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REGULATORY AND ECONOMIC INSTRUMENTS IN LATIN AMERICA AND THE CARIBBEAN

A summary of 18 studies

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Summary

The objective of these eighteen documents is to address the role that regulatory and economic instruments can play in reconciling environmental and economic policy in Latin America. The present strategy has failed to integrate the environment into development planing and is causing severe social and environmental problems in the region. Environmental costs have not been considered in policy projections nor do mechanisms exist for citizen participation, with governments forced into fire fighting emergency measures to solve environmental problems.

In the international arena one can identify seven basic types of economic instruments; a) Prices and costs, b) Subsidies, c) Deposit and Compensation systems, d) Market creation, e) Coercive financial incentives, f) Property rights, g) Fiscal incentives.

They are categorized as those tools which alter cost and benefit estimations of actions by economic actors, affecting their decision making and behavior. If correctly structured and designed they can work in favour of the environment. Unlike strict obligatory regulations, economic instruments allow individuals and companies the opportunity to react to determined stimulants in a beneficial way.

In general, economic instruments are generally utilized in conjunction with regulatory instruments. They are in effect a conciliatory bridge between private and social costs through the internalization of externalities, permitting greater production options, and a rational choice by consumers.

The overall conclusion of the analysis is that complex social, ecological and political conditions cannot be managed solely by control, command, or economic instruments, but a combination of these. The latter depends upon the ability to enforce regulations, and as a consequence some degree of political-administrative consensus, is needed as backup support. At least in most of the countries studied, the institutional and legal tools are now in place.

The document contains studies carried out in Argentina, Bolivia, Colombia, Costa Rica, Chile, El Salvador, Guatemala, Mexico and Dominican Republic.

SOCIO-ECONOMIC FORCES AFFECTING FOUR PROCESSES OF ENVIRONMENTAL DEGRADATION IN ARGENTINA.
Soil erosion, deforestation, loss of biodiversity and water contamination[1]

This document seeks to identify the underlying socio-economic forces behind environmental management in three distinct periods in Argentina; the seventies, characterized by an influx of foreign capital, the crisis of the eighties with rising unemployment, marginality, falling real salaries, a decline in food supply, health and housing, and structural adjustment in the nineties with a reduction of public spending, state reform, liberalization of prices and the economy in general.

The situation has led to high rates of rural and urban poverty, land and soil erosion, deforestation and loss of biodiversity, exacerbated by a short term vision which seeks maximum profits and fails to incorporate the environmental factor into the decision making process.

The kind of technology to be implemented has been left in the hands of property owners and large companies, whilst the participation of the state has been reduced, causing an increase in toxic wastes, land speculation, and deforestation as the agricultural frontier continues to advance.

There is considerable uncertainty as to the precise effects of technological packages upon the environment, and the social and cultural effects of a sudden change of cultivation from tradition to cash crops. The authors conclude that the wishes and desires of sustainable development in the agricultural sector given present tendencies are far from a possible reality.

Ironically the economy is characterized by an under-utilization of resources, only a quarter of the potential agricultural land is actually cultivated, the rest is undergoing erosive processes. Land ownership is notable for the persistence of the Latifundio structure which has been transformed into the neo-

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[1] Summary in English of the report "Fuerzas socioeconómicas condicionantes de cuatro procesos de degradación ambiental en Argentina. Erosión del suelo, deforestación, pérdida de biodiversidad y contaminación hídrica" (LC/R.1545, 30 May 1995), prepared by Mr. Jorge Morello and Ms. Beatriz Marchetti.

latifundio by way of the concessions and privatization deals recently offered by the state. The indices of rural and urban poverty and deforestation by mismanagement have increased as a result.

The absence of sufficient credit, and the de-capitalization of the farmer obliges them not to rotate crops, breaking the traditional and beneficial crop/cattle cycle. The neo-liberal policies in place between 1982-94 take on the following form:

- Systems aiming at high productivity and economies of scale.
- Restructuring of small and medium sized producers.
- Abandonment of conservation practices.
- More frequent ploughing with heavier machines accentuates degradation and erosion.
- Greater impermeability and more compact soils lead to more frequent flooding.
- The increase in unemployment has forced more workers into the informal sector especially in urban areas.
- Technological transformations aim to increase competitiveness and reduce labour costs.
- With the increase in farming contracts, environmental responsibility is more difficult to pinpoint, and the potentially high profits have attracted investors from other sectors.

These changes have led to serious environmental and social consequences. Neither large nor small producers have been able to control soil erosion, and the tenants have simply not been interested. One of the principal problems has been overgrazing with a view to make short term profits, fuelled by the tendency to rent land just for the season or for one harvest, obliging the tenant to devise ways of squeezing the maximum out of the land in the shortest possible time.

The small and medium sized producers suffer from under-financing, often forcing them to undersell their products even before they are sown. Changes in the destination of the land from the cultivation of domestic crops to those for the external market has been termed by the authors as "exporting fertility" which refers to agricultural exploitation for short term gains at the expense of soils and the environment in general.

The extension of the agricultural frontier for activities such as cattle raising is one of the main causes of deforestation. The replacement of the National Forestry Institute by merely an Environmental Secretary displays the derisory way in which the problem has been treated. Many of the most valuable native species have already been extracted and a replacement plan based on the introduction of exotic quick growing species is well under way. The projects are planned by highly mobile international corporations, dedicated to replacing native species with plantations to be managed on a perpetual basis.

The 26 national parks are invaded periodically by rural farmers and foreign immigrants looking for the most valuable strands to sell, or simply looking for fuel and cooking material. Deforestation is presently occurring at a rate of 89,000 hectares per year. The authors cite the lack of public investment to solve some of the most urgent problems of the sector such as infrastructure, energy, urban and rural roads.

In the seventies and eighties large tracks of native forestry were sold to facilitate credit and hence deforestation, structural adjustment policies started to limit these kind of sales and incentives, but the continued high profitability of the sector still makes it an extremely attractive investment. In the first two years it is possible to amortize the initial costs, but the two or three steps in the chain generally ignore the small producer and any traditional management techniques.

The most threatened species in Argentina are those with the highest commercial value, from hardwood trees, herbs, to rare orchids. The absence of credit and tax breaks has favoured large companies who are also best able to unravel the maze of regulations.

Many urban rivers are highly polluted, due to domestic, agricultural and industrial wastes, endangering the public health of the population, particularly the poor who tend to use water directly from these polluted sources. Only 65% of the 9000 industries in the metropolitan area have any kind of waste water treatment. There has been a dramatic increase in the use of fertilizers and pesticides which due to overuse or mismanagement often end up in water sources. These contamination problems have immediate health effects causing increased cases of hepatitis, diarrhoea and other stomach problems.

Wildlife has been sold and exploited on international markets often facilitated by low paid public employees, and the rise in rural unemployment. The challenge is to change the consumer mentality and to value the rural way of life, promoting participation in planning and environmental management.

To an extent the economy and indirectly natural resources are very much dependent and linked to the exterior. The necessity to gain foreign currency through exports can be understood by the increase in consumption (imports) and the need to comply with foreign debt payments. The structural adjustment policies designed to put the house in order and satisfy the external debt, has unfortunately accelerated the deterioration of natural resources.

The debt crisis faced by many rural farmers has forced them to sell land at low prices which is being bought by large firms and international conglomerates with the aim of growing cash crops or replacing native forestry eucalyptus or pine.

At the government level the environment has still not become a priority issue, local government is characterized by inter-institutional conflicts and poor dialogue.

In regard to legislation a new environmental institutional framework is under study to permit a more agile approach with working groups, and an adherence to the Environmental Federation Pact.

The incentives on offer do not favour conservationism, nor are companies and individuals likely to adopt these techniques whilst there is an unfavorable cost/benefit analysis. At present sustainable forestry techniques signify more time, labour and costs. There is even less incentive for sound management if the land is not owned by the producer/farmer.

Nobody is prepared to assume the costs of incorporating externalities into agricultural reconversion in the transition towards sustainable management, especially at a time when lobbying groups representing the private sector are growing in prominence and number. The dominant economic model in Argentina limits the size and spending of the public sector, which is ill equipped to tackle the mounting environmental problems, causing the population to become more disenchanted with local and national government.

The concentration of wealth and power is one of the most disingenuous achievements of structural adjustment, leaving a minority with a high quality of life and a marginalized majority unable to fulfil their basic needs and aspirations. The neo-liberal vision which is under full steam in Argentina assumes the market will resolve economic, social and environmental problems. This position is becoming more pronounced with continued structural adjustment and increased trade through the Mercosur trading block.

ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN ARGENTINA.
Diagnostic and proposal for the Province of Buenos Aires[2]

1. Use of economic instruments for environmental management in Argentina

The authors start by stating that in Argentina, a grand problem has been the inability so far to internalize environmental costs into the production process.

They then describe and itemize the legal and institutional framework of the country, giving a brief description of the general repercussions. They look at the legislation which has relevance to the environment, and list the laws associated with soils, forestry, and water resources, together with a description of the corresponding institutions, the economic instruments applied to date, and an evaluation of their environmental impact.

In regard to soils, the state has in the past provided credit subsidies, infrastructure and equipment encouraging non-sustainable development (which amounted to US$ 11.74 per hectare). As a policy shift, the economic instruments proposed are designed to encourage sustainable farming in fragile areas. They consist of credits and subsidies for the conservation of soils, and exemption from tax on profits during the first 5 years, in some critical areas the period is extended to 10 years, however the law and subsidies have only been partially applied to date.

The authors state the importance of involving producers and communities in initiatives as they are the ones directly affected by non-sustainable techniques. An integral evaluation of environmental and social impacts is not in place.

In regard to water, a programme is under way to counteract flooding in the northeastern province of Buenos Aires, a map showing areas of high risk is being elaborated, and the latest early warning technology is being installed. Tariffs are an

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[2] Summary in English of the report "Instrumentos económicos para la gestión ambiental en la República Argentina. Diagnóstico y propuesta para la Provincia de Buenos Aires" (LC/R.1542, 30 June 1995), prepared by Messrs. Héctor Sejenovich and Jorge R. Abraham.

economic instrument highlighted in the water law of 1993 which implies a higher cost for the user, but care must be taken to ensure that the whole population has access to supplies together with a conscientization program to promote correct water use.

The services lent by nature are not included into market calculations, leading to grave pollution problems. The authors stress the point of assigning a value to resources or the services that they provide, through the use of an economic instrument.

It is difficult -say the authors- to measure the success of legislation in support of the "polluter pays principle"; however, to date, they have not functioned very well. Fines have been too low to act as a disincentive to pollute, nor have they been efficiently monitored and policed, nor are studies available to the amount that should be paid. The results of the incentives have not been convincing: in the metropolitan area the rivers have become so contaminated with domestic and industrial waste that aquatic life is non existent.

In regard to forestry, the extra value that accrues to land due to a plantation is exempt from taxes. Exemption from taxes will also be available on investments in new forestry activity and forestry management, import of seed and other inputs and reduced transport rates, and subsidies for studies on conservation and management.

The credit offered covers up to 70% of the plantation costs and is paid over two years, between 1978-1990 322,232 hectares were planted with an average subsidy of US$ 706 per hectare, this is very high compared with the plantation cost of US$650-850 per hectare. This attractive rate is compensated by the uncertainty of how and when the subsidy would actually be paid.

The need for subsidies can be appreciated if one considers the long pay back period of forestry (10-30 years) and the possibility of higher returns in other sectors. It should be noted that alternative forestry products are not considered in calculations, nor the ecological services that forests provide such as river basin control, erosion and flooding prevention, and value to humans for recreation. Care must be taken on the use of exotic species because of their voracious appetite for nutrients and susceptibility to plagues and diseases due to high concentration of one particular species.

Industrial development as we know it necessarily causes wastes, and thus the challenge today is to reduce the quantity and toxicity of these wastes by slowly introducing clean technologies. The job of economic instruments is to accelerate this change.

There are difficulties with the "polluter pays principle" because ecosystems do not operate like banks. In other words past

a certain level of contamination ecosystems may become unstable or collapse, nor is it generally possible to return an ecosystem to its original state. For example, a forest which has taken thousands of years to reach maturity cannot be replaced so easily.

Furthermore the extra cost involved for the producer causes problems in the market. In some parts of Europe where the free market and freedom of choice exists by informed consumers, the system may work very well. In many developing countries, however, markets are seldom perfect, and are strewn with oligopolies and monopolies that determine prices.

2. Proposals of the potential use of economic instruments for environmental management and sustainable development

The type of markets in existence within developing countries range from free markets, to oligopolies and monopolies, which dictates the political economy and economic instruments which are more likely to work. The principal failures in markets have been defined by Theodore Panayotou as:

- Poorly defined or non-existent property rights.
- Resources without prices.
- Externalities.
- High operational costs.
- Public property.
- Existence of imperfect markets.
- Short term planning, and high discount rates.
- Uncertainty and risk avoidance.
- Irreversible consequences.

The authors conclude that an economic system is needed which adequately allows for the internalization of externalities. In terms of natural resources, research is needed into their qualitative structure, and how to manage them. Therefore the design of an economic system must start with an inventory of natural resources and their valuation, which can be broken down into three areas:

- Risk reduction value: A diverse and stable ecosystem permits greater security against sudden changes or natural catastrophes.

- Option value: A diverse eco-system permits greater options for the future that may not be important at the present time.

- Existence value: A diverse and healthy ecosystem gives security of food production, and its intrinsic value adds to human wellbeing.

In all cases the authors recommend the participation of the work force and social actors who are both initiators and recipients of any action taken, and that education has a key role in changing public opinion and general awareness of environmental issues.

BOLIVIA: DIAGNOSTIC AND POTENTIAL USE OF ECONOMIC AND REGULATORY INSTRUMENTS FOR THE MANAGEMENT OF RENEWABLE NATURAL RESOURCES[3]

1. Regulation instruments (Command & Control)

They signify obligation through laws, norms and standards, which require strict control and monitoring. They have been divided by the author into three types: standards of environmental quality, (emission controls, etc), permits and licenses, and land or water controls.

Standards dominate, and establish permissible levels of contamination, concentrations, or technological specification. Permits and licenses are used to support standards in the control of contamination and wastes. Land use controls tend to be centered around zoning for certain uses.

The advantages of regulation instruments is that the regulator can roughly gauge the expected reduction in contamination levels, and to an extent manage the behavior of polluting agents. For example the fixing of technological standards will encourage the use of clean technology.

The disadvantages are that the laws and norms are generally ignored by those who pollute, and they tend to be inflexible, static, and sub-optimal in efficiency terms, and offer no incentive to adopt clean technology or processes. They also carry a high monitoring and control cost which requires a solid institutional structure and technical staff, and information which is often expensive to acquire. The system is complex if contamination is caused by unusual sources, or it is sometimes difficult to place the blame on phenomena such as the ozone layer depletion, or global warming. The idea of emission tradable permits requires a strict record of all transactions, and it also assumes that the market for these transactions is perfect, which given the reality of monopolies and oligopolies is seldom the case.

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[3] Summary in English of the report "Bolivia: Diagnóstico y uso potencial de instrumentos de regulación y económicos para la gestión de los recursos naturales renovables" (LC/R.1533, 30 May 1995), prepared by Ms. Ximena Flores Palacios.

The experience in developed countries suggests that regulatory instruments work well when there is sufficient capacity to impose sanctions and fines, and where an adequate monitoring and control system is in operation.

2. Economic instruments

Some economists state that the inappropriate or non-sustainable use of resources can be attributed to market inefficiencies, that is, the true value of natural resources is not incorporated into the costs of production or in the prices of the products consumed. Some of the main market defects are mentioned below:

- Property rights are poorly defined or non-existent.
- Resources without prices, with a non-existent or precarious market.
- External effects.
- High transaction costs (such as information, vigilance) that affect exchange.
- Short term planning, and high discount rates.
- Uncertainty and risk aversion.
- Irreversibility.

Polices have been marked by failure due to inefficiency, underpricing of resources, environmental degradation, and poor administration, for example:

- Policies often fail to consider negative environmental impacts.
- Problems with land rights and policies.
- Problems with water rights, irrigation, and underpricing of this resource.
- Weaknesses in urbanization and industrialization policies, location and expansion.
- Industrial policy has encouraged free use of resources as an incentive to produce in order to create jobs, which in turn causes contamination through increased waste products.

Economic instruments are being promoted as a way to improve environmental management, using the market and minimizing state

intervention. The main tool so far has been the polluters pay principle, to integrate social and environmental costs. Negotiated permits and subsidies are other tools frequently used. Many economists believe that if the price of resources reflects their true costs then the market will regulate their use.

In the opinion of the author, the absence of property rights encourages short term mining of resources rather than their sustainable use. Prices should also give the right signals to encourage the efficient long term sustainable use of resources. However:

- The market for resources must be competitive.
- There must be no difference between the private and the social discount rate.
- All the significant externalities must be internalized through the establishment of property rights which must be clear, assured, exclusive and transferable, and fall within three types:
  - i) Land titles with water and mineral rights.
  - ii) Rights of use such as licenses, concessions, usufruct certificates, and access rights.
  - iii) Development rights (distinct from the above)

Rights are easier to fix in the case of static resources but more difficult in the case, for example, of river contamination caused higher up the river, from activities such as deforestation. Asserting property rights does not only mean that land must only be privately owned, but can coexist side by side with public or community rights, always when there is clarity in the rules.

