interest in the search for democratic planning and decision systems. Although the crisis may have triggered a movement of this kind, the fact that these are systematically unsatisfied basic needs suggests that it is important to consider that these programmes may provide the chance to create suitably institutionalized and financed permanent programmes and activities.

A priority area for adjustment and reorientation, which was mentioned above, is the area related to consumption and investment patterns and also to guidelines on technological matters. It will be necessary to apply severe and selective restrictions - save for justified cases - to any type of demand that may directly or indirectly imply a large component of imports or on any technology or design with the same demands. The idea would be to promote the substitution of imports for goods, services, technologies and designs that rely on the use of national and local material and human resources.

All the guidelines that have been suggested will imply a greater pressure on the environment. The expansion, conservation, care and protection of the environmental patrimony is, therefore, a fundamental contribution to improve

the standards of living and productivity levels. This necessarily involves a greater knowledge of the environmental potentiality, of the ecosystemic factors that condition exploitation and of the most efficient management forms in order to make the most of the chances offered but, at the same time, prevent its deterioration and exhaustion and preserve its long term sustentation capability. All this hints at the need for giving priority attention in all future strategies to the issues of natural resources and technology, considered from a long term ecological perspective in order to incorporate fully the issue of the material tenability of development. The criteria to be used will have to stress the central objectives of raising the standards of living of the lower income strata and of overcoming the severe external disequilibrium and dependence.

The emphasis on the exploitation of the Region's own resources implies a greater differentiation between the Latin American countries and within each individual country than in the past. It requires that the development strategies should modify their exaggerated level of abstraction and consider, in a concrete way, the supply of natural resources and technology, the size and location of the country, the relation between population and resources, the energy situation and the degree and characteristics of urbanization. This means that the new development strategies will have to be different in the countries that show marked differences in terms of the aforementioned aspects. It also means that when these strategies are applied to any given country, they will have to favour the consideration of regional and spatial aspects (including the urban-rural issue), since each country is a unique heterogeneous kaleidoscope of environmental conditioning factors. For example, the Andean, tropical, island, coastline and other ecosystems that form part of the different countries constitute resources with very dissimilar capabilities and types of exploitation and they, therefore,

imply different technologies with varying degrees of knowledge and applicability.

The international crisis has once again revived the issue of integration and regional cooperation. The exploitation of the great potential resources of Latin America by means of an adequate environmental management in view of the danger involved in the use of some resource whose ecosystemic behaviour is not well known should be an important tool to revive regional cooperation. The joint, coordinated and long-term tenable exploitation of areas such as the River Plate Basin, the Amazon Basin, the Caribbean, the maritime zones and coastline of the Pacific and the Atlantic and Patagonia constitutes an enormous potential in terms of agriculture, forestry, energy, mining and fluvial and maritime transport.

This stress on the use of the countries' own resources originates great opportunities but also great risks. It is for this that it is necessary to incorporate the environmental dimension to development strategies and planning. This means to encourage the awareness and operational capability on the part of planners, their technical instruments and the institutional organization of planning at all levels whatsoever to consider the natural and constructed resources and their ecosystemic characteristics as scarce resources whose use may be optional, which are susceptible of expansion, renovation, deterioration and/or exhaustion depending on the treatment they get, and which are interrelated in multiple and complex ways with other resources and with human activities.

The planning methodology generally adopted in Latin America has paid little attention to the considerations listed above, mainly due to the fact that, like the development strategies themselves, it has been strongly influenced by a style that is based, mainly, on the imitation of the development patterns of the industrialized countries.

The institutions and groups responsible for the environment and environmental

action should therefore aim at an influential presence in the process of conception, generation, design, evaluation and implementation of the development plans, programmes, projects and policies.

One of the lines of strategic priority for future environmental action should be the incorporation of environmental institutions and aspects to planning and development policies, in keeping with the institutional characteristics of each country. To meet this target it will probably be necessary to bring about institutional and legal modifications. Because of this, it would be advisable to revise the characteristics of the present environmental institutions so that they may reach this type of objectives.

For any action of this kind to be possible, it is indispensable that the consideration of the environment should be present in all the centres that generate and adopt decisions. This will not be possible if the environmental perspective continues to have a peripheral position, excluded from the main decision-taking centres where the crucial decisions - which are, inevitably, the priority issues - are made.

Another constraint for coordination is the fact that the economic policy belongs in the sphere of the economists and public administrators of the Ministries of Finance and Economy, whereas environmental planning and management are generally handled by planning ministries and autonomous State corporations responsible for energy, natural resources, public works, regional and urban development, education, science and technology. This problem is a fundamental part of a solution of the institutional type.

We shall make one final comment with regard to the distinction between short and long term policies, because of its importance for tackling recession and the structural crisis. Long term policies i.e., those that impinge on conservation of the environment, natural resources, population, education, science

and technology, international relations or forms of social organization, appear to bear no relation to short term problems. However, as has been pointed out, they offer the chance to contribute to the solution of some of these problems as, for example, job creation, development of new exports and possibilities for the substitution of imports. Conversely, the contingency policies formulated to react against recession may be designed to preserve and improve social structures and patrimony and natural resources in the long term.

II. WAYS OF INCORPORATING THE ENVIRONMENTAL DIMENSION INTO PLANNING

1. The environmental dimension into planning approached from different conceptions on the relation between development and environment.

The incorporation of the environmental issue to the systems of global planning has been extensively dealt with, above all, starting from existing conceptions on the relation between development and environment. In the last years, a large number of studies have aimed at analyzing and interpreting this relationship. Many researchers state that the concern for the issue of ecology is quite recent as a result of the environmental crisis that the Region is undergoing. 1/ However, it has existed from old. It is highly likely that the sectors in power and the decision-taking centres may have picked up the prevailing concern because they themselves may feel threatened. It is undeniable that the discussion centred on demographic growth and availability of natural resources has stirred up more attention than the gradual deterioration of nature or, even, the problems of environmental pollution. The political crisis that this problem implies generated a large number of studies in the whole world and in Latin America. 2/ It may well be that many of these studies resulting from evidence of the effects in other parts of the world may have served to understand the environmental issue in the Region.

The lack of response and the scarce or non-existent treatment of the problem of environment by the classical and neo-classical economic theories were the reasons why, in the seventies, some people were moved to question these theories and others to posit some additions and modifications. The studies centred on raising objections - from an environmental viewpoint - to the tenets on the advantages of the market as the organizer of an efficient economy and also as a tool for the perception of environmental problems. 3/

These criticisms made it possible to draw the following conclusions, which are basic in relation to the efforts to incorporate the environmental dimension

to planning:

i) The Paretian optimum proposed by the neo-classical school does not necessarily equate the environmental optimum, which is a basic condition to understand the rationale applied by the policy-makers to the use of resources. 4/

ii) Many of the environmental changes exceeding the limits of reversibility are not necessarily accompanied by the corresponding economic manifestations. 5/

iii) The chance of solving the environmental problems through bilateral negotiation (Coase theorem) is questioned. 6/

The objections to the classical and neo-classical theories mentioned above originated from the same current trends of innovating thought, which were trying to make up for their shortcomings. Some authors posited that the property systems condition the use of resources and are, therefore, the basic cause of environmental problems. 7/

The Marxist tenets, although not explicitly acknowledging the importance of the environmental problems, since they centre their analyses on the social and political considerations of the economy, have the merit of differentiating carefully between the various production modalities and, therefore, point to the analysis of the rationale underlying the different systems for the use of resources, derived from different technical and social relations. Moreover, their elaborate planning systems may more easily come up with alternatives for the incorporation of the environmental dimension. All this notwithstanding, the various styles within the socialist system open up the field for a series of queries on the different solutions adopted vis-a-vis environmental problems and actions. 8/

Together with the critical appraisal of the economic theories and the taking up of positions of the economists vis-a-vis the challenges posed, there have appeared some integrative or holistic approaches that try to interpret the

development prospects in an integral way yet, at the same time, giving priority to the consideration of the planet as an ecosystem and pointing out the physical constraints that may affect the development process. An instance of this is the report prepared by the Massachusetts Institute of Technology 9/ for the Club of Rome, which was an important contribution to the debate on planning world development with zero population growth and a reduction of economic growth. The Latin American response to this position was that of the Fundación Bariloche World Model which points out the need for re-distributive strategies orientated to the satisfaction of basic needs rather than to the setting up of physical limits. 10/ To these propositions it is necessary to add a series of studies derived from neo-Malthusian positions. 11/ The global approaches centred on the controversial limitations to growth restricted themselves to an energetic approach, defining flows and transformations in terms of energy and presenting unidimensional analyses of energy balances.

Other analyses explore the causes of environmental problems, relating them to technology, social organization and economic structures. 13/ These analyses have originated the differentiated interpretations applicable to developed and underdeveloped countries 14/. The Founex report prepared for the United Nations Conference on the Human Environment introduces the concept of human environment. This concept is developed further to associate it in a well-defined way with the development strategies. 15/

In Latin America, the efforts to incorporate the environmental dimension to development are complemented with the introduction of the concept of development styles from the performance of which it is possible to derive the varying status of environment. 16/

All these tenets, positions, interpretations and studies make it possible

to draw some conclusions that should contribute to the greater degree of coherence between the planning systems and the environmental dimension. Their use as a frame of reference may save the planning experts the duplication of the learning efforts to be made if this information bank did not exist. The main conclusions are:

i) The market is not an adequate mechanism to perceive the environmental aspects of development or, at best, if there is perception, it suffers from limitations and clear time-lags.

ii) It is not possible to assign the same level in the hierarchy to physical, ecological, political, social or economic laws. It is easy to understand that the socio-political sciences cannot alter the fundamental physical laws. However, the situation is not quite as clear in the case of the complex ecological laws. It is important to understand these laws and how they work in order to understand their position in the hierarchy with respect to the socio-political laws. However, naturally, this should not be read as doing away with the study of the interaction between society and nature.

iii) The new requirements of resources and space do not necessarily have to have an automatic technological answer. Society is sometimes unable to give a technological solution to many of the problems confronting it. For this reason, no "optimistic" forecasts should be made based on the myth of man's reaction capability lest mankind may run the risk of an irreversible catastrophe.

iv) The Latin American countries must approach their environmental action with different priorities from those of the developing countries. The adoption of technological development may be coherent with the global development objectives.

v) Ecosystems have a limited, sustentation capability, which, if stressed beyond a certain point, may bring about the deterioration of the whole system.

Economic growth tends to exceed the limits of this sustentation capability. This concept is of interest as a variable to be considered for the interpretation of economic and social development, above all, with regard to the time it takes to reach or exceed the tolerable limit. This fact stresses the importance of long-term planning from the environmental point of view.

vi) The sustentation capability is not a rigid concept related exclusively to the limits of the supply of resources or, in other words, to the physical environment supply. The socio-cultural capacity permits the modification of the sustentation capability. For this reason, environmental action understood as the intelligent interaction of the physical environmental supply and the socio-cultural capacity would facilitate the positive transformation of nature and, consequently, the modification of the sustentation capability.

vii) There is a marked time-lag between the economic target periods of the producers and the ecological target periods of environment. This is particularly relevant for the analysis of the different rationales applied by the different types of producers.

2. Environment in development planning in Latin America.

The immediate challenges of economic growth have hindered the effective incorporation of the environmental dimension to development planning in Latin America. Despite the awareness of the conflicts generated, it is necessary to go into the analysis of the basic conceptions of planning and, then, to consider how planning is approached in Latin America.

The degree of planning at a given moment can be defined by the existence and relative weight of a series of elements conforming both a planning system and a planning process. ^{17/} This assumes, apart from having an agent (either

an individual or groups of individuals), having an agency or institutional system an a formal procedure; having the subject of planning clearly defined; a project for change, and a system of priorities and allocation of resources other than the one operating in the market.

This is the main problem that the experts must sort out when trying to take the environmental dimension into account.

In the first place, it frequently happens in Latin American planning that the subject of planning is not very clearly identified because of the lack of complete knowledge of the structures and processes involved in it. The ignorance of the behaviour and characteristics of the ecosystem of the Region is combined with some gaps in the substantive knowledge of the social and economic structures.

In the second place, many planning systems, given the little decision-taking power and/or influence of the planning agents set up objectives that are the mere prolongation of the trends that have been verified. In other words, there is no explicit statement of a target-image that may involve a change in the inertia of development.

This poses a crucial problem: when the incorporation of the environmental dimension clashes with prevailing trends, the usual thing is to follow the trend. The planning agents considered by this document refer to formal institutional planning. This is also valid for other planning agents operating in other sectors such as economy ministries, development corporations, etc.

In the third place, given the problems posed by the subject of planning and its objective, it is safe to assume that the system of priorities and allocation of resources will not be clearly defined either.

3. Environment and regional planning

Regional planning seems to be one of the main alternatives to be resorted to,

to achieve a greater degree of incorporation of the environmental dimension to development planning. As Boisier puts it "The development of a region, as a phenomenon distinct from mere growth, implies the capacity to regionally internalize its own growth. In purely economic jargon this is equivalent to retain and reinvest a significant proportion of the surplus generated by economic growth in the region itself." 18/ It is in connexion with this problem that the incorporation of the environmental dimension may become a crucial tool to make sectorial planning perform its allocation, compensation and activation functions in an effective way.

One first aspect that the Region must master is the actual and wider knowledge of its own environment. It is generally the case in Latin America that the evaluation of natural resources is, on the whole, performed by centralized bodies, be they specialized or sectorial. 19/ It is these bodies that handle the information that may be transferred to other centralized bodies. This fact has not, to date, been assigned due importance. The limited handling of information on the part of the regions themselves, particularly with respect to their resource potential, can be a contributory factor to preventing certain exogenous variables that condition growth from becoming endogenous. It is, therefore, the centre, that decides when and how to use the "national resources" and the only option open to the Region is to negotiate the investment priorities with respect to other regions.

As a matter of fact, the lack of complete information on the prospects and restrictions of the Region's natural resources hamper the thorough evaluation of the regional impact of some of the most significant macroeconomic and sectorial policies. If the impact is negative - a very common situation in the case of environment - the lack of information may prevent having the necessary evidence to negotiate with the centre. For example, when important plans for the exploitation

of forestry areas are centrally stipulated, the Region could be in a better negotiating position if it had a thorough knowledge of the behaviour and characteristics of the ecosystems affected.

But where the environmental issue may really contribute to the allocation and compensation functions of the regional planners is in terms of the dimension, type of programmes and projects for the exploitation of natural resources.

The dimension of programmes and projects has got to do with the possibility of making the national ones stand up to the regional. The advantages derived from the economies of scale associated to the adoption of imported technologies, generate the tendency to undertake large investments or macroprojects centrally designed and managed. The fact that they are considered as "national" reduces the Region's negotiation chances. On the other hand, and this is a crucial issue, the choice of a national project eliminates the alternative options of a larger number of "regional projects" which would give the Region a better negotiation position. The latter type of project generally assigns a higher priority to local considerations and, because of this, the human environment is likely to improve.

On the other hand, the type of projects for the utilization of natural resources associated to their dimension has a marked influence on the chances of attracting surpluses and on the economic recovery of the Region. The Region may stand a better chance of attracting resources by means of holding on to the physical production generated by the projects. Thus, for example, a large hydro-electric plant may easily extract its physical production through its incorporation to the interconnected energy systems. If the Region has no negotiating power, growth, in terms of generated product, will have no correlation with local development. But an investment that prioritizes irrigation will obviously permit the local utilization of production. Although it is possible

to divert the water to other regions by means of canals, it is most likely that the utilization of the production will be regional. This does discard the indirect appropriation of surpluses via marketing structure or in some other way. However, this problem is present in any type of investment.

It may be said that the retention of the physical production is one of the few courses of action open to the regional agents to gain an advantage, or at least, a reasonably equitable share of what remains in the Region with respect of what gets sent to the centre.

There is no complete agreement in this respect. Haddad says that it is precisely the national projects that facilitate negotiation. At all events, opposing points of view open up the possibility of an ample debate

4. Environment and sectorial planning

Since the origins of planning in Latin America the environmental dimension has been in fact incorporated to a greater or lesser extent to it in such traditional sectors as agriculture, mining, health, housing, etc. There is, however, a tendency to create a new sector involved in the environmental issue in terms of the problems of the environment. There is no doubt that a solution of this type may contribute, in the medium and long term, to exclude the environmental dimension from development planning. 21/ The main arguments against promoting an "environmental sectorial" treatment will be dealt with in the corresponding chapter.

The fact of not favouring an "environmental sector" does not imply the rejection of environmental planning and, specifically, policies and lines of environmental action. Some studies tend to present a dichotomy between the positions advocating the global incorporation of the environmental dimension to planning and environmental planning. However, the analysis of the status

of environment in the Region shows in a clear way the need for systematic action. On the one hand it seems that the incorporation of the environmental issue is far from being fully attained. This has created gaps that tend to be bridged through the environmental policies and lines of action by means of traditional plans and sectorial agencies. On the other hand, the Latin American environmental situation is so urgent that, leaving aside what can be done through adequate environmental action, it is indispensable to take a series of environmental measures because of the pressing need to solve the more and more serious problems that arise. Needless to say, many of these measures appear, therefore, as a result of ad hoc environmental policies.

And this leads to the analysis of the existing relation between environment and traditional sectorial planning. The study of the situation in Latin America permits to draw the conclusion that the incorporation of the environmental dimension to planning is carried out in most of the cases through sectorial planning, be it national or regional. It is necessary to be aware of the fact that the creation of autonomous environmental institutions to deal with the implementation of policies does not necessarily imply a break away from the sectorial sphere since the said institutions may clearly correspond to the functions of a given sector.

The sectors that have to deal directly with the production of natural resources have, in fact, incorporated environmental action to their planning.

The planning of the agricultural or forestry-farming sector must be carried out in terms of the performance and characteristics of the live ecosystem and its degree of artificialization. This is possibly one of the sectors where any policy or line of action has repercussions on the treatment given to resources and, therefore, impinges on the ecological costs involved in transformation. However, when the environmental planning of the environmental sector is proposed

in Latin America, it is associated, on the whole with the prevention of erosion and with the problem of soil and water pollution mainly by pesticides. As the problem is much more complex, it is necessary to point out the following aspects:

- i) The complexity of the production modalities prevailing in agriculture as a result of the structure of tenure of resources and of cultural, social and economic patterns;
- ii) The introduction of technological models that favour the maximum artificialization of ecosystems, failing to take advantage of the environmental supply and conditioning agricultural development to the energetic subsidies that artificialization requires;
- iii) The specialization of the ecosystem in a way that is incompatible with natural aptitude as a result, mainly, of action by the international and national purchasing powers;
- iv) Social problems of rural poverty that encourage, in many cases, the overuse of the environment;
- v) Competitiveness in the use of the soil by the food, energy and industrial sectors and also with relation to urban sprawl.
- vi) Marked divorce between the short-term economic performance and the conservation of resources.

Among the sectors engaged in secondary activities, it is an evident fact that the industrial sector has a real importance with respect to the relation between planning and environment. On the one hand, it is closely connected with demand for the resources of the primary sectors and, on the other hand, the generation of industrial waste creates pollution problems which, in turn, result in a series of environmental policies for the prevention or solution

of these problems.

In the ecosystems of the sea, the situation is similar to that of agriculture. The exploitation of the renewable natural resources of the sea has a high ecological cost, which is aggravated by the scanty knowledge of the behaviour of ecosystems and, above all, because of the difficulty of programming efficient control measures.

To all these problems it is necessary to add two aspects that are not easy to plan: the control of the alterations produced by the dumping of man-made waste into the sea and the pollution produced by oil slicks and by the exploitation of other non-renewable resources from the bottom of the sea. All this leads to the conclusion that the planning of the processes affecting the sea has such a high degree of complexity that it can only be achieved through great efforts. 22/

Other sectors for which the environmental issue is of great importance are the social sectors: health, housing and basic services. It would be redundant to list, once again, the well-known shortcomings - which tend to become more serious - of all the social aspects in Latin America. The traditional problems have been complicated in the last years by the increased dimension of the issue of pollution. In the urban areas and, principally, in the metropolis, the air and water pollution and also the chemical and organic contamination of food grown in the outskirts of the cities have created permanent duties in the public health agencies. In the rural areas, the increased danger of human contamination produced by pesticides has resulted in the creation of special programmes to look for the solution to this problem.

With relation to housing and basic services, the housing programmes have, in fact, incorporated the environmental dimension. However, the urgent need for solutions has, as a rule, resulted in limited, low cost programmes which have been carried out in not entirely suitable areas, to the consequent detriment of the environmental potential.

5. The environmental potential and urban planning

The extensive studies on the process of urban development have not always assigned the corresponding importance to the environmental issue. However, the global understanding of the problem under a systemic approach and the exhaustive research on the themes of migration, social status, spatial organization, sale of land and transport provide an adequate framework for the incorporation of the environmental dimension to the urban development policies. 23/

It is possibly in the field of urban planning where sectorial and, particularly, social policies that have to do with the environment materialize. The relative importance of urban population with respect to rural population has made it necessary to assign priority to the launching of many urban social plans and programmes to the detriment of rural areas. The number of environmental problems arising from the processes of accelerated urbanization and, very particularly, the gravity of some of them in the big cities, have made urban planning incorporate in varying degrees the environmental dimension.

It is important, however, to clarify some concepts: the city may be considered as a highly artificialized urbo-system, which must be permanently supplied with materials, energy and information and from which the waste matter generated from its activity must be extracted. However, it must be borne in mind that, although it is a highly artificialized system, the city originates from an ecosystem that, despite the transformations that it undergoes, has preserved its basic characteristics and has a permanent given environmental supply. Consequently, the high degree of artificialization should not become a factor that conceals the possibilities for the use of the environmental potential still present in the ecosystem. All this notwithstanding, the planning of

urban development should consider that some transformations have an irreversible effect on the environment.

Notwithstanding these considerations and those of urban planners, the environmental dimension in Latin America has been incorporated to planning as a result of serious environmental problems that have become real bottle-necks in some cities. In medium and small cities there is often an implicit incorporation of the environmental dimension to their design and urban action.

The growing power of the local, municipal, metropolitan and other administrations in Latin America, as a result of the worsening of the urban development problems and, very particularly, of the environmental problems, has been demanding planning processes with a higher degree of elaboration and interrelated with regional and global sectorial planning. Consequently, it becomes more and more crucial to analyze the ways in which the environmental dimension may be integrated. The following considerations may prove useful: 24/

i) It is essential to acknowledge the need to give the urbanization process an integral, historic and long-term approach and also take account of the fact that human settlements should be considered as the nuclei for the concentration of population, activities and built environment generating and resulting from the constant flow of transformations and use of materials and energy.

ii) Apart from the familiar problems of pollution, the planning of the spatial structuring should pay special attention to the problems of sale of land and the organization of the transport systems.

iii) The transport policies have a multiple influence on the urban environment and on general demand for natural resources in general and energy resources in particular.

iv) Representation of the interests of the community has not, so far, been

a widely used planning tool. There have been notable experiences which have come up with local solutions to local problems, which have been handled independently from the formal planning channels.

6. The environmental dimension in the planning and execution of projects.

Taking the considerations above as a starting point, it is necessary to examine the level of project planning since it represents the materialization of all the policies, strategies or lines of action advocated by the planner.

To a greater or lesser extent, the analysis of the environmental impact has become standard practice in projects. The methodologies used therein have been perfected so much that, to date, they have been accepted without reservations.

25/

Without going into the critical analysis of the conceptions underlying evaluation and without delving into the methodologies - since this is not the objective of the present work - it is necessary to emphasize the two elements that are of fundamental importance in the planning - environment relation. The first one is the need to state "environmental action in the projects." It is quite common to find that the studies on impacts present only the evaluation of the negative influence on environment, without referring, or assigning a lower level in the hierarchy, to the positive impact of artificialization. In this connection, the following quotation may help to clarify the environmental issue in connection with important works of hydraulic engineering. 26/

... "There was a stress on the advantage of undertaking the analysis of the relations between environmental action and the large works of hydraulic engineering through the study of the former in terms of the objectives of development, i.e., answering the question of how to handle the environment in a better way in order to attain a sustained economic and social growth. Due

account was taken of the fact that the material expression of environmental action for development purposes was, precisely, the execution of an important project for the exploitation of hydrological resources." It would be encouraging to see more cases in which this position is favoured in all the works involving some degree of artificialization of nature.

The idea is not, therefore, to take a decision on different optional projects on the basis of mere economic criteria and, at a later stage, to consider, out of a more limited number of options, which is the most convenient ecological and environmental choice, but to formulate the environmental considerations from the outset. And this provides a lead into the second subject to be dealt with, cost-benefit analysis, which will be referred to in detail below. 27/

7. Forms of arriving at a greater incorporation of the environmental dimension to specific strategies and policies

The balance of the situation in Latin America with respect to the incorporation of the environmental dimension to planning is not positive. On the contrary, the environmental situation in many areas and different productive processes tends to deteriorate, a fact that confirms that the countries' traditional planning systems, which fail to introduce special measures, do not appear to be the most promising way of fully incorporating the environmental issue. It is the economic policies that have the most frequent repercussions on environment. However, in general terms, these policies have a negative effect because of considering only the short term.

The analysis of the different levels of planning shows clear differences in the degree of incorporation and, above all, in the effectiveness reached at each level. There is no doubt that, with every passing day, more efforts are made to attain incorporation at the level of macroplanning. The inclusion of

environment as a basic factor of development is widely acknowledged, which has resulted in guidelines that have been formulated in terms of purposes, objectives and global approaches.

At the other end of the scale, the microeconomic level also shows a rising trend with respect to the incorporation of the environmental dimension, particularly, in the case of specific projects. The main problem here, apart from a certain lack of definition and gaps in methodology, lies in the political decisions of incorporating the environmental dimension both to action and analysis of impact.

However, the main problem resides in what could be termed "meso-planning" which, is accountable, on the one hand, for the fact that the macro-formulations do not materialize in an adequate way and, on the other, for the absence, at the micro-level of specific lines and suitable frameworks, and also for the lack of articulation with the whole system.

For this reason, it is necessary to explore which are the ways to achieve a greater incorporation of the environmental dimension to the policies. The solutions should be formulated in terms of:

- i) Sectorial treatment;
- ii) Treatment through urban planning;
- iii) Regional treatment;
- iv) Treatment according to relevant processes.

A larger degree of incorporation of the traditional sectors (agriculture, mining, industry, health, education, etc.) will be possible, depending on the efforts made to encourage the sectorial policy-makers to account for environmental considerations. The greater or lesser importance assigned to the environment will be conditioned to the development objectives and priorities of each economic sector.

It frequently happens in the Region that the planning of the different economic sectors is structured in terms of growth of the product and income of the sector. Although other development objectives such as job-creation and, on some occasions, elimination of poverty and satisfaction of basic needs are explicitly stated, it seems that the growth targets have priority over all others.

In some sectors such as agriculture, the pressure to increase growth influences the inadequate consideration of the environmental issue. Two problems must be mentioned. The first one refers to effects on the ecosystemic patrimony, an issue that has not as yet been detected due to the non-existence of patrimonial accounts. In the agricultural activity, since what is at play is the alteration and modification of productivity and type of production of the natural ecosystems, the ecological cost is high. This fact, however, is only detected in the long run. Moreover, when new spaces are incorporated to the forestry-exploitation activity, what is "harvested" in most of the cases is part of the ecosystem, which results in a reduction of the patrimony.

As for industrial planning in Latin America, it is quite common to find evidence of the remarkable efforts made to stimulate it. In the case of protected or State-intervened market planning, the State tries to promote industrialization in different ways, although, mainly, with the aim of making the investments highly profitable. And this is, precisely, the main obstacle for the incorporation of the environmental dimension. The internalization of environmental costs is in open contradiction with the high profitability sought, a fact that moves many economists and planners to abstain from introducing these concepts.

Similarly, the efforts to re-locate industries should consider a series of environmental aspects in terms of the organization of space. Among these aspects are the following: population affected, capability for the absorption of waste of the affected ecosystem and mobility of its workforce, transport of

inputs and products, competitiveness in the use of certain resources such as water, etc.

The policies generated in the social sectors should delve into the causes of the social situations in order to promote the necessary measures for their solution. Thus, it is quite common to find that the public health agencies of the Health Ministries are responsible for the control of the levels of pollution. However, finding a solution to the causes of this problem goes beyond the brief of these Ministries.

The solutions which have been formulated through urban planning are based on the growing importance of urban problems and the growth rates of cities and metropolis. The urban development policies, therefore, may become integrative formulations where a series of sectorial and spatial policies may converge. Although urban planning looks promising for the introduction of the environmental problem, it seems to be more suitable to include this issue within urbo-regional, or merely regional, planning. Given the magnitude of the problems and population numbers involved, an exception could be made in the cases of metropolis or metropolitan regions justifying the application of an ad hoc treatment.

The solution through regional planning, as was stated elsewhere, appears to be an interesting and suitable way of incorporating the environmental dimension through retention of physical surpluses and, also, through environmental action that considers investments more in accordance with the regional dimensions and types.

Within the regional treatment, it is necessary to differentiate whether it should take place through the traditional areas or whether it is necessary to create specific areas in terms of the importance that the environmental issue may have in them or in terms of the importance of the environmental action taken. There is no doubt that, if specific areas are created and they are given the

necessary legal and political instruments, it will be possible to arrive at a better incorporation of the environmental dimension.

The planning of hydrologic basins responds to this purpose since it is based on possible environmental action to be taken through managing the water resource. However, past experiences in managing basins have encountered a series of difficulties that must be considered. In the first place, the inflexibility of the technical experts vis-a-vis determining strict physical limits has implied, on many occasions, not considering the integration of one sector of the basin with another one, or treating as a unit some sectors of the same basin that should have received a differentiated treatment, or else, not incorporating the analysis of potential inter-basin water flows, etc. In the second place, much of the planning of hydrologic basins has been carried out by superimposing a new planning scheme on the existing one, with the consequent generation of conflict between both. This has resulted in institutional difficulties due to the lack of coordination and to the struggle to define the institutional power issue, rather than in complementary and articulated action.

Something similar has occurred with the definition of areas to be the recipients of large investments in infrastructure such as hydroelectric dams, irrigation works or areas earmarked for an intensive farming treatment.

The solutions through the definition of relevant processes is a course of action that will no doubt gain more supporters, to the extent that traditional planning fails to respond to the environmental problem. The processes to be defined may be considered as bottlenecks because of their negative impact, but they also offer the possibility of a creative and positive transformation.

These processes may have varying degrees of generality or specificity.

Thus, a general process may be the urban development of a marginal area and a more specific one the availability and organization of transport facilities for this area.

Similarly, there is a large number of processes to be defined by each country in terms of their problems and potentials, with the country's own priorities being attended to. Some processes, however, are present in almost all the countries in Latin America. Among others, the following can be mentioned: industrial location, industrial pollution, spatial urban-regional planning of the land, management of the cultural patrimony, management of national parks and others, deterioration of the soil in forestry-farming areas, sprawl of marginal urban areas, rural development, development of irrigation and drainage areas, expansion of the farming "frontier", use of farmland by urban sprawl, urban air pollution, mining pollution, pollution resulting from the transport of oil, management of hydrological works, management of cattle grazing, action vis-a-vis coast-line fauna, action vis-a-vis mangrove swamps, contamination of the sea by man-made waste, food contamination by pesticides, action vis-avis fauna, etc.

If this modality is adopted to make the incorporation of the environmental dimension more efficient, it will be necessary to create ad hoc commissions with executive and coordinating authority and, also, with the necessary resources. It does not seem realistic to propose the creation of new special agencies, save for exceptions, since the main need is, rather than the creation of new functions, the restoration to action of functions already assigned to some agencies and/or their coordination with others.

One of the dangers underlying this planning modality is to establish priorities exclusively in terms of the processes that produce environmental deterioration, ignoring the importance of incorporating environment to the

planning of a positive transformation of nature. In other words, the idea is not exclusively to put an end to the process of deterioration but the planning and management of nature.

The analysis of the modalities to reach a greater incorporation of the environmental dimension to specific policies shows that the most suitable seem to be the last two, particularly, if they are combined. In other words, the idea would be to determine relevant processes and locate them in space in specific regions or areas. There is no doubt that, in this way, specific policies will be able to harmonize the short term with the medium and long term.

This position can be better appreciated in the following table:

Areas	Processes	Processes					
		P ₁	P ₂	P ₃	P ₄	P ₅	P _m
a ₁	Hydrological basin	a ₁ P ₁	a ₁ P ₂	a ₁ P ₃	-	-	a ₁ P _m
a ₂	Irrigation zone	a ₂ P ₁	-	-	-	-	
a ₃	Area of rural development	a ₃ P ₁	a ₃ P ₂	a ₃ P ₃	a ₃ P ₄	a ₃ P ₅	a ₃ P _m
a ₄	Area of influence of dam	-					
a ₅	Urban area						
a _n	a _n P ₁	a _n P ₂	a _n P ₃	a _n P ₄	a _n P ₅	a _n P _m

Thus, it will be possible to determine the specific areas where several of the relevant processes may be taking place in a particularly marked way. These areas could be given a special treatment.

On the other hand, when the relevant processes are determined, these may be studied in terms of the areas where they appear in a more marked form, a fact

that would facilitate the regional and, above all, the sub-regional allocation of each process.

The experience of some Latin American countries may contribute with valuable background information. For example, the determination of the process of air pollution in the specific area of a certain metropolis has promoted the activation and creation of specific policies to be put into practice in that area.

Another example, this time of a positive transformation, could be the experience amassed in areas of integral rural development. Some of them have been planned in the traditional way, but in others, a more innovative approach has been applied, which has resulted in the environmental management of resources which will facilitate a sustained growth in the long term.

Notes

- 1/ M.C.F. Mansilla: "Metas de desarrollo y problemas ecológicos en América Latina", Cuadernos de la Sociedad Venezolana de Planificación N°150-152, Caracas, January 1981, p. 9.
- 2/ For further information see: CEPAL, Boletín Económico de América Latina, vol. XIX (1974) N°1 y 2. Angel Fucaraccio et al, Imperialismo y control de la población, Buenos Aires, Periferia, 1973. A. Meadows et al, Limits to Growth, Cambridge, MIT Press, 1972. David Chaplin (ed.), Population Policies and Growth in Latin America, Lexington, Health, 1972.
- 3/ The most conspicuous spokesman for those people who promote the acknowledgement of the advantages of the market is Milton Fridman. See Milton Fridman: Price Theory, Mc. Graw Hill, Nueva York, 1976. Also, L. Ruff: "The Economic Common Sense of Pollution", The Public Interest N°19, 1970
- 4/ In this respect, see: N. Georgescu-Roegen "Energy and Economic Myths", Ecologist, vol. 15, N°15, 1975.
- 5/ See H. Daly: Steady State Economics, W.H. Freeman and Co., San Francisco 1977. Además S. Melnick: "Principales escuelas, tendencias y corrientes de pensamiento", in Estilos de desarrollo ... op. cit., pp. 236-287.
- 6/ R. Coase: "The Problem of Social Cost", Journal of Law and Economics, October 1960. For a criticism, see: E. Mishan, J. Krutilla y J. Galbraith, quoted by S. Melnick, op. cit.
- 7/ See Sergio Melnick, op. cit.
- 8/ Osvaldo Sunkel: La dimensión ambiental en los estilos de desarrollo de América Latina, E/CEPAL/G.1143, CEPAL/PNUMA, Santiago, Chile, July 1981.
- 9/ D.H. Meadows, D.L. Meadows, J. Randers y W. Behrens, Los Límites del crecimiento. Informe al Club de Roma sobre el predicamento de la humanidad, Fondo de Cultura Económica, México, 1972. Also, M. Mesarovic y E. Pestel, Estrategia de la sobrevivencia: crecimiento orgánico, Fondo de Cultura Económica, México, 1975.
- 10/ Amílcar Herrera et al, ¿Catástrofe o nueva sociedad? Modelo mundial latinoamericano, Fundación Bariloche, Centro Internacional de Investigaciones para el Desarrollo, Bogotá, 1971.
- 11/ See Lester Brown, World without Borders, Vintage Books, New York, 1972. B. Ward and R. Dubos: Una sola tierra: El cuidado y conservación de un pequeño planeta, Fondo de Cultura Económica, México, 1972.
- 12/ See E. Odum, Fundamentals of Ecology, Saunders Co, 1971. A. Kneese et al, "Economics and the Environment: A Material Balance Approach", Resources for the Future, 1970.
- 13/ See Osvaldo Sunkel, La dimensión ambiental ... , op. cit.

- 14/ Barry Commoner: The Poverty of Power, Alfred A. Knopf Inc. 1976.
- 15/ Gilberto Gallopin: "El medio ambiente humano", in Estilos de desarrollo..., op. cit., pp. 205-235.
- 16/ See Osvaldo Sunkel y Nicolo Gligo (Selections) Estilos de desarrollo..., op. cit.; Osvaldo Sunkel: La dimensión ambiental..., op. cit.; Nicolo Gligo: "Estilos de desarrollo, modernización y medio ambiente en la agricultura latinoamericana", Estudios e Informe de la CEPAL N°4, Santiago Chile, 1981.
- 17/ ILPES, III Conference of Ministers and Heads of Planning in Latin America, El estado actual de la planificación en América Latina y el Caribe, E/CEPAL/ILPES/R.16, 30 October 1981.
- 18/ Sergio Boisier: "Política económica, organización social y desarrollo regional", ILPES, Programa de Capacitación, Document D/77, 1981.
- 19/ Among the specialized agencies it is possible to mention, for example the Instituto de Investigación de Recursos Naturales of Chile (Institute for the research on natural resources) the Ministerio de los Recursos Renovables y del Ambiente de Venezuela (the Venezuelan Ministry of Renewable Natural Resources and Environment) and the Oficina Nacional de Evaluación de Recursos Naturales of Perú (National Office for the Evaluation of Natural Resources). Among the sectorial agencies are the institutes or ministerial departments of water, soil, forestry, mining, energy, etc.
- 20/ P. Haddad: Participação, Justiça Social e Planejamento, Zahar Editores, Río de Janeiro, 1980.
- 21/ For further details on the institutional aspect, see: Héctor Echechuri, José María Montes, Ricardo Koolen y Alberto Uribe, "Seminario de expertos sobre planificación del desarrollo y medio ambiente", Supporting document for the dissemination of information, Centro Internacional de Formación En Ciencias Ambientales (CIFCA), doc. Apoyo/9, Buenos Aires, 14 - 18 December 1981.
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- 23/ In this connexion, see: Luis Unikel and Andrés Necochea: "Desarrollo urbano y regional en América Latina", (Selection), El Trimestre Económico, Lecturas N°15, Fondo de Cultura Económica, México, 1975. Also, Lucio Kowarick: "El precio del progreso: crecimiento económico, expoliación urbana y la cuestión del medio ambiente" and Guillermo Geisse and Francisco Sabatini: "Renta de la Tierra, heterogeneidad urbana y medio ambiente", en Estilos de desarrollo ..., op. cit.

- 24/ Some of these conclusions are derived from the generalization of items appearing in the Informe del seminario regional sobre metropolización y medio ambiente, Curitiba, 16 - 19 November 1981, E/CEPAL/L.266, 30 April 1982.
- 25/ In this connexion see: Hilario Domínguez, Eduardo Rodríguez P. and Luis Cordero G.: "Tres casos de impacto ambiental. Aeropuertos. Embalses con central hidroeléctrica. Vertedero de residuos sólidos", Cuadernos del CIFCA N°4, Madrid, 1977; José López de Sebastián y Gómez de Agüero: "Evaluación económica del impacto ambiental", Cuadernos del CIFCA N°3, Madrid, 1977.
- 26/ CEPAL, Informe del seminario regional sobre gestión ambiental y grandes obras hidráulicas, Concordia, Argentina, 1 - 3 de October 1981, E/CEPAL/L.262, 25 February 1982.
- 27/ José Leal: "Análisis costo-beneficio de medidas de protección del ambiente", ILPES, Programa de Capacitación, Document CDA-31, 1982.

III. THE PUBLIC INSTITUTIONAL ORGANIZATION AND THE LEGAL DIMENSION

1. Evaluation of the attempted institutional forms

Because of the complex puzzle of causality it is difficult to tell to what extent the institutional forms adopted for the planning of development and environmental action can be held accountable for the frustration of the ideals of ten years ago.

In the field of development planning, some interesting reactions have been detected which, by means of the planning modalities and techniques, somehow or other will have an effect - if the critical position asserts itself - on the institutional models and the planning mechanisms. This is so because all the ideas that have been floating in the last years with respect to, for example, the adoption of negotiated, participative and adaptive planning modalities or the propositions on the planning of situations, etc., have to do with admitting that the problem is not so much the transfer of the technical formulations produced by the planning offices to the realm of political decisions or, not even, their transfer to society as a whole, where the deficit has historically been more marked.

The heart of the matter is, rather, to ensure the necessary interaction between planners and the whole of society so that the former may pick up the forms in which society perceives its problems and aspirations, as well as the transformation modalities that appear to be the most suitable to its idiosyncrasy and degree and form of political development, and conversely, how the proposals that planning comes back with are accepted or rejected by society. To the extent to which this flow moving to and fro between planning and society is mediated by the political structure of the State, the greater or lesser democratic nature of this structure and the institutional forms it may assume will acquire a crucial importance.

On the other hand, the institutional forms tried out in Latin America with respect to the environmental issue from 1972 on, are also largely responsible for the situation of technocratic isolation of this issue within the State itself, not only with respect to the incorporation of the environmental dimension to development planning but also with respect to an effective supply and incorporation of ecological considerations to the flows both vertical (National State - Regions or Provinces - Municipalities) and horizontal (environmental area - other public administration areas) of any decision taken by the State.

As a matter of fact, since the main objective of environmental management was that of the incorporation of the environmental dimension to development planning and since the latter has been undergoing a generalized situation of political isolation and technocratic hibernation, the result is hardly surprising.

However, in our opinion, it is no less true that from the very beginning, the environmental "institutionalization" was approached with very little imagination and creativity and with orientations that were, on the whole, mere imitations of the forms adopted by the developed countries. This has confirmed the fundamental way in which, within the fields of Law and Public Administration Sciences, the Region has always evinced a dependent juridical culture.

We refer to the fact that after - as was stated at the beginning - the Latin American thought was among the forerunners advocating the need to make the environment - development relation the main issue and stating repeatedly and unanimously that the holistic, intersectorial and interdisciplinary approach was the only valid one, in actual fact, we were able only to create environmental sectorial bodies. These bodies were the very image of the models institutionalized in some central countries, whose suitability for them we are far from acknowledging. However, in any case, they approached the environmental issue from the perspective of "correction" of the model and development style and not from a perspective of

"change", as has been the case in Latin America.

Brañes gives a very complete outline of the forms of concentration of environmental functions in specific areas of the Administration. These go from instances with a high degree of concentration - though no less "sectorial-prone" - as is the case of Venezuela, to others of relative concentration through the allocation or annexation of environmental functions to pre-existing agriculture, mining, public works, health, urban planning or other bodies. 1/ It is only in the case of Peru that the body that concentrates the most coherent package of environmental functions - the Oficina Nacional de Evaluación de Recursos Naturales (ONERN) - reports directly to the National Planning Institute. Despite this fact, from the formal point of view although its technical product may have shown a suitably holistic and growing tendency to internalize the Society/Nature relation, its thematic field is restricted to that of natural resources.

We coincide with Gligo 2/ in his criticism of the general trend of the Region in the seventies to create a new "administrative sector" engaged in environmental tasks. According to Gligo, "There is no doubt that a solution of this type will only tend to exclude the environmental dimension from development planning in the medium and long term". And this, because of the following reasons:

"1) Since the environment is a dimension that cuts across the other sectors in a horizontal way, if an environmental sector were created, it would lack internal cohesion and would become a set of disconnected problems;

2) Given the negative environmental tendency of the development style prevailing in Latin America, the environmental sector would, most likely, be assigned a merely controlling role which, on many occasions, might veto projects affecting the environment. In the eyes of the planners of the other sectors,

the environmental sector would become an obstacle for development.

3) Since the economic and the planning decisions would be in ad hoc bodies and ministries, the environmental sectorial bodies would not handle the necessary funds, which would contribute to make the conflict referred to above more serious;

4) Except for very special situations, this type of body has shown the tendency to become marginal. In this way the environmental dimension may become a second or even third class issue and may not get incorporated to global and sectorial planning."

This reality, which has been the characteristic of environmental action in most of the countries of the Region, has no other justification but the bureaucratic-sectorializing inertia of the way in which the State is organized to play the necessary roles demanded from it by the complex issues of each country since the time of the Bourbons when the departmentalized forms of administration were introduced. Although this departmentalization is valid for such fields as public works, transport, energy, industry, foreign affairs, etc., it does not seem to be appropriate to meet the target of a reasonable environmental development policy. This is mainly so because a policy of this kind implies the reorientation of the present form of the Society/Nature relation, which demands that the whole of the State, throughout all its levels and sectors, should operate in terms of a common aim. It is absurd to think that this joint operation may result from the action of one sector or part of the State, despite the multiple forms of coordination that may be attempted.