In order to create a market for resources several steps must take place. First of all the authority must establish environmental quality objectives, then environmental quality is defined in terms of total permissible contaminants. Emission permits or exploitation quotas are then issued, based on technical criteria such as carrying capacity, which if necessary can then be exchanged or sold (depending upon necessity) between polluters. In theory, if the market is competitive, the cost of introduction will be minimal.

In some cases such as clean air, the author suggests creating artificial scarcity, so that the permits acquire positive value. Negotiable participation is necessary where the resource is invisible or difficult to quantify such as freshwater, or fish stocks. In this case each user can be allocated a percentage of this common resource which can then be used or sold. Another method is to allocate exploitation rights to individual fisherman in the

case of fish stocks, so that the total of rights equals the calculated sustainable exploitation rate. Rights can also be transferred to other areas, which is useful in the case of fragile zones where any kind of exploitation could prove ecologically disastrous.

3. Fiscal instruments

Taxes on emissions permit companies to decide how much they are prepared to pollute so that the marginal cost of this reduction in pollutants equals the tax. The funds collected could be invested in environmental and conservation projects, however fiscal instruments have a high monitoring and control costs, and often stipulate the use of clean technology. Critics point out the lack of incentives in this system.

User charges may be applied for the collection of wastes, which is normally charged at a fixed price. Taxes on products are similar to effluent and waste charges but permit the polluter to look for the most cost-effective way to reduce contamination. These administrative charges are a way of recuperating the costs of applying environmental regulations and controls.

Positive discrimination encourages consumption of non-contaminating products, and discourages consumption of those that contaminate, such as reduced taxation on non-leaded petrol.

Subsidies can be used to encourage behavior or production of those products which have a positive effect upon the environment, and should be removed from products which do it harm, such as agro-chemicals, and subsidies for forestry clearance.

Finances are often received from abroad for specific causes such as debt reduction schemes linked to the environment, which may require the setting up of a separate entity to manage the funds, which has occurred in Bolivia.

Insurance schemes may operate where a company may insure itself against environmental damage. The greater the risk the greater the premium. This has the advantage of guaranteeing the availability of replacement resources in case of accident. Such schemes are very popular in the mining and forestry sectors.

A deposit charged on some products at the point of sale such as beverages or car parts, will encourage the return of bottles or used parts thereby reducing contamination (old car batteries for example).

4. Advantages and disadvantages of economic instruments

The advantages are that they provide the government with a source of income, encourage rational use of resources, allow flexibility in the type of technology used to control contamination, and promote the use of cost effective mechanisms to reach acceptable levels of contamination.

The disadvantages are that they reduce direct control and therefore are less predictable, requiring a set of standards with adequate institutional and managerial capacity for monitoring and control. Economic instruments need to be carefully calculated so as not to encourage even more contamination; therefore, expert knowledge is needed, particularly of the firm's costs. Otherwise, the system will function strictly by trial and error.

5. Diagnosis of regulation and economic instruments, and their use in the management of renewable resources

At the present time in Bolivia, investment decisions fail to consider environmental costs and benefits, government decisions are taken along sectorial lines, and no environmental management policies are in operation. In response, a combination of regulatory and economic instruments are being considered.

Even though some partial advances have been made based upon existing regulations, their proper enforcement and monitoring is difficult, and they tend to be sector-based, which precludes intersectorial cooperation and the proper integration of development planning.

The new environmental law gave birth to an environmental ministry; however, after two years, environmental impact evaluation rules and environmental quality controls are still being discussed.

In each sector a revision of old and new laws is proposed, in order to reach appropriate environmental management. In addition to the modifications to each sectorial law, a territorial ordering is being prepared by the environmental ministry, which is collecting experiences of various government departments financed by international aid. Environmental impact assessment rules are being discussed, together with an audit of mining stocks.

6. The application of economic instruments in Bolivia. The case of renewable natural resources

Economic instruments cannot be applied without sufficient monitoring and control, which is why they must work in parallel with regulatory controls. For example, the establishment of clear property rights is a precondition for the application of economic

incentives for appropriate land use. At present, of the 36 million arable hectares in Bolivia (the rest is jungle), 32 million hectares are in the hands of companies and 4 million in the hands of small farmers. Apart from the unequal distribution of land which is morally questionable, insecure property ownership encourages short term exploitation and works against sustainable practices.

The author suggests that agricultural subsidies need to be eliminated because they have unfairly favoured large landholders, and that progressive land taxes have also favoured large landholders over small producers. There is a need for an efficient land registry as a first step in opening up a land market.

Land tax laws are being revised to mark the difference between arable and non-arable terrain, but no distinction is made between agriculture and forestry land.

Government subsidies are offered to increase domestic production and consumption. The availability of credit, however, depends on title to land and the lucrative nature of the product (normally for export), which is uncertain due to world price and climate fluctuations. In small farm areas the author recommends public irrigation investment, commercial infrastructure, rural roads, and technical assistance.

Forestry policy has been far from clear, and irregularly applied in practice. Here are some examples:

- Tax exemptions on new forestry plantations and forestry products.

- Concessions are favourable to those who can demonstrate financial solidity, technical efficiency, and industrial diversity, that is to say large companies.

- Exemption of import taxes on capital equipment, chemicals and seeds used in forestry exploitation.

The government declaration that the large extensions of forestry are state property (even though they may also have individual owners), together with the uncertainty over their true price, has accelerated rather than halted forestry exploitation. Titles can be assured if productive activity is evident, such as deforestation, where a plantation of inferior biodiversity replaces rich natural forests.

The poor definition of appropriate forestry management, unclear property rights, and poor human welfare planning, fail to adequately address the environmental management question. As a result, serious conflicts exist in rural areas between colonizers and indigenous groups. Coherent conservation policies are far from developed and in their preliminary phase.

The new environmental law stipulates the need for credit, fiscal, technical, scientific incentives without being more specific or suggesting where they might be obtained. Unfortunately economic incentives have so far not been used.

The irrational use of water resources is partly caused by insecure property rights. Deforestation in upper river basins has caused severe flooding problems downstream with subsequent agricultural losses. Clearly the multiple use of river basins has not been sufficiently examined.

The application of economic instruments in these areas has been inconsistent. The law stipulates their need, but they have not been appled. Irrigation water, for example, is used freely with no intention of considering it a scarce resource. If water is priced at near zero, then over irrigation and salinity are likely consequences in some areas, and scarcity in others. A new water law is proposed.

7. The effects of economic and regulatory instruments in Bolivia

The author points out that macroeconomic policies are not neutral in respect to the environment, and recommends a study to evaluate their effects.

During the fifties a current of thought promoted migration to overcome overpopulation in the altiplano, to kick start production and development, and provide consumers. Unfortunately this policy has caused ecological and social problems associated with the need for services and increasing tendency towards deforestation.

8. The potential use of regulatory and economic instruments for the management of renewable natural resources

These instruments must be linked to a clear vision of the destiny of renewable natural resources, which at the present time are deteriorating in an accelerated way, and producing an economic, social and environmental dilemma, which apart from putting a brake on development, is destroying the base of the economy.

If the government wishes to accept proposals for sustainable development then it must take local and regional differences into account.

Given that the economy is very much based on natural resources exploitation, efficient management of these resources is of paramount importance but faces a series of difficulties:

- No organization exists for centralizing information concerning natural resources.

- Resources have only been researched, evaluated, and itemized in a partial way.

- Organizations connected to the environment are not interconnected to permit a more integral vision of the ecosystem. In general, they work with secondary source material except when required for a specific programme or project.

Well designed economic policies coupled with sound management can be compatible with environmental sustainability. Nevertheless the implementation of economic and regulatory instruments requires a series of pre-conditions:

- Insecurity over property rights must be resolved.

- Externalities need to be internalized.

- Market incentives need to be accompanied by appropriate legislation.

- Management must address the ecosystem and the services it provides as a whole and not just individual products.

- The environment needs to be valued in social and ecological terms.

One must add that prevention of environmental damage is cheaper than reparation, direct regulatory controls should be both qualitative and quantitative and exercised through improved legislation and institutionalization.

Economic instruments should be designed to use the market and "induce" polluters and environmental users to change their habits and production systems. Among these instruments are fiscal incentives such as subsidies, credits, tax relief, preferential interest rates, periods of grace. Taxes can be used to increase the price of some resources, and the proceeds could be re-invested in conservation programmes.

9. Proposals for environmental policies that include economic and regulatory instruments

The fixing of priorities towards sustainable development should be based on the information available, so that the costs and benefits of intervention can be carefully evaluated. It is also indispensable to identify and include administrative aspects and levels of public participation. Based on this information, the

government must decide what grade of sustainability is right for the country in economic, social, and ecological terms.

The chosen policies should reflect the true value of natural resources and correct the bias of the market. Instruments should be cost effective and utilize the existing administrative system, which needs more accurate information and professional evaluation. Opening up channels of communication with other countries would facilitate a rapid and mutually beneficial interchange of information. It is also important to carry out a revision of current legislation to ensure that decisions and instruments proposed are supported by the law.

The author recommends increased public and private investment together with improved technology (preferably clean). Moreover, the environmental variable must be incorporated into mainstream planning, and intersectorial impacts considered. A set of clear criteria must be present within institutions, inviting international cooperation towards sustainable development that does not clash with national interests. Public participation in decision making should be encouraged, along with human resource training and development, institutional coordination mechanisms, internalization of costs, and the promotion of an environmental ethic within the general population.

POLICY AND ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN BOLIVIA. General overview[4]

This paper on economic instruments for environmental management in Bolivia gives an overview of production, credit, investment, science and technology, institutional support, and analyses general policy aimed at conservation. The first part of the paper looks at renewable resources, particularly soil use, concentrating upon agricultural policy and economic instruments to recover public investment and environmental management in productive areas. In the next part the author studies environmental sustainability in the forestry sector and then bio-diversity in general. He concludes by calling for an integral approach to natural resources in all the areas discussed.

In the first instance, the author states the importance of defining conservation policy guidelines in order to achieve sustainable development. This must be done by starting with the productive sector in order to internalize social and environmental aspects.

For effective environmental management it is necessary to include the social and environmental value of resources which up to now have been considered free goods. Through the use of economic control instruments, the aim of production should be towards efficiency with a tendency to increase the aggregate value of products and to satisfy the internal market, whilst substituting imports and encouraging exports. All this must be done using natural resources in a rational way.

A suggested strategy is to first amplify the rural agricultural productive base and integrate small rural producers into the productive chain, substituting imports and creating exports using appropriate technology, together with rational land use planning.

Investment and credit policy should be designed principally to help the agricultural sector and their different areas of

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[4] Summary in English of the report "Políticas e instrumentos económicos para la gestión ambiental en Bolivia. Visión global" (LC/R.1532, 30 May 1995), prepared by Mr. Juan Carlos Chávez.

production. Policy instruments should be designed so that production is self-rejuvenating in regard to the use of natural resources. Investments should be aimed at areas rich in resources with selective participation by the state, motivated by domestic and foreign capital with the aim to:

- Increase efficiency of environmental management.
- Develop a participatory planning system and improve institutional cooperation.
- Provide methodologies and systems for environmental management.
- Design a technological policy to improve national and international competitiveness and profitability whilst implementing environmental management plans.
- Improve technical capacity of public institutions to promote local and regional development.

The state should play a central role in spreading technology, coordinating institutions, reducing costs, and improving efficiency with appropriate technology. Therefore public institutions should be coordinated and properly trained in intersectorial communication that involves all the actors in the development process.

1. Soil recovery: policy instruments for the agrarian problem

The discussion of soils must be placed within the wider context of land use. The problem of land rights is reinforced by the free market and must be resolved at the legal level to establish clear rights and security for their rational application.

The author calls for changes in land legislation and institutional structures with policies to resolve the minifundio and neo-latifundio problem (farm estates). Laws need to reflect the new emphasis on socio-economic development towards the goal of sustainable development, which requires an institutional framework for its implementation, coordinated by a central coordinating body. He calls for research into intensive farming for long term, rather than short term gains.

2. Forestry resources: policy and instruments

The policy objective should be to halt the loss of endemic species and to increase the aggregate value of products from natural resource exploitation. The author calls for:

- Equitable access to resources.
- Incentives and simple sanctions.
- Rational control in keeping with the capacity of the state.
- Integral management of ecosystems as a whole.

Sustainable forestry management can only take place when the forest is viewed as part of a complex ecosystem and not just as an isolated product, therefore planning must be related to land use, with legal incentives and local management. The following are proposed:

- Greater clarity over ownership to help assess forestry concessions.
- Forestry management plans.
- Forestry auditors and new forestry laws.

The new institutional arrangements would be responsible for: research, training and extension, management plans, conservation management, with special attention given to small property owners.

3. Conservation of biological diversity: policy and instruments

The objective is to preserve productive capacity in the long term for the national and local population, because biological diversity ultimately forms the basis of the economy, and is essential to maintain the quality of life of the population.
The author recommends:

- A system of protected natural areas.
- Institutional capacity to manage the above.
- Legislation to protect objectives.
- Develop scientific technological capacity to enhance the sustainable use of renewable resources.
- Improve human resources in this area.
- Develop ecotourism for the benefit of local people.
- A centralized information system.

- Direct participation of local people in management and conservation.

4. Integral focus of river basin resources

Land classification and listing is important as a planning instrument for the achievement of sustainable development in river basins in order to permit:

- The orderly use of renewable and non-renewable resources.
- Integral use of territory.
- Implementation of a national water plan through government departments and councils.
- Institutionalized management of information and appropriate technology.
- Information system of land use.
- Define legal boundary limits.
- A digitized national mapping system.

The national planning system should be supported by national territory planning for the optimal use of lands.

Development in Bolivia is based upon natural resources requiring innovative and precise planning methods in order for development to be sustainable. For this reason it is necessary to clearly define and categorize natural territory to overcome limits of the old planning system. The new system must be simple to use and must take advantage of the experience gained to date in territorial planning of underpopulated areas. Comparing information from different sources permits an identification of similarities which will assist analysis and planning, and will be more cost effective.

AN ANALYSIS OF THE SOCIO-ECONOMIC FORCES BEHIND ENVIRONMENTAL MANAGEMENT. Bolivian experiences[5]

1. Non rational use of natural resources

The unsustainable use of natural resources represents the loss of long term development potential, and this is very much the case in Bolivia particularly in regard to renewable resources.

They are affected by over and under utilization, inappropriate technology, the nature of public investment, insufficient infrastructure, poverty, and a lack of public education.

The irrational use of resources also explains the lack of productivity when they form part of the production process. In order to cover the internal and external demand for wood, for example, forests are exploited irrationally, destroying large extensions of flora and fauna for a few prime strands. What is extracted (only about 50%) is utilized for chips, and little attention is paid to the value of other alternative forest products.

Forestry exploitation in Bolivia is also characterized by a lack of management and integral planning which is reflected in the supply and quality of freshwater, and soil erosion. A great uncertainty exists over the rules of the game, in administration, state policy, and financial trust.

2. Low levels of private investment in the use of resources

Exploitation is governed by the use of short term forestry exploitation rights granted by the state, who receives a percentage payment for wood extracted. The short term nature of the concessions (over 5 or 10 years) motivates investors to seek maximum rentability in the shortest time possible, reinforcing the extractive mentality. These contracts are open to abuse, as the

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[5] Summary in English of the report "Analisis de las fuerzas socioeconómicos subyacentes tras la gestión ambiental. La experiencia boliviana" (LC/R.1534, 30 May 1995), prepared by Mr. Juan Carlos Chávez.

state is ill equipped to ensure that they are strictly kept, and there is always the possibility of corruption.

The indigenous peoples have been directly affected by the irrational exploitation of the forest, providing cheap labour for wood extraction (and classifying the best species), without receiving any benefit from exploitation. Traditional land rotation has been largely stopped, indigenous knowledge and management techniques have been largely ignored.

3. Legislation and policies that motivate the non-rational use of resources

This area is characterized by sectorial legislation, which the state is in no position to enforce. Agrarian expansion since colonial times has used inappropriate techniques on fragile soils, leading to erosion and a fall in fertility, accelerated by the abandonment of traditional systems. The desire to satisfy the needs of a growing population through the agrarian reform led to parcelization of land and low productivity. Chaos over land rights means it is possible to find two or more owners of the same piece of territory. The Agrarian Reform Law changed land structure and led to a new process of intensive and indiscriminate use of resources.

The individual small farms were bled dry of resources forcing the rural population to encroach upon the native forestry using inappropriate technology which quickly exhausts the soil. The forestry law has been converted into an instrument of exploitation, the colonization initiatives were undertaken with a lack of forethought and planning.

4. Inappropriate technology and education for the management of natural resources

The lack of appropriate technology and education are the major obstacles for the appropriate use of resources, along with low levels of processing technology and scientific research.

The implementation of low levels of technology in the forestry sector necessarily means there is very little aggregate value in forestry products. According to the author, large companies have the capability to apply appropriate technology, whilst small landholders are not in the same position causing problems such as soil erosion and increased migration to urban centers. Education has been highly influenced by an inappropriate development model and fails to teach the rational use of natural resources.

5. Low levels of factor productivity

The productivity of natural resources has been characterized by the extractive nature of resource use since colonial times, leading to mono crop production and selective exportation of raw materials, marked by political instability and a short term rent seeking approach.

The weak economy has been dependent on external markets; forests have been exploited in an uncoordinated and destructive way, with complete lack of land and resource classification which would form the basis of any kind of management. This weak productive structure is subject to changes in world markets and demand, with the constant threat that capital may be transferred to other more lucrative areas of the country or transferred abroad.