In fact, conversely, the experience of these last years has shown that the new environmental bodies of the Region, apart from disseminating the environmental theme among the population can show clear and defined results only at the stage of global studies and diagnoses - particularly at a macroregional level - of the

environmental situation of the countries and in determining the potential environmental impact of some projects. However, as pointed out elsewhere, 3/ there have been permanent difficulties - ranging without exception from serious to insurmountable - to attain the transfer of the technical product to the decision-taking process, be the decisions global, sectorial or even specific (as in the case of the environmental evaluation of projects).

The time has come, perhaps, to question whether it is advisable to persist in believing that the environmental bodies are the "goodies" and that all the others are the "baddies".

2. Ideas for an institutional adjustment

Any institutionalization implies the generation of an instrument in order to perform something. All the countries have at present a much clearer and accurate idea of what they want to do than ten years ago. The information base has become much broader and the diagnosis of the environmental situation and its interrelations with the specific development modality of each country has been considerably refined. Despite admitting, as was done above, the usefulness of the environmental sectorial bodies of the Region vis-a-vis some matters, it is necessary to ask ourselves whether these bodies are of any use to do what we now know that should be done.

A document jointly prepared by ECLAC and PNUMA 4/ presents a very clear outlook on the fields of action and priorities implied, at present, in the incorporation of the environmental dimension to development planning:

a) In the first field of action, that of global planning or "macroplanning", as the document calls it, the incorporation of the environmental dimension is no longer questioned in the countries where this type of planning exists. The

problems, in this case are to make the environmental issue become more than single episodes and to go beyond mere statements, one of the dangers, as was said above, of the Global Plan.

b) At the other extreme, at the micro-scale of specific projects, the environmental evaluation is also accepted, particularly, in the case of large projects, and methodologies have been sufficiently developed. It is possible to observe, however, an insufficient effect on the orientation and final definition of the projects.

c) As the document quoted very rightly puts it "the main problem resides in what could be called 'mesoplanning' which, on the one hand, prevents the macro-formulations from materializing and, on the other hand, at the micro-level is the cause for the absence of specific lines and suitable frameworks and also for the lack of articulation with respect to the whole system". 5/

The field of mesoplanning, which is where the experts advise to concentrate the greatest efforts for the incorporation of the environmental dimension is formed by:

- sectorial planning: agriculture, mining, industry, health, education, energy, technology, etc.;
- regional planning;
- planning of human settlements;
- management of hydrological basins, and
- relevant processes. 6/

The incorporation of the environmental dimension to all these fields of planning obviously needs, among other things, an appropriate organization of the apparatus of the State and mechanisms for administrative and political action.

In our opinion, such institutional organization, whose specific profile

will depend on concrete situations and even on the administrative tradition of each country should combine the following crucial characteristics:

- a) To have the sufficient legal-normative base to offer, at all its levels, the necessary support to the development planning system and to the incorporation of the environmental dimension to the said system.
- b) To adopt rigid administrative and concentration forms only when strictly necessary with respect to such environmental functions as need it, but to develop more flexible and adaptive formulae with respect to all the rest.
- c) To pick up the regional expectations of a strengthening of democracy in order to go from a "paternalistic" and "technocratically infallible" State to a State that may be capable of trying out formulae to increase the people's participation in the definition and attainment of objectives, both as regards development planning and as regards the incorporation of the environmental dimension.

In relation to the first point Brañes - in a very interesting study, unfortunately, as yet unpublished - points out that "it is not common to find in the Latin American countries a formally established legal system of planning. The first problem to be overcome for the incorporation (of the environmental dimension) resides in the non-existence of a defined legal framework for planning that may be clearly applicable to it". 7/ Obviously, this refers to the procedures or the operation modalities of planning resulting from the said procedures, rather than to the formal institutionalization of planning since the respective bodies always have the necessary legal back-up. In this sense, whatever planning model is adopted 8/, any model implies some degree of obligation on the part of somebody and, because of this, it is necessary that the incorporation of the environmental dimension should be included within the band of objectives and

procedures enforceable by law. This should be valid for all levels, from global planning to the evaluation of the environmental impact of projects.

With regard to the second point, i.e., the adoption of rigid administrative and concentration forms only where strictly necessary, we have derived this conclusion from the analysis of the tendency to create environmental bodies in the Region since the seventies and the results obtained thereof.

To think that it may be possible to act in an efficient way in all the fields of incorporation of the environmental dimension described above, insisting on the type of environmental bodies annexed to a certain sector, either traditional Public Administration or Ministries, seems to us to be conducive to failure.

In our opinion, this "sectorialization" has, proved to be an obstacle to influence on the development planning agencies which, on the whole, always show a strong tendency to "self-sufficiency" with relation to transectorial objectives such as the environmental ones. It is difficult to imagine, for example that a sectorial body may issue guidelines or criteria for spatial planning or territorial regularization to a global planning office.

Furthermore, the annexation to any one sector has generated a strong tendency to emphasize the environmental aspects in terms of the parent agency (e.g. natural resources, health, urban development, etc.) diluting the holistic perspective or negatively affecting credibility and acceptance in cases when this perspective has been used to attempt to actually influence the policies of other sectors of the Administration or even of the parent agency itself. It is also difficult to imagine that a body attached to, say, the health sector, may issue criteria for the management of natural resources to be adhered to, say, by the agricultural or mining sectors.

Above all, it must be borne in mind that the incorporation of the environmental

dimension to the sectorial planning of the other areas does not imply a specific type of task but, rather, a mechanism for collaboration or for the permanent transfer of environmental inputs, which, however, the other sectors generally consider to be a form of subordination which they are not prepared to accept.

All this, which takes place along the horizontal axis becomes much more serious along the vertical axis with the regional, provincial or municipal bodies.

Some countries like Brazil, Costa Rica, Cuba, Nicaragua and, to some extent, Panama, have been attempting since 1981 the formulation of National Environmental Systems which may in some way guarantee the technical product of the environmental agencies some degree of political and operative transcendancy with respect to the rest of the State, from the national to the municipal level, throughout all the relevant sectors. Since these measures are still in the early stages, it is still very difficult to make a statement on their advantages. However, we feel the need to voice, a priori, that the disconnexion of this system with the development planning system makes us have some doubts on its possible efficacy.

However, it is our contention that the solution does not lie with the attempt to guarantee the "penetration" of the technical product of the sectorially conceived environmental agencies in the other areas or sectors of the Administration, through coordination mechanisms more typical of institutional cultures - as is the case of developed countries - which are, historically, more used to the conciliation of economic, social and bureaucratic interests.

We believe that the starting point is the clear identification of the functions of the State which are closely linked to the incorporation of the environmental dimension to the development process to then proceed to the adequate

and practical "restoration" of these functions in the apparatus and decision-taking mechanisms of the State.

If, as was stated before, the possible and desirable fields of incorporation are a) global planning; b) sectorial planning; c) regional planning; d) planning of human settlements; e) management of hydrologic basins; f) relevant processes, and g) specific processes derived from all the above, the impossibility and folly of any attempt at trying to concentrate all this series of sectors in one institutional area becomes clear, since this would involve practically the whole of the State. Moreover, what is at stake is that the institutional mechanisms make sure that the environmental issue is correctly represented.

Seen in this light, the advisable course of action seems to start from a simple practical tenet: whatever can and should be done from within the State agencies responsible for the above-mentioned fields through their own teams should be done by them and not by an environmental pseudo-agency that, because of trying to assume functions that are not inherent to it generates such confusion and rejection that the functions for which it is actually responsible end up by not being even noticed or acknowledged.

Therefore, the conformation of the environmental area may only validly materialize through the analysis of the functions required for the incorporation of the environmental dimension to development planning and the breakdown per function of the remaining ones that can, in no way, be performed - at least exclusively - by the other State agencies.

Our hypothesis is that these functions are:

- a) To formulate and update an inventory of natural resources.
- b) To formulate and update a diagnosis on the environmental situation of a country and its regions, with follow-ups on, particularly, the form and intensity

that the Society/Nature relationship may assume.

- c) To develop a decentralized national system of environmental information, with the necessary capacity to incorporate all the information originating in other public and private agencies.
- d) To carry out research on specific environmental problems.
- e) To prepare environmental guidelines for global, regional, sectorial, human settlements, river basin management, relevant processes and specific project planning.
- f) Acting as a real "State consultancy service", to give technical assistance to other state agencies of every type and level for the incorporation of the environmental dimension to the fields mentioned in e) above and, very particularly, to the evaluation of the environmental impact of the projects.
- g) To administrate the national protected natural areas (national parks, reservations, etc.), rather than with a mere conservation of nature criterion, with the inclusion of aspects such as development of and capitalizing on the scientific and operative knowledge, to be smoothly transferred to other areas and levels of the State, particularly those responsible for the management of natural resources and to the private sector.

With the exception of this last function, which implies an administration with territorial jurisdiction, none of the others involve responsibility for direct action on the environment but, rather, the production of "environmental inputs" to be used by others.

The smooth flow and channelling of these inputs implies a form of dependency on the central planning office but also a certain degree of autonomy, particularly necessary, in terms of the function of administration of protected natural areas defined in g) above.

The central office links the area to the National Planning System through

which it operates in all the sectors and levels (regional, national, etc.), without excluding such actions as agreed via the conventional channels to give technical assistance to any other agency.

However, for the adequate receptivity and management control at the other end of both the vertical and the horizontal lines, it is necessary to create small environmental units in the different levels and sectors of the planning system, particularly, at the levels of regional planning offices and Administration sectors whose action has an important repercussion on environment (public works, agriculture, industry, etc.) Despite their multidisciplinary nature, these units should have a certain degree of specialization in terms of the characteristics of the respective sector or region.

Finally, both for development planning and for the incorporation of the environmental dimension to all the fields of development, it is of crucial importance to identify the ways in which the population is aware of the problems, their concrete expectations, response, technological tradition, etc. It is also necessary to guarantee stable forms of popular participation in the definition of policies and the evaluation of projects.

Although the setting up of legal action mechanisms (such as, for example, popular environmental action) or institutional mechanisms (such as Advisory Boards or Councils) will depend on the juridical system of each individual country, they seem to be more necessary than ever and their creation should not be delayed.

3. The legal issue

The core of the legal model for planning is formed by the procedures to which the planning activity will have to adhere to. Starting from the determination of the competent planning agencies, the model will point out the

types of plans to be formulated. In this respect, the model will have to, at least, consider the existence of global, sectorial and regional plans, apart from others that may be judged necessary. Similarly, it will have to consider the way in which the execution of these plans is implemented through more specific programmes and projects, as well as their links with the State's budgets. In particular, the model will have to be prescriptive vis-a-vis compatibility of the different products of the planning process by, possibly, determining their hierarchical relationship. A very important point within the model will be the spatio-temporal targets of planning which will bring about, among other things, the detailed regulation of the formal contents of the plans.

The outline above may suffice to give an idea of the more general aspects of the "hows" related to the legal incorporation of the environmental dimension to development planning. As a matter of fact, for the environmental perspective to be juridically transferred to development planning, it stands to reason that, in the first place, this perspective should be incorporated to the objectives of development planning. Also, should the case arise, it should be incorporated to the definition of development to be contained in the juridical planning model. The reason for this is that, eventually, it will be these objectives - which are the expression of an underlying national project - that will give a direction to the whole of the planning activity. Nevertheless, it is also obvious that, in the second place, the environmental dimension should be represented, as faithfully as possible, in the most important specifications that the juridical planning model may contain, particularly, vis-a-vis regulation of the content of the plans, so as to force the planners to consider this dimension in all the activities listed. One of the problems to be sorted out is how to ensure compatibility between the different types of planning and, particularly, between sectorial and regional planning.

What has been said so far, is applicable to the "how" of the legal incorporation of the environmental dimension to development planning. However, it refers to a supposedly general juridical model for planning and, possibly, exhausts the possibilities for the regulation of global planning, but may be, on the whole, complemented by other planning sub-systems. The case of human settlements planning can clearly illustrate this since this type of planning is regulated from global planning, generally, by urban development laws (which are planning laws). Consequently, the how of the juridical incorporation of the environmental dimension to planning does not in any case end with its treatment at the level of general juridical planning model. Once again, it will be the particular characteristics of each juridical sub-system for planning that will point to the "how" of the legal incorporation of the environmental dimension to this sub-system. However, these particular characteristics will not, in general, require incorporation criteria of a more elaborate nature than the ones mentioned above for the general juridical planning model.

4. Progress made in the field of statute law in Latin America

The issue of the incorporation of the environmental dimension to development planning is not at all unrelated to the national legal codes in Latin America, despite existing shortcomings both vis-a-vis legislation on planning and vis-a-vis environmental legislation proper. As a matter of fact, it has been some time since the relationship between planning and environment was established in the legal field. This represented a true principle of juridical incorporation of the environmental dimension to development planning or, at least to global planning. Some cases of legal regulation in Latin America, where the existence of this relation is confirmed as, for example, in Colombia, Venezuela, Brazil,

Cuba, Costa Rica and Mexico will be presented below. Logically, this relationship has generally been established in environmental legislation rather than in legislation on planning. However, as a matter of fact, the environmental legislation that began to appear in Latin America from 1972 on, i.e., legislation that has a holistic conception of environment in that it considers it in all its aspects, has shown a clear tendency to relate planning and environment, through the inclusion of some regulation related to planning.

Thus, for example the National Code of Renewable Natural Resources and Environmental Protection of Colombia (1975) contains several stipulations where planning and environment are related. One example of this is the stipulation prescribing that "the plans and programmes on environmental protection and management of renewable natural resources should be integrated to the general plans and programmes for economic and social development so that the corresponding problems may be studied with a common approach and the search for solutions is subordinated to a scale of priorities applicable to the policies for the management of ecology and the utilization of two or more competing resources, or for cases of competition between different uses of the same resource" (quoted from article 45, (d)).

Similarly, the Organic Environmental Law of Venezuela (1976) considers the existence of a National Plan for the Conservation, Defence and Improvement of Environment that "... will form part of the Plan of the Nation...", including some indications on the content of this Plan (article 7). This stipulation was recently complemented by the Organic Law for Territorial Regularization (1983), which develops one of the points of the Plan, namely, "territorial regularization". This Law regulates in an exhaustive way the different plans that will become the basic instruments for the regularization of the territory: the National Plan for Regularization, the Regional Plans for Territorial Regularization, Sectorial

Plans, Plans for the Regularization of Areas under Special Administration Systems, and Plans for Urban Regularization. It is interesting to note that this type of planning is explicitly considered as part of development planning. In fact, article 8 of the Law stipulates that "territorial planning forms part of the process of planning the integral development of the country, for which all the activities carried out as a result of territorial planning, should be subjected to the norms valid for the National Planning System once they are established."

In Brazil, Law 6938 of 31 August 1983, which has to do with the National Environmental Policy, also refers to environmental planning. When this Law defines the basic objective of the national environmental policy it points out that the guiding principles, among others, should be the 'planning and control of the use of environmental resources (article 2, subsection III). In another article, the same Law lists the specific objectives of the national environmental policy emphasizing, in the first place, the 'harmonization of economic and social development with the preservation of environmental quality and of ecological balance' (article 4, subsection I.) However, nowhere does the Law incorporate juridically the environmental dimension to development planning, in the sense in which this concept has been used, but simply restricts itself to relating development planning and environment. Furthermore, the same Law hints at a type of environmental planning independent from development planning when in article 5 it prescribes that "the guidelines for the National Environmental Policy will be formulated through regulations and plans with the purpose of orientating the action of the governments of the Union, of the States, of the Federal District, of the Territories and the Municipalities, for the preservation of environmental quality and ecological balance, adhering to the principles established in article 2 of this law". The new legal Regulation

contributes with nothing in this respect. It only states that in the execution of the national environmental policy the Authorities, at the different levels of government are to be responsible for "the permanent control of environmental resources, looking for harmonizing economic development and protection of environment and ecologic balance" (article 1 of the Regulation of 1 June 1983).

Needless to say, in the case of Cuba the relationship between planning and environment is stated by planning, as happens in countries in which the centrally conducted economic system determines that it should be integrally planned. Therefore, Law N°33 on Protection of the Environment and Rational Use of Natural Resources (1981) is a mere reflection of this with regulations such as this one, that prescribes that the protection of the environment consists, among other things, in "its planned conservation or transformation" (quoted from (a), article 7), or the regulation stipulating that "the necessary financial resources to apply the measures orientated to the protection of the environment and the rational use of natural resources are explicitly included in the Single Plan for the Economic and Social Development of the State, and are carried out accordingly, giving priority to such issues as most closely linked with the economic, social and cultural development of the country" (article 8).

A similar situation occurs in Costa Rica where the relation between planning and environment is also stipulated by the legislation on planning. On the basis of the National Planning Law of this country (1974), a decree issued in 1981 stipulated the creation of the National System for the Protection and Improvement of the Environment, as an integral part of the System for National Planning and Economic Policy, with the main objective of "defining, promoting and coordinating the national policy for the protection and improvement of the environment" (article 1). This decree stipulates the creation of a National Council for the Protection and Improvement of the Environment, one of whose functions is that of

"revising, integrating and harmonizing policies, priorities and strategies which are scattered throughout different institutions, which the country must adhere to vis-a-vis protection and improvement of the environment, in accordance with the National Development Plan and specific guidelines to be issued by the Presidency of the Republic, through the Minister-Director of the National Planning and Economic Policy Office" (quoted from (c), article 5).

The case of Mexico is slightly more complicated. Originally, the present document included a special section on this country. However, for reasons both of space and the existence of a process of legislative reform that might alter the present juridical framework, it was necessary and advisable to omit it 9/. Having said this, it is possible to point out some of the important elements provided by the said juridical framework, which will probably not be modified by the congress of the Union. In the first place, it is necessary to remember that Mexico has a modern legislation on planning (Planning Law published in the Diario Oficial of 5 January 1983) and also a modern environmental legislation (Federal Law on Environmental Protection, published in the Diario Oficial of 11 January 1982). However, although each of the respective laws define their main field of action, namely, planning and environment respectively, 10/, the truth is that neither of them is concerned with establishing a clear relationship between planning and environment. However, the Planning Law contains, in our opinion, a stipulation that, at least states a principle for the incorporation of the environmental dimension to development planning regulated by law. We refer to article 2 of this Law which stipulates that "planning should be carried out as a means (to achieve) the efficient performance of the duties of the State related to the integral development of the country", adding that it "should contribute to attaining the political, social, cultural and economic goals and objectives stated in the Political Constitution of Mexico. The same law lists

these objectives, among which appears "... attention to the basic needs of the population and, improvement, in all its aspects, in quality of life..."

(subsection III). If attention to the basic needs of the population and, above all, an improvement in the quality of life in all its aspects are the ways of expressing the environmental issue, it seems safe to conclude that the Law is referring to this issue through these expressions and that, in this way, it is making the improvement of the environment become an objective of planning.

Conversely, the Federal Law for the Protection of the Environment of Mexico does not establish a relation between planning and environment, at least, in the same terms as the other environmental laws referred to above, i.e. in terms of development planning and environment. As a matter of fact, the Law restricts itself to stating planning criteria such as the one on dependencies of the Federal Executive responsible for the application of planning which will have to "study, plan, programme, evaluate and rank the projects or studies on urban development, national parks, fishing areas, industrial and work zones and zoning in general..." (article 6) but does not link this type of planning to development planning. All this permits to conclude that, in its broadest sense, the environmental dimension is juridically incorporated to development planning in Mexico via the definition of its objectives. This is important because, as was said before, it is these objectives that condition the whole of the planning activity of the State no matter the level -"National, sectorial, regional, etc." - where it takes place. A different issue is whether this is enough.

Notes

- 1/ See: Raúl Brañes Ballesteros, "La legislación ambiental en América Latina: Visión comparativa", Inter-American Seminar on legal and institutional frameworks of Environment, Universidad Nacional de Educación a Distancia de Costa Rica/CIFCA, November 1979, Rafael Valenzuela Fuenzalida "Requerimientos para el desarrollo y la implementación de la legislación ambiental en la América Latina", Ad hoc meeting of High Level Government Experts on Environmental Law, Montevideo, October-November 1981; by the same author, "Legislación Ambiental en la América Latina: elementos para su conocimiento, desarrollo y perfeccionamiento", mimeo; Raúl Brañes Ballesteros, "El derecho ambiental en América Latina", Opiniones del CIFCA, Serie Ordenamiento Jurídico, Fascículo N°1; CIFCA, documents by several authors cited in the bibliography presented at the Encounter on Environment and Juridical Framework, Mérida, Venezuela, February-March 1982; and at the Seminar on the same topic in Madrid, March 1983, PNUMA/ORPALC, documents on the Institutional Profile of environmental administration in each of the Latin American and Caribbean countries (1979/1980).
- 2/ Nicolo Gligo, "Medio Ambiente en la planificación latinoamericana: vías para una mayor incorporación", E/CEPAL/ILPES/R.46, Santiago Chile, 11 June 1982, p. 15
- 3/ See: Uribe, Echechuri, Montes y Koolen, "Seminario de expertos sobre Planificación del Desarrollo y Medio Ambiente", Doc.9, Buenos Aires, 1981 Ricardo Koolen, "Legislación y conservación de la naturaleza" (Seminario sobre "Conservation of Nature"), Consejo Federal de Inversiones/Administración de Parques Nacionales, Buenos Aires, 1984.
Héctor Echechuri et al, "Diez años después de Estocolmo", particularly the chapters written by Enrique V. Iglesias and Vicente Sánchez, Ed. CIFCA, Madrid, 1983; and Gilberto C. Gallopín, "El ambiente humano y la planificación ambiental", Opiniones del CIFCA, Serie Política y planificación ambiental, Fascículo N°1, Madrid, 1981
- 4/ CEPAL/PNUMA "Incorporación de la dimensión ambiental en la planificación", IV Conference of Ministers and Heads of Planning of Latin America and the Caribbean (Buenos Aires, 9 and 10 May 1983), Doc.E/CEPAL/G.1242, p. 12
- 5/ Ibid. pag. 46.
- 6/ The relevant processes are defined as those development processes in which there is a very close inter-relation between the economico-social and the environmental issues both with regard to possible negative impacts and to the chance of a creative and positive transformation. See CEPAL/PNUMA, op.cit., p. 48
- 7/ Raúl Brañes Ballesteros, "Notas sobre la incorporación jurídica de la dimensión ambiental en la planificación del desarrollo".

- 8/ See, with respect to the most suitable models from the viewpoint of the incorporation of the environmental dimension: Nicolo Gligo, op. cit., in note 2/.
- 9/ It is foreseen that the analysis related to the juridical incorporation of the environmental dimension to development planning in Mexico - including whatever reforms may be passed by the Congress of the Union - will be published as working documents by El Colegio de Mexico in the next months.
- 10/ The national planning of development is defined by the planning Law (for the purposes of the said Law) as "the rational and systematic regulation of such actions as -through the exercise of the authority vested on the Federal Executive vis-a-vis regulation and promotion of the economic, social, political and cultural activity - have the purpose of transforming the reality of the country in accordance with the regulations, principles and objectives stipulated by the Constitution and by law" (first paragraph, article 3). Similarly the Federal Law for the Protection of the Environment defines environment (also, for the purposes of this law) as "the series of natural, artificial or man-induced, physical, chemical and biological elements that foster the existence, transformation and development of living organisms" (article 4)

IV. RESEARCH AND MANAGEMENT OF NATURAL RESOURCES IN PLANNING

Research on and evaluation of natural resources may become a suitable way of incorporating the environmental dimension to development planning.

For this to happen in actual practice it is necessary to perfect the traditional systems being applied by means of enriching them with integrated, systemic and, above all, coherent approaches to the objectives of planning.

1. Analysis of the traditional management of natural resources

It is quite difficult to attain an efficient and integrated management of the natural resources of a region, area or country. Many studies show a tendency to analyze the environmental issue without differentiating between levels and scales.

It is not often that the methodologies for the management of natural resources may be generalized, because of the increased complexity involved in going beyond the level of farm. However, three main levels can be identified: the macro, meso and micro levels.

The macro level corresponds to the national level where the analysis of the national resources is orientated most of the times to the study of their availability. In this level, the first place goes to resource balances, which may provide the foundations for a not necessarily integrated management. There are many cases of sectorial balances, e.g. land, water and energy resources. These balances point out the deficits and surpluses, which necessarily generate some measures that affect the management of the resources. In fact, the balances are born from a national development project; their objectives and targets tend, at least in theory, to present a global and harmonic development strategy, which presupposes the suitable and coordinated exploitation of resources to meet the envisaged targets.

Such a position should therefore involve an adequate management of resources but, in practice, because of the pressure of development, the forms of use of natural resources that prevail are those that favour the short term without taking the long term into account. In this context, integrated management at a national level acts against conservation and many policies are operationalized through measures that have a high ecological and patrimonial cost.

Since energy is a dimension that is present in all the sectors, the energy

balances may provide some integration elements. Unfortunately, the heavy weighting of the sources of non-renewable natural resources makes the analysis be centred only on them without assigning importance to the integrated management of all the resources associated with energy.

Some balances of the water situation, particularly in countries where arid or semiarid zones form the largest part of the territory may provide the bases for integrated action approached, preferably, from the resource that poses the most severe limitation, namely, water.

The balances of land according to suitability for farming may also prove to be adequate to provide foundations for integrated action since, farming aptitude studies consider practically all the natural resources that impinge on it.

To sum up, the macro or national level offers a few courses of action to formulate the bases for the integrated management of resources. It may well be possible that the level of aggregation is such that it may be difficult to build a sound foundation for integrated management, yet, some resource balances may contribute to make significant progress if properly used.

The term meso has been used to identify those regions or areas classified according to behaviour of natural resources.

In general, in the Latin American countries the regional structuring does not respond to the physiographic performance of the regions or to their organization as an ecosystem or basin but, on the contrary, has adhered to the historical patterns of occupation, communication, roads, ethnic identity, etc. Consequently, integrated management at a national level responds to national guidelines expressed in terms of specific balances. These are some cases of regional identification with ecosystems, basins or physiographic entities and, obviously, it is much easier in this case to formulate positions aiming at an

integral management of resources. However, in general terms, it may be said that the efforts to achieve integrated management at the meso level have met with little success.

There have been instances of efforts connected with the management of basins. A large number of studies and work has been carried out in the last decades in Latin America, but, despite this work, it may be said that the basins are managed in a non-integrated way and that, on the whole, they have been broken down into units that have little to do with physiographic performance.

The micro level refers to the farm or unit of production. It is, in fact, at this level where the aim is the integration and maximization of resources. Naturally, this effort depends on the rationale of the productive agent. Thus, a capitalist agricultural enterprise will aim to obtain the maximum profitability on the capital invested and a peasant farmer working his plot will apply a different rationale arising from his survival efforts. 1/ In either case, the natural resources handled by the producer are those that he receives directly such as soil, water supply, climate, geomorphology, natural vegetation. It is at this level that the "disruptors" of a possible integrated management turn up. In the first place, there is the over-exploitation of resources resulting from the urge to obtain maximum returns in the short term. In the second place, because the production units are semi-closed systems, some problems arise which are derived from not having considered that these systems form part of an ecosystem and that any alteration in the unit will affect the whole ecologic system. Thus, it turns out that the producer considers a series of effects resulting from his own exploitation as "externalities". For example, a well may affect the underground water source and, consequently, the water supply in neighbouring areas. In the third place, exploitation always produces residues which not only affect the productive unit itself but also alter the rest of the

ecosystem to which it belongs. An example of this is pesticides that contaminate the canals that will irrigate other plots.

2. Evaluation of natural resources

a) Problems of evaluation

The potentiality of a natural resource is a function of the intrinsic characteristics of this resource; its accessibility status in terms of complementary resources is a function of demand, of technology and of the investment necessary for exploitation. 2/ However, there exists a relative potentiality that depends, precisely, on the comparison of resources with different spatial locations. In order to determine this relative potentiality it is necessary to define a "basic technology" to be used as a frame of reference for the different areas.

The production obtained from mineral resources offers almost no other alternative due to the specificity of geological formations. Similarly, hydro-energy resources are also specific, which makes the exploitation possibilities depend on the corresponding technological alternative. The situation is entirely different in the case of forestry-farming resources, given the wide range of production options. In this case it is essential to establish a basic technological level, particularly, if the aim is to compare different areas in terms of economic planning priorities.

Therefore, in order to set up an adequate system for the evaluation of natural resources for their integrated management, it is necessary to have a clear idea of the concept of basic technology, substitution of manual labour by technology, substitution of land by technology and possible relations between these substitutions and the product. In this way, it will be possible to clarify which is the contribution of natural resources to development planning, how to

multiply this development and how to interact positively in relation to an integrated management of resources.

A frequent misconception is that the evaluation systems for integrated management should be based on the traditional studies of soil, water, vegetation, climate, etc. Their importance is not questioned, but an evaluation system that starts from the diagnosis of an absence of a balanced use of resources, should explore the causes of underutilization or overutilization. It is for this reason that, to maximize the integrated management potential, it is more important to contribute with the economic, social and cultural background information that may explain the situation vis-a-vis use of resources. This implies the search for a common language that may facilitate interdisciplinary research. System analysis may answer in part this need for an exploratory language to interrelate different disciplines. However, system analysis is a methodology directed, on the whole, to understand the operation of complex systems and to generate, on the basis of this understanding, new queries on the operation of the phenomena. If only the search for a common language is favoured, very frequently, a complex methodology will be used to explain simple phenomena.

It is quite possible that system analysis may be adequate to interrelate systems where the principles of entropy prevail as physical phenomena, with systems with a prevalence of systems of homeostasis, such as the processes studied by ecology, and with systems regulated by the morphogenetic principles present in social processes. Integrated studies aim at superimposing and interrelating these three types of sub-system, but it is highly probable that the control of the system gets transferred from the entropic and homeostatic sub-systems to the morphogenetic system.

This process, which is revealed through system analysis, is not quite clear

when the integrated studies lack well-defined objectives. Furthermore, the prevalence of this or that discipline, or the allocation of the research programme to a body responsible for a natural sciences or social area will make the study vary depending on the position of the different disciplines in the hierarchy.

The evaluation of the natural resources of Latin America is plainly directed to certain resources and is normally pressed or conditioned either by the need for certain products for the international market or by the prospection made by the national and transnational companies for the direct exploitation of these resources.

The technologies used in the prospection of resources are foreign and generally generated in other ecosystems. For example, it is still quite frequent to find in Latin America a large number of studies on tropical zones with the classical classification of types of soil of temperate-climate agricultures, which does not permit to see the food production variants involved. Fortunately, in some cases, particularly in Brazil and Bolivia, positive innovations have been introduced to the prospection of natural resources in terms of the ecosystemic formation of the tropics.

It is necessary to emphasize that the framework for research is normally directed to very few resources, with a marked ignorance of the operation, characteristics and attributes of the regional ecosystems and, consequently, ignorance of their potential.

A serious problem that can be detected through evaluation are the shortcomings in the planning of research on natural resources. This research generally generates in a series of institutions from the public or private sectors and there are very few countries where they are effectively coordinated. This creates, on the one hand, considerable duplication, with the consequent loss

of financial resources and, on the other, gaps that are not handled or dealt with by any institution. This accounts for the lack of ecological and basin studies. These institutional problems, combined with the lack of a suitable framework for research, create evident problems of scale of the studies. The institutional division and the atomization of responsibilities frequently prevent studies from being carried out on an adequate scale, which affects their integration and comparability. This lack of coordination is stressed in Latin America because of the frequent changes and absence of institutional continuity affecting the public apparatus.

One final aspect that must be considered is the real integration of research on natural resources to the plans for economic and social development of each of the countries. Very frequently in Latin America, it is possible to verify the little importance assigned to studies on physical planning and to the institutions that are engaged in research on and evaluation of natural resources, which has resulted in shortage of funding. Also, on many occasions, research and prospection of natural resources is derived to private enterprises which, out of sheer profit considerations, may distort the data to favour the objectives and interests of their exploitation. This type of pioneering investment, as is the case of investment on the prospection of resources, should evidently get a special deal within the priorities that the different countries assign to their respective research. Finally, it is necessary to mention the role of university institutions in research. Naturally, given the fact that no priority has been given to investment in research and evaluation of resources, many of the universities have taken over this research function. This is positive to the extent that the framework of research and prospection is given by a development framework which is compatible with the country's dynamics. However, it has been frequently confirmed that the framework used is not the most suitable since

the universities set up their own priorities in terms of their own organic development.

It is undeniable that there has been enormous progress in the last years as regards quality and possibilities of obtaining detailed scales on remote sensing methods. 3/ Much of the national and international concern has been channelled into seminars and meetings with the purpose of motivating and training technicians. 4/ It seems that the problem at present is not the lack of research methods but the absence of global policies that demand the use of these techniques. The present development style is such that not only is there no pressure for the formulation of these policies but the responsibility for research is transferred to the private enterprises.

b) Integrated approaches and ecosystemic specificity

There are serious shortcomings in Latin America for the integral and functional treatment of natural resources. There are no systemic approaches and no analyses of the characteristics of the ecosystems or of their natural behaviour and there are no forecasts of possible reactions resulting from the simulation of anthropic factors.

Traditional integrated studies, although they have outgrown the stage of individual analysis, are not orientated to the study of the exploitation of the ecosystemic characteristics, but analyze in a global way the degree of artificialization that may be introduced. In other words, a frequent approach used by these studies is to look for the maximum possible transformation of the environment as a productive alternative.

The ecologic studies have permitted to make some progress: most of the Latin American countries have some studies on a general scale and some of them

have semi-detailed studies. Their main shortcoming is that they are mainly fito-geographic studies and do not analyze the intra- or inter-systemic conditions and operation.

The first relevant aspect arising from the analysis of the Latin American ecosystems is the greater degree of specificity of some of them, even considered at the level of macrosystems. 5/

Among these, it is possible to mention, in the first place, the Andean ecosystem. The whole area presents an evident complexity resulting from the fact that some of its altitude zones have a high density of population; from its low availability of resources per unit of area; from the particular natural conditions generated, mainly, by altitude; from the historic exploitation of this land, that was the birthplace of such important civilizations as the Tiahuanaku and Inca; from the notable potential for the vertical integration of the ecologic strata at different altitudes, and from the existence of wild flora and fauna - as for example, llamas and alpacas - with special and unique characteristics.

Another remarkable ecosystem is that of the Caribbean. Its specificity originates from the precarious sea - islands - coastline - mainland integration and from the particular conditions of the maritime sector both as regards its flora and fauna and as regards geomorphology of the seabed.

The Mato Grosso swamp, a spectacular preserve of the Latin American fauna is an area that combines marked contrasts in rainfall - very rainy seasons followed by periods of no rain - and an almost non-existent gradient (as an average, 0.07 per cent on the plain). This creates, in the rainy season a vast flooded area of approximately 20 million hectares where it is possible to observe all the types of movement of the mass of water and of vegetal adaptations both with respect to location and roots. Also, the Swamp plays an important

role in bird migrations.

La Catanga, another large Latin American ecosystem, which is entirely located in Brazil, stands out because of its sharp variations in rainfall within conditions of aridity and semi-aridity. The droughts may last for years, a fact that has had repercussions on the low supply of resources and their overutilization.

Patagonia is also an ecosystem with very particular characteristics. Western Patagonia combines conditions of inner seas, islands and irregular coastline with a sharp increase in altitude - vegetation is particularly vulnerable because of insufficient transpiration, frequency and intensity of winds, poverty of the soil and its own characteristics of precarious balance. Eastern Patagonia, less complex and with a smaller biomass per unit of area is also a very vulnerable temperate-to-cold steppe.

Needless to say, the other large Latin American ecosystems also present specificities which are not, however, quite as marked as the ones mentioned above. The Amazon jungle which, in general terms can be said to be the largest tropical jungle in the world, can be broken down into specific sub-systems. The cases of the Gran Chaco or the Brazilian Cerrado are similar.

Apart from the specificity just mentioned, a final issue is the difficult evaluation of the progressive loss in potential capacity of the Latin American ecosystems as they become incorporated. For example, the systems that are at present used for the expansion of the farming frontier are producing a marked deterioration. This deterioration goes undetected and is relegated to a secondary position because this expansion produces such economic effects as growth of the agricultural product and employment. New production is possible, but for this to be effective, it is necessary to pay a high ecologic price which results in the loss of productive potential in the medium and long term. This

is a generalized situation in all the areas of expansion of the agricultural frontier, but its intensity is greater in the rainy tropics.

3. Integrated management of resources for development planning

a) General criteria

The danger underlying the analysis of this subject is to resort to prescriptions and solutions which were conceived for a different reality. The only prescriptive statement to be made is that each case should have a methodology of its own in terms of its goals and objectives. All this notwithstanding, some general criteria may contribute to achieve an integrated management of natural resources, which is the fundamental issue for the incorporation of the environmental dimension to planning. The following criteria are worth mentioning:

i) if it is possible to define a region or area with a physiographic identity, this will facilitate the integrated management of resources;

ii) in the case of a markedly constraining resource (say, water), this could become the environmental ordinate and condition integrated management;

iii) the physical studies should be adequately rounded off with social and cultural background so that environmental indicators may be thus constructed.

It is for this reason that it is essential to have studies on production modalities and on the structure of tenure of resources, as the only means of accounting for their use and the rationales underlying these uses;

iv) there is no doubt that a homogeneous structure of tenure will facilitate the integrated management of natural resources; when the structure of tenure is not homogeneous, it will be necessary to understand the complementarity operating between the different forms and systems;

v) when the areas do not include a significant urban centre it is also much easier to establish systems for integrated management. It must be borne

in mind that the cities are urbo-systems with a high degree of artificialization where there is a permanent input and output of matter, energy and information, which normally results in the whole environment operating in terms of these inputs and outputs;

vi) similarly, the large mining production centres such as, for example, oil exploitations alter relations in such a way that they subordinate the behaviour of their environment. If these centres could be dispensed with, it is evident that it will be possible to achieve a more integrated management of natural resources;

vii) the more clearly stated the objectives of integrated management, the less complex will their pursuit be. It is usual to observe a certain degree of confusion with respect to the aims of integrated management: to maximize the productivity of resources, maximize the use of the workforce involved, attain the increased welfare of the resident population, etc. This is a very important definition which may involve serious problems when it is not explicitly stated. There is a technocratic tendency to consider in the integrated management of resources a form of maximizing their use, despite the fact that it is possible to find other alternative objectives resulting from definitions on development goals based on, for example, the welfare of the population and an improved quality of life.

Therefore, to carry out a plan for integrated management, it is necessary to undertake some thorough research on the availability of resources and their use and also formulate a strategy of management. There are several methodologies that may be adopted which, in our opinion, may be based on:

i) the natural resources of a region, sub-region or area should be investigated in an integrated way on the basis of the principle that nature is a systemic structure composed by parts which are transformed into resources by

man;

ii) within this context, there are two guiding criteria that orientate the possibilities of integral management: on the one hand, knowledge of the natural structure and its systemic operation and, on the other, the relations between society and this structure;

iii) there are different ways to study the natural structure, two of which are the main ones. The first one is to start from the whole and proceed from there to the components or resources, and the second, to analyze the components and, at a later stage, undertake their integration. Both are valid depending on the form in which the resources have been researched;

iv) it is methodologically possible, in terms of iii) above to count on two categories of information: one related to supply of specific resources - qualitatively and quantitatively - and the other related to the different spatial units in which the resources are integrated in a homogeneous way;

v) with respect to the relationship between man and nature it is necessary to go into which are the social and cultural factors conditioning the use of resources and the way in which they might be altered. This point is essential because if it is ignored, there is the danger of undertaking very complete studies from the viewpoint of natural sciences, which may fail to produce effective plans and programmes because they do not aim at the exhaustive exploration of the factors that condition use;

vi) much of the research on natural resources studies their potential use. It must be borne in mind that this potential use is formulated by means of determining a given technological level. It is, therefore, necessary to consider whether this technological level is coherent with the global development model;

vii) on some occasions, in the case of renewable resources, the potential uses are established on the basis of past studies that bear no relation with

the situation at the time of the analysis. Consequently, it is not possible to formulate a potential use generated on the basis of the analysis of the ecosystem when it has not been affected, but the only remaining valid thing to do is to establish the recovery level that can be attained by means of feasible measures;

viii) when comparisons are drawn between actual and potential use, there is the risk that these may be too static and may not consider the present use. For this reason, many studies do not consider the maturation period of plans and projects which, on being applied show marked differences with the primitive studies;

ix) several methodologies suggest a "recommended" use or a "recommended potential use" with more realistic formulations that take the conditioning socioeconomic factors into account. These "recommended uses" are, in fact, alternatives based on the real possibility of altering the conditioning factors or of introducing technological innovations that may permit a more intensive use.

b) The three management levels: country, region and farm

As was stated in chapter I, it is possible to orientate the integrated management to three levels: macro, meso and micro.

i) national or macro level: it is very difficult to attain a real integrated management at this level, particularly if the tendency of the plans is to prepare balances of specific natural resources. If regional planning is given the right place in the hierarchy, it is possible that, by means of the adequate integration of regional information, an improved national formulation is attained. However, this requires that the regional plans should, in turn, determine actual actions for the integrated management of natural resources.

The basic criteria to attain a certain degree of integrated management

at the national level should be based on:

- the possibility to make compatible and interrelate, on the one hand, the balances of resources with the regional plans in which an integral management is proposed. It goes without saying that all the background related to foreign trade and the flows derived from it should be incorporated;

- to give preference to the analysis of some integrative resources, as is the case of energy and land, the former, because it is a dimension that cuts across all the others and the latter because, in terms of its agricultural use, it integrates other resources and may, in fact, be identified with the ecosystemic performance;

- to concentrate the management strategies on the transformation of socioeconomic conditions, particularly, those limiting the use of resources. Marketing and prices policies as well as changes in the structure of tenure, may generate use dynamics to facilitate an integrated national management.

ii) Regional or meso level: this is possibly the level where significant progress may be made in the integrated management of natural resources. At this level there is not such a degree of complexity as at the national level and the spatial management of the problem is possible, which permits to work with the field reality. Also, since the regions are constituted by ecosystems, their integrated analysis may permit the internalization of effects which, at the level of farm, are considered as externalities. The basic criteria to attain an integrated management are the following:

- if the region is defined by non-natural factors it is necessary subdivide it into physiographic entities corresponding, as far as possible, to ecosystems. A division into basins would be recommended, particularly, if the region is in an arid or semi-arid zone;

- if the region forms part of an ecosystem or basin, it will be necessary

to analyze the extent to which the external behaviour influences on and restricts the possibilities of integrated studies.

- the regional identity of natural resources generally clashes with the autonomy that the regions have to alter the socioeconomic conditioning factors. It is for this reason that the regional plans should formulate these constraints and determine the measures to be taken at the level of central government;

- the integrated management of natural resources should be based on the principles of urbano-regional planning. Consequently, there should be no disaggregation into town and country, but the issue should be dealt with as a whole, considering the different flows that may be generated on the basis of production of goods and services, be they inputs, products or residues;

- within this context it is not possible, either, to consider management as the sum total of the decisions of the productive units since they, on many occasions, consider the environmental effects of exploitation and, even, the contribution of some resources as externalities.

c) Micro or farm level

If this level has the framework of an adequate regional management where resources are integrated, it is safe to assume that performance will be conditioned to the regional guidelines. However if this is not the case, it will be very difficult to reach the integrated management of the resources of individual farms without affecting the setting. The basic criteria to attain an integrated management at this level are the following:

- the rationale underlying the basic activity of the farm - whether it is self-consumption, commercial, etc. - must be borne in mind all the time. The different alternatives facilitate the different ways in which the resources may be combined;

- the scarcest resources should be managed with maximum efficiency.

For example, the use of water should be maximized in arid or semi-arid zones;

- the division of the farm into fields should respond to a global organized system and not to the contingencies of any one year. However, some transitory divisions, such as electric wire fencing, may introduce agility to the process of utilization.