The extractive nature of production is unsustainable with minimal productivity and diversification of production, and a complete disregard for resource replacement. They are used without considering their true potential, permitted by a lack of norms, conservation, or clean technology, and the lack of an institutional framework.

One of the difficulties is measuring the value of other alternative uses of forest products which are sometimes used in traditional medicine and whose worth is extremely difficult to calculate.

Below present exploitation criteria, only tree species of high value are worth extracting showing the low value attached to forests and bio-diversity in general (51% of Bolivian territory is covered by forests). In recent years there has been an increase in non-traditional exports, which may reflect an increase in material exported but not an increase in aggregate value. Deforestation is also affecting the quantity and quality of freshwater.

Internally there have been a number of problems: a lack of clear rules for medium and long term investments, lack of codes for access to natural resources, and political and social impasses over access to land rights, all of which motivated investors to look for the largest profit at the smallest risk, even if it means the non-rational use of forests.

Since the middle of the eighties, Bolivia has become the world's number one exporter of wild animals, but without generating funds for biological research. Demand for genetic material and germoplasm is increasing, but this material flows abroad rather than being used for internal research.

6. Ownership and land access

The existing laws are characterized by their inapplicability distorting appropriate environmental management. The principal problem with the land reform law is that the land has to be shown to be used in a productive way, or else it can be repossessed by the state. In the case of forestry, this means that the only option is to cut clear or lose the land.

Despite the agrarian reform law, there is a marked lack of homogeneity in the size of farms and properties. The inequality of distribution inhibits the application of a coherent management plan, and rural property is not considered creditworthy by financial sources.

The allocation and conditions associated with exploitation rights are slanted against the sustainable use of forestry. They are inflexible and encourage short term and illegal cutting, therefore forestry investors need an opposite set of rules currently in existence. There is a lack of resources for institutional management for the appropriate use of land, lack of studies and integral action, as, for example, in the construction of roads into frontier territory.

The expansion of the agricultural frontier has occurred in an unplanned and unsystematic way causing environmental problems and social conflicts particularly with indigenous groups. Bureaucratic obstacles to the concession of their land rights remain, leading to survival tactics rather than long term concern for the land.

7. Low investment levels

Public investment in recent years has been targeted principally at non-renewables and road building, demonstrating a lack of interest in sustainable use, and low investment in research and development. Resources have not been allocated under the criteria of sustainability nor has planning been projected further than the short term.

The lack of environmental management incentives has isolated social and economic processes, leading to conflicts of interest and poor coordination. One of the biggest problems in improving the amount of aggregate value and improving environmental management is the lack of human resources.

8. Territorial planning

Approximately half the territory is covered in forest marked by ecological fragility and is deemed unsuitable for migration purposes. There is a lack of technical ability and institutional

capacity for the definition of a territorial plan. National planning is depicted by a lack of an integral vision of the territory and a lack of knowledge of the forestry resources. At the moment, forestry concessions are granted on the basis of this incomplete knowledge.

The lack of proper resource management has encouraged opportunism and rent seeking behavior. Furthermore there is no inventory or evaluation of resources, which are viewed through selective criteria identifying species of high value without viewing their integral function as part of a wider ecosystem.

9. Existing institutional framework

The Bolivian institutional structure is obsolete and characterized by its centralized nature. Despite institutional reform in 1993, the impacts have still not permeated to the administration of natural resources. Institutions complete their tasks along purely political lines, laws have been passed, but are without the necessary economic or technical instruments.

Decisions have been taken unilaterally backed up by isolated actions. The lack of coordination inhibits administrative and management capacity of resources and biological diversity. A wave of corruption has contributed to the non-rational use of resources. On a final positive note, a program of protected areas is presently under study for the country.

ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN COLOMBIA[6]

This document opens with the declaration that there are many common forces which affect bio-diversity, water, surface, and forestry resources in Colombia. These are identified as: inadequate legal and institutional structures, economic undervaluation of natural resources, lack of transparency in markets for the introduction of subsidies, difficulty in obtaining clean technology, and the lack of coherence in state policies.

A description of these trans-sectorial forces is given below followed by an analysis of how these forces manifest themselves differently in each productive sector.

1. Trans-sectorial forces

In terms of income, poverty has been steadily reduced in Colombia this century. This positive tendency has been more visible in urban areas which has opened up the so-called rural-urban divide.

The dynamics of environmental deterioration is closely associated with social marginalization and poverty. Under these conditions, to satisfy basic needs, resources are overexploited. As a consequence, a vicious circle develops where inequity is both cause and consequence of environmental deterioration. This phenomena is demonstrated by encroachment upon biologically rich areas, and exploitation of the most valuable resources and replacing them with unsustainable farming practices. This process is exacerbated by low levels of rural education.

2. Institutional problems

Environmental management in Colombia faces a series of institutional problems. The legal framework and institutional structure was formed at the end of the sixties and does not

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[6] Summary in English of the report "Instrumentos económicos para la gestión ambiental en Colombia" (LC/R.1530, 26 May 1995), prepared by Messrs. Manuel Rodríguez Becerra and Eduardo Uribe Botero.

correspond to todays social and environmental conditions, for example:

- Responsibilities are widely dispersed between regional and national entities.

- Conflict exists between the different entities responsible for environmental management.

- Conflicts of interest within these organizations, whose remit is the rapid development of their respective sectors whilst at the same time conserving resources. For example, the Mining Ministry must promote mining development which has taken precedence over conservation; consequently mining activity has continued with the most minimal environmental controls.

- Limited authority of environmental bodies to act, as they are often part of other ministries.INDERENA for example is based within the agricultural ministry which has been promoting irrigation schemes, marsh drainage, forest colonization, whilst it is supposed to control these very same activities.

- The need for a national environmental entity to coordinate management of the regional entities.

- The need for a national environmental authority to defend environmental interests against the various actors who tend to view environmental aspects as a minor complication that should not affect the viability of their project.

- Political centralization which fails to consult local communities.

- Lack of participatory channels to allow groups to air their views.

- Local mayors cannot define or influence policy in regard to environmental projects planned for their area, because local taxes are sent to centralized headquarters who then decide which projects to implement. Thus the mayor cannot respond to local requests and concerns.

- Insufficient financial resources for environmental concerns, as the corresponding entities have to compete with other government ministries for their share of funds.

- The heads of environmental bodies are directly chosen by the president leading to an unacceptable level of

political bias in the selection of personnel and instability of technicians and experts.

- Existence of coercive mechanisms of environmental control which are difficult to enforce, easy to evade and open to corruption.

- Lack of control and economic instruments designed to promote clean of technology for a healthy environment. Despite this, there appears to be a willingness on behalf of the private sector to voluntarily adopt these measures, whose permanence will depend on how they affect competitiveness.

- Absence of environmental authorities in zones rich in bio-diversity such as Amazonia.

In December 1993, the government passed a new environmental law and established an Environmental Ministry, and new regional bodies based on INDERENA. Its objective is to devise appropriate economic instruments, and open channels for greater community participation. Many of the above problems are being addressed by the ministry.

3. Undervaluation of resources

Colombia is rich in natural resource and therefore gives the impression of plentiful supply. Nevertheless, recent rapid economic growth has taken its toll, due to exploitation at greater rates than replacement, as externalities are not included in the costs of production or reflected in prices.

The fact that resources are considered infinite, without an owner, leads to the idea that natural resources do not have a value. The system of forestry concessions has been poorly designed, is not controlled, and is susceptible to pressure from the productive sector. Forestry resources belong to the state and due to ineffective control are considered free goods, and thus future generations and poor Colombians have been subsidizing present economic growth.

The state is the principal owner of forestry lands and has allocated exploitation concessions based upon the market value of the wood. These rates are applied to the volume of wood extracted, and not on the concession, which is a disincentive for the rational use of resources, because it is not important how many trees are destroyed to extract one of high value.

The norms and laws in existence have impeded the development of an efficient and modern forestry industry, able to utilize the resource in a sustainable way. Obsolete and artisanal methods have

been promoted which have perpetuated conditions of poverty, corruption and evasion of taxes.

The internalization of environmental costs has been made more difficult by government subsidies targeted at sensitive areas such as petrol, electricity, and agricultural inputs. They are generally short term emergency measures which cause social strife when they are removed and increase environmental contamination. When the costs of using natural capital and the opportunity costs and depreciation are not included in the price structure, there is a transfer of capital to those who produce and consume, so that the rest of society and future generations are subsidizing this production and consumption.

4. Technology

There are various public and private institutions in Colombia dedicated to diffuse science and technology, supported by universities. However there are a number of difficulties; their articulation and integration is almost zero, human and financial resources are widely dispersed, and investigation does not run in harmony with national development due to poor communication channels between investigators and users.

Many environmental problems can be associated with inappropriate technology which tends to be more cost effective in the short term. For example, if coffee is grown under agro-forestry conditions it is less damaging in environmental terms using biological and culture control, but less competitive compared with using more environmentally damaging techniques. The environmental costs of this latter system have not been internalized which gives it the competitive edge.

In the industrial sector the stimulus for change to cleaner and more efficient technologies has come from the market. Nevertheless the open economy tends to displace environmentally friendly technology in favour of others which are more productive but with higher environmental costs, especially in the agricultural sector. On this basis, competition between technologies is unfair.

5. Incoherent state policy

Traditionally the design and implementation of policy and regional and sectorial projects has been characterized by weak coordination and integration. For example, it is common for a project in one region to cause negative environmental impacts in another, or that the goals of the manufacturing sector are affected by the goals of the energy sector. EIA's have been the only tool available so far to induce environmental planning but they have been viewed as

merely a bureaucratic hurdle before obtaining permission to proceed.

Environmental costs have not been considered in policy projections nor do mechanisms exist for citizen participation, with the government choosing fire-fighting emergency measures for the most pressing and obvious environmental problems.

The challenge for the new law is to find a real and effective integration between the environment and development. At least the institutional and legal tools are now in place.

6. Analysis by sector

Colombia is widely covered by forestry, and therefore the expansion of the agricultural sector is almost certain to impinge upon bio-diversity. This tendency is becoming increasingly difficult to justify due to marginal or negative increases in social benefits. By the middle of the sixties the best agricultural lands had been occupied; the governments of this epoch began to encourage colonization of forested areas, with the provision of credits and subsidies for agricultural inputs, and the building of roads.

The comparatively low production levels in these areas, combined with high social and environmental problems, show high inefficiency in the use of human and natural resources. The destruction of forests and bio-diversity is generally accompanied by acidification of soils, and contamination of water sources.

Studies show that farming in these fragile zones was only made feasible in economic terms by the granting of government subsidies; once these disappeared, profits declined and the government had to step in and subsidize prices to maintain public order. Thousands of small farmers turned to illicit ways of making a living such as poaching and deforestation, which has concentrated wealth in the hands of a small group of traders.

Colombia incorporated green revolution technology into production in the seventies, but the high doses of fertilizers and pesticides cultivated dependency and increased environmental and health problems.

The failure to internalize environmental costs into the price structure is without doubt a major contributor to degradation by subsidizing production and using damaging technologies, such as large amounts of pesticides and fertilizers to increase production with low prices. Furthermore international competition from countries producing under different conditions of mechanization and high volume further complicates the competitiveness of small producers. In addition green markets or environmental standards

have become another way of limiting access to foreign markets, and could be considered as disguised trade barriers.

Medium and small sized mines have had the most damaging impact on the environment because large mines normally incorporate more modern technologies. Control of the sector has been in the hands of the ministry which has been trying to promote development, and the volume of material extracted rather than the application of environmental controls. This duality of roles has led to some grave problems. Gold mining for example utilizes rivers and streams by washing huge quantities of silt and dirt, and then adding mercury to fix and identify the gold. This process is hugely contaminating. Cleaner technology is available on world markets but is not used, because environmental costs are not internalized creating a disincentive to use clean technology.

Eighty percent of the energy generated in Colombia is hydroelectric, which is relatively cheap, clean and renewable. The only problems have been in the construction stages, with a lack of consideration for environmental and social factors.

Colombian industry developed behind protectionist policies until the start of the nineties, illustrated by a reduction in growth figures after the economy opened up to international competition. Due to obsolete techniques, production is highly contaminating. Around 30% of air pollution in the cities comes from industrial sources, and these wastes affect urban health. The most competitive industries are those introducing modern technology.

Even though much of the environmental legislation is in place, there is a lack of institutional capacity for its application. It is hoped the new Environmental Ministry will be able to fill this gap.

7. Actual and potential physical and non-physical measures for environmental management in Colombia

The passing of environmental legislation in 1993 and the creation of an environmental ministry are important milestones for environmental management in Colombia. The law establishes command and control regulations and opens channels for popular participation. It also adjudicates over the administration of national parks and the national environmental fund, environmental licenses (very effective so far in the new oil fields), monitoring and research. Of the 34 regional entities planned, 18 are in operation, with the objective of promoting regional autonomy in the area of environmental management.

8. Economic instruments for environmental management

The new law demands the incorporation of environmental costs and the use of economic instruments for the correction of environmental deterioration, for restoration and for the conservation of renewable resources.

As a result of these changes, a share of land taxes must be used for environmental purposes and can be fixed between a minimum and maximum by the local council. Assuming a 15% base rate for 1995, this will amount to US$ 45,283 and for the period 1995-98 US$ 181,016,000. The problem with fines is that they rely upon institutional and technical strength for their monitoring and collection, although this can be partly overcome by concentrating on particular problems.

The law also demands a contribution from the hydroelectric companies in the order of 6% (of sales) which is destined for environmental purposes. The main difference with the old system is that these contributions will be collected by the administration of the regional environmental corporations instead of being managed by the private companies. There is also a maximum of 10% tax on vehicles for the control of vehicle emissions, and 1% of the income received from Value Added Tax (consumer tax) will also be used for environmental purposes.

9. Fiscal incentives

The opening up of the economy and the new laws are forcing industry to upgrade their technologies and consider the environmental factor in industrial planning. The government is encouraging investments in control and improvement of the environment with a maximum of 20% reduction in profits on taxes. For example, exemptions are available on the sale of equipment for the treatment, control and recycling of wastes.

There are various incentives to encourage community participation such as the National Environmental Fund, Amazonian fund, and Eco-fund. Four other economic instruments should be examined:

- Economic sanctions: direct fines calculated on a spot basis.

- Forestry incentive certificates, which cover up to 75% of the costs of starting a native species plantation, or up to 50% with introduced species; these percentages are also applicable to maintenance costs.

- Mechanism to finance waste water treatment programmes in the three main cities: Bogotá, Medellín, and Cali,

financed from waste collection charges and a loan from international sources.

- Eco-tourism in national parks, which represent 8% of national territory, will be promoted by an arm of the ministry with a 500% budget increase. The authors stress the importance of incorporating local people into the scheme so that they may directly benefit from the increased income.

A wide range of fiscal and non-fiscal instruments are available at national and regional level to promote environmental management. Furthermore with the support of precise legislation, these funds that become available cannot be used for any other activity except that stipulated. Above all, the success of these instruments really depends on the efficiency and capability of the ministry, its 34 regional corporations, the 4 entities for the main cities, and the 5 research centers.

10. Case studies: charges, community forests, property and ideologies

The objectives of forestry use seem diverse depending from which angle one views the resource. The productive private sector finds it difficult to understand the necessity of conservation. However the new constitution explicitly recognized the need for its protection, whilst maintaining ethnic and cultural diversity.

Since 1973 various economic instruments and measures were taken to improve productivity in the forestry sector, and to combat various problems such as: low quality of life particularly for smallholders, lack of training and education, difficult climates and topography, deforestation and colonization.

The state should collect between 12% and 46% of profits depending on the efficiency of technology used: the above cited problems mean that the state only collects US$ 1.5 million annually. This, coupled with the allocation of property rights to settlers and indigenous groups, demonstrates that the prospects for these kind of charges in Colombia are limited.

The evasion of payment is due to various factors: the large quantity of concessions granted and their isolated locations, low fines for defaulters (US$6 irrespective of volume moved) corruption of the authorities, use of fraudulent documents to move wood. A study by Motta (1992) based on the actual demand for wood, estimates that evasion is equivalent to 130% over the amount collected.

The agriculture ministry sponsored a group of private and public sector officials to carry out a study of forestry

concessions. One of the conclusions is that charges for forestry exploitation should not be based on purely profit based criteria but also on the volume of wood extracted and the kind of technology used. Nevertheless, the difficulty of access and the increase in guerrilla activity has made it very difficult for the state to control illegal exploitation and collect charges.

The general conclusion of the analysis is that complex social, ecological and political conditions cannot be managed solely by control, command, or economic instruments. The latter depends upon the efficient operation of regulations, and as a consequence an ideological-administrative consensus as backup support. The objective must be to reach a political agreement to establish economic instruments and technical assistance directed especially at colonizers, forestry companies, and ethnic minority communities to change actual damaging practices and tendencies.

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ENVIRONMENTAL MANAGEMENT IN CHILE.
The relationship between development policy, soil erosion, loss of biodiversity and the deforestation process[7]

Environmental management in Chile has had an inconsistent history, and throughout, the relevant public, private and social sector actors have taken essentially isolated roles. The environment as a consequence is characterized by inefficient legislation and enforcement. Only recently has the state attempted to promote and encourage sectorial coordination.

During the eighteenth and nineteenth centuries the only preoccupation was over which natural resource would replace the previous one as the motor of economic growth rather than any concern for the environment. This occurred as a result of the dominance of the scientific paradigm which only considered natural resources if they directly affected levels of production.