Notes

- 1/ See Nicolo Gligo "Estilo de desarrollo, modernización y medio ambiente en la agricultura latinoamericana. Estudios e Informes de la CEPAL, N°4, 1980.
- 2/ Estevam Strauss: "Metodología de evaluación de los recursos naturales para la planificación económica y social", Cuadernos del ILPES, Serie II: Anticipos de Investigación N°4, Santiago, Chile, 1972.
- 3/ The region has image receiving plants (LANDSAT) in Brazil and Argentina.
- 4/ For example, see: U.N.O., Report on the United Nations Training Course on Remote Sensing Applications (A/AC/105/255), 23 January 1980, and Secretaría de Planejamento da Presidencia da Republica, CNPq, Instituto de Pesquisas Espaciais, I Seminario de usuários do sistema nacional de coleta de dados por satelite, May 1980, Sao José dos Campos, Sao Paulo, Brasil.
- 5/ The work of Nicolo Gligo and Jorge Morello, Perspectivas de la expansión de la frontera agropecuaria en el espacio sudamericano (E/CEPAL/PROY.6/R.8), November 1981, lists the following ecosystems for this area: Amazonian, Cerrado, Paraná, Yungas, Venezuelan Pacific, Orinoco Savannah, Atlantic, Páramo (Moors), Guayana, Chaco, Caatinga, Espinal, del Monte, Pre-Puna, Pampa, Central Chile, Guajira, High Andean, Puna, Patagonia, Desert and Sub-Antarctic.

V. NATURAL AND CULTURAL PATRIMONY PROGRAMMES AND ACCOUNTING

1. Objectives and nomenclature of the natural and cultural patrimony programmes

The objectives of the natural patrimony programmes in the Latin American countries should be expressed in terms of the dynamic situation of changes in natural resources, losses and overexploitation.

The objectives of the cultural patrimony programmes for these countries ought to be determined by the historical underesteem of the pre-Columbian and creole cultures and by the eruption of the values prevailing in the centre countries, which tend to aggravate this underesteem.

Therefore, the main obstacle to define the natural patrimony is the difficulty to define the fine dividing line between what is "natural" and what is "man-made". The artificialization that nature undergoes in the course of the development process is a continuum going from minimum to maximum levels. It is therefore necessary to fix an arbitrary point in this continuum to determine the limit that permits the differentiation between "natural" and "non-natural". This difficulty is quite relevant in Latin America because of the great transformation dynamics of the pristine or slightly intervened ecosystems which, due to their artificialization process, have to be reclassified as "non-natural".

There are in the Region some man-made assets of historical usefulness, transmitted from generation to generation, which must be classified within the natural patrimony. Such is the case of land development infrastructures such as platforms, terraces, drains and even some old rural roads. These assets will be called "naturalized".

To be consistent with the position stated above, the natural patrimony should include the assets of nature that have not undergone modifications or whose artificialization has been so negligible that the behaviour imposed

by the natural situation has not altered in a significant way. Also, to this natural patrimony it is necessary to add the "naturalized" assets that contribute to the conservation of the characteristics of certain resources such as soil and water (terraces and drains, for example.)

The cultural patrimony would be composed by the inherited assets, places of aboriginal or pre-historic historical interest, places where the aboriginal and the foreign cultures came into contact, pre-Columbian, colonial or post-colonial art, buildings, historical houses or houses with an artistic interest, old industries, and typical shops, means of transport and towns.

Within the framework of these definitions and given some characteristics which are common to the Latin American countries, the programmes to determine the natural and cultural patrimony should be orientated to:

a) develop information both at the level of resources and at the level of systems to be used in the generation of development alternatives and to rouse to real awareness of the evolution of the status of resources in terms of the use given to them by society.

b) regulate property rights with the incorporation of legal stipulations that account for their social roles in terms of their social value, their long term projections and, in the case of many assets, their collective usefulness as a non-economic asset. This includes the preparation of new regulations, vesting the public bodies with the authority to control and penalize. Also, special attention must be paid to the juridical forms that improve the State's chances of acquiring patrimonial resources.

c) set up inventory and account systems for the natural and cultural patrimony in order to observe periodically the changes produced and to be able to incorporate the patrimonial issue to development planning, particularly, with respect to the efforts made to harmonize the short term planning processes

with the medium and the long term;

d) contribute to detect the main problems of deterioration of the natural and cultural resources, aiming at making the registers and accounts form part of the formal education systems and become public domain.

In all the Latin American countries there have been, for many years, juridical instruments and control regulations applicable to certain aspects of the natural and cultural patrimony. Moreover, one part of the goods of the natural patrimony has been investigated by ad hoc agencies, either of a sectorial nature, as is the case of those corresponding to energy, mining, agriculture and forestry, or of a global nature. 1/

Therefore, the natural and cultural patrimony programmes should not duplicate these functions, but should integrate and complement them. For example, the sectorial mining agencies commonly study certain mineral resources, ignoring those resources of no current economic value. The idea is that this information, already available, should be completed with the information to be generated to complement the knowledge of the patrimony.

The preparation of a taxonomy of the cultural patrimony will be based on a series of definitions and decisions that will depend on the objectives aimed at, for which reason, it will be necessary to choose some of the multiple existing alternatives.

With the above-mentioned objectives in mind, this document proposes to explore the behaviour of a taxonomy based on two levels of analysis. The first one is the general or global level proposing the spatial distribution of the great biomes with the purpose of understanding their ecosystemic behaviour or of some natural characteristics in the case of their being subjected to a high degree of artificialization.

This global level would give the chance to determine the extent to which

a certain biome is a more "natural patrimony" than another and which are the physical and functional resources that impinge on the value assigned to them. This level would correspond to the alternative that the French call "geographic spaces".

The other level would be a combination of the nomenclature of the elements of the biosphere and a functional nomenclature of natural elements, aiming at its maximum simplification.

Needless to say, the classifications may be broken down into components to arrive at the physico-chemical elements, but the advisable thing to do is to fix the limit at the level of current resources that go into the economic cycle such as minerals and some of the flora and fauna.

In the first global level, it is necessary to include the "naturalized" resources which, although involving a high degree of artificialization are considered as part of the natural patrimony because they are incorporated to and improve on a natural resource. An example of this is the case of drains and terraces.

In relation to the cultural patrimony, it is safe to assume that the determination of areas or places contributes to a more effective action on the resources that need protecting, for which, this procedure is recommended in this case. Apart from its operative advantages, it permits to incorporate everything that the countries have already set up as laws and regulations for protected areas, national monuments, buildings of architectural value, etc.

The fact of determining areas should be no obstacle for the incorporation to the cultural patrimony of some activities that are not located in any specific area but are carried out throughout the whole country or in a given region as happens, for example, with folk music.

What follows is a proposed taxonomy for the natural and cultural patrimony

which may prove to be of interest for the countries of Latin America.

1. Natural patrimony

1.1 Global level

1.1.1 Large biomes

1.1.1.1 Caducifolium forest ecosystem

1.1.1.2 Tundra "

1.1.1.3 Cold steppe "

1.1.1.4 Hyperthermic savannah "

1.1.1.n

1.1.2 "Naturalized" transformations

1.1.2.1 Irrigation agricultural systems

1.1.2.2 Infrastructure of canals and drains

1.1.2.3 Areas with terraces and platforms

1.2 Specific level

1.2.1 Climate

1.2.1.1 Precipitation

1.2.1.2 Temperature

1.2.1.3 Relative humidity

1.2.1.4 Wind

1.2.1.n

1.2.2 Solar radiation

1.2.3 Continental hydric resources

1.2.3.1 Rivers

- 1.2.3.2 Lakes, pools
- 1.2.3.3 Underground water
- 1.2.3.4 Mangrove swamps
- 1.2.3.5 Glaciers
- 1.2.3.6 Snow

1.2.4 Geological resources

1.2.5 Geomorphological resources

1.2.6 Soil

1.2.7 Mineral resources

- 1.2.7.1 Iron
- 1.2.7.2 Copper
- 1.2.7.3 Aluminum

1.2.7.n

1.2.8 Biotic resources

- 1.2.8.1 Genetic patrimony
- 1.2.8.2 Terrestrial or maritime flora
- 1.2.8.3 Terrestrial fauna
- 1.2.8.4 Aquatic fauna of lakes
- 1.2.8.5 Amphibious fauna
- 1.2.8.6 Sea flora and fauna

1.2.9 Maritime resources

- 1.2.9.1 Off-shore sea
- 1.2.9.2 Continental-shelf sea
- 1.2.9.3 Special interest areas

1.2.10 Energetic resources

1.2.10.1 Hydrocarbons

1.2.10.2 Coal

1.2.10.3 Hydroelectricity

1.2.10.4 Biomass

1.2.10.5 Eolic power

1.2.10.6 Solar power

1.2.10.7 Nuclear power

1.2.11 Landscape

2. Cultural patrimony

2.1. Archeological patrimony

2.2. Building constructions of an artistic, historic or technological impact (gardens, churches, palaces of architectural value, old public buildings, bridges, dams, mines)

2.3 Arts and handicrafts

2.4 Landscapes of visual or historical beauty

2.5 Man-made environment that shows forms of living, customs, no longer practised, in danger of extinction (small towns, forts, presses, etc.)

2.6. Notable objects and collections

2.7 Notable urban developments

Once the nomenclature of the natural and cultural patrimony has been established and its components have been exhaustively defined, it is possible

to account for them and place them within the national information and evaluation systems.

The characteristics of the cultural patrimony make it very difficult to attain a physical or economic quantification. However, in some cases-collections, rare objects, works of art or constructions of an architectural value -it is possible that they may have a market value and, consequently, are susceptible of economic quantification.

Because these are exceptional cases, the cultural patrimony restricts itself only to the description of areas, constructions, goods or activities which are hardly quantifiable but susceptible of exhaustive qualification.

For this reason, the efforts to encourage quantification of the patrimony will be circumscribed only to natural resources.

2. Location of the accounting programmes for the natural and cultural patrimony

There are many doubts as to how to integrate an accounting programme for the natural and cultural programme within the national systems.

It is necessary to say that the Latin American countries have no structured or explicit systems for environmental or patrimonial accounting. What does exist is environmental data inserted within the different information systems. 2/ The principal data and evaluations on natural resources usually originate from the different sectors of the economy. Naturally, the sectors that contribute with the most information are the agricultural, mining and fishing sector. In some countries, the information on natural resources is also generated in the industrial sector to the extent that this sector may keep a close tab on inputs.

There are also central agencies at a national, state, provincial or departmental level whose function is either the direct generation of records

and evaluation of natural resources or the planning function for which it is necessary to keep records on and evaluate this natural patrimony.

A programme for the natural and cultural patrimony must necessarily be intersectorial and located at such a level as will facilitate the integration of the data generated in each of the sectors. On the other hand, this location must allow for the delivery of data to the planning bodies and/or to those responsible for handling the national accounts.

This presupposes its insertion at a higher level than that of sectorial statistics (water, minerals, flora, fauna, energy, etc.) and, even, at the level of more global data such as environmental statistics, studies on the state of the environment, compilation of economic-environmental data, regional-environmental plans, etc.

Insertion will, logically, depend on the institutional organization existing in each country. At all events, from the proposed intermediate level, the accounts will have to feed higher levels, such as macroeconomic models, and national accounts. It is of special interest to incorporate the natural patrimony accounts to long term planning models.

3. Accounting and exploitation balances of the natural patrimony

Once the measurement units corresponding to the three adopted dimensions or approaches have been defined, it will be possible to start working on the preparation of natural patrimony accounts. It goes without saying that the difficulties inherent to the quantification of the cultural patrimony make its control be restricted only to inventories or registers, for which reason these considerations on accounting will refer exclusively to the natural patrimony.

It is not difficult to keep a physical account on non-renewable natural

resources. In the first place, it is necessary to determine the different types of reserves or resources that the country has. For this, there are different forms of classification. The problem lies with the degree of inaccuracy of the information on unexploited reserves. It is quite common to find in Latin America very little or very inaccurate information due to the fact that prospecting is commonly carried out at very general levels. Much of the information is privately handled by the companies, national or foreign.

There have been important efforts to prospect and evaluate some resources. Some specialized agencies of the Mining Ministries or Secretariats or ad hoc bodies such as institutes for geological or mineralogical research have made significant progress in the last years. Unfortunately, many of these efforts have been biased either because of the importance of one resource as generator of foreign exchange (as is the case of copper in Chile and Peru) or because of the energy problem and oil prospecting.

In general, the countries keep a global control on production and consumption, which permits to infer the duration of reserves. There are standard procedures for control of production, consumption and mineral reserves.

Accounting is much more complex in the case of renewable natural resources. In the natural ecosystems, the stock may be modified in a natural way. If an ecosystem has not reached its climax, it will obviously tend to grow until a constraining factor begins to operate (law of the minimum). ^{3/} Conversely, there may be a reduction in stock when the climatic or geological conditions experience a variation and do not correspond to the ideal conditions for the climax. There is, in this case, a natural process of retrogradation which may be easily speeded up by man. Logically, the "qualitative" variations in the stock of these processes are very difficult to quantify.

In the artificialized systems, the issue of the renewable natural resources becomes more complex because the problems mentioned above have been combined with fluctuations in the stock caused by the development process. That is the case of tree plantations that may grow or decline depending on the balance existing between planting and exploitation.

Special reference must be made to the modifications undergone by the natural ecosystems, which are caused by processes that would not affect, apparently, their conservation capability. Some superficial statements, which are based on general parameters of resilience, posit that nature produces and recovers the primitive ecosystem. For example, there is an erroneous generalization on the recovery power of the humid tropic because of its high resilience. Within this context, the secondary or intervened jungle is measured in terms of the same values as the primitive jungle. The time lags existing between the climactic optimum and the climatico-geological reality and, above all, the ease of entry of new colonizing species - many of them aggressive - make that many interventions, no matter how slight they may be, should produce the deterioration of the ecosystem.

There is no doubt that the quantification of the modifications should be backed up by scientific studies or by estimates based on these.

In this way, it is possible to apply the following table to each one of the resources, both renewable and non-renewable.

Table N°1

NATURAL PATRIMONY BALANCES

(Relations between stock and flows)

Availability	Loss
1. <u>Stock at the beginning of the period</u>	
2. Increase of reserves 2.1. In known reserves 2.2. Through discovery of new reserves	3. Loss of reserves 3.1. In known reserves 3.2. Because of non-natural catastrophes
4. Natural increase 4.1. Natural growth of initial stock (e.g. a wood) 4.2. Natural growth through reproduction (e.g. growth of a species, fauna)	5. Natural losses 5.1. Because of cyclical or normal processes 5.2. Because of a natural catastrophe
6. Increase due to improved use of technology (e.g. construction of soil drains)	7. Losses due to use or exploitation 7.1. Domestic use 7.2. Exports
8. Imports	9. Other losses 9.1. Loss by contamination 9.2. Loss due to change in use (e.g. urbanization of agricultural land)
	10. Adjustment (+ -)
	11. Stock at the end of the period

These tables should be accompanied by complementary qualitative studies indicating vulnerability, risk, irreversibility, etc., which, as far as possible should not be open to scientific question. Also, it would be very useful to state the links between one resource and others and its role within a given ecosystem.

Thus, for example, the decline in numbers of a wild species has repercussions on the trophic network of the system to which it belongs.

4. The three dimensions of the balances

It has been stated before that the different approaches to evaluation cannot be expressed unidimensionally at the level of specific resources. There are resources that can be evaluated from three points of view: the ecologic, economic and socio-cultural, i.e., in the three dimensions that have been established. Other resources can be evaluated in a combination of two dimensions or only in one dimension.

Certain methodologies for evaluation may make that a certain resource, which is commonly measured in one or two given dimensions, should be extended to the third one. What is recommended is to try and opt for evaluation systems that do not call for questionable and/or too elaborate methodological efforts.

Mineral resources can be evaluated quite easily approaching them from the physico-ecological and economic viewpoints. Hydric resources can be evaluated from the three viewpoints, the same as forestry resources. The case of the natural forest, due to the importance that it has in Latin America, deserves a special analysis.

The unit of evaluation that may be used for the physico-ecological approach is biomass per type of forest, measured in kilos per hectare.

In the case of physico-ecological analysis, it is highly advisable to assess vulnerability and deterioration level, since the resulting information will contribute to the design of the necessary policies. Also, the forest must be analyzed as the regulator of rainfall, weather and fauna, all of which is very difficult to qualify. This evaluation can be incorporated as a complement to the accounting procedures in order to arrive at a diagnosis of the situation.

Economic evaluation must be carried out on the basis of previous physico-ecological information. As not all the forest is an economic asset, the usual procedure is to quantify the existing volume of exploitable timber, which is then assigned a value. It is here very important to differentiate between stock and flows because this analysis gives the chance of inferring the degree of over-exploitation and, even, of under-exploitation (in the case of over-ripe species). The current unit is cubic metres per type of timber species. The forest produces not only timber, but fodder, medicinal plants, wild fruit, etc., which should also be taken into account.

The socio-cultural evaluation should be performed in terms of what the forest represents for the population, for example, an area of educational or recreational interest or a beauty spot. In this case, the measurement unit should simply be the area covered (hectares, acres, square metres). It is possible to prepare visual sensitivity tables, ranking them according to their impact on the population. The method to be used in this case is that of direct surveys to the users of the forest.

5. The integration of natural patrimony accounting to the National Accounts Systems

The incorporation of national patrimony accounting to the national accounts

systems is of enormous importance for the integration of environment to development planning. The national account systems are the basic foundations for the formulation of the national policy: if it is possible to introduce evaluations of the natural patrimony, it is obvious that a decisive step will be taken to ensure the real and efficient incorporation of the environmental dimension to planning. However, it is necessary to state that the national accounts systems are mere indicators of the growth level of goods and services and not of the welfare of the population. 4/

Many of the patrimonial assets are beyond the economic field of the national accounts systems. Others fit into this, so there is a common field. As stated by Sejenovich and Sourrouille "... in the measurement of the costs of environmental protection and of control of flow of contaminants - if there is an agreement on the range of the concepts - the data, in as far as they involve money expenses, are included in the national accounts." 5/

What is important about this situation is that many of the assets of the natural patrimony which are outside the common field are directly related to the welfare of the population. In the case of these assets, it is only exceptionally that it is possible to determine their shadow prices or to construct the curve of demand for their environmental functions. 6/

Consequently, the effort should be centred on the expansion and completion of the common field so that many patrimonial assets may be evaluated and incorporated to the national accounts systems. Other assets, for example, the atmosphere, which are considered as "free goods" do not have their use defined as economic activity.

If the accounting of the production process does not incorporate any indicator of exhaustibility or deterioration, it distorts the resulting evaluation. If, in fact, the production of goods involves doing so at the

expense of other environmental goods or of part of those goods and if this cost cannot be evaluated, it is therefore impossible to arrive at a fair shadow price of the goods under discussion. 7/

The usual accounting systems impute only the amortizations of renewable tangible assets or of durable goods and not of natural patrimonial assets even though these may be evaluated from the economic point of view. 8/

The solution to this may lie in two directions which are not mutually exclusive but, on the contrary, complementary. The first one is to attempt the economic evaluation of the natural patrimony assets and to incorporate this evaluation in addition to the amortization of tangible assets.

The second solution is one that tends to conciliate the usual accounting of flows with one that reflects the changes in patrimonial assets. The idea is to keep parallel accounts of renewable goods and of patrimonial goods. 9/ The first would be current accounts where the gross capital formation of the period is added to, and the amortizations subtracted from, the original stock. The second would be conciliation accounts as described in the previous chapter, in which flows and stock are related from the physical point of view.

The necessary links between the national accounts systems and the recording and accounting systems of the national patrimony will play an important role in the incorporation of the environmental dimension to development planning if the latter continues to favour a central economic policy. A different conception of development which demands integral planning, where the population's welfare and, consequently the population's environment, is the aim to which the economic policy is subordinated, will no doubt introduce modifications and will make the efforts described above redundant since the environmental issue will be implied in all the decisions on development.

6. Recommendations for a programme for natural and cultural patrimony

To put into practice a programme for the preparation of natural and cultural patrimony inventories and accounts, it will be necessary to define some key phases and, subsequently, analyze the different alternatives for its institutionalization via the public sector.

a) Suggested phases

The first phase should define the national objectives at which a programme for the natural and cultural patrimony aims and, consequently, should prepare the nomenclature corresponding to the said objectives. The proposition presented in Chapter II may serve as a basis for its preparation. The second phase consists in the preparation of a national inventory of existing inventories of statistics and information on natural and cultural assets. This national inventory should include:

- i) title of each inventory;
- ii) explanation on whether it forms part of a programme, project, institutional function, etc.;
- iii) institutional authorship of each inventory;
- iv) its geographical scope, should it not cover the whole country;
- v) level and scale of information;
- vi) date of latest publication and, if applicable, periodicity.

Once the situation of the different assets of the natural and cultural patrimony is known, it will be necessary to get to know the legal regulations to which they are subjected, since there exist in the Latin American countries a large number of juridical norms valid for protected areas, national monuments, constructions of an architectural interest, etc. It is also necessary to analyze the efficiency of these norms, since many of them are not actually enforced.

The concrete proposition is the putting together of the programme for inventories and accounts of the natural and cultural patrimony. In the global inventory it will be necessary to define the required complementary information to be incorporated to it. Once the global inventory is ready, it will be time to prepare the accounts system, in particular, that applicable to the natural patrimony.

In relation to the preparation of the system, it is recommended that this should not attempt the general coverage in the first stages, but that certain patrimonial assets be selected on the basis of the following criteria:

- i) Its importance for the generation of the National Product (e.g., copper).
- ii) Its importance for the generation of foreign exchange (e.g. tin).
- iii) Repercussions on job-creation (e.g., water and irrigated land).
- iv) Deterioration level (e.g. eroded land).
- v) High ecological cost of the development process (e.g., native forests).
- vi) Strategic role (e.g. oil).

b) Public institutional of the programme

There are different options for the launching of this, or a similar, programme, but the important thing is for the programme to be assigned the correct hierarchical level. This means that the programme should be ranked above the sectorial levels. This can be done either by allocating it to the central planning office, reporting directly to the executive power, or by allocating it to an ad-hoc ministerial commission.

It may be possible that the national agencies for natural resources may be appointed to carry out the programme in the diagnostic phase, in those cases in which they exist in the public institutional organization. 20/

This diagnostic function could also be performed by environmental agencies

operating within a certain sector or ministry, but for this, they should be granted special intersectorial powers, something that, institutionally speaking, is quite difficult to attain. 21/

As for conformation and operation of the programme, it is most advisable that this should be the responsibility of a sectorial agency.

Issuing a law to incorporate institutional authority would give the programme the necessary strength to make it efficient.