The author states that true environmental management is only possible when policy originates from within society, and the benefits of a well managed society must accrue to the community as a whole.

1. The national health service and the environment

Interest in health and the environment started in the nineteen forties and fifties terminating in a government commission to study the subject. Through these initiatives, Chile built one of the most extensive water and sewage systems in Latin America supported by specialist technical schools centered around the principal productive processes, i.e. mining.

2. International concern and the environment

International concern for the environment has been demonstrated by the Stockholm conference in 1972, and the Antarctic treaty for example. The latter is perhaps the only area where Chile has

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[7] Summary in English of the report "Gestión ambiental en Chile. Relación entre las políticas de desarrollo y los procesos de desforestación, deterioro del suelo y pérdida de la biodiversidad" (LC/R.1544, 30 May 1995), prepared by Mr. Luis Alvarado.

approached environmental management with a wider view incorporating policies, legislation and administration supported by an institutional structure.

During the early seventies, little emphasis was placed on the Stockholm or other subsequent meetings. The military government from 1973 onwards adopted free market ideology which espoused non-intervention in the market. As a consequence environmental problems have accumulated over two decades. The democratically elected Aylwin government created an institution for decontamination in Santiago, but unfortunately decision-making power remained within the relevant sectoral ministries.

3. Public environmental institutions in Chile

The National Ecological Commission (CONADE) was formed in 1984 by a group of ministers designated by the military junta to examine environmental concerns. The institution turned out to be a political tool to give breathing space for a government in crisis during this period. No environmental law was passed by the commission.

In June 1990 the new government created CONAMA (National Environmental Commission) with the objective of designing environmental policies. There was resistance from other government ministries and institutions. Actually, the law that was passed had to be first negotiated for 18 months in parliament with businessmen, interest groups, and within the state itself. As a result, CONAMA was designated a coordinating role (as, for example with Environmental Impact Assessments) rather than given authority in itself.

The role of CONAMA can best be illustrated with examples. In 1991 a new fishing law was proposed as a result of over-fishing due to free market conditions which threatened to collapse fish stocks. Rather than protect the environment the new law aimed to merely control and regulate exploitation. Furthermore, when a new fish processing plant is proposed, CONAMA only coordinates the corresponding environmental impact assessment (EIA).

A new forestry law is still being debated after three years in parliament. The large chip companies have tried to show with technical arguments, that native forests are over-mature and ripe for harvesting. The author of this paper stresses the importance of taking a more global view of resources and their management before more forests are clearcut.

Decentralization has been a key policy of the present government creating Regional Environmental Commissions (COREMAS). Their main role has been the coordination of EIA's. At the regional level there are also Regional Advisory Commissions whose role is to

promote economic development creating an obvious conflict of interests. In turn, issues are often referred back to CONAMA's central office thereby reversing somewhat the decentralization process. This is just one example of the institutional conflicts that have been created which also damages the image of environmentalists.

4. International commerce and the environment

The Chilean economy is based on the exploitation of natural resources with little value added, which has been responsible for severe environmental problems. The blame cannot be attributed to the external market, but to internal policy, and the lack of public institutions dedicated to the proper maintenance of the environment. This serious situation threatens to become worse if Chile eventually enters NAFTA or other free trade agreements, in which case the only control instrument will be the market, where the only brake on exploitation, environmental quality certificates, may be used as new forms of trade barriers.

5. People and the environment

Environmental management in Chile has been disharmonious, irregular and historically inconsistent. The key actors, the state, companies and citizens, have taken a highly individual and sectorial approach, and only recently has the state taken a small lead.

Organizations which have legal representation have the right to inspect the outcome of EIA's and protest the results before the regional governor. It is theoretically possible to directly approach the mayors, but in practice this seldom happens, causing friction. The author concludes that true environmental management is only possible within a well organized society where environmental protection is viewed for the common good.

6. Structural diversity and sustainability of the chilean economy

In early modern history, Chile became a staging post for trading ships wishing to take advantage of the rich wealth of natural resources they encountered on route. Resources were soon exploited for shipbuilding, exports and later agriculture and urbanization. European immigrants fueled the process utilizing wood, resins, and growing wheat.

The main production unit in the south and central Chile was the "hacienda" or large estate which organized an extensive if not efficient use of natural resources. A transformation in productive structure took place in the 1940s and 1950s, motivated by the

demand from emerging agro-industries which required greater quantities of raw materials and increased efficiency.

The land was sold and put into more intensive use employing fertilizers and hybrid seeds, the long term ecological effects of which are still to be ascertained. In the lakes region the combination of grass and woodlands was in a sense sustainable, because trees were felled to make way for another economic activity, which lasted until the era of forestry plantations.

7. Modernization and sustainability

In this document sustainability refers to the productive use of the environment without destroying the resource base (in the case of renewables) and the intelligent use of resources (in the case of non-renewables).

The incorporation of biogenetic engineering in the pursuit of increased yields ignores the natural capital upon which the economy is based. Export agriculture has transformed the countryside and traditional work practices, and the use of chemicals has created dependency on suppliers and created environmental and health risks.

Whilst production techniques have been modernized, labour relations and contracts have remained firmly in the past. The zone between the Maipo and Bio-Bio rivers was once a strong wheat producing area, which after a boom period declined sharply due to world market and local ecological conditions. This degraded zone has since been transformed by forestry production, becoming rich once again, but at the same time creating a new stratus of rural poor.

Growth in this area as in much of Chile is precarious, dependent on world market conditions and prices, ecological fragility, and backward labour relations. This form of development is extremely worrying because it forms an insecure base for self development, based on the criteria of profitability and not sustainability.

Forestry has become the most important export sector after copper; at present there are 1,200,000 hectares of plantations, and by the end of the century 2,000,000 hectares are projected. The exploitation of the sector is highly concentrated in a few hands which helps explain why the new forestry law is still to be passed after three years.

8. Soil and water resources

Pressure on soil and water resources comes from a number of sources: deforestation, desertification, contamination. The

underlying conflict is nearly always between productive and social interests and the quality of the environment nearly always suffers.

Mining for example exercises a strong demand on water supplies at the expense of agriculture and local communities causing immigration to urban areas. In the north, the Escondida mine produces the cheapest copper in the world, but uses water to transport minerals across 100km of the world's driest desert. The cost of water is not considered in production, and not by chance the cost of water in nearby urban centers is the highest in Chile.

In the III region the competition between agriculture (mainly grapes) and mining is very strong, with no state mechanism to resolve these conflicts. In the IV and V regions the main problem is desertification which started long ago in the nineteenth century after intense wheat and cattle production, and the use of timber for mining.

Recovery of the zone depends upon the availability of water and the possibility of building small dams, but the zone is characterized by periodic droughts, themselves partly caused by the desertification process, thus completing the vicious circle.

In the central region, the competition is between agriculture, forestry, and hydroelectric dams. The recent change in productive structure has caused changes in land ownership and brought environmental problems. The fruit industry is a large user of chemicals, and increased use of bioengineering poses the risk of chemical reactions in the environment, requiring further intervention to cure man-made faults. The widening circle of chemical cocktails eventually ends up in water supplies.

In the southern region the conflict is not necessarily over the quantity of water, but over access, which is a common problem in Chile and is governed by property rights.

Forestry companies have taken advantage of the low price of land and the subsidies for forestry plantations offered by the last government. Much of this land was previously used for wheat, but with its collapse, the land prices fell. In the Arauco region, many indigenous people sold their land to forestry companies and became a source of cheap labour on land they once owned.

Deforestation is a problem which primarily occurs as a result of industrial needs, although wood is also burnt for heating and cooking, and forests cleared for cattle grazing. It is estimated that 1.5 million hectares or 20% of the total area of native forestry has been extracted by selective cutting using market criteria affecting the fauna and recovery prospects. This timber has been used for wood chips and other uses with minimal aggregate value incorporated.

In the mountainous coastal region of Valdivia, 50% of the native forest has been replaced by plantations. The accompanying cellulose factories are usually situated on river banks where they consume large amounts of water and dump the waste product (essentially chlorines) back in the river which is then used for irrigation by farmers further downstream. Plantations of exotic species do have a positive impact on already eroded soils, but this advantage is cancelled out by clearcutting which leaves the soil unprotected for short periods. They also consume more water. According to studies of river basins where there are now plantations, there is a 30% drop in water availability in Summer.

Unfortunately in nearly all cases each actor acts for their own benefit and not for the wellbeing of others or the environment, and the state after two decades of neo-liberal policy is not in a position to rectify the situation.

In the X region the traditional woodland/grazing combination is under threat from plantations, and problems have also arisen with salmon farming in which Chile is the world's second largest producer. The waste food from fish farms, and waste from the processing factories threaten water quality.

9. Biological diversity

Biodiversity offers future services to mankind such as drugs and uses yet to be discovered. For example, the Magallanes forest has survived and prospered in very harsh climatic conditions, and thus its study could prove worthwhile for other areas of harsh climate. Regrettably this potencial wealth has been ignored and genetic material has already found a path to northern country laboratories.

ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN CHILE. DIAGNOSIS AND RECOMMENDATIONS FOR IRRIGATION WORKS, SOILS, BIO-DIVERSITY AND THE FORESTRY SECTOR[8]

Economic instruments to regulate environmental use are increasingly being applied in developing countries. These experiences show that the market, adequately regulated and utilized, can be used to satisfy environmental concerns.

At the present time in Latin America, the transformation of natural resources into productive goods is frequently encouraged by subsidies and financial incentives causing a direct reduction in bio-diversity. There are many schemes to reduce bio-diversity, and very few schemes to conserve it, which from the economic point of view is not very efficient.

Concern for sustainable environmental management has arisen parallel with Chile's recent export led economic strategy which is based on the exploitation of natural resources. The opening up of the economy has without doubt kick-started the economy but the private sector has until now only considered the environment and ecological issues as obstacles in their way. This policy has aggravated and initiated severe environmental problems.

1. Conceptual framework

Normally some controls exist on emissions, but in addition to controls and regulations, there is a need for economic incentives, now popular in developed countries. Unclear property rights tend to create negative externalities; if ownership were clearer, negotiation between exploiters and those exploited could take place.

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[8] Summary in English of the report "Instrumentos económicos para la gestión ambiental en Chile. Diagnóstico y propuestas para el recurso forestal, las obras de riego, el recurso suelo y la biodiversidad" (LC/R.1539, 30 May 1995), prepared by Messrs. Vladimir Hermosilla R. and Alejandro Royo D.

2. Instruments

In Chile, a number of economic instruments have affected the state of natural resources in a positive and negative way, these are:

- Law 701: subsidies for forestry plantations.
- A 50-85% loan for the cost of irrigation projects and of pre-factibility studies.
- Subsidized credit to small producers through INDAP along with technical assistance.
- Sales of state lands guided solely by market criteria.

3. Legal apparatus

Environmental legislation in Chile has traditionally been linked to specific sectors: forestry, agriculture, etc. The new government set up the National Environmental Commission (CONAMA) in 1992, and they proposed the new environmental law which was eventually passed in March 1994. The current tools of environmental management are: education, knowledge and awareness of the environment and environmental problems, Environmental Impact Assessments (EIA's), with CONAMA acting as central coordinator assisted by the regional offices (COREMAS).

4. Rural development objectives

During the military government, rural development policies were directed at the external market, with the aim of exploiting resources to satisfy external demand. The government of Patricio Aylwin attempted to incorporate small producers into the productive chain, with a series of incentives and programmes directed by INDAP. Under Eduardo Frei, more research and greater institutional building has been carried out, with the objective of re-vitalizing rural life and discouraging migration to urban centers. However there is still a lack of direct policies that go beyond EIA's and consider ecological or genetic resources.

5. Forestry controls

45% of Chile's surface area is suitable for forestry activity, and many areas have very rapid growth rates. There are 1,600,000 hectares of pine and eucalyptus, and 7,600,000 hectares of native forest. The first forestry law dates back to 1931, but the most important legislation was passed in 1974 with law DL 701, which limited state involvement placing the sector almost completely in private hands. Various incentives were offered to entice domestic

and foreign capital, such as tax breaks and guarantees against expropriation. As a result the following occurred:

- Increased number of plantations.
- Atomization of the workforce and social conditions.
- Damage to rural and cultural life.
- Changes in property ownership - greater concentrations in wealth.
- Direct negative ecological effects.
- Modified shape of the rural sector.

Forestry products constitute 12% of exports (1993) and between 1980-93 the average growth was 5.8%. The main products are wood pulp, chips, sawn wood, and chipboard. The majority of these products are characterized by a minimal amount of industrial processing.

Rapid growth in the sector has certainly improved economic indicators, but there have been a number of deleterious social and environmental consequences. Socially, it must be noted that only the large companies were in a position to benefit from the incentives offered because:

- The subsidy can only be recovered a year after planting on condition of a 75% survival rate, which means small and medium firms need to have access to soft credit.
- In view of the long term investment, small and medium sized companies are discouraged from investing.

a) Ecological conditions

Chile, due to its special geographical characteristics possesses every variety of ecosystem except for tropical forest. Forestry sector law Dl.701 reduced genetic diversity, and through plantation activities is causing problems with soil and water contamination with the use of pesticides. The main plantation species in Chile is pine (95%) which is economically stable but ecologically unstable, and little research has been done into alternatives.

Traditionally many Chileans have lived contentedly in forest areas, but this idea of rural tranquility has been steadily lost as forestry companies surround smallholders and buy up their land. Since 1978 150,000 hectares of native forest have been replaced by plantation species, with no value allocated for other forestry products, or the value of scenic beauty.

On the other hand, native forest in Chile covers 6-7 times more surface area than plantations, but contribute only 3% to production. Forests are divided into three categories, the first is classified as prime untouched forest which is very rare and legally protected, but the second and third are under attack from forestry and chip companies. Today plantations exist on degraded soil with high production using modern techniques.

On the negative side, forestry activity should not only be viewed from the economic point of view but ecological as well. The assumption to date is that the economic benefits of forestry exploitation outweigh the ecological and social costs.

Law DL. 701 increased exports, and as result, associated industries developed, but with marked socio-economic impacts, with few advantages for society as a whole or the environment. Ironically economic growth failed to halt increasing rural poverty and increased inequality.

Forestry companies should not only view their activities from a profit and loss perspective, but should also consider social equity and environmental sustainability. As a rule, plantations should be targeted at uncovered zones as a complement to native forestry and not as a substitute. Research should also be carried out into plantations of native species, although modification of law DL701 by the new government does allow for the inclusion of some environmental and social parameters.

6. Analysis of subsidies as economic instruments for private irrigation schemes

Given the fact that most of Chile's agricultural production takes place within the central zone corresponding to it's Mediterranean climate, one of the principal agricultural problems is the lack of water, which is essential for the zone's productivity.

Since 1914 the state has had a key role in irrigation planning, apart from the period 1973-89 during the military government which drastically reduced direct public spending, from US$60 million in 1973 to US$15,3 in 1974 and yet, despite free market policies, ironically offered subsidies of up to 75% to private investment.

In 1994 the Frei government opened up the scheme to small businessmen and community groups through INDAP offering help with pre-factibility studies. US$500 million has been earmarked to irrigate 50,000 hectares by the end of the century. Furthermore other works are planned such as:

- A large government public works programme, organized through state institutions.

- A medium sized public works programme, partly financed by the World Bank.

- A small works programme, organized through INDAP/FOSIS (Fondo de Solidaridad y Inversion Social).

Within the agrarian sector, the differences in agricultural policy between the Frei government and the military regime are pronounced:

Between 1986-89

Beneficiaries: Average size of plot	=	385 hectares
Amount allocated per person	=	US$ 39,000
No. of beneficiaries	=	877

Between 1990-93

Beneficiaries: Average size of plot	=	4 hectares
Amount allocated per person	=	US$ 1,100
No. of beneficiaries	=	33,481

From the above one can conclude that there has been practically a reversal in policy. Primarily, changes to the irrigation law have helped reverse inequity and are now helping small/medium sized producers.

The government also offers help with pre-factibility studies with the criteria that there must be local input without negative environmental impacts. The criteria put forward is interesting for the number of non-economic elements incorporated. Nevertheless greater importance should be placed on environmental issues within all the stages of the project.

7. Current and proposed land management in Chile

A 1979 study by IREN analyzed land and soil erosion, indicating some severe problems in various parts of Chile. The IV region has the highest amount of fragile areas (74%). The greatest soil loss, however, however, occurs in the IX region. Degradation in this document refers to overall decay in the environment that produces several negative effects. Measurement of soils is essentially qualitative and quantitative referring to:

- Reduction in depth and volume of soil.

- Reduction in water retention.

- Loss of organic material.

- Soil loss and decline in fertility.

- Loss of flora, fauna and diversity.

- Changes in soil texture.

There are many causes of soil erosion such as lack of protection, urban expansion, loss of leaves and other organic material that could form humus. Overcoming the degradation of soils must become a number one priority.

a) Social and economic effects of soil erosion

The country faces three challenges:

- Agricultural transformation.

- Improvement of rural life.

- Restoration of degraded environment and conservation of natural resources.

Rural areas offer two main challenges: firstly, to overcome extreme poverty, and secondly, the conservation of natural resources.