Notes

- 1/ In all the Latin American countries there is a large number of institutions responsible for research on natural resources. Among the most relevant non-sectorial agencies it is possible to mention the Oficina Nacional de Evaluación de Recursos Naturales (ONERN), in Peru and the Instituto Nacional de Investigación de Recursos Naturales (IREN), in Chile.
- 2/ CEPAL "Informe del taller latinoamericano sobre estadísticas ambientales y gestión del medio ambiente", E/CEPAL/G.1120, E/CEPAL/R.222/Rev.1. Santiago Chile, 6 June 1980; Naciones Unidas, Comité de Desarrollo y Cooperación del Caribe, "Informe del taller sobre estadísticas del medio ambiente del Caribe", E/CEPAL/CDCF/56, Port of Spain, 18 January 1980.
- 3/ This law, applicable to biological systems, states that regardless of availability of resources - which may at the same time be excessive in some cases - a biological system will arrest its development because of the most constraining resource.
- 4/ Héctor Sejenovich and Juan Sourrouille, "Notas sobre balances de recursos naturales". Informe de avance. E/CEPAL/R.221 April 1980.
- 5/ Francia Commission Interministerielle des Comptes du Patrimoine Naturel. Rapport Général, Volume 1, Paris, 31 March 1979.
- 6/ See Roefie Hueting, New Scarcity and economic growth, Amsterdam, Nueva York, Oxford, 1980.
- 7/ J. Theys, "Environmental accounting and its use in development policy". Environmental Accounting Workshop, PNUMA/World Bank, Washington, D.C., 5-8 November 1984.
- 8/ Héctor Sejenovich and Juan Sourrouille, "Notas sobre balances...", op. cit. p. 14.
- 9/ The term renewable should be understood in its economic and not biological sense.

VI. ENVIRONMENTAL IMPACT ASSESSMENT

1. Basic Considerations

Once accepted the reality that the environmental problems of Latin America are essentially the same as those of the industrialized world - in terms of effects of the development style - our hypothesis is that the application of EIA methods and techniques or, at any rate, their consideration as available tools to tackle environmental problems is perfectly feasible. Furthermore, they may be immensely valuable, above all, in the case of some specific and urgent problems in which the objective conditions for their resolution exist.

In general terms, EIA is a study in depth of the effects and impacts on environment of a human activity. It performs a first key function which is the identification of specific activities that affect an environment or a specific part of that environment. Not all human activities, of course, have an important environmental effect or impact - positive or negative - yet, the most influential ones from the social viewpoint do have it. The magnitude of these studies is quite considerable in that, on the one hand, they need a conception of environment so as to include it at the receiving end of the effect or impact and, therefore, to identify the part of it that has been affected or impacted. On the other hand, it creates the need for a plan, programme or project to contain the necessary information to estimate the largest possible part of the flows that are channelled towards the environment, which must include, among other elements, the total of products and by-products generated, from goods and services to smoke and slag-heaps; those that have a real price as those that do not have one, as well as the total of the elements taken from the environment in the form of raw materials, energy resources, soil, air spaces, etc., including those that have a value and also free or original goods. The general data of a project such as locations, financial

flows or expected results also provide important information to be analysed from the environmental viewpoint. Any programme or project that lacks environmental considerations may become just a set of queries if it is analysed by a conscientious and prepared environmentalist.

By summing up different contributions from the specialized literature, we can say that the environment can be defined as "a complex and sensitive system into which the human being settles by building human settlements, from which the necessary elements - material and energetic resources - are obtained for the satisfaction of man's physical and spiritual needs and where the waste generated by man's vital activities is discharged".^{1/} This is, no doubt, a somewhat broad definition but not at all ambiguous. In fact, it attempts to incorporate the main dimensions of the modern term "environment" which is ultimately the basic life support system for human life.

Therefore, environment is, in the first place a system. This means that it has well-defined limits and a behaviour which is subordinated to characteristic laws. If these limits have been determined by the ecological laws, which are the ones that govern the behaviour of natural systems including the living beings that live within these limits, we speak of ecosystems: systems in which certain groups of human beings make use of a certain physical habitat. Therefore, when dealing with our environment, we perform a selection of a physical geographical zone, including its atmosphere, lithosphere, and hydrosphere or, in other words, of a concrete "chunk" of biosphere. There is, naturally, the national environment of a country, which is a much more complex system that embraces several sub-systems. The natural ecosystem, which is governed by the laws of ecology, is superimposed upon the so-called socio-economic system created by man, which, in turn, produces the substantial change of that natural system into a constructed and artificialized one.

This system performs certain functions. In the first place, it supplies resources. These resources, which are material or energetic may be renewable or non-renewable and may be available or not available. No conception of environment that ignores this first, basic and essential function makes sense to explain the complexity of the systems in which we have settled. Man not only dumps waste in the environment - land, sea or air - but also takes some elements from it. Why are we so concerned about air pollution? Because we breathe it and it is a necessary condition for survival. If the air is polluted, our life expectancy is reduced and our chances of catching some diseases increase. To give a classic example, the correlation existing between some lung diseases, including cancer and different forms of air pollution, cigarette smoke among others, has been demonstrated by several studies whose results have been based on unquestionable data. 2/

There is a second function: the environment receives our refuse. Ultimately, pollution is nothing more than exceeding the capacity of the environment to receive, assimilate and transform refuse into new resources. The assimilation capacity is, therefore, in a way a renewable resource and, like all renewable resources, susceptible of exhaustion. This may perhaps not be the case of the sea and the atmosphere - although the issue is still open to question - but a lake may be irreparably lost through eutrophication, or a zone may become a desert - in theory, a recoverable condition which, however, may take centuries. The ecological history of Latin America is full of examples of this kind. 3/

What is more, man, unlike most of the animal species is sedentary by nature and tends to group in large communities. For this it needs special mechanisms for the removal of excreta lest he may drown in man-made waste. This role is ultimately played by the environment by receiving and assimilating human waste to the limit of its capacity. In this way, air, sea and land must be considered

receptive agents. Both individually and taken as a whole, all three should be considered as scarce resources to the extent that contemporary man produces such an enormous amount of waste as to exceed, from the very start, this assimilation capacity.

In the third place, if we speak of spiritual development, the aesthetic quality, visual, auditory or, in general sensory, of environment - landscape and the cultural patrimony in concrete terms - plays a particularly important role. For some, and here subjective factors come strongly into play, this could have a very high value and pollution may mean more in terms of loss in quality of the city (as is the case of Santiago, Chile), destruction of traditional architecture (the case of Quito), dangers of an extremely chaotic traffic (Caracas), loss of green areas (Lima), delinquency and human overcrowding (Rio de Janeiro), etc., than the problems of health or the loss of the ozone layer - yet another effect of air pollution. The incorporation of these environmental elements of an intangible nature is a very important contribution of the classical environmental school, that should not be overlooked.

What is not clear is the interrelation between all these elements. It is not possible to isolate one function from another without completely distorting the multiplicity of effects that each of them, in combination with the others, have on environment taken as a whole, complex system. Figure 1 is an attempt to show these interrelations, by means of a matter and energy balance in a system composed by two large systems: environment and the socio-economic system, where each of the functions of environment is interrelated to each of the others. In actual practice, all these functions are inseparable: this is the reason for many of the difficulties of the environmental policies that individualize them in an arbitrary way with the aim of operationalizing them. It is worth

noting that unlike traditional balances, this one includes recycling as a special activity. This is possible to the extent that some material resources are susceptible of re-utilization to transform them into elements that are useful for the process of human life. In this aspect, modern science has made enormous progress which will permit, in theory, the future recovery of an important number of these elements. 4/

The sources of environmental deterioration (or negative effect/impact) can be found both in the production and in the consumption activities and, consequently, it would be necessary to act on both for the definition of an environmental policy. In the same way, both activities pose demands on the environment in terms of resources. It seems evident, that the resources - production - consumption cycle does not end with consumption, as posited by the traditional conception used by economic theory, but is prolonged to the generation of waste at each of these levels and in all the processes, producing the corresponding environmental consequences. Consumption is no longer the end of the line, the objective of economic activity. The matter and energy balance shows that an important amount of elements remains physically present after the process of consumption has been completed. These must return to the environment and use up a part of its assimilation capacity and, eventually, pollute it when this capacity is exceeded. However, this waste is not explicitly stated in the traditional economic process nor is it reflected in the market - although, in all fairness, some progress has been made in the developed countries.

Furthermore, a greater quantitative utilization of resources implies, ultimately, not only a larger production of goods but also of evils. This is extensive to all the waste receptive or assimilatory means, be they natural or man-made, which are, at the same time, the support of all the resources available

in nature. This is essential for the design of EIA studies, to the extent that partial assessments should have a very clear idea of the limits of the studies, from a systemic viewpoint, if the aim is to respect the set of interrelations. It would be advisable that the study should, at least, point to the force lines involved in the interrelations with other environmental functions.

At a more dramatic level, if we refer to the controversial issue of energy resources, it is impossible to deal with oil - scarce, exhaustible in a finite period of time, inaccessible, highly contaminating - as, say, hydroelectric power. Both are energetic resources but of an entirely different nature. The so-called alternative sources of energy, today once again relegated to oblivion, such as solar, wind or thermal energy and biogas, still offer the same potentiality and are conceptually quite different from the former. 5/ Similarly, unlike energy resources all material resources are theoretically recyclable, even if this recycling may be possible at the expense of enormous energetic subsidies and through the use of even larger resources. The possibility of recycling poses different challenges in terms of environmental impact, which are difficult to forecast because of the interrelations.

Each EIA should therefore propose a different and specific treatment for each of the resources involved lest it falls into gross simplifications that will completely distort the problem.

The conception of development as a process of transformation of the natural environment into a constructed and artificialized environment is an original way of approaching some of the problems that have been discussed ad infinitum, such as the relationship between development and environment. It is an improvement on the old amorphous dualistic conception of nature, on the one hand, and society, on the other. The interrelations between environmental functions

make it possible to tackle the issue of resources looking for their differences in their relationship with the other elements of the environmental system and the framework of a broader spatial conception that goes beyond the environment that is strictly involved in the activity.

There is also an essential temporal dimension, namely, the long term. What characterizes, precisely, the environmental impacts that are the most difficult to identify, estimate or quantify and forecast is that many of them become apparent only in the long term. From this it is also possible to infer the irreversible deprivation of future generations from enjoying the resources affected by environmental deterioration. This is an ethical issue that is seldom dealt with by the "serious" studies on environment but which has been taken up by many conservationist groups. In other words, there is no need for leaving our successors the legacy of a disaster courted by immediate appetites if we can prevent it.

The long term horizon makes the environment system acquire two additional characteristics, which make it even more complex: it is a dynamic and uncertain system. The problem of uncertainty is one of the most critical within the sciences of environmental management. Uncertainty is reflected in two dimensions: the information available lacks definition in terms of probability associated to its own values; i.e., that the said values should be real at a given moment; and the forecasts of effects that may be prepared are hardly reliable, just because of their long term dimension, because of the synergism associated with these processes and because of their very interrelations.

As for uncertainty, this problem can be dealt with in a surprisingly simple way: if the information is deficient either because of the delays of scientific advances or research on this area, or because of the insufficient real availability of series of data (the case of underdevelopment), or because of the immensity

of the temporal horizon to cover (the case of environment), then, what must be done is to pay for the information. This can operate on two planes: to improve the scientific quality of information proper or to manipulate the deficient information with techniques to handle uncertainty.

It is virtually impossible to become liberated from this need to work on environmental data as if they were highly uncertain, which introduces a higher degree of complexity in their manipulation. There are some methods that permit to work with uncertain information, which vary vis-a-vis the scientific basis and reliability with which they can be used. At all events, the simplistic assumption that data are determinant and fixed factors is a source of blatant error in the process of assessment of effects and impacts. In this way, an element that will always coexist with EIA will be the presence of uncertainty coefficients associated with all the levels of study. This does not mean that the data or forecasts should be not valid or useless but that this difficulty should always be borne in mind. In any case, it is precisely this characteristic that has contributed, throughout history, to make the environmental issue show a serious time lag and to make us suffer the consequences of mistakes made, perhaps, centuries ago.

2. Objectives of Environmental Impact Assessments

There are different criteria to develop EIA studies. In the first place, with regard to the environment involved, a first distinction must be made in terms of its dimensions, facets or functions. All the criteria to be applied later should be based on this. In a nutshell, there will be impacts on resources (material and energetic), on the capacity for the assimilation of waste (pollution), on recreational facilities, landscape and cultural patrimony and multiple impacts (combinations of all the above).

a) Impacts on resources

In the first case, a criterion of logic and rationality should prevail. This aims at the survival of the set of human beings that have settled in a given environment. The main issue is, essentially, to question whether the use of the resources available at a global or regional level to carry out an activity justify the use of the said resources, particularly in the case of non-renewable or scarce resources. In this case, there are very few economic elements which, just by themselves, may guide whatever decision is taken. The non-renewable resources will be exhausted sooner or later depending on their use and development possibilities. Although this is not a fatalistic and static situation, it is evident that their fate is exhaustion in the long term. There exists the possibility of re-using or recycling material resources in qualified and specific cases and no alternative in the case of energy resources, which are non-renewable. Logic, backed by science, points out that the possible alternatives are i) their conservation; ii) the development of substitutes and iii) the search for more efficient uses. Each resource will, naturally, have a different weighting depending on its importance for the national or local economy, its strategic nature, geo-political considerations, etc. Therefore, there will be no identical impacts on a given resource located in different regions or countries or on different resources in the same area.

The renewable resources should be protected so as to preserve their reproductive capability and prevent their exhaustion. In actual practice, many of them have disappeared from this planet due to over-utilization. The fact that they are renewable is not a synonym for inexhaustible. Predatory actions, irrational use, indiscriminate exploitation, for want of a better name, do nothing but point to an insane behaviour, whose explanation may be found in the short term, inter-class or inter-country violence or irresponsibility at the

level of species. In other words, logic should be combined with ethics both between species and between generations. Here, the analysis should aim at the identification of the resources that will be affected and evaluate and project their inventory during and after the execution and development of the project.

b) Impact on the assimilation capacity

This second case is based on biology and on what this science can teach us about the capability that the receptive facilities of the earth have to receive the discharges of flows that do not belong in the typical operation modalities of these facilities and which exceed their capability for absorbing them. In terms of flow of discharges there is an enormous difference between a society of croppers and a large modern metropolis. Ecology has coined a series of specialized terms such as sustentation capability, resilience and productivity (see Glossary in Annex I), which are the indicators used to measure this function of environment. The assimilation capacity may, in fact, be considered as a renewable resource of a great potentiality, but which may, however, be exhausted when its natural capability is stretched beyond its limits, particularly through the action of substances created by man and to which it is not able to respond.

c) Impact on recreational facilities, landscape and the cultural patrimony

In the third case, the criteria are, essentially, of an aesthetic and subjective nature. They are the key elements in the spiritual life of man and a key variable in quality of life. These aesthetic elements form a whole which, at the same time covers the natural environment (landscape) and the constructed environment (the cultural patrimony). We can say, with regard to this issue that the greater or lesser value assigned to these elements is highly subjective

and may, therefore, be susceptible to all kinds of manipulations to orientate this subjectivity towards certain interests, a fact that has endangered the quality of environment. Publicity, subliminal desire, obsession with progress, social-climbing, mystification of technology, etc., are some of the forms that manipulation may take. The important thing is that by means of environmental education, it is possible to re-orient subjectivity towards protection of the environment and habitat. These impacts are the most difficult to quantify since there are too many intangible elements which are also not susceptible of measurement. However, some efforts made in this respect may be and should be used. On the contrary, many of the components of welfare and quality of life will be excluded and will become impacts that have not been taken into account.

d) Multiple impacts

These extremely complex impacts may be somewhat managed by making use of balances such as the one presented in Figure 1, which make it possible to "track" a certain product throughout the users of the different inputs supplied by the environment. The analysis is also useful to avoid the duplication of tallies, which may lead to error.

This is the most general framework to be used in the development of an EIA and will be considered throughout the present report. No complete EIA may escape this multidimensional aspect of the environmental issue, this holy trinity, the sum of whose whole is larger than the sum of its parts. The largest of the schemes proposed may be broken down, for operative purposes, thus making it possible to arrive at the more traditional criteria that differentiate, for example, between impacts according to the environmental recipient that is directly affected. This criterion can, in practice, be superimposed upon the impact criterion according to type of discharge (solid, liquid, gas, energy),

starting from the basis that each type of discharge may hit each environmental recipient (air, sea, land). This distinction according to type of discharge is sketched in Figure 4.

Whenever these discharges exceed the assimilation capability of one or all the environmental recipients (individually or as a whole), we speak of pollution. When both criteria are superimposed, we arrive at the following description of impacts listed below as a frame of reference to orientate EIA. This classification is not, naturally, exhaustive and its aim is only to include the most important known impacts.

3. The process of the environmental impact

The first thing to be done on formulating the methods for the evaluation of environmental impacts is to classify the stages that lead to the impact. In fact, each phase presupposes different types of analyses and the fact that they are consecutive implies that the environmental analysis of each stage is a requisite for the following one. Figure 5 outlines the process that leads to an EIA. The proposed classification is relevant in terms of fixing the limits within which all the impact studies are carried out and contributes to differentiating between activities.

a) Action

Action is any human activity (plan, programme, project, operation) that in one way or another produces an important transformation in the environment. It is useful here to make a previous distinction: it is necessary to take a decision with respect to which will be the projects (speaking in generic terms) to be considered. It is obvious that it is not possible to carry out

an in-depth impact study on all of them. The environmental impact studies may be analysed in a different scope depending on the gravity and presence of the problems. On the other hand, there are certain activities whose possible effects are very clear to the extent that they imply substantial changes in the physical environment: road-building, the exploitation of a forest, the construction of a dam or a pesticide factory. This is not the case of others, of a smaller range in terms of use of the soil as, for example, the touristic development of a region, the construction of a power station or a programme for the control of pests, the results of which are not easy to visualize. There are some that appear to be totally innocent from the point of view of transformation of the environment, as would be the case, for example, of the creation of an ecological reservation, a monument, legislation on the use of certain spaces or energy resources or a housing plan. All this is not quite true because the impact assessment may reveal the true dimension of the consequences of these activities that, apparently have no negative environmental impact.

Before systematizing the proposition above, it would, perhaps, be necessary to clarify that the concept of action itself has no environmental connotations whatsoever, unless in specific cases of actions tending to the positive transformation of the environment. In these cases EIA is justified only to take notice of the diversity of their positive effects and impacts, whereas the possible negative impacts shall be felt in other dimensions such as the social, political or economic.

There is a first level of actions which are linked to the national development plan and its breakdown into or versions of sectorial plans and regional plans. At this level it is only possible to establish in a very general way the potentiality which some of the guidelines of the plan may have

and their repercussions on the whole of the national territory and its respective regions or sectors, in the case of national and regional plans. In this case, a comparison with a former plan seems to be an interesting step to take in order to contrast the relative changes in use of the territory involved in the application of the new plan. Without going into prescriptions as to how plans should be formulated in order to incorporate the environment and not taking account of the different planning categories existing in the Region, the mere consideration of environment - in terms of a dimension that cuts across all the sectors - may shed some light for the execution of an environmental plan that will involve, in the first place, the identification of the effects that the plan may have on environment in all its functions and will contribute to establish certain criteria for its subsequent disaggregation. This is not, naturally, a plan in the formal sense but the consolidation of the environmental aspects developed in the different intersectorial and regional mechanisms of the planning system.

The environmental plan may become, in any case, a conceptual reductio ad absurdum if, as is often the case, the environment is considered as a separate sector from the socio-economic structure. Yet, environmental planning may be an effective aid to an environmentally concerned development process to the extent that it is the aggregate of the environmental components of the whole of the national plan and its components. Therefore, the environmental plan would be, in principle, in condition to recommend the preparation of more or less detailed impact studies for such activities as the national, regional or sectorial plans may recommend should be carried out in specific regions or sectors.

This leads, in an indirect way, to ask ourselves which may be the true significance of the national plan since it includes all the activities of the

country or, at any rate, considers them within its structure. It is quite likely that many of the dimensions of the environmental issue may not have been taken into account by planning in the country, which will depend, on the one hand, on the development of the planning system and of the mechanisms responsible for the environmental issue and natural resources. For example, in indicative planning, there hardly appear any recommendations - with a varying degree of weakness - for the private sector, whereas prescriptive planning, as stated by its name, prescribes strict norms or regulations for this same sector. Both extremes have in common, at least in theory, the incorporation of the private sector, which is of undeniable importance, at any rate at a general level, and above all in the agricultural and industrial sectors vis-a-vis use of a common environment for which they must compete. In either case, environmental action should be compatible with the nature of the national plan. If the plan is merely indicative with respect to the decisions of the private sector vis-a-vis some general objectives such as employment, income distribution, self-rule or food, it will also be so with respect to levels of environmental quality.

At all events, it is the existence of a national plan, whatever the level, that guarantees, in principle, that all the activities of the national life which make some kind of use of the natural and constructed environment should be considered.

It can be said that all these general plans are, in turn, translated into plans and programmes according to sector, area, zone, micro-region, basin, etc., which involve a higher level of disaggregation and, certainly, in most of the cases, specific actions that will affect some environmental aspects in a substantial way. In this case the EIA's will have a more extensive content, particularly in terms of assistance for the setting up of sectorial and regional policies, which are the ones that are, in fact, more effective to the extent

that they are considered in earnest and have an adequate political backing.

It is at this level that the Declarations of Environmental Impact (DEA) prepared on the basis of aggregate or disaggregate EIA (and, in any case, simplified in its technical aspects) will have an enormous effect on the whole of the socio-economic activity, in the sense that they will truly reveal the environmental consequences of global actions in specific areas. These are - or should be - the basis for the implementation of environmental laws or regulations in such areas, sectors or activities as exploitation of the soil, use of pesticides, levels of discharges into waterways or the atmosphere, use of scarce and exhaustible energetic resources, etc. This will imply the definition of norms whose necessary scientific basis and adaptation to the national reality should be guaranteed. The idea is not to determine a posteriori the extent of damages but to foresee future situations by incorporating data on effects and impacts to the body of the programme or project.

In this respect, EIA provide some very valuable objective information to the levels mentioned above, which ranges from the correct identification of actions and their consequences to an estimate of the magnitude of negative impacts.