For the rural poor, the environment is deteriorating day by day, forcing peasants to look for other means of subsistence, and many choose to migrate to urban centers or encroach even further on inaccessible or protected areas. According to the author, indigenous peoples are closely connected to the environment, and more able to respond to these challenges. He suggests property rights need to be reinforced to motivate land care and maintenance. Six million hectares of land in Chile is presently suffering from erosion which needs to be recovered.

A small investment stimulus could mobilize large private forces. For example as previously stated, plantation subsidies of around US$130 million over 20 years have created forests worth over US$2,600 million. A similar incentive could be used for degraded and eroded areas, implemented by professionals able to train local people. In cases where erosion is severe or capital is lacking, foreign investment could be invited.

A responsible strategy would be to balance growth with sustainability promoting rural development with environmental responsibility. Restoring degraded areas is possible with sound production techniques and technology. The author recommends:

- The development of technical and management capacity to confront environment deterioration through training.

- The incorporation of environmental management variables into all projects and programmes.

- Consolidate financial resources for institutional building.

A strategy to overcome the previously stated problems must occur along two paths: **concrete actions** and **motivation.**

b) Recuperation of degraded soils

In the north of Chile, poverty tends to be concentrated in dry, degraded areas. A number of counter measures are suggested namely, rotation of grazing areas, incentives to conserve soil, to encourage other species more apt to local conditions, and to aim for more efficiency with less livestock. In the central region of Chile, problems exist with urbanization, fires, chemical and biological contamination. In the south, problems exist with agricultural and forestry development leaving soil unprotected and exposed.

The solution in each case really depends upon local conditions. One technique which has been successfully tried in Chile is to seed an area with a small plantation, then supplying the right nutrients and irrigation, to allow fertilization to take place for the expansion of the forest.

c) Legal instruments

At present there are laws which indirectly refer to irrigation, such as the forestry law DL 701, and certain agricultural laws, but the country lacks a specific law for the conservation and management of soils.

d) Some recommendations

- A geographic and planning information system.
- A countrywide map showing erosion.
- The exclusion of economic activity in ecologically sensitive zones.
- A subsidy for conservation.
- Financial incentives to encourage the use of appropriate technology, shrub planting for forage and to reduce ploughing.
- More meadows for grazing, terraces, contour tracks, retaining walls and storm dams, reduce use of fire.
- Credits for environmentally aware companies.
- More funds for research/university departments.

In the private sector, companies have yet to incorporate the environmental factor in their planning. The Central Bank together with CONAMA and CIREN are developing economic indicators adjusted to take natural resources into account.

8. Bio-diversity and environmental control instruments

Bio-diversity refers to the sum of genes, species, and ecosystems in the animal and vegetable kingdom, and the rate at which species are lost and gained determines diversity. It should be recognized that below a certain limit ecosystems may collapse.

The geography and climate in Chile has permitted a grand variety of isolated ecosystems which has favored a high number of endemic species. The greatest diversity in flora and fauna occurs in the VI and X regions, exactly where there is the greatest number of forestry plantations. As a consequence of this natural resource exploitation, bio-diversity is in crisis.

The SNASPE system is used in 58 of the 83 natural environments in Chile and is an important tool in conservation and preservation of bio-diversity, but in general macro-economic policy does not consider this information or encourage sustainable development. There is no defined use of natural resources, and the market is not equipped to sustainably manage the environment with equity. However the author concludes by suggesting that the effective use of controls and incentives could utilize the driving force of the market in favour of the environment.

POLICY EFFECTS OF ECONOMIC INSTRUMENTS UPON THE ENVIRONMENTAL SUSTAINABILITY OF FRESHWATER SUPPLY IN CHILE AND PROPOSALS FOR ACTION[9]

The quality of freshwater directly influences the quality of life, affecting among other things, child mortality rates. Therefore, water policy and respective instruments have an important contribution to make in regard to water quality, environmental sustainability in general, and human wellbeing. Water is also essential for urban and commercial use, to create green areas, and to put out fires, uses which are often ignored especially when water is in abundance.

The principal source of freshwater in Chile is its rivers which commence in the Andes mountains and run westwards towards the Pacific. On the way this water is used as an energy source, for irrigation, human consumption, mining, industry. In short, water is fundamental for human development.

1. The state of river and surface water

Unfortunately many of Chile's rivers have become burdened with sediment due to human activities in river basins (such as deforestation) which affect river control.

The north of the country is characterized by a dry desertic and semi-desertic climate. The water supply contains a high percentage of dissolved salts, causing a shortage of quality water exacerbated by the demand from mining activities.

Improper treatment of domestic and industrial waste is the main cause of domestic and sea water contamination in Chile. Some of the rivers exceed the level of contaminants allowed by Chilean water quality standards by between 12 and 50 times. This untreated water is then used for irrigation purposes causing periodic health problems such as hepatitis, typhoid, and cholera.

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[9] Summary in English of the report "Efectos de las políticas e instrumentos económicos sobre la sustentabilidad ambiental del recurso agua dulce en Chile y propuestas de líneas de acción" (LC/R.1531, 29 May 1995), prepared by Mr. Herman House.

2. Countermeasures

The author suggests two countermeasures:

- Better prices for crops would encourage the use of clean water.

- The issuing of quality certificates.

In agriculture, the use of certain types of pesticides and fertilizers is prohibited for many exported products, but not for local consumption. In many underground water supplies large quantities of nitrates have been detected in excess of Chilean standards.

CONAMA (Chilean National Commission for the Environment) produced in December 1994 a discussion document in December 1994 regarding environmental quality and standards which have yet to be deliberated, modified and put into law.

The market has proved inefficient in regulating intersectorial conflicts over water use, and has augmented rather than reduced water contamination. At the present time, no justification is needed for water use since water rights are essentially governed by property ownership with no limit to usage. This situation causes grave environmental problems which ought to be internalized through regulation.

The distribution of property rights is important because whilst land is in the hands of the poor there is equity as well as efficiency. On the other hand there may be efficiency but equity suffers.

In areas where the poor have property rights yet continue to exhaust wood supplies (for example for cooking and heating), this shows a lack of training and organization.

According to Figueroa (1994), market definitions can be corrected if property rights are clear and externalities are internalized, although he admits this approach is limited and requires some state control, and has to be applied where benefits exceed the costs. One must bear in mind however that the beneficiaries of exploitation are usually the producers, and that society at large bears the costs in various ways, in monetary and intangible terms.

3. Experience in developing countries

Experience in developed countries suggests that environmental controls act as brakes to economic growth, and that the costs of growth have been higher than expected, but absorbed by these

nations thanks to their high incomes. However the separation of political economy and the goals of sustainable development has been disastrous from an environmental and ecological point of view.

In poor countries, poverty is closely related to environmental degradation. Exploitation of natural resources in these countries fuels the engine of growth, and therefore there is little reason to protect them. The challenge in developing countries is to allow the economy to develop, whilst integrating the environment into mainstream development planning.

4. Economic and regulatory instruments

There exists both economic incentives and regulatory controls that attempt to internalize environmental costs. They include prohibition, quotas, property rights, market creation, tax and financial instruments.

Economic instruments contain a monetary stimulus to allow decisions to be taken by industry and government bodies to improve environmental quality and conserve natural resources. These instruments should be expertly calibrated so that they are not converted into instruments of contamination.

Nevertheless, in developing countries problems may arise with:

- Lack of well trained institutes and agencies able to design, implement, and impose economic instruments.
- The use of these instruments which can be highly sophisticated demands a high level of technical ability.
- There is a lack of a sound information base.

The application of economic instruments often faces opposition from environmental groups, development agencies, and some developing countries. The aim of the latter is to maximize economic growth rather than protecting the environment through the use of any kind of instruments.

Very few economic instruments are presently being used in Chile. For example there are no controls over SO^2 emissions in copper works, or industrial waste water, which are political decisions rather than technical problems.

At the end of 1994, the Chilean government (CONAMA, 1994) designed the terms of reference for an emission transfer study to improve the understanding of productive activities and environmental phenomena to allow costs to be internalized.

Certain control standards exist in Chile, usually connected to health, but it is difficult to fix an optimal level and many standards are difficult to police, relying on the good will of the contaminator.

Regulatory instruments take the form of licenses, permits and quotas which are difficult to enforce, whilst economic instruments take on a purely financial form, for example, taxes, incentives, bonuses, subsidies, transfer emissions.

In Chile, there are many regulatory instruments which have been passed into law at different times, meanwhile there have been changes in environmental conditions and advances in technology. Fines are usually very low and difficult to monitor and enforce.

The combination of economic and regulatory instruments is more effective than standards alone, possibly due to the distinct technologies of each firm. The advantage of economic instruments is that they are applied on the seriousness of contamination produced, rather than upon production quotas (per unit or volume). Economic instruments achieve the desired effects more cheaply - which is important on the world market, they are less open to abuse, generate income for the country, and are easier to implement.

The application of economic instruments in developing countries has so far been limited. The author suggests:

- To start with less sophisticated instruments.
- Clearly identify contaminants and their sources.
- Invite foreign technical assistance where necessary.

The trick is to find the right combination of economic and regulatory instruments for each specific situation.

5. Proposals for the use of instruments that improve freswater sustainability

There are several problems related to the quality and supply of freshwater, such as: deforestation, poor river basin management, conflicts between users, lack of regulation, low efficiency/lack of coordination, etc.

The author suggests forming a special corporation for the management of river basins, using both regulation controls and economic instruments. The corporation ought to be self-financing, with revenue coming from:

- Taxes and fines.
- A fixed user payment per m^3 of water.

These funds could also be used for research and development, and pre-factibility studies, targeting large users first and using these funds to promote equity by helping small producers.

The corporation which would take on the role of a national water research and technical development organization, should also include in its remit the wider problems of river basin management such as deforestation (with CONAF, The Chilean National Corporation for Forestry), user conflicts, lack of regulation, low efficiency, water contamination. These tasks require close coordination and cooperation between the various actors such as regional and local authorities, industrial users, mining companies, and agriculturists. A starting point could be an examination of domestic and industrial waste, pesticides and fertilizers in agricultural use, and defining acceptable limits.

The author also suggests a study on underground water supplies and a series of seminars with the aim of discussing the correct balance between regulatory and economic instruments.

Traditionally, technical studies for fresh water management have been directly imported from industrial countries, with little or no consideration for local circumstances, which implies increased costs, and ill use of water resources which is especially critical in the northern dry areas of Chile.

Whilst water becomes increasingly scarce, demand is rising from industrial and domestic users. Therefore, it is imperative that river basin management corporations are developed and supported to counteract the above mentioned problems.

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ENVIRONMENTAL INVENTORY AND ECONOMIC BALANCE OF THE NATURAL RESOURCES FOR THE MAGALLANES REGION, CHILE[10]

1. Environmental inventory for the Magallanes region. A basis for its economic evaluation

The aim of this document is to firstly describe the natural resources in the Magallanes region in Chile, and then classify them into how they satisfy, social/human, ecological and economic needs. This information, asserts the author, is essential to allow the regional government to implement the latest advances in administration and natural resource planning methodologies.

The inventory uses the concept of national property which is defined as natural resources and the value they acquire in satisfying needs. These needs are classified into three types: social needs, ecological needs and economic needs. A selection of the most threatened resources are chosen to illustrate the point. (see Table 1).

Regional environmental problems are distinctive from urban ones: damage can more easily be seen, and there is generally a greater participation in civic life. This influences the type of environmental management tools which are used. As a rule for effective application, sufficient information is required, that can be understood and operated by specialists. The challenge to the region is to adapt these techniques within the boundaries of restricted public funds.

Common sense suggests it is outside human and material possibilities to protect everything: investment funds are scarce and they have to be invested in plans and projects that give tangible results. Therefore funds must be invested in the most efficient way within the criteria of satisfying social, ecological and economic needs.

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[10] Summary in English of the reports "Inventario ambiental de la región de Magallanes, Chile. Bases para su balance económico" (LC/R.1553, 31 May 1995) and "Balance económico del patrimonio natural de la región de Magallanes, Chile" (LC/R.1554, 31 May 1995), prepared both by Mr. Daslav Ursic.

In order to fix the productive value of the resource the system of accounts must be:

- Be understandable by the general population.
- Be simple, pitched in a non-technical language and easily understood by public employees.
- Clearly indicate environmental problems.
- Allow the incorporation of existing information that may be widely dispersed.

a) Magallanes - a brief history

The native peoples of the region were a few thousand Tehuelches (now extinct) and Onas that date back 11,000 years after the last ice age. These peoples were dependant upon the guanaco for subsistence, and lived a rich spiritual life. Within the islands lived the Alacalufes and Yámanas who were later converted into christianity by missionaries and became extinct due to alcoholism and sickness. The first European adventurer to the area was Hernando de Magallanes in 1521, after whom the region was named, but for over 300 years no attempt was made to colonize it, due to the inhospitable climate and infertility of the soils in what Darwin called "The land of fire." In 1843, the Chilean government took possession of the south, and there installed a military base. Sheep were later imported from the Falkland islands to occupy the available agricultural land. In 1945 oil was discovered, which encouraged immigration from the north.

b) Economy, population & climate

The economy of the region is based on the exploitation of natural resources: oil, natural gas, methanol, forestry, livestock, and more recently, a sharp rise in fishing activities.

The Magallanes region is scarcely populated with 145,000 people (1992 census) which corresponds to about 1% of the total population; yet the region is the most urbanized in Chile (92%), due to the absence of agriculture. Within the region, Punta Arenas has the highest concentration of inhabitants (80%).

Geographically, the region can be separated into 4 distinct zones: Mountain, High plain, Islands, and Pampas (grasslands). The territory is divided basically East/West by two distinct climates: wet and inhospitable in the West; and windy, dry and inhabitable in the East.

There are 5 distinct sub divisions:

Isothermal tundra:	Wet temperate, cold along the northern coast.
Mountain climate:	Close to the border with Argentina progressively colder with height.
Cold steppe:	Dry with a short wet season.
Ice climate:	Snow and glaciers. The region still maintains a grand ice mass from the last ice age.

The soils of the region are thin, infertile and poorly developed, which explains the lack of agriculture. There are however coastal and interior evergreen forests providing habitat for a variety of fauna, the most famous being the Puma and Huemul which are very rare.

Almost all the area in the south and south west is protected in National Parks, and only 40% of this area is inhabited. Environmental damage is concentrated around centers of population. Punta Arenas, for example, has problems with water contamination from oil refineries, overgrazing outside the city limits, and overexploitation of coastal resources.

c) Methodology

The national and regional environmental accounts must reflect the value of the environment to man, to the economy, and its intrinsic value (ecology), notwithstanding the likelihood that each geographical area will probably have a different proportion of each factor.

The valuation of the environment proceeds along 3 steps:

i) Identification of natural resources, relating them to needs.

ii) Selection of those resources under threat as indicators of sound environmental management.

iii) Choice of appropriate ways of measuring resource quantity and quality; the annual variation in these figures will display an increase or loss for each item.

The methodology above was applied to the Magallanes region with some changes due to local conditions. A reduced area was chosen due to:

i) Lack of appropriate institutions to administer the environment, making it almost impossible to undertake a full inventory.

ii) Environmental threats are localized and concentrated in certain areas usually corresponding to areas of high investment and economic activity.

d) Value needs to man

Social needs have been defined by CEPAUR (1986) and can be briefly classified as the following;

- Desire to live in a pleasant environment.
- Need to preserve regional identity.
- Recreational and open areas.
- Contemplation of natural beauty.
- Maintenance of traditional customs.

e) Ecological needs

The World Strategy for the Conservation of Nature (1986) recommends a series of aims and preoccupations;

- To conserve bio-diversity in all its forms.
- Quantity and quality of fresh water.
- Pure air.
- Soil stability and regeneration.
- Habitats and ecosystems rich in fauna and flora.
- Recycling of nutrients.

f) Economic needs

- Extraction of primary materials and fuels.
- Food production.
- Energy production.
- Absorption of urban and industrial waste.
- Use for tourism.

The author presents in his document a list of over 60 resources which fall into the above brackets. For each need there are various resources which complete the same function. (See Table 1).

Within the category of social needs, some resources cannot be included such as pure air, because they cannot be regarded as national property or easily measured.

Once the needs have been identified, the resources which satisfy these needs must be identified and costed in the most accurate way possible. For example, the need for recreational and open air spaces can be satisfied by reserving easily accessible natural areas close to centers of high population density. If sufficient care was taken over its planning, this action could also satisfy the need for bio-diversity.

Within the category of energy needs, these are satisfied for example, by oil, gas, and coal reserves.

g) Results

It was not possible to measure all of the natural resources intended. Of the 84 necessary, only 51 were eventually registered (61%) for one of two reasons;

- Non-compatible kinds of information.
- Lack of information, especially regarding social needs.
- Much of the information could not be adapted for use, and in some cases the last or only data is 10 years old, which of course caused doubt about the sources, and was difficult to cross check and confirm.

h) Conclusions

The first attempt at collecting information and working out gains and losses will be the most difficult. Repeating the process in other areas will be much simpler with a proven methodology and the good will of regional authorities and public employees. What ought to be clear is that once the valuation process is in operation, if a resource shows an overall loss then it must be a sign that important decisions need to be taken.

References

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UNEP, WWF, IUCN, World Strategy for the Conservation of Nature, 1986.

Table 1

AN INVENTORY OF HUMAN, SOCIAL AND ECONOMIC RESOURCES IN THE MAGALLANES DISTRICT.

Human value	Quantity	Ecological value	Quantity	Economic value	Quantity
Pure natural water	n/a	Water basins: Rivers Lakes Erosion	628 km^2 1,062 km^2 n/a	Forests	463,674 ha
Cultural sites	n/a	Unprotected native forests	2,400,000 ha	Fish stocks	n/a
Recreation sites	8	Marshlands	26,968 ha	Wildlife: Guanaco Grey fox	16,410 36,940
Pristine areas	6,440,616 ha	Fauna: Penguins Seals	87,000 126,000	Sea alga	n/a
Traditional foods	n/a	Protected wild areas	6,626,540 ha	Wild flowers	n/a
Landscape beauty	n/a	Marine reserves	n/a	Fossil fuels: Oil Gas	$20x10^8$ m^3 $120x10^9$ m^3
Healthy Environment	n/a	Threatened fauna	47	Coal: Lignite Peat	$5x10^9$ ton $71x10^8$ m^3
		Threatened flora	3	Minerals (metallic): Copper Gold	$1,650x10^3$ ton 16.38 ton
		Freshwater: Rivers Lakes Ice	366,7 m^3/seg 2,609 km^2 2,800 km^2	Minerals (others): Clays Limestone Quartz	923,000 ton $2x10^9$ ton $7x10^8$ ton
		Seashores	n/a	Acuiculture	59
				Fishing	n/a
				Pasture	3,525,525 ha
				Soils: In use Potential	400 ha 28,000 ha
				Animal health	n/a
				Tourism centres	17

n/a = Figures not available.

2. Economic balance of the natural resources in the Magallanes region

This document starts by confirming that environmental management techniques and instruments are extremely scarce as an aid to environmental management and planning, and even more so in remote areas.

To rectify this situation the author presents a simplified methodology of environmental accounting applied in the Magallanes region in southern Chile. In simple terms, gains and losses are expressed in monetary units along with changes in wellbeing of the regions inhabitants who are directly or indirectly affected by changes in the environment.

The hypothesis is that the present development model based on the excessive exploitation of natural resources reduces reserves in qualitative and quantitative terms which of course reduces their future productivity. These economic policies strongly affect the Magallanes region because the economy is primarily based upon natural resource extraction and related industries.

The region is rich, in unique flora and fauna, 28% or 37,000km^2 of the area is covered in forests, and there are potentially rich fish stocks and grazing areas for sheep and cattle. Non-renewables consist of coal, oil, natural gas, karst, and peat. As one would expect, the economy of the region is largely based upon the above. Regional exports reached US$351,034,653 in 1994.

Whilst the economy has grown in monetary terms, the environment has become less diverse as a result. This reduction in bio-diversity does not appear in statistics, an omission which would be inadmissible within a private company. One of the difficulties associated with environmental accounting is the lack of trustworthy information in regard to the threats to resources and the limits to their use. One of our main objectives therefore is to collect more information which is accurate to use as a basis for decision making.

First of all, for a change to happen in the way the environment is managed and planned two things need to occur;

- Information needs to be accurate and expressed in the most didactic form possible given the limitations of the regional public budget.

- A common perception and understanding needs to be developed of what is happening to the environment in terms of exploitation versus environmental conservation.

In the view of the author, the real state of affairs is measured by calculating the environmental losses through mismanagement, and comparing this figure with the economic gains (see Table 2). In addition, an allowance should be made for the deterioration in social wellbeing of the areas inhabitants.

To summarize, the three factors that are considered are the following:

Social: Refers to social wellbeing.

Ecology: Measures the changes to the natural and artificial environment and includes any attempts at reparation.

Economy: Refers to direct profitability of the environment.

These three factors must be strictly measured in monetary terms which is problematic and inaccurate because it is impossible to measure certain gains and losses.

The author chooses to sum up resource impacts and benefits in the form of a simple balance sheet of profits and losses, that is, first, calculating the benefits in favour of a development and second, calculating the losses. An example is given of a typical scenario in the forestry sector:

a) Accounts in favour

(Assuming the best possible scenario)

- Social wellbeing: Forestry companies generally offer grants for housing, health, education, cultural activities, and improve transport and communications especially in rural areas.

- They usually offer work training for the local population.

- Improved infrastructure for public use such as roads, bridges, electrical and water installations.

- Research, generally related to forest activities.

- The possible replacement of lost or damaged scenery.

- Decontamination of water and soil caused by forestry activities.

- Forestry reserves put aside for conservation/preservation and research.

- Help with costs for local services.

- Taxes paid locally.

- Formation of nurseries, and reforestation to increase the sustainable production of forest.

b) Losses

- Undervaluation of resource, companies pay too little for exploitation rights.

- Minimal value added in the region.

- Damage to tourism, tourists are attracted to pristine environmental conditions.

- The large percentage of wood exported causes problems of short supply and higher prices in the local market.

- Intensive exploitation is not sustainable or efficient in the long term.

c) Calculations of resources losses

Given the list of possible gains and losses on the previous page, each one has to be estimated as accurately as possible in monetary terms, for example:

- Losses due to undervaluation

Considerable losses have been caused by undervaluation. As an example, in the Magallanes region during a period of 7 years, 330,000 hectares of land was sold to forestry companies at ridiculous prices of between US$ 0.7 - US$ 5 per hectare. Some time later the same companies bought land from smallholders at between US$ 50 - US$ 60 per hectare. Based on this information the state lost:

330,000 (US$ 50 - US$5) = US$ 14,850,000

Although sales of this type have stopped, in order to compensate for this loss on the account books, US$ 2,120,000 must be shown as a loss every year over the next 6 years.

- Tourist losses

Of the 330,000 hectares now in private hands, 10% (that is 33,000 hectares) is virgin forest and suitable for adventure tourism. This area could receive 3,000 tourists per year who would pay US$180 for 15 days during 5 summer months of the year. This leads us to the following calculation;

3,000 @ US$ 180 for 15 days = US$ 8,100,000

Clearly forest activity and tourism are in direct competition.

d) Higher prices

The demand for extra wood by chip companies has forced up the price in local markets from US$ 210m^3 to US$ 540m^3, which has meant that houses in the region have become much more expensive for the local population.

3,500m3	@ (US$540 - US$210) =	US$ 1,155,000
(Local annual consumption)		(In increased local costs)

These higher prices have hit the lower/middle class income bracket the hardest because they usually build their houses of wood.

e) Resource deterioration

The exploitation of 5,000 hectares of forest per year surpasses the natural replacement rate 20 times. The 60 year recovery plans implemented by the companies are only experimental and are not proven to be sustainable.

The losses detailed above are shown alongside the gains from resource exploitation in table 2.

f) Losses from lack of processing

In 1994, the region produced 231,000 tonnes of bulk wood, of which 98% was turned into woodchips for export, and sold for US$65 per tonne. In contrast, elaborated products are sold for US$450, and high quality wood for furniture at US$800 per tonne. Technically, it is possible to elaborate up to 40% of the wood extracted, which leads to the following calculation;

40% of 231,000 tonnes (US$450 - US$65) = US$ 35,574,000

Table 2

BALANCE OF NATURAL RESOURCES
FORESTRY

(Year 1994)

Profits to the region	US$ 1,000	Losses to the region	US$ 1,000
Social wellbeing	2,070	Forest undervaluation	2,120
Work training	?	Damage to tourism	8,100
Public works	5,250	Local wood scarcity	1,155
Research	325	Loss of diversity	917
Countryside repair	....		
Reserved areas	....		
Local spending	4,500		
Local taxes	?		
Resource replacement	....		
TOTAL (thousands)US$	12,145	TOTAL (thousands)US$	12,292

Potencial loss (thousands)

Non-processing = US$35,574

Wood extraction 1994 = 700,000 m^3

Loss to the Magallanes Region = US$ 147,000

STRATEGIES: THE APPLICATION OF ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN GUATEMALA, EL SALVADOR AND COSTA RICA[11]

Environmental policy and management in Central America has traditionally been viewed as separate from economic policy, a fact which thwarts attempts to achieve a more sustainable development. The objective is to urgently reconcile the two, because the present strategy is causing severe social and environmental problems in the region, where natural resources have traditionally been the motors of economic growth, and where poverty is a major cause and victim of environmental degradation.

Sustainable development has become the new goal of the region but the challenge is how to achieve it in practice. The Central American alliance was born out of this context in 1994, to satisfy political, social, cultural economic, and environmental aspirations. The various regional groups and organizations came together for the formation of a strategy which contained five main objectives:

- Reactivation of sustainable economic development.
- A change in the quality of growth.
- Conservation and improvement of the resource base.
- The fusion of economics and the environment in decision making.
- Improve the quality of life of human beings.

This document tries to find some answers to these objectives, suggesting a change in attitudes, priorities and institutional decisions at all levels, with a regional strategy for the design of economic instruments and policy for environmental management and sustainable development.

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[11] Summary in English of the report "Estrategia: Aplicación de instrumentos económicos para la gestión ambiental en Guatemala, El Salvador y Costa Rica" (LC/R.1549, 30 May 1995), prepared by Mr. Mariano Rayo M.

Although each of the three countries under study have distinctive characteristics, similarities exist in the areas of environment/political economy and possible ways to achieve sustainable development, which may permit the extension of these conclusions to the other countries in Latin America.

These countries are at different levels of environmental consciousness: for example, Costa Rica is in a more advanced state than Guatemala, whilst El Salvador still has not declared environmental priorities.

1. Environmental situation

In general terms, the severe problems in Latin America such as poverty, lack of opportunity, exclusion, have created unsustainable pressure on natural resources. This social and ecological disequilibrium is occurring together with an agricultural and industrial production system that runs contrary to the objectives of sustainable development.

Latin America suffers from severe soil erosion, due to lack of understanding of the damage caused by deforestation, cultural practices, traditional and modern agricultural production techniques, forest encroachment, intensive use, land distribution, population and urban expansion, lack of conservation incentives. These problems coincide with under and over utilization of land connected to land ownership, a lack of effectiveness and intervention on behalf of the state, and apathetic cultural attitudes. Some of these problems are discussed below.

Deforestation in the region is occurring at a faster rate than reforestation. Between 1950 and 1990 a larger area of forest was deforested than in the previous 500 years. Intensification of extractive activities, limited access to land, fall in the prices of basic agricultural products, forest encroachment, expansion of grasslands for cattle grazing and search for high value hardwoods, lucrative illegal cutting, and frontier conflicts -all have taken the environment as a casualty.

Forests have suffered from non-sustainable use both on the part of the wood industry and as a raw material for construction, and as a fuel source. Another problem is the ignorance of the real value of the forest, that must include the social and ecological value of other forest products.

Water resources are highly contaminated from productive and domestic sources. This problem is aggravated by deforestation and land degradation. The abuse of water sources is linked to its underpricing, and the lack of planning and institutional coordination.

Land degradation, desertification, deforestation, water contamination, and the disappearance of aquifers, all contribute to the progressive disappearance of biological diversity in Central America. There are other factors which have contributed to this phenomena such as: land structure and use, population growth, agricultural expansion, deforestation. In general there has been an undervaluation of biological diversity which has accelerated its abuse.

2. Economic models and their impacts

Economic models in Central America have consistently failed to consider environmental impacts. Only recently there has been some concern incited by the growing number of natural disasters, loss of productive base, and pressure from environmental groups. Despite economic successes, these models have failed to halt poverty, marginalization, and inequality that these very models claim to appease.

It is true to say there has been economic growth, but this has been based almost exclusively on the exploitation of natural resources, under the criteria of short term profit and not the rational use of the environment or the real needs of the population. Furthermore the productive structure is capital intensive, with little absorption of the abundant labour in the region. Under these supply and demand conditions, wages have been kept very low and unprotected by the state. The concentration of industrial activity has tended to increase the flux of migrants to urban centers, also leading to a concentration of pollutants. In rural areas, the green revolution increased the use of agro-chemicals, displacing other activities and increasing pollution.

Until now governments have been more concerned with productivity and social problems than the long term sustainability of natural resources. Recent economic performance has aggravated the situation, the crisis of the eighties provoked crisis structural adjustment policies, leading to recession. The subsequent economic recuperation occurred at the cost of the environment.

3. Environmental impact of economic policies

The main point to note in Central America is that environmental aspects have not been incorporated into mainstream economic planning, and the damage caused as a result has been regarded as an externality without being incorporated into economic calculations, although some advances have been made in Costa Rica.

In general terms fiscal and monetary exchange policies have been the key instruments in altering the rules of the game, which

has been the main tactic of governments. However this approach has environmental impacts, because any incentive that merely incites export production, such as a fall in the currency, will have a negative environmental impact, elevating for example, the opportunity cost of not exploiting a forest. An overvaluation on the other hand reduces the price of imports in general, with no environmental criteria.

Property rights are also important, because if the producer is not owner of the land, there is no incentive for long term sustainable use; on the other hand, owner/producers have a direct interest in maintaining the long term profitability of their land.

Fiscal policy has favoured exports and manufacturing industry with indirect subsidies, land tax exoneration, and imports. The result has been weak agro-industrial chains, high protection, and low competitivity. These mercantile practices in the search for short term profit have had a pernicious effect upon the environment.

Apart from Costa Rica's reforestation grants, there are no specific incentives or stimulants within the region for conservation or reducing contamination. The policies of extensive cattle ranching, deforestation, and road building have all contributed to degradation and are not consistent with sustainable development. Large rural landowners have been favoured by the banks obtaining credit which has been invested in short term profitable activities which have also run against sustainablity. The idea of a profit at some future point is not very attractive for the poor rural communities who have present day urgent needs.

There is very little experience within the region with economic incentives. Those initiatives already taken are minute in comparison with the wide range of environmental problems. It is too early to judge the effect of the Costa Rican discount certificates, and environmental impact assessments have been little utilized because of their complexity and doubt over who bears the cost. Their application is undermined by a lack of clear guidelines and suitably qualified professionals.

"Debt for environment" swaps have been used particularly in Costa Rica, allowing access to fresh financial resources for environmental projects, but it has not occurred in a massive form. The crux of the matter is that conservation, and sustainable use of resources must be converted into a profitable business. Until this time the incentives discussed will be condemned to failure.

4. Legal and institutional aspects

The legal structure is characterized by a multiplicity of sectoral laws, each partly connected with the environment, leading to

duplication. Apart from the Costa Rican case, neither has the structure permitted the effective participation of communities in environmental management, nor has the state been effective in policing and punishing environmental contamination.

The weakness of the legal structure and the role of the state has been substituted by NGOs and organized community groups. However, without the proper legal structure, their interventions cannot be enforced and acted upon.

With the re-adjustment policies, state expenditure was trimmed and in some cases institutions linked to the environment were erased. Lamentably the urgency to carry out economic reforms has taken importance over the need to train government officials in environmental management.

Scepticism exists over the effectiveness of environmental legislation, which tends to react against emergencies rather than confronting the causes. Furthermore the difference in methodologies, and human capacity in each country, causes comparison problems impeded by a lack of information and technical capacity.

5. The introduction of economic instruments

To date, the laws and initiatives undertaken have had very little effect in environmental conservation and recuperation. The environment is not costed as an input to production, due to the fact that scarcity has not been a factor up until now, nor has it been understood that excessive demand produces scarcity. Environmental management is characterized by market and policy failures, whereby producers externalize environmental costs and transfer them to consumers, and in the final instance future generations.

Due to a lack of regulations, insecure property rights, free resources, etc., the market is incapable of including social benefits into economic calculations. The relationship between resource scarcity and prices needs to be established by, first of all, eliminating market failures that have has encouraged a profit mentality of investors.

Regulations have failed for various reasons. Their rigid format has encouraged ways to elude their control, which in turn generates more laws leading to a jungle of regulations. Against thousands of small producers, it is difficult to police these laws, and the large oligopolic structures have considerable economic and political influence. Another problem is the sophisticated nature of laws which are not backed up by technical capacity for their implementation, limiting the effectiveness of decentralization and

community participation. Fines are often fixed so low that they fail to act as a disincentive.

The actual situation in the central American countries calls for an urgent change in instruments and mechanisms. The author calls for conservation stimulants such as economic instruments which possess several advantages over regulatory controls. Firstly, they minimize costs, which is important in maintaining international competitiveness. Secondly, in view of institutional weaknesses already discussed, economic instruments have a better chance of being implemented, encouraging a gradual elimination of rent-seeking behavior and permitting greater equity. These instruments do not require large bureaucracies and have the potential to be self-financing.

The ability of each country to introduce economic instruments depends very much on human capacity and individual situations, and is connected to economic and social adjustment policies. Each case needs to be carefully studied and analyzed before any decision is made. Experience to date shows that economic instruments have the capacity to alter the complex arrangements between production and consumption. However, these instruments need to be evaluated according to the following criteria:

- Their efficiency in reducing environmental impacts.
- The rational use of economic inputs: capital, labour, materials.
- They must complement and not confront existing regulations or policy.
- Implementation should be gradual and programmed, to give clear signals of the rules of the game.
- Compensation may need to be made for those who lose out from the new rules, but the cost must not be greater than the benefits derived from the new rules.
- The introduction of economic instruments must take social, political, institutional and cultural aspects into consideration.

To conduct such an evaluation, sectorial policies need to be re-examined in the light of the new environmental management principles such as "He who contaminates - pays" which have the objective of internalizing environmental costs. Macro economic and fiscal policies need to be revised to asses whether they contribute to the goal of sustainable development including cultural diversity. The operationalization of these instruments requires a consensus on basic fundamental principles:

- The initiatives must be ethically, socially, and economically acceptable by the majority of society, which means environmental management policies need to possess a grade of flexibility for their implementation. For this reason environmental quality must be explicit, monitored and verifiable.