However, complete and detailed EIA only make sense at the level of specific development and operation projects both with respect to projects that are integrated to plans and programmes and to those that are isolated. They are not justified for general plans or global strategies because they become mere qualitative assessments and lose their quantitative specificity which, with all its shortcomings, is the only way of making EIA studies be valid. The types of projects where these studies are, among many others, the following:
(this list is merely illustrative)

i) Use and transformation of the soil: Urban development industrial and agroindustrial projects, agricultural activities, airports, motorways, transmission lines, basin development...

ii) Extraction of material resources: Mining exploitation, wood-felling, commercial exploitation of game and fishcatch, marketing of aboriginal flora and fauna...

iii) Agricultural processes: crops, livestock farming, dairies, fields for cattle grazing, irrigation...

iv) Industrial processes: Steel mills, petrochemical industry, metallurgical and non-metallurgical mills, woodpulp mills, chemical works, cement plants...

v) Transport: Rail, aviation, public transport and truck fleets, private cars, motor-cycles, ships, aqueducts, oil pipelines, gaseoducts...

vi) Energy: Dams, coal, thermal power stations, nuclear power plants...

vii) Management and treatment of water: pollutants and toxic substances, biological waste, underground water sources, oceans...

viii) Chemical treatments: pesticides, herbicides...

iv) Renewal of resources: Reforestation, soil fertilization, recycling of waste, control of floods and tides...

x) Recreation: Parks, tourism and holidays, game-hunting and fishing areas, green areas...

This list is not at all exhaustive. However, what is worth noting is that this type of classification of actions or activities is precisely the same one used in the environmental impact studies as a preliminary organization of the activity. It is, in short, a different way of classifying a series of projects in order to facilitate their analysis from the viewpoint of the environmental aspect(s) affected.

b) Changes

Changes, as was stated above, are the transformations that are necessarily produced in the environment when an activity (or action in our terminology) is projected or implemented. These changes must be understood only in this sense and are not directly associated with connotations of the qualitative kind. In other words, they are not related to the concept of environmental quality, at least, at this stage of analysis. They are simply transformations of the environment through the action of an activity whose aim is to obtain the best possible yield of resources in the broad sense.

Within the wide range of changes that are produced in the environment, it is possible, in the first place, to differentiate between natural changes and man-provoked changes. Among the natural changes, the following categories can be distinguished:

- i) Reversible: floods;
- ii) Irreversible: sedimentation of a lake;
- iii) Cyclical: seasons of the year;
- iv) Transient: droughts.

As a matter of fact, the changes provoked by man, which are superimposed on the natural changes have a different value depending on the development status of the society. Thus, the societies of croppers or hunters imply a minimal or marginal change in the environment no matter how more or less intensive their activity may be. They will never affect the environment in a serious way since the number of members and the nature of their activity prevent them from doing so. Furthermore, many of them have been and are characterized by their harmonic relations with their habitat. The changes become more important or structural (not marginal) as the societies outgrow the successive historical stages of development. The primitive

societies of farmers, for example, are the starting point of a significant artificialization of the natural environment and may have caused the disappearance of certain native species or the introduction of others, as well as structural changes in the soil. Thousands of years later, the present industrial society is not only the creator of the concept of environment, but also the cause of its greater deterioration. Industrialization has involved such transformations that the natural world may have become a thing of the past.

As an example, we can mention the loss of topsoil in a zone as a result of the process of urbanization. Action, in this case, is the building of houses, roads, services, supporting infrastructure, etc. All this has a series of advantages which, no doubt, at the time backed and justified the work: house the population, extend public services, increase the quality of the city, extend the range of action of the commercial belt, incorporate new spaces to the process of modernization, etc. The loss of topsoil (and the impermeability of the land) are the obligatory changes that the process of urbanization provokes in an ecosystem that has been altered by this process. This is a mechanical issue, typical of the laws of Physics and Chemistry. The action-change relation is inherent to the former and is, in general, contained in any plan, programme or project although the environmental viewpoint may be absent. It is very seldom that an urbanization project is seen as a project that will use agricultural land for other purposes.

c) Effects

The effects on the environment of these changes related to human action are the consequences that they produce, which take the form of alterations in the balance of the ecosystems. These effects may be positive or negative depending on the way in which the intrinsic properties of the ecosystems may

be affected. The negative effects conform what has been called environmental damage. To continue with the example of the loss of topsoil as a CHANGE produced by the ACTION of urban development, the corresponding EFFECTS could be the erosion of adjacent slopes, impermeability of the soil or the sedimentation and/or eutrophication of rivers that flow through the area, etc.

The determination of these effects is now the responsibility of the environmental sciences since they are phenomena that are directly linked to the functions of the physical environment. They are, on the other hand, a dimension of analysis that is generally ignored by the planning studies, partly due to the scant notice taken of the long term and, partly, to the greater stress given to financial rather than material flows and to the absence of consideration of the inventories of non-renewable - and, particularly, energetic- resources.

As a matter of fact, the analysis of the "material" aspects of a project will lead to the conclusion that the effects that generate the greatest concern are, precisely, those that, objectively, involve a damage for the environment by jeopardizing the very sustentation base of the project and the human groups directly or indirectly associated with it. The determination of effects does not involve qualitative judgements in relation to the consequences of these effects but does involve the physical and ecological dimension of the damage that the activities produce in some very specific environments.

The way in which the analysis of effects is carried out is by considering three cases that are complementary and not mutually exclusive: the estimation of the initial state of the environment (referential state); the estimation of the future state of the "action-less" environment; and the forecast of the future state of the "acted-upon" environment. As each of these cases is considered an integral part of the process of EIA design, these concepts will

be expanded below.

d) Impacts

The environmental impact implies a value judgement (and, therefore, qualitative and subjective) on the importance of a certain environmental effect, as defined above. Once this effect has been assessed, the greater or lesser impact of an activity is determined, in terms of a given conception of environmental quality (determined conventionally in a given society). The impact is, therefore, the variation that the quality of the environment experiences. Some examples of impacts derived from the effects mentioned above would be the loss of arable land (through erosion); loss of fishing resources (through sedimentation of a river); etc. These variations may be positive or negative for the environment but will always be associated with value judgements on the importance of this effect on the environment.

The introduction of value judgements immediately raises the issue of who should make them. It is evident that the pollution of a river will affect in a more serious way the inhabitants of the river-banks who will be objectively conditioned to assign a higher value to the impacts than the inhabitants of, say, the valley or the mountain. For the latter to value the impact in a similar way it is necessary to generate the awareness of the problem and a feeling of solidarity with the people affected. Environmentalist scientists and technicians will probably assign a high value to the impacts on the basis of their knowledge. However, the economic groups responsible for pollution will prefer to go on dumping their waste free of cost or not to treat waste because of the expense involved.

In any case, it is essential to determine in a clear way which are the sectors affected by the actions proposed and the extent to which they are affected will

be estimated by means of a set of impact indicators, which are the parameters to measure the significance of an effect.

The identification of the sectors affected requires some previous hard work, which is normally omitted. This fact becomes the source of many of the mistakes made when carrying out an EIA and besides, lends itself to all kinds of misinterpretation (or biased interpretations) of the causes and consequences of the environmental impact. A complete study should be as clear as possible in this respect.

Although the largest possible amount of information is ideally desirable, the essential thing is to include basic social, economic and cultural data. The weighting of one or another aspect will depend on local conditions and there are no fixed weightings to be prescribed. The socio-economic and occupational pattern, the levels of health and life styles form the first group of basic information to be gathered. Next, it is necessary to have some idea of cultural aspects such as traditions, religious beliefs and aesthetic sense of the social group. Finally, there are psychological and sociological factors that will condition the previous aspects either reinforcing or mitigating them, depending on the degree of dependency that the social groups may have with respect to mass media, public campaigns or political awareness.

All this will contribute to build up the aforementioned impact indicators, many of which have traditionally been used as socioeconomic indicators and will this time be considered from a different perspective. At all events, there will be some indicators that have to do exclusively with environment whose design is complex and uncertain because of the shortcomings of the national scientific development and the inaccessibility of the available information. Thus, there will be a wide range of parameters which may be numerical (quantitative) or subjective (qualitative). The latter may also be

subject to some kind of ranking system following different scales such as acceptable/unacceptable; good/better/best; etc.

In any case, the identification of the groups affected and their breakdown into a series of indicators should be as comprehensive as possible. The prospective winners and losers of environmental actions, effects and impacts should be identified as clearly as possible in terms of time and space.

4. Characterization of EIA

By way of definition, Environmental Impact Assessment (EIA) is an activity orientated to identifying and forecasting the effects and impacts on environment of proposed legislation, policies, programmes, projects, operational procedures, etc., in order to interpret and communicate this information on impacts. 6/ This definition accounts for the concept of EIA. However, in more restricted terms, EIA involves a series of recognised methods and techniques of environmental management. These are formal procedures, despite the fact that their scientific foundations are still unstable, the literature not easily available and not well disseminated and the experts on the subject very few.

EIA's are calculations and estimates of the consequences of an activity and are in no way a substitute for global diagnostic or evaluation studies on the state of the environment.

The task of the assessor is not to prepare a scientific treatise on environment but, mainly, to give the necessary support to the decision-taking process, particularly, with respect to selection of the development alternatives of the action under study and the consideration of alternative environmental management strategies.

In order to avoid confusion it is necessary for the language used to have a certain degree of rigour. On the basis of the most important literature on

this topic, the following phases can be considered, each of which corresponds to the basic elements of an EIA, as established in the previous chapter.

CHANGE	Natural or man-provoked alteration of the environment.
IMPACT	Variation in environmental quality. The expression "impact" implies a value judgement on the importance of an environmental effect.
ACTION	Project, proposed legislation, policy, programme or operational procedure with environmental implications.
EIA	Activity designed to identify and forecast effects and impacts and interpret and communicate information on these impacts.

Considering this sequence, the EIA study should contain a series of parts to account for one and all of the phases.

In relation to the process of preparation of an EIA, the following factors should be considered:

i) The EIA should be an integral part of the development activity under study and should begin at the same time as the other evaluations inherent to a project (technical, economic, sociopolitical and other assessments). In the same way as the development of projects in mixed economies implies their reformulation in order to include "social" considerations in their assessment, it is also possible to set up compulsory environmental requirements such as an EIA. It is evident that the parallel development of these calculations will be of great help to take decisions and to make a better use of the resources available. This will also facilitate a more integrated use of the information supplied by the project.

ii) The EIA must be considered within the framework of the most relevant national and inter-governmental objectives and policies. This means that it is

not enough to legislate in favour of the obligation to include an EIA in the project, but that the study should respond to the environmental and global resources policies. EIA studies some times tend to suffer from hypertrophy and make excessive demands on the technical and financial resources without the subsequent results offering justification for such a display. The struggle, therefore, may be transferred to the implementation of broad guidelines at the constitutional level, for example, to back up the execution of EIA with a greater or lesser degree of elaboration. But not the other way round.

iii) EIA's should be carried out with a clear identification of the institutional mechanisms involved. This is valid not only vis-a-vis control of the execution of the study but as a way of integrating activities that may be scattered and contribute in an effective way to enrich it and provide a larger number of viable alternatives.

1. Content of the EIA's

Within the context of the foregoing considerations, an EIA should contain the following components, all of them developed at level of detail that the priority or urgency of the study may determine.

- a) Description of the actions proposed and of their alternatives;
- b) Description of the relevant components of the environment in which it operates;
- c) Forecast of nature and magnitude of the environmental changes provoked by the actions and their positive and negative effects (natural and man-induced);
- d) Identification of the interests of the community affected on the environment, their weighting and priorities and identification of the social groups that represent these interests.
- e) Listing of impacts and of methods used to determine their relative significance;

f) Prediction of the magnitudes of the impact indicators for the project and its alternatives;

g) Recommendations for the acceptance or rejection of some of the alternatives;

h) Recommendations of control procedures;

i) Description of their integration to the planning process;

2. Substantive reports of an EIA

In terms of the process outlined, the substantive elements (in the form of reports) that an EIA must contain are the following:

a) Description of the ACTION: The EIA study should contain complete information on the action (project, programme, etc.) for each of its main alternatives. The way in which the information may be organized is by referring to a concept of environment such as the one outlined in Figure 1 so as to take into account all its dimensions, even if it is only partially.

b) Description of the environment: Once again, it is necessary to emphasize that the basic purpose of an EIA is the identification and prediction of the environmental effects and impacts of concrete actions and, therefore, the task of the assessor is not to prepare a scientific reference work on the environment involved, but to support the decision-taking process as fully as possible. For this reason, it is necessary to examine as much information as possible and do the job of selecting scattered and non-integrated data. It is necessary to add that the emphasis should be placed on the relevant components of the environment on which action is undertaken, either directly or indirectly. More specifically, it is possible to refer to the concrete types of effects and impacts illustrated before, without going into the quantification or qualification of these impacts but just identifying them at this stage.

In the same way, the types of action identified in that chapter may serve as a guide for analysis.

These two first phases are very important since they will condition the whole remaining work in two main dimensions:

i) the identification of the alternatives for action that may have the most important consequences on environment (effects and impacts); and

ii) The consideration of alternative strategies for the environmental management and organization as a consequence of the study.

c) Estimation of changes: This stage is essentially a forecast of the nature and magnitude of the transformations that will be produced in the environment because of the projected human action. The magnitude of the changes should be the object of a study to include basic socioeconomic information, on the one hand, and data on the characteristics of the territory, on the other.

d) Identification of the society: the EIA should also contain the identification of the individuals affected by the action and their concerns or interests with respect to the transformation of the environment involved. It is important to note, in any case, which are the groups or social classes representing these interests and the varying range of their concern, since there may be marked differences, particularly, vis-a-vis socioeconomic stratification. Naturally, within these concerns, it is necessary to detect which are the ones that are actually relevant so as to concentrate on them.

e) Measurement of effects: This is a key stage in EIA, which gives it its specific content, since all the other stages are orientated to back this one up. The effects are, at this stage, the consequence of the introduction of the action of man in the environment, particularly, the damages provoked, directly or indirectly, through that action.

Specifically, EIA should take the following cases into account:

- Initial state of reference: This is deduced from a state of the environment

defined in time and space, in terms of a set of characteristics to be previously defined. This is a very complex task, particularly due to the environmental dynamics and to the cyclical and uncertain components.

- Future "action-less" state: The elements composing an environment will not necessarily remain stationary at the present level, regardless of the project under study. There are environments that normally present a great variability due to climatic or merely temporal factors. For this reason it is necessary to carry out a projection of the state of the environment into the future taking into account, of course, the corresponding levels of uncertainty. Among the changes, there are natural changes, which may be irreversible long term tendencies implying an evolution of the environment from one state to another, and trends provoked by man, mainly when he interferes with the ecosystems beyond their natural capacity. In most of the cases, it is a combination of these two phenomena that will involve the most important transformations of the environment.

- Future "acted-upon" state: This same analysis should be carried out, assuming the occurrence of the projected action, in order to compare situations.

3. Factors that influence an EIA

a) The EIA should investigate all the relevant physical, biologic, economic and social aspects. The level of detail will depend on the magnitude of the project and its possible impacts;

b) At each stage of an EIA, inventories of the sources of information and technical assistance should be prepared;

c) The EIA should include a spatial frame of reference that should be larger than the area affected by the action and that should extend beyond the

limits of the activity under study;

d) The EIA should include both medium and long term forecasts. In the case of engineering projects, this should be done:

- during construction;
- during operation;
- once operation and development are over;
- two or three decades later;
- after the project has been discontinued.

e) Environmental impacts should be assessed as the difference between present and future state of the environment whether the action takes place or not;

f) Estimates should be performed both vis-a-vis magnitude and significance of impacts;

g) EIA methodologies must be selected on the basis of their suitability to the nature of the action, the data base and the geographical setting;

h) The affected zones and parts must be clearly identified, as well as the corresponding greater impacts.

4. Impact indicators

They are parameters that measure, at any rate, qualitatively, the significance of an effect or impact. Some are associated with numerical scales such as child mortality or crop yield. Others may only be described as "good-better-best" or "acceptable-unacceptable". The selection of the relevant set of indicators is often a crucial step in the EIA process and requires guidelines from the decision-takers. Their mere choice already determines social priorities.

In the case of the design of an industrial plant, for example, this is simplified from the environmental point of view if there is a previous definition of standard discharges for different pollutants or standard quality of air or

water. These values are obtained from the available toxicological information that relates exposure to pollutants to effects on health or vegetation, while, at the same time, permits considerations on the best feasible technologies. The evidence may be incomplete or controversial, yet the assessor will have to accept the previously defined standards. If these do not exist, alternatives may be proposed on the basis of standards used in other countries. We should, however, point out that standards may be useful but do not reflect the whole range of human interests. It is necessary, therefore, to establish the limits of their validity.

Once the indicators and their scales have been selected, their values for each action should be estimated, preceded by the environmental effects corresponding to each alternative of the project and to different time scales.

5. Level of detail of an EIA

The level of detail at which an EIA should be developed for a specific case, depends on a series of variables among which are the following:

- a) Sensitivity of the local environment;
- b) Scale of the action proposed and its potential effects;
- c) Social value locally and nationally assigned to the conservation or improvement of the environmental quality;
- d) Resources and scientific and technological capacity of the country;
- e) Time available for the assessment.

6. Applicability of an EIA

EIA's have been widely used in the industrialized countries but have, in principle, a generalized application, provided that they should consider not only the physical and biological characteristics of a particular region but

also the socioeconomic local priorities and the cultural traditions. The process of elaboration and application of an EIA should not be considered as an obstacle to economic development or a rein to modernization and industrialization but rather, as a means to assist in the planning of the rational use of the natural resources of a country.

5. Selection of EIA methods

1. Stages of an EIA

In a simplified way, the stages that the analyst must go through in the development of his study are the following:

- Identification of effects and impacts;
- Forecasting of effects;
- Forecasting of impacts;
- Communication of results;
- Recommendations on control procedures.

2. Classification of EIA methods

An important issue is the choice of the most adequate method for the conditions of the particular environment affected and the reality of the country. A way of organizing in a systematic way the process of selecting the method is by means of a questionnaire like the following:

a) Is the method sufficiently comprehensive? This is fundamental to detect the total range of important elements.

b) Is the method sufficiently selective? The answer to this question requires a tentative pre-determination of the importance of effects and impacts. It is possible to prepare a list of the human interests that are the most relevant for the environmental effects and impacts of the project in terms of

the ways in which they will be affected.

c) Is the method mutually exclusive? This is necessary to avoid the double count of impacts, which is quite possible due to interrelations. For example, the tourism industry may have an economic manifestation for those people whose income derives from it; it may have a social manifestation for those people who use the area as a permanent habitat; it may have an ecological impact for the people concerned about wild life, etc.

d) Does the method generate estimates on the reliability limit of the forecasts? It is convenient to include some kind of calculation of uncertainty (for example, on a subjective base), which may lead to the confrontation of projections. Once the range of the present uncertainties is estimated, it will be necessary to carry out at least three separate analyses considering the most plausible, the half plausible and the least plausible ones. Each of these should be associated with the numerical value of the elements forecast.

e) Is the method objective? This is desirable to minimize the chances that the forecasts may be influenced by the preconceived notions of the promoters and advisors of the study, which may be due, for example to incomplete information on local conditions, insensitivity to public opinion, etc.

f) Does the method predict subsequent interactions? The environmental, social and economic processes are characterized by their feedback mechanisms. Therefore, a change in the magnitude of an environmental effect or of an impact indicator may produce an amplification or influence on other parts of the system.

g) Does the method identify unacceptable impacts? There are actions that may produce totally unacceptable impacts such as, for example: the destruction of a historical place.

3. Adaptation of the methods

Most of the EIA methods have been developed and used in the United States and have not been totally validated although there is an enormous experience amassed. Their validity for other countries, particularly, for developing countries, should be examined in each case, especially vis-a-vis socioeconomic impacts. A crucial restraint is the absence of environmental legislation and of acceptable environmental quality standards. At the time of selecting EIA procedures such action as a survey of environmental legislation; availability of monitoring stations; training of manpower, etc., should be considered.

4. Examination of methods

a)

i) Inventories: These are comprehensive lists of environmental effects and impact indicators orientated to providing the analyst with the necessary elements for an adequate diagnosis of the possible consequences of the projected actions.

ii) Matrices: They are lists of human actions crossed with lists of impact indicators. Both lists are related on a matrix that may be used to identify (up to a certain extent) cause-effect relations.

iii) Flow-charts: Flow-charts are used to identify action-impact relations. This method is more suitable for single and relatively small-scale projects since the flows may become so large that this method may not be practical. A simple example may be the case illustrated by Figure 6.

b) Methods to forecast the magnitude of effects

All forecasts of absolute and relative magnitude of effects and impacts are based on conceptual models that simulate the workings of the universe. For this reason, they are not susceptible of classification due to the enormous

range of possible alternatives. Assuming that the problem is well formulated and that it is not too complex, it is possible to use scientific methods to arrive at useful predictions. There are no adequate methods to the values of qualitative variables. These are generally estimated or, at least, delimited by means of indicative levels such as degradation, no change or improvement of environmental quality. Another possibility is the use of qualitative ranking scales (1-5/5-10/10-50/etc.)

c) Methods to forecast the magnitude of impacts

Once the effects of an action proposal have been estimated, the next step is to decide whether the effects are significant. There is one group of impacts which is easy to estimate. It is those impacts for which there are standards, criteria, codes, regulations or objectives. The rest has to be estimated by means of qualitative procedures which may be based on some of the following action modalities:

i) Opinions of the decision-takers;

ii) Opinions of specialists (ecologists, experts on geography, hydrology, agronomy, urban planners, sociologists, etc.)

iii) Historical precedents;

iv) Public opinion (as recorded by opinion polls, open local council meetings, etc.).

d) Methods to compare impacts

i) Individual indicators: They consist in the development and calculation of values for individual impact indicators. This permits to prevent the problem of synthesis of decision in a reduced set of compact indices. The qualitative picture of aggregate impact may be derived from these data.

ii) Ranking: It consists in ranking the alternatives into impact categories. It is the hierarchical classification of alternatives into groups

of impact indicators. This permits to determine which alternatives have a less adverse (or more beneficial) impact on the largest number of indicators. The indicators are not assigned a weight and, therefore, total impacts cannot be compounded.

iii) Standardization and weighting. In order to compare numerically the indicators and to obtain aggregate results for each alternative, the scales of the impact indicators should be expressed in comparable units. For this, it is necessary to select an objective allocation method. Finally, a weighting methodology may be necessary to obtain an aggregate index that allows for the comparison of alternatives. This may be achieved in different ways:

- By means of tallying the number of impacts (negative/insignificant/positive) and adding them up by class;
- When the impact indicators are expressed in comparable units, equal weighting may be assigned;
- Assigning a weight according to the number of people affected;
- Assigning a weight according to the relative significance of each impact indicator.

e) Communication methods

It is necessary to avoid misunderstanding or ambiguity because of the use of scientific jargon or little used measurement scales. It is also necessary to state in an explicit way the criteria and assumptions used in connexion with value judgements and balances. Along the same line, the affected sectors should be identified as clearly as possible.

f) Control methods

Once an action has been carried out, the environmental quality may drop below the standards designed due to the following factors:

- An incorrect or incomplete impact evaluating;

- A natural deterioration of the environment (earthquake, drought).
- An accident (fire) or structural fault of a component (rupture of a duct).
- Human error (discharge of oil off-shore; faulty use of a pesticide);
- Error in design (insufficient safety margins)

Control procedures should always take these possibilities into account and include periodical check-ups of equipment, safety procedures and regular monitoring procedures.