- It must be cost effective, for society, including implementation, monitoring and verification costs.

- "He who contaminates - pays" is perhaps the most important principle and perhaps the most difficult to introduce because the fines must be set to include the real internal and external costs of production and consumption.

- Economic competitiveness must not be lost, so that instruments allow the economy to adequately function in the provision of services and products.

Highly contaminating productive processes and structures must be converted into a rational use and low polluting apparatus, which must be carefully programmed, gradually implemented, and requires policies and instruments that are: stable, coherent, consistent, and predictable.

Regulations need to be constant and neutral. The ideal economic instrument appears to be one which internalizes the cost of natural resources and can only be avoided if the user declines to buy or use the natural resource.

The first priority in Central America must be the removal of incentives which have perverted and accelerated the exploitation of resources and environmental degradation. If forests are removed to make way for pasture by way of subsidies and incentives, for example, then these need to be removed. This may also help reduce inequality.

Environmental education has generally been very poor and biased. Unfortunately the short term attitude of some politicians and economic sectors has been transmitted to the general population.

6. Selection criteria for the instruments

In order to evaluate the different instruments that are available, it may be useful to ask certain questions. Are they:

- Environmentally effective: Will they achieve the environmental objectives within the fixed time scale and with certainty?

- Cost effective: Will they achieve objectives at the least cost possible for society?

- Flexible: Are they sufficiently flexible to adjust to technological, resource and market changes.

- Efficient and dynamic: Will they provide incentives to introduce clean and more efficient technologies?

- Equitable: Will the cost and benefits be equally distributed: who wins and who loses?

- Easy to introduce: Are the instruments consistent with the existing legal structure, or will new legislation be needed?

- Able to be monitored and applied: How difficult and expensive will it be to apply and monitor them?

- Predictable: Are the instruments predictable and flexible?

- Accepted: Are they understood by the public and economic actors, and are they politically manageable?

7. Institutional and human requirements

One of the main benefits of economic instruments is that they require a minimal institutional structure, which is the opposite of command/control regulations. However, officials need to be well trained because EI's operate through incentives rather than coercive power.

The author recommends the use of existing regional institutions with a training programme in EIA's. It may be necessary to install new institutions in areas where there is little experience such as national resource accounts or property rights, issues which are little studied at present. The idea is to establish the rules of the game rather than monitor each movement.

8. Possibilities for success in Central America

The application of economic instruments really depends on individual circumstances. What may work in one case may fail dramatically in another. It depends on various factors such as the level of development and the economic structure. Here are some suggestions:

- To take into account the scale of production: in the case of a few large producers, emission standard controls may

be very effective; on the other hand, with many small producers, recycling or other incentives may be more successful.

- Distinguish the degree of competitiveness: monopolies and oligopolies will not respond in the same way as an open market, due to inelastic demand. They may respond better to obligatory control standards, unrelated to market fluctuations.

- Differentiate between the various land holding systems which will affect the efficiency of instruments.

- Distinguish the composition of the contaminants: if they cannot be assimilated by the environment, flexible instruments may not work, and strict regulations will be necessary.

- Consider the monitoring capacity: where it is low, instruments should be devised accordingly.

- Consider the heterogeneity of the area in encouraging the decentralizing processes and the incorporation of local conditions.

- Obtain the acceptance of instruments by all the economic actors, so that the rational use and conservation of resources is a better option than exploitation and pure rent seeking.

The first introductory step will be politically, economically and socially difficult given that one is trying to internalize external costs. It depends on programming, which needs to be gradual, coherent, consistent and constant. The author recommends a series of permanent seminars and training workshops to provide technical assistance, and formulate strategies and asks for the support of all the institutions working in this area in Central America.

DIAGNOSTIC AND ANALYSIS OF THE POTENTIAL OF ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN COSTA RICA[12]

Approximately 25% of Costa Rica is covered by a system of national parks and conservation areas. The country is quite mountainous and forms the bridge between North and South America, two factors which explain the presence of an extreme variety of flora and fauna.

Costa Rica is rich in biodiversity, 25-30% of the species are considered rare and 50% considered vulnerable or threatened by deforestation activities. In 1992 a new wildlife law became the responsibility of the National Service for Conservation Areas (SENAC) with the objective of administering and financing the protected areas in Costa Rica. Economic valuation of resources is a recent theme, and is linked to the various uses and services that the forests provide, such as the increase in ecological tourism (equivalent to 21.5% of exports). New macro economic policies are needed that take into account the value of natural resources, with a proven methodology.

Social and political development is marked by a system of general education since 1869, the elimination of the army in 1949, social guarantees and women's rights, political participation, and social security.

The deterioration in natural resources has occurred at the same time as agricultural modernization, and the introduction of large amounts of capital based on short term criteria. Coffee, bananas, and cotton are the main export crops; however, non traditional activities are growing, especially eco-tourism.

1. Legal and institutional aspects

The legal situation in Costa Rica is confused by a multitude of laws and restrictions coming under the responsibility of various institutions, causing a duplication of effort and excessive bureaucracy. For example, 9 institutions are involved in water

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[12] Summary in English of the report "Diagnóstico y análisis de las potencialidades de la aplicación de instrumentos económicos para la gestión ambiental de la República de Costa Rica" (LC/R.1547, 30 May 1995), prepared by Mr. Olman Segura.

management and conservation, 8 in river basin management, 6 in soil management, 5 in reforestation, plus a large number of NGO's and other private organizations.

Some of the main organizations and ministries are detailed below:

- The Natural Resource, Energy and Mining Ministry (MIRENEM), is responsible for the formulation and planning of natural resource, energy, mining, and environmental protection policies.

- The National Electricity Service (SNE) administers concessions for water use and the fixing of tariffs for electricity use.

- The Costa Rican Institute of Piping Systems (ICAA) is responsible for the adequate supply of piped water, to detect its contamination, and to carry out water basin studies and use.

- The National Service of Underground Water, Irrigation and Drainage (SENARA) organizes irrigation and drainage, and the optimal uses of water and soils, and the elimination of contamination.

- The Ministry of Public Health (MSP) aims to guarantee the health of the population, particularly the supply and quality of drinking water.

- The Costa Rican Electricity Institute (ICE) is in charge of developing water resources whilst protecting river basins and water sources.

- The Ministry of Rural Development (MDR) provides technical and financial cooperation to improve rural life, to work for equity, sustainable development, international integration and openness, and greater participation.

- Councils are responsible for the local administration of supply systems and issues.

- The Ministry of Planning (MIDEPLAN) is to promote the national planning process, and finances pre-investment studies of projects in the public and private sector.

- The Agriculture and Livestock Ministry (MAG) promotes agricultural development through the management and conservation of soils, with emphasis on the medium and small producer, offering technical assistance and technology.

- The Costa Rican Tourist Institute (ICT) was formed to encourage a greater number of visitors to the country.

There are a number of private organizations that have been set up to promote eco-tourism whilst protecting the native forest and bio-diversity. In general, tourist numbers are carefully controlled, and scientific and educational study programs are organized, opening up the possibility to provide other services to tourists. There are also several indigenous reserves dedicated to preserving indigenous ways and culture; however, they have no land rights, which are still in the hands of ADI, The Agricultural Development Institute.

Non-governmental organizations (NGO's) have an important role to play in the research and conservation of natural resources. There are also a number of private lobbying organizations, whose principal objective is to promote economic development within the forestry sector and the image of the forestry business as a socio-economic force.

2. Economic models and their impact on the environment

To date all the economic models implemented in Costa Rica have failed to consider their impacts upon natural resources. This is a common phenomena in the region, caused by ignorance, a perception of an abundance of resources, or simply a short term governmental vision of planning which is transmitted to the general population.

In the two decades between 1950 and 1970 the export model produced a forest loss equivalent to the whole previous history in Costa Rica. This exploitation was concentrating on a few products vulnerable to international market fluctuations. These structural adjustment policies promoted exports, producing glut and a consequent fall in price, despite the increased volumes exported. The production of these cash crops leads to negative ecological consequences, such as deforestation, changes in the water cycle, loss of diversity, wildlife. The use of agro-chemicals, and the wastes from factory production have been dumped untreated into surface waters.

When cotton and sugar were introduced, it led to unemployment for much of the year, because they are seasonal crops; cotton also requires large quantities of pesticides. Cattle ranching has been a major cause of forestry destruction, providing unequal earnings and useing a minimal amount of labour.

During the sixties there was a movement to reduce the reliance on imports. However, the Central American countries remained reliant on agriculture led by the subsidiaries of multinational companies. The oil crisis of 1973 caused balance of payments

problems, and dependency on oil. Road building continued on with a minimal of national planning.

The new model of the eighties attempted to increase non-traditional exports, backed up by international aid, offering concessions and incentives to produce for the external market. It led to increased protection from importing countries and deteriorating terms of exchange. Privatization affected the internal market, and reduced the social responsibility of the state on the excuse that foreign capital and free markets were needed to kick start the economy.

This model has had a severe environmental cost using inappropriate technology and a free market system which fails to include the real value of natural resources.

The demand from the forestry industry has also been a large contributor to forestry destruction, cutting at more than the sustainable rate. Furthermore forestry owners do not have a clear picture of the real worth of forests in terms of other products, nor of the services that forests provide.

Wood prices have been very low, acting as a disincentive for forestry management. Neither have social gains been estimated or considered. Banks are prepared to accept agricultural land, but not forestry, as collateral for loans.

By 1950, only 28% of the native forest had been destroyed; by 1984 this figure had risen to 74% and many experts estimate that before the year 2000 the country will have to import wood to satisfy internal demand.

Much of forest land has been converted to farming, and in particular banana plantations. The requirement of the Agricultural Institute to show an "improvement" in land use in order to obtain title certificates has accelerated forestry burning.

Tropical soils are extremely susceptible to erosion, which has been a consequence of these changing production patterns. The loss is calculated at US$ 5.8 million per year since 1970, which has yet to show its impact because the soils were deep, but will surface as a problem for future generations. Contamination has also occurred with the use of pesticides and chemicals in the production of cash crops.

Sixty percent of Costa Rica is suitable for forestry, a third of which could be incorporated into the productive system. So far, between 1979-93, 100,549 hectares have been planted. The wood industry needs to be modernized to reach higher efficiency levels through the use of improved technology. The National bank has established a credit line at low interest rates for the development of non-traditional wood production.

Despite healthy amounts of rainfall, there are problems with urban water supply due to rapid urban growth outpacing the supply system, and contamination from agro-industrial sources. No treatment or recycling plants exist, and tap water is used frivolously because the price does not reflect its true cost. Greater care needs to be taken over river basin management at the institutional level, with proper coordination and national planning.

Non-traditional cash crops are highly dependent on imported inputs such as agro-chemicals, fertilizers and pesticides, which have negative environmental effects such as health problems, toxicity, soil acidity, and production on steep slopes causes erosion, and landslides. The state is now more concerned over the use of dangerous chemicals prompted by the international market, which is increasingly asking for organically grown products.

A National Biodiversity Institute created in 1992 is helping to promote eco-tourism, with considerable success: the sector is equivalent to 8% of GNP and 25.5% of exports, overtaking in importance many traditional products. The state has promoted the activity through the use of preferential interest rates, access to credit, road infrastructure, basic services and tax wavering on imports necessary to start a tourist business.

In 1982, only 17% of tourists visited the national parks. In 1994 this figure had increased to 75%. However, careful planning is required so as not to exceed numbers and for the safe disposal of wastes, monitoring, etc. SENAC lacks an adequate plan for the areas and is under pressure from farming groups and organizations encroaching on the buffer zones.

3. Environmental impact of economic policy

The state has an undeniable role to play in the application of economic policy in allegiance to one model or another. Nevertheless, all the models tried to date have failed to properly include environmental aspects into planning. With a greater environmental awareness, this situation is changing, and governments are beginning to incorporate the environment into planning with the use of economic incentives.

During the last three or four decades various types of fiscal and non-fiscal policies have been implemented in accordance to the economic model in favour. For example, the overvaluation of the currency in the eighties favoured the importation of capital goods, and less income was received for exports. The exchange rate also affects inflation, determining the real interest rate, which, if high, will slow economic growth. Increased poverty also affects natural resources as the poor encroach upon protected and sensitive areas to satisfy their basic needs.

Since 1990 the agricultural ministry has been offering free technical assistance and other inputs for the sustainable use of soils, aimed principally at small and medium sized producers. NGO's and various public and private organizations have been active in environmental education to alert the public regarding the importance of protection and conservation behavior.

In the forestry sector, the government has offered tax breaks on profits, bonus certificates, technical assistance, soft credits, and a council and organizational fund. The problem with tax breaks is that the majority of the rural population are excluded from the tax base, and the legal process for non-compliance is also very complicated. The issuing of grant certificates also excluded small producers, who were unable to finance the initial investment to be claimed back in subsequent years. To compensate for this, forward payment of these grants was offered to organized rural groups, and soft credit was charged at 8% interest with a 10 year grace, and a limit of a 30 years payback period. However, farmers preferred the grant certificates, offered without interest.

Organizations legally approved, that have at least 70% of small producers are able to access credit from the cooperative bank at low interest rates. Funds have also been available from international sources, and grant certificates are also available for the sustainable management of tropical forest areas.

Reforestation activity through the issuing of forestry certificates is growing. Between 1979 and 1991, 42,724 hectares were planted, but close to this total was cut down annually in the same period.

The newly created National Conservation Areas Service (SENAC) will work for the conservation of secondary forests, and create protected reserves involving the community in different projects.

Given the international concern over global warming, one idea which has surfaced is to offer the services of the forest as a carbon sink. It is estimated that the forest has a carbon absorption capacity of 10 tonnes per hectare, which, given the size of the protected areas, is equivalent to 13 million tonnes per year. Approximately 5 million tonnes of carbon are produced locally, leaving 8 million tones available as spare capacity. This excess capacity should be valued by the international community, who ought to be prepared to pay for it by the conservation of these areas, and the carbon absorption service they provide.

In Costa Rica, the main steps towards sustainablity of renewable resources have been made in the forestry sector. The incentives are the following:

- Tax reduction on profits, forestry grants for large and small producers, soft credit, council and organizational

fund, forestry development fund, and forestry grant certificates for forestry management.

- Bio-diversity incentives: reform of the national park entrance fees and creation of a biological reserve.

- Water incentives: despite the social and economic importance of water, and some disperse initiatives, there is no effective communication for coordinated action between institutions.

An adequate plan for the conservation and management of water resources has never been felt necessary in Costa Rica. However, as indicated at the start of this paper the period of rapid economic growth based on exports and a growing urban population are causing concern. Real and effective institutional cooperation is needed in order to form a national integral water plan.

In the past, there has not been a consciousness about the importance of preserving bio-diversity. However, in recent years this attitude is changing due to a recognition of poor planning and inadequate organization. The entrance fee for national parks and the creation of a biological reserve have been important moves, together with the partial funding by international private sources for an environmental inventory which will be the first of its type in the world.

DIAGNOSTIC AND ANALYSIS OF ECONOMIC AND REGULATORY INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN EL SALVADOR[13]

El Salvador is the smallest country in Latin America. The high population density is exerting increasing pressure upon natural resources. General education is of a low standard, one in three people cannot read or write, and many children suffer from health problems related to intestinal parasites.

Traditionally, 72% of the country has been used for agriculture. However, between 1980 and 1991 the area in use fell to 64%, due to a reduction in cotton production, urbanization, and internal conflicts. The changing cultivation to inappropriate cereals has been the cause of severe soil erosion. Soil contamination is marked by the use of pesticides and agro-chemicals, particularly in the cultivation of cotton. These chemicals (many of which are now banned) threaten public health through inaccurate spraying and misuse due to the low literacy rate. Coffee is one crop with agro-forestry potential because it uses tall trees for shade.

Only 2% of the territory is still covered by native forest, destroyed by agricultural expansion, energy demands of the poor, and demographic changes. What remains is protected in national parks, which are threatened by the lack of funds for control; consequently, forested areas have been reduced in size from 267,640 hectares in 1980 to 184,155 hectares in 1991, that is from 13% to 9% of the national territory.

1. Water resources

Around 50% of the population has access to piped water, but the service is irregular, and 65% comes from one source, the Rio Lempa river basin. Only a third of the population has sewage facilities, and in rural areas only half have access to latrines, the rest uses the open air, and the untreated waste is discharged into rivers and lakes. The national sewage administration does not respect the

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[13] Summary in English of the report "Diagnóstico y análisis de las potencialidades de la aplicación de instrumentos económicos para la gestión ambiental de la República de El Salvador" (LC/R.1548, 30 May 1995), prepared by Mr. Rafael Rodríguez L.

current legislation and, according to the author, is itself a major source of contamination.

Figures from this institution show that 84% of industry discharges their waste without any treatment into rivers and lakes. Consequently, an estimated 90% of the countries surface waters are severely contaminated, directly affecting health and labour productivity.

Ninety five percent of the water for human consumption is dependent upon aquifers. Studies show they are being managed unsustainably, due to deforestation and contamination. The water table in the metropolitan capital area is falling a meter per year.

The natural vegetal cover of El Salvador has been drastically reduced with a corresponding reduction in the variety of flora and fauna. Many species have become extinct such as the Tapir and the Jaguar, due to habitat loss, hunting, and the introduction of foreign species. Unfortunately, there is no up-to-date technical information available in regard to natural resources, which weakens planning and prospects for the implementation of economic instruments.