Notes

- 1/ We based this definition specially on: David W. Pearce, ENVIRONMENTAL ECONOMICS. Longmans, 1976.
- 2/ See: Lester B. Lave and R. Sesking, AIR POLLUTION AND HUMAN HEALTH, Science, August 1970.
- 3/ See: Nicolo Gligo and Jorge Morello, NOTAS PARA LA HISTORIA ECOLOGICA DE AMERICA LATINA, in O. Sunkel and N. Gligo (eds.), ESTILOS DE DESARROLLO Y MEDIO AMBIENTE EN LA AMERICA LATINA. Serie Lecturas N°36, Fondo de Cultura Económica, Mexico, 1980.
- 4/ For a summary of the challenges of the future see: Robert Allen, HOW TO SAVE THE WORLD. STRATEGY FOR WORLD CONSERVATION, IUCN/UNEP/WWF, 1980.
- 5/ See, among others: Amory B. Lovins, SOFT ENERGY PATHS. TOWARD A DURABLE PEACE, Penguin Books, 1977. For a Latin American example, see: Osvaldo Sunkel and Sergio Alvarado, ESTILOS DE DESARROLLO, ENERGIA Y MEDIO AMBIENTE. UN ESTUDIO DE CASO EXPLORATORIO, Estudios e Informes de la CEPAL N° 28, E/CEPAL/G.1254, July 1983.
- 6/ Two key EIA works are: R.E. Munn (editor), ENVIRONMENTAL IMPACT ASSESSMENT. PRINCIPLES AND PROCEDURES, SCOPE 5, Second edition, John Wiley and Sons, 1979; y C.S. Holling (editor), ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT, IIASA 3, John Wiley and Sons, 1978.

VII. COST-BENEFIT ANALYSIS

1. Environmental protection measures

The measures for the protection of the environment are orientated, in the last place, to optimize social welfare. In other words, their objective is to make society move towards a situation involving a higher level of welfare on its way to an optimal level. This optimal level will depend, among other factors, on a certain level of environmental quality. The optimum means that when a certain level of environmental quality is reached, this cannot be improved by additional environmental measures. Although this optimum is a theoretical concept, which is unattainable in any real socioeconomic structure, its search conforms the dynamics of the whole process of assessment. In this context, the problem of application of a cost benefit analysis (CBA) will respond precisely to this need to act in terms of optimization patterns.

As has been stated before, the reason that moves the implementation of environmental protection measures is that economic activities imply a (past, present and/or future) deterioration of the environment. This involves a certain cost to society on account of having to recover, maintain or improve the quality of the environment. This cost is closely linked to the damages that the environment has suffered or may suffer as a result of the production or consumption activities. This has been called environmental damage and its corresponding costs are environmental damage costs. In this context, the purpose of production measures is to reduce or eliminate environmental damage, within the framework of a pre-established environmental policy, i.e., a socially defined level of environmental quality. 1/

However, the implementation of a measure like this will necessarily require the use of resources. These also conform a set of specific costs which are generally called environmental measures costs, since they only appear when the

possibility of implementing corrective measures to the damage is considered.

These two basic categories, environmental damage costs and environmental measures costs, can be considered as the starting point for the evaluation of environmental measures by means of CBA. These are two very general categories, but they permit to differentiate between the two main branches of negative resource flows - among them, monetary costs - of the environmental measures: flows linked to the reduction or elimination of environmental damage and flows linked to the implementation of these measures. These categories are very useful because they permit to differentiate from the outset, the most important costs which are present in all decisions concerning environment. These categories should be considered in different ways at the moment of tackling the process of calculation and estimation of costs and benefits for a specific measure. It is precisely in these cases when the environmental categories and types of measures defined elsewhere become wholly significant.

However, environmental damage costs are generally considered as benefits since their reduction or elimination generally automatically result in an increase in social welfare. This is valid for all the categories of measures described above, except for the measures for environmental improvement, in which environmental damage does not necessarily exist. What does exist in this case is an improvement of its quality which is a direct benefit in that the capacity of the environmental functions increase. In short, environmental damage appear as benefits in terms of damage eliminated or prevented.

This approach works the other way round in the evaluation of projects or activities that involve potential environmental damage. In these cases, the costs of future damage associated with the project appear as real costs to be considered negatively in the process of evaluation of that project or activity.

The optimization process in terms of social welfare has not been exhaustively treated by the cost and benefit categories described above. The considerations on environmental quality and global quality of life add other factors to be included in the process of definition of costs and benefits. We can, thus, mention the existence of other cost and benefit categories which are not directly linked to environmental problems proper, but that are either favourably or unfavourably affected by protection measures. In other words, the fact of moving from the framework of partial balance - exclusively in terms of the effects of the measure - into a wider framework involving other aspects of social welfare introduces another group of costs and benefits whose purpose is to determine the supposed relationship that exists between a certain level of environmental quality and social welfare.

It is necessary to point out that, in many cases, it is possible to use some type of macroeconomic calculation as a substitute for environmental calculation proper. Thus, through the concept of willingness to pay on the part of the consumers - in this case, to pay for environmental protection - it is possible to estimate in an indirect way some cost benefit relations of any protective measure. At all events, given the ambiguity and the imprecision of the concept, its usefulness is doubtful from an operative viewpoint, although its use, integrated to other categories of costs either directly or indirectly quantifiable, may contribute with important elements for the application of CBA.

From the above, it is clear that the search for optimization does not permit to restrict the process of calculation only to environmental considerations. It is also necessary to consider the more global framework of social welfare: environmental quality is one part of quality of life, an expression used to define a certain level of social welfare.

2. Considerations on cost-benefit analysis

Each of the environmental functions identified above have limited potential capacities, both considered individually and in terms of their interrelations, which may be used in different ways by society. Thus, the reduced capacity of these functions will necessarily imply a reduction in the quality of the environment. A decline in quality of life, economic welfare and social welfare will be the consequences of this deterioration in environmental quality. Furthermore, not only will present welfare be affected but also the potential welfare levels of future generations. The latter threat is due to the environmental effects of many economic activities.

This complex chain reaction is due to the lack of infinite and permanent availability of the goods, services and resources which are normally provided by the environment. These goods, services and resources are, precisely, the concrete products of the environmental functions described above. The fact that these goods, services and environmental resources are not sufficiently available is a consequence of the reduction in the capacity that these environmental functions should have in order to satisfy the social needs. In this way, the deteriorated environment becomes a threat for consolidating a sustained economic and social growth in the long term.

From the above we can derive that the handling and management of these functions is not merely a problem of methodological tools, but an essential issue in environmental economics. It is this issue that underlies any discussion on evaluation methodologies, as is the case of CBA. In other words, the economic problem may be formulated by stating that the environment has certain basic functions and certain limited capacities, all of which should be efficiently used. These capacities have been used by societies throughout Man's history on earth,

which has been done, in many cases, with disastrous consequences. The cause has been the ill and anarchic use of these capacities, which have been taken to be unlimited. This has been further aggravated by the use of systems for the evaluation of these capacities, which have turned out to be highly unsuitable to deal with environmental goods, services and resources, i.e., the products of environmental functions. A key element to explain this situation has been the assumption that the environmental functions have an infinite capacity and that, therefore, their products may be considered as free goods, services and resources.

Considered from the perspective of a scientific management of these functions, the objective of the protection measures is to induce the voluntary and controlled change in these capacities, in those cases in which these have been reduced or are in danger as a result of human activity. All the environmental alterations of a negative nature (pollution, exhaustion of natural resources, destruction of the landscape) or of a positive nature (reduction or elimination of damages, rational use of resources, aesthetic improvement) generally involve important changes in the possibilities of use of the potential capacity of the environment. In this context, CBA appears to be a suitable methodology for the evaluation of the economic feasibility of the different alternatives open to the measures. This evaluation will make sense only if it is carried out in terms of the global objectives of society with respect to the use of environmental functions. Moreover, CBA responds to the need for ensuring a true economic effectiveness in the application of protection measures.

One of the main features of CBA applied to environmental measures may be observed here. The cost and benefit calculations should not be restricted to purely financial considerations, nor is it possible to restrict them to such cost and benefit categories as susceptible of direct quantification. CBA is by

no means the simple valuation of the monetary advantages of a measure. Such a perspective would disregard important factors which do constitute costs and benefits but which do not fit within the financial framework. It may be said that the definition of costs and benefits should be formulated according to the effects of the measures on the respective functions that need protecting, restoring or improving. And for this, it is fundamental to carry out a previous analysis of the specific environmental functions on which the measure will operate.

A valid question to ask is whether CBA is, indeed, the best way to tackle this kind of problems, particularly, in such cases as the advantages of an action for environmental protection or restoration appear to be clear and obvious from a social point of view. Nobody will have reservations on the fact that certain decisions tending to ensure a clean atmosphere, or water fit to be drunk or used for recreational purposes, or the conservation of wild life, or higher levels of sanitation, etc., are desirable and convenient options from the social viewpoint. On the basis of these considerations, a possible approach to the problem would be to consider environmental protection as absolutely essential and, therefore, assign it top priority, whatever the cost. The result of this, in terms of policy, would be that the society would have to implement all kinds of protection measures without paying attention to the consequences of these resource allocations or to the possibility of alternative allocations. Conversely, it is also possible to think that all the advantages of the aforementioned protection measures do not constitute a task to be socially approached. This implies that environmental protection is only one among other socioeconomic problems. Environmental protection should, therefore, compete for the use of the scarce financial resources of society, on an equal footing with the other allocation alternatives. The conclusion would be that if the protection measures are not financially profitable, these should be abandoned in favour of other allocations. Both positions are, obviously, wide

of the mark of the economic rationale and belong more in the fields of ideology or religion than in that of science. On the one hand, fanatical conservationism sees the environment as some kind of Garden of Eden, where such "immoral" considerations as economic calculations would be out of the question. This position shows nothing but disregard for the real fact of a country's shortage of resources, as well as for the political, social and economic constraints. Furthermore, this position may lead to the reinforcement of the traditional conception of environment as the supplier of free goods and services, which has been one of the main causes of the present state of deterioration of the environment. On the other hand, a simplistic attitude of indirect allocation via the invisible play of the market, which conceives the capacities of the environment as some of the many merely tradable goods and services, implies, in fact, a threat on the lives of future generations because of not considering the long term effects of actions that affect the environment, let alone the low feasibility of creating markets for these resources. It should also be noted that the present level of knowledge on environmental economic quantification is not sufficiently developed, for which reason these resources would enter the market in unfavourable conditions and, most certainly undervalued because of the absence of accurate price allocations.

Instead of these extreme positions, modern environmental economics stresses the idea that all the environmental goods, services and resources - at the level of all their functions - should have a market presence, i.e., a certain price, no matter whether this is not always very accurate. This price, however, should be controlled through some centralized mechanism or determined by planning. It would thus be possible to take into account the specificity of environmental problems and their economic consequences, as well as the global objectives of society in this connection. This seems to be of universal validity and the emphasis on market considerations or on planning will depend on the global

economic system that society has chosen.

From the above, we can derive that in order to arrive at the correct estimation or calculation of the costs and benefits of the measures, the prices corresponding to the goods, services and resources supplied by the environment should be known. Some of them will be susceptible of more or less accurate calculation; others will be mere estimates or will move within a range of highest and lowest values, and one part of them will continue to be considered intangible. However, the greater the level of quantification, the greater will be the chance of having real cost and benefit categories for the evaluation process. 2/

3. Environmental costs and benefits

In order to give some guidelines for the evaluation process, it is possible to propose a basic set of categories that may facilitate tackling the problem of calculating costs and benefits. These are elementary categories aiming at the widest possible coverage of the whole range of options for the definition of the said costs and benefits, without aiming at these categories being considered as a strict model.

In keeping with the foregoing propositions two global categories of costs may be used as a starting point for analysis: costs of environmental damage and costs of environmental measures. These categories have not been intended to provide any direct quantification, but are useful to separate into two streams economic effects from measures in the evaluation process.

1. Costs of environmental damage

For the analysis of environmental damage it is useful to differentiate between two types of costs: direct costs and indirect costs. This classification responds to the need to identify the costs corresponding to specific negative

effects, which act directly on an environmental function and the costs resulting from indirect damage caused by these effects in other functions.

a) Direct costs of environmental damage

These costs are related to the damage generated by the presence of negative agents acting on an environmental function, e.g., pollutants or waste; overexploitation of natural resources or waste of energy; marginal settlements or noise, etc., with reference to specific environmental functions.

b) Indirect costs of environmental damage

These costs appear because the negative agents may cause other damages in the environment which may result in additional costs for the prevention of greater damage: the pollution of rivers renders them useless for recreation; overexploitation of woods provokes erosion and creation of wasteland; lack of urban planning "uglifies" cities and depresses their inhabitants.

This category of costs generates the first category of benefits: a reduction in the costs of environmental damage. In this way, the benefits of environmental measures may be visualized, basically, in terms of a reduction on the damages or threats to environment as a result of past, present or future economic activity. This is valid for the application of CBA to all the types of environmental measures. A different case is that of investment projects which may or may not have important effects on environmental functions. In these cases, the evaluation process must look for a way to introduce potential future costs into the categories of costs used in the process of evaluation of the project as well as the environmental benefits that may be derived from these projects.

2. Costs of the protection measures

As was pointed out above, there are costs that correspond to the study, implementation, operation and upkeep of environmental measures, which constitute a valuation of the series of social resources set aside for the application of

the protection measure. They may, therefore, be assimilated to public investment. Different classifications have been proposed to take these costs into account in the CBA. It should be quite clear that these costs do not generate any type of benefit as a counterpart, unlike the costs of environmental damage. A general classification of these costs may be the following: 3/

a) Costs linked to the reduction or elimination of damage

i) Regulation and control costs: These costs are the result of activities to determine which capacities of the environment should be used and the amount of use permitted (regulation costs). These are also costs that result from the control of the application of the measures (control costs). These costs do not necessarily imply a regulation activity proper, but may only mean the setting up of general rules or norms for the use of environmental capacities. Therefore, regulation may mean not only establishing the limits of discharges, but also a specific policy orientated to the protection of the material or energy resources or to the regulation of a recreational area. The control activities appear to be essential for an adequate administration and direction of the environmental policy.

ii) Financial costs: These costs are, basically, the opportunity costs of the alternative uses of the resources dedicated to the measures. Their nature is eminently financial and they are not related to specific consequences of the measures concerned.

iii) Costs of research and information: these costs originate from the research, teaching and information activities orientated to improve the social knowledge on the importance, need, and effects of the alterations of the environment. These costs may also be determined for those types of measures that do not derive from environmental deterioration, but which correspond to a social aspiration of environmental quality.

It should be pointed out that the three types of costs listed above are basically incurred by the highest levels of the country's organization structure, i.e., the levels of national, regional or local authority. In other words, they correspond to the government and other expressions of the national administrative organization - ministries, regional governments, municipalities, etc. In general, no relevant cost of this type will be directly imputable to individuals.

b) Costs orientated to increase environmental capacities

i) Restoration costs: These costs correspond to expenses incurred to restore the quality of a deteriorated environment. They are generally linked to restoration activities, for which they will be an important component of the cost structure. However, both the protection and the environmental improvement measures may have a restoration component, apart from the fact that in many cases, the separation between one and another type of measure is rather theoretical since many measures form part of a more comprehensive environmental policy, to which they belong, together with other types of measures.

ii) Costs of creation of new environmental capacities: These costs correspond to the creation of new environmental goods and services which are necessary for the implementation of a policy: creation of a national park, delimitation of exclusion zones for traffic; defining when a zone has become a desert; etc.

iii) Conservation costs: These expenses are incurred in order to permit the conservation of specific areas. They are linked to the types of costs mentioned above, but refer, rather, to the very activity of development and operation of these areas.

These other three types of costs, unlike the first types described imply direct costs both for the government and individuals. The latter must adapt their activities to the environmental norms fixed by the government. The

presence of the former or the latter type of cost in the costs structure will depend on the type of environmental measure under analysis. Thus, the types of costs described in b): i) and ii) do not generally appear in protection measures, but are typical of restoration and environmental improvement measures.

It must be added that the costs of the environmental measures presented so far are concretely generated at the level of the productive activities involved in the form of the normal costs items, i.e.:

- Implementation costs: These are costs associated with the installation of equipment or with processes for the control and treatment of activities that cause environmental alterations. They may be considered as costs associated to investments in machinery and/or equipment for the implementation of the measure. These costs may be of two types:

-Additional installations costs: Cost of equipment for the direct treatment of waste before its discharge, so as to make it less harmful to environment;

- Cost of new processes: These costs are associated with changes in productivity and/or quality of the product due to the development of processes that generate less deterioration.

- Capital costs: These are the computed financial loads such as the opportunity cost of the capital used for environmental control purposes.

- Operation and maintenance costs: These costs include the labour, materials and energy expenses incurred to provide assistance for the efficient operation of an environmental control team.

All the items listed above have to do with the expenses that each unit that produces discharges or makes use of scarce resources must incur in order to fulfil the requirements stipulated by the protection measures.

3. Social costs

These costs correspond to the reduction in welfare due to the damages

caused in the environment. Like the costs of environmental damage, these costs are generally estimated as benefits. They correspond to the social gains that appear with the increased welfare resulting from the protection, restoration or improvement of the environment. Once again, in this case, it is necessary to differentiate between environmental measures and projects that have environmental consequences. For the former, the social costs count as benefits - with the exception of those costs directly associated with loss of welfare due to the allocation of social resources to environmental protection. For the latter, the social costs will be costs proper, which will appear during the life-span of the project, including the fate of the installations once the operation of, say, an industrial plant, is over.

4. Benefits of environmental protection measures

Within the context of the categories of costs listed above, the objective of the protection measures is to prevent environmental damage. This originates the first set of benefits to be reached. Adhering to the division of environmental damage costs into direct and indirect, the measures for the reduction of direct damage should be orientated both to the reduction or elimination of possible damage and of possible costs caused by other possible damages. Along the same line, the costs of environmental measures imply that these measures should be implemented looking for a reduction of the costs involved in the said implementation process. All this implies that the benefits of the measures could be estimated as the resulting achievements in terms of environmental quality plus the reduction in cost to attain the said achievement.

As was stated before, the benefits of environmental measures may be defined as the reduction in the costs associated with environmental damage, plus the

social welfare achievements produced by these measures. Both types of costs - environmental damage and social welfare - may be calculated or estimated in monetary terms. Therefore, the monetary benefits may be assigned a value as the corresponding reductions in monetary costs. On this basis, it is possible to identify two general types of monetary benefits:

- Financial losses: These are the monetary values of the fluctuations of demand in the goods and services market due to changes in environmental quality;

- Loss of environmental value: The monetary value of the environmental changes that do not appear directly as changes in the performance of the market.

Both categories conform one of the best ways of tackling the problem of the monetary calculation of environmental benefits. It is clear, in any case, that these are indirect ways of calculating the costs of damage, which are practically impossible to measure in a direct way because of the absence of a complete system of prices representing the relative shortages of environmental goods, services and resources. In other words, the lack of a market for them does not permit their total estimation. In those cases in which some kind of effort has been made to internalize the changes in the environment and in which more or less reliable prices - or pseudo-prices - exist, a direct calculation should be attempted.

With respect to the monetary valuation of social cost as a social welfare achievement, this should be interpreted as social benefit, by means of determining and calculating the functions of welfare.

In the process of calculation and estimation of all these benefits and costs, both the long term and the short term effects should be considered. The definition of a deadline is essential in this process since many of the benefits are susceptible of appearing only in the long term. Thus, the definition of a

restricted period of time will necessarily involve that an important part of the possible benefits will not be included. Some specific characteristics of the environmental systems - such as synergism or the level of concentration of flows - may cause that negative values may be obtained in the economic evaluation in the short term. The result might be that the measure adopted may involve a cost for today's population and a benefit for future generations. It is necessary to stress the urgency of a greater accuracy in determining a time horizon for the evaluation process. As was pointed out, the results may be radically different depending on temporal considerations. In this respect, it is necessary to support the quantification process through resorting to some kind of analysis of the system. Another closely related aspect to consider is the stochastic nature of many environmental variables and parameters. The consequence of this is that it is very difficult to know exactly which are the true disseminated effects. Therefore, there is a clear need for carrying out the uncertainty and risk analyses of the main variables and parameters, as well as of the evaluation results. Although this has been said many times, it is necessary to emphasize the fact that the process of estimation and calculation is by no means direct or clear. It will be necessary to use supplementary analytic tools, which are not always required for the evaluation of other types of projects, in order to support evaluation.

The benefits should be evaluated in monetary terms to the maximum possible extent. This depends, on the one hand, on the possibilities offered by the knowledge of quantification techniques and, on the other, on the problem of having sufficient and reliable data to construct benefit functions. Both constraints may be insurmountable in many cases. Some of the benefits of environmental measures have been classified as intangible or immeasurable.

Despite the fact that these are true benefits, in the sense that they contribute to increase social welfare and quality of life, the corresponding amount is difficult or impossible to calculate. Some studies have been developed to improve quantification techniques but, it should be borne in mind that, in many cases, it has not been possible to arrive at fully valid results.

With respect to the problem of availability of data, this implies, on the one hand, the growing influence of uncertainty on analysis due to the constraint of having to rely on insufficient information, as well as the need to create an information system to support the decision-taking process. The experience of the last years in connection with environmental protection has shown that actually very little has been accomplished by operating in these conditions of low level of knowledge of environmental problems.

Notes

- 1/ For a fuller treatment see: OECD: Environmental Damage Costs, 1974.
- 2/ See Nicholas H. Coomber and Asir K. Biswas, Evaluation of Environmental Intangibles, Genera Press, 1973.
- 3/ Mainly based on K. Lidgren and I. Olsson, The Macroeconomics of Environmental Protection, 1978; and Johan Facht and Hans Opschoor, The Role of Benefit Evaluation in Environmental Quality, UNEP, 1978.