2. Economic models and their impact on the environment

The economic model in El Salvador is based on agro-exports, mainly coffee, cotton and sugar, which grow well in local soils and utilize cheap labour.

The import substituting model predominant in the fifties and sixties encouraged migration to urban areas, as industry became concentrated, drastically affecting the environment. The wealth that was created was not saved for investment, but squandered on imported consumer durables, exaggerated by a widening gap between rich and poor and other social problems. At the end of the seventies, these underlying social tensions exploded in a bloody civil war. The agrarian reform at the start of the eighties lacked technical criteria, and, hindered by sabotage, led to a lowering of productivity.

The agrarian reform law which commenced in 1980 drastically changed property ownership: 37% of the territory has been affected or will be affected by the peace agreement that has been negotiated.

The new government, in 1989, adopted free market policies, reinstating the private sector as the leading economic force. The peace agreement in 1992 and a National Reconstruction Plan are attempting to incorporate ex-soldiers into society. The recent growth in the economy is recognized as short term and offers no prospects for long term sustainability. The present alarming

environmental situation in El Salvador has been caused by two factors: population growth, and an economic model which favours growth over social and environmental factors. Furthermore, the author stresses:

- A lack of economic integration in the region.
- The possible inclusion of some of the Central American countries in NAFTA would probably bring legislation reforms.
- There is a tendency towards more open trade in agricultural inputs which could have negative environmental consequences.
- A possible change in price structure could make more rational use of resources redundant.
- The government is trying to decentralize decision making in regard to education and health, which could have positive benefits for the environment.
- The opening up of the economy to foreign capital could effect the environment.

3. Environmental impact of economic policy

In recent years the market has been the main determinant of prices. Underutilization of resources remains, mainly because of poorly developed property rights and access to credit.

Most of the subsidies have been eliminated except for electricity and water. If these subsidies were removed it would encourage more rational use of resources and energy, around 50% of which comes from hydroelectric sources.

Although a wide range of legislation which could be used to protect the environment exists, in practice public administration and management of resources has had little success due to a lack of political will, public finances, and interest of the general public. The author states that the effects of tariff reduction are uncertain, but probably mean more free trade in natural resources, which will necessarily harm the quality of the environment.

Environmental protection has become the key word in recent years voiced by NGO's and election speeches, supported by international aid. Several projects are under way, many of which are promoting local participation in the search for environment solutions. One private bank is offering soft credit for reforestation projects with a pay back period related to the initiative's projected profitability.

Fiscal policies have not had much success. The state has taxes on profits, value added tax, and import taxes. However, there is no effective property tax. Furthermore the majority of "unsustainable users" do not form part of the tax base, which complicates the design of tax breaks for environmental projects. The state owns the aquifers, but they are badly administered and managed, with little control over private well users that could benefit from defined property rights. A framework should be drawn up by the state to encourage more rational use, along with appropriate economic instruments and traditional command and control regulations.

4. Legal and institutional aspects

At the start of 1991, the National Environmental Committee (CONAMA) was formed, with representatives from different ministries, aimed at coordinating government efforts in recuperation and conservation of the environment.

The executive arm SEMA seeks improved cooperation and interaction between the private, public and academic sectors to improve environmental management. Despite its efficient image, SEMA is devoid of institutional infrastructure to carry out monitoring, analysis, or administration of natural resources.

The objective of the El salvador environmental fund (FONAES) is to capture international finance from environmental projects through schemes connected to the national debt, which can be wavered provided the funds are allocated for environmental purposes.

The agricultural and livestock ministry (MAG) formed in 1911 regulates activities that utilize renewable resources promoting irrigation and drainage technology. An arm of this ministry is directly concerned with the management of renewable resources, and has been successful in developing sustainable territorial programmes. Nevertheless the organization was systematically under funded during the civil war, reducing its ability to function effectively.

The El Salvador Institute for Agricultural Transformation (ISTA) emphasizes the importance of property rights and obtaining legal security over land, with the aim to revitalize the sector and recuperate abandoned areas.

The National Science and Technology Council (CONACYT) aims to promote technological and scientific development carrying out quality control, verification and other activities.

The National Center for Farming and Forestry Technology (CENTA) is concerned with technology transfer, and was involved in

the green revolution. After the problems surfaced with green revolution technology, more care was placed on conservation, but their work was interrupted by the war.

The emphasis is now upon appropriate technology to cope with the food needs of the population. The National Committee of Water boards (CONIAPOS) is responsible for implementing controls and programmes connected with the public water supply.

5. Institutional evaluation

The economic reforms undertaken in the eighties under the banner of economic restructuring, largely disregarded the sensitivity and importance of institutional structures, carrying out drastic cutbacks in human resources. Institutions related to environmental management found their budgets reduced or frozen, with a concordant loss of management capacity and basic information, putting the sustainable development of natural resources in jeopardy by reducing the state apparatus.

6. Legislation

Despite the 1973 forestry law and the setting up of forestry institutions, there is no reliable information regarding the quality and quantity of forestry resources. Despite the recommendations stipulated in the constitution, in practice very little has been done in the way of programmes or fiscal incentives. The ability to impose fines is inhibited by a scarcity of human resources, and lack of coordination between public institutions. A selection of proposed and existing legislation is listed below:

- A new forestry law has been proposed by SEMA for sustainable management, with emphasis on economic instruments, and technical assistance.
- A law for the protection of wildlife exists, and El Salvador ratified the CITES treaty in 1994.
- A law controlling the use of pesticides, fertilizers, and agricultural chemicals.
- A law regarding fishing activity.
- Development and territorial planning of San Salvador and its surrounding regions.
- Integral management of water resources.
- Water quality, waste control, and protected area regulations.

DIAGNOSTIC AND ANALYSIS OF THE POTENTIAL OF ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT IN GUATEMALA[14]

Guatemala possesses a wide variety of ecosystems and is rich in bio-diversity due to its geographical position and mountainous terrain. However, 133 species are in danger of extinction, primarily due to loss of habitat, deforestation, and excessive exploitation for subsistence or exportation. Other factors have come into play in the last three decades such as poverty, inciting the poor to encroach upon natural areas to satisfy their basic needs; damaging production processes; lack of institutional and policy effectiveness; and the exclusion of environmental criteria in the formulation of development and social policy.

Seventy percent of Guatemalan soil is apt for forestry production and 30% apt for agriculture. Nevertheless, the country's soils are characterized by misuse of their productive capacities, leading to soil erosion of between 20 and 300 tons/ha/yr in forested areas and between 700 and 1100 tones/ha/yr in deforested areas. At this rate, desertification is a distinct possibility in many deforested and fragile zones.

Several socio-economic factors influence the sustainable management of land, such as unequal land distribution, population and urban growth, lack of environmental education, inadequate use of agro-chemicals (fertilizers and pesticides), and intensive land use.

The country is also characterized by unequal land distribution, that is, the majority of the population has the smallest percentage of total land or is without access to land.

Soil degradation causes heavy economic losses as soils become less productive, in ecological terms. Rivers and lakes become sedimented with corresponding damage to drinking supplies and hydroelectric installations.

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[14] Summary in English of the report "Diagnóstico y análisis de las potencialidades de la aplicación de instrumentos económicos para la gestión ambiental de la República de Guatemala" (LC/R.1546, 30 May 1995), prepared by Mr. Mariano Rayo M.

Thirty one percent of the country is covered in forestry contributing 7% of GNP. However, trees are being cut at a faster rate than they are being planted. Furthermore, between 1950 and 1990, more trees were cut down than in the previous 500 years. Deforestation is estimated at between 60,000 and 90,000 hectares per year and reforestation at a mere 2,000 hectares, including 800 hectares created by fiscal incentives.

In spite of the aptness of the terrain for forestry, production has been concentrated on agriculture, particularly monocultures, which has tended to replace forests. This tendency is exacerbated by forestry companies that look for the most valuable native species ignoring other forest products. Another factor has been the outbreak of civil war where the army destroyed large tracts of forests because they acted as cover for guerrilla groups.

The immediate effects of deforestation are the loss of bio-diversity and tourism, and subsistence of rural farmers that have traditionally sold alternative forest products representing up to 50% of their family income. Overexploitation of forestry resources is common not just for wood but for other products such as seeds, resin and latex. The continued loss of forests causes a panic effect amongst the rural poor and further encroachment in order to subsist, creating a viscious circle, usually terminating in the conversion of land to cattle raising.

There is no systematic monitoring of water resources, which have been progressively deteriorating in quality. The main sources of pollution are industrial plants, agro-industry, sediments and domestic waste. Inadequate supervision of water extraction and concreting of urban areas has diminished underground water levels.

Guatemala suffers from a high level of urban problems due to rural population looking for opportunities without the necessary infrastructure. Rural population is also exerting pressure upon national reserves and wood areas. Unfortunately the importance of natural resources or bio-diversity is not understood by the population. Perhaps due to poverty and lack of education, resources are not valued in a sustainable way, and are utilized under the criteria of short term profit. The use of dynamite and small meshed nets is over exploiting the fish stocks. Controls on the taking of turtle eggs has been ignored and is difficult to enforce putting this species in danger of extinction.

1. Economic models and their impact on the environment

Guatemala has the strongest economy in Central America with a GNP of US$13 billion unequally shared between 10 million inhabitants. Between 1950 and 1979 the country had one of the highest average post war growth rates of 2.45%. This growth was based on traditional cash crops such as coffee, cotton, bananas, and sugar

and towards the end of the period, meat. The country is characterized by a concentration of wealth and a large pool of people living in abject poverty, generating fertile ground for internal armed conflict and environmental degradation.

In common with other Latin American countries, Guatemala went through a period of import substitution industrialization, using tariffs and other barriers to protect regional development. The economy developed behind a protective curtain of subsidies, which worked against increasing efficiency. Despite more recent public and private investment in the formulation of exports, this capital is seldom spent within the economy but re-invested in export activities explaining the continuing necessity to import intermediate goods.

The export model of the eighties was characterized by economic, social, and environmental inefficiency due to overvaluation of the currency, preferential credits, and negative real interest rates. This generated a capital intensive structure with low absorption of labour and resistance to technological change. Competitiveness is not based on productivity but on low salaries, and on natural resource extraction.

With the concentration in exports, the prices of rural agricultural products for domestic consumption dropped, leading to increased rural poverty and greater pressure upon the environment, further strengthening rural-urban migration. The export credits offered by the government required guarantees, and were therefore biased in favour of medium and large property owners.

Between 1980 and 1985 the country entered into its worst recession in modern history putting the country back 15 years to levels of income similar to that of 1970. It was linked to the worldwide fall in demand for primary products, leading to a monetary devaluation, inflation, and general disequilibrium. Structural adjustment was adopted, with the short term objective of monetary stability. The contradictions in government policy to retain macro-economic equilibrium are also apparent in regard to environmental policy, that is, regulation versus liberalization of markets, and economic growth versus sustainable development.

The government chose to rejuvenate economic growth, but at the expense of the environment and growing contamination problems. Regrettably the state was unable to face the challenge of economic wellbeing without affecting its natural resource base.

In 1991 the government initiated economic modernization to stabilize macro economic indicators and implement structural adjustment, however the instruments used have not been complementary or compatible in finding an integral solution to disequilibriums. Many of the problems beleaguering the economy arise from a partial, inconclusive and incoherent structural

adjustment. With the concentration on macro-economic stability, the government forgot the social and environmental effects of their policies with obvious deleterious results.

Structural adjustment concentrated in expanding the base of exports, but this policy was enacted without the necessary conservation and economic instruments leading to a further deterioration of the resource base.

The environment has really been considered only because of international pressure since the middle of the eighties, with the establishment of an environmental and protected areas commission, and an environmental protection law.

These initiatives have been launched with high ideals and objectives but without the necessary economic instruments to see them through. The only real advances have been made through the Central American Alliance for Sustainable Development, with its own definition of sustainable development according to the peculiarities of the region. So far concrete actions have been few and far in between.

2. Environmental impact of economic policy

The political economy of Guatemala, as already mentioned, has not until now incorporated the environmental factor into planning and policy, and little is known or understood by economic instruments. Basically they are categorized as those tools which affect cost and benefit estimations of actions by economic actors, affecting their decision making and behavior. If correctly structured and designed they can work in favour of the environment. Unlike strict obligatory regulations, economic instruments allow economic subjects the opportunity to react to determined stimulants in a beneficial way.

Guatemala and the Central American region is characterized by a failure to date in both regulatory and economic instruments in correctly valuing natural resources. It is not possible to give a single final definition of what is and what does not constitute an economic instrument, because each one will have a different significance in different contexts. However, in the international arena one can identify seven basic types of economic instruments: a) Prices and costs, b) Subsidies, c) Deposit and Compensation systems, d) Market creation, e) Coercive financial incentives, f) Property rights, g) Fiscal incentives.

It should be noted that in reality economic instruments are generally utilized in conjunction with regulatory instruments. They are in effect a conciliatory bridge between private and social costs through the internalization of externalities, permitting greater production options, and a rational choice by consumers.

In general terms, fiscal policies such as monetary and exchange controls, as well as stabilization programmes, influence the environment by changing the rules of the game. The same can be said of economic instruments although in both cases the direct relationship is difficult to pinpoint, partly due to the lack of reliable information. In the past the state has been instrumental in applying economic incentives which have run contrary to environmental sustainability with a short term profit seeking focus. These policies show that neither the state nor the market has been able to utilize resources in a rational way, nor have they been successful in reducing the marginalization of an increasing percentage of the population. This last failure motivates the poor to take life saving action further depredating resources to meet their basic needs.

If production is increased through an extension of the agricultural frontier, rather than improvements in productivity and efficiency, then this will clearly have effects on the environment as has been the case in Guatemala. Furthermore the type of crops employed have a damaging and pernicious effect upon resources such as cotton, tobacco and sugar cane, which rely heavily upon agro-chemicals.

Fiscal instruments have attempted to induce foreign and domestic capital to invest in agro-industry by offering indirect subsidies such as tax exoneration on profits, reduced land, import, and value added tax. The result has been the establishment of weak, highly protected agro-industrial chains, with a low level of national, regional and international competitiveness. In effect they have promoted the profit seeking mentality and not filled the gap between private and social costs.

To complete the policy measures, the government implemented an infrastructure building programme of roads and bridges encouraging rural workers and farmers to venture further into previously natural untouched areas, and provided soft credit for the expansion of cattle production.

3. Applied economic instruments

Applied economic instruments to counter past errors are led by an exemption from land taxes in the protected areas of up to 50% for those property owners dedicating their land to natural reserves, and an exemption of taxes on profits for those carrying out research and development. There is also a reforestation incentive of up to 50% of the costs and 50% reduction of taxes on profits, and exoneration of infrastructure taxes (working tools etc.) for those who reforest more than 50% of their land. This instrument is attractive for large landowners and forestry companies with money to invest, but fails to absorb large amounts of labour. Its effect

has been minimal, reforesting 15,000 hectares in 16 years compared with an annual destruction of 60,000 to 90,000 hectares.

Guatemala also studied the possibility of carrying out debt for nature swaps, and set up a special commission. The only initiative to date has been promoted by Conservation International were US$5 million was exchanged for conservation bonds. However the process is not very attractive because Guatemalan external debt on the secondary markets is worth only 25% of face value.

CONAMA (National Commission for the Environment) is responsible for the coordination of EIA's. No criteria are available, however, to decide which projects should be submitted to this procedure. The lack of manpower inhibits their ability to carry out such studies and many businessmen view them as an obstacle to development. The studies undertaken need to utilize the same reference framework and methodology, and should be understood and enforced, something which they are far from achieving.

4. Legal and institutional aspects

Despite the existence of a series of laws which in theory are connected with the environment, there is a distinct lack of finance and political will for their implementation. Environmental organizations do not form part of the government decision making, which is plagued by a series of contradictions. On the one hand the government has encouraged an expansion of the agricultural frontier, whilst at the same time another ministry or organization is trying to impede the destruction of forests which the first law implies.

The national bank offers credit for cattle raising which invariably involves degrading forests, because if a parcel of land is not cleared and farmed within 5 years, it is considered idle. This is another example of short term thinking based on the idea that cattle ranching and farming are more profitable than forestry, and therefore they do not offer credit for tree planting.

The state institutional weakness has been filled by community organizations and NGO's, with little success. Meanwhile the exploitation of natural resources is so profitable in the short term, that companies are enticed to practice unsustainable techniques with impunity. In addition, poor coordination and interaction between government and non-government bodies partly explains the failure of most environmental projects.

A study carried out by ASIES in 1995 identified the precariousness of the legal and institutional structure in the country. This is clear from the prosecutions which were attempted for illegal intrusion and cutting in a protected area. The NGO in charge of surveillance removed their workers after they were

threatened by smugglers and military personnel. The author believes that the systematic cutting is organized by powerful groups that operate with impunity.

Another problem is the isolated action of institutions which plan without properly consulting other relevant bodies. These institutions have changed their names frequently, confusing users, and the procedure is fraught with inconsistency.

Bureaucracy and underfunding are significant problems along with a lack of trust in the legal structure, and the belief that certain actors can operate with impunity. The author believes that many functions could be handled at the local level, but despite the demands of the constitution, many of the legal articles are not respected. He recommends an ordering of national territory with the appropriate institutions responsibility allocated accordingly, and the creation of an environmental ministry.

A major problem lies in the institutional inability to carry out the requirements of environmental law, which in itself lacks the proper mechanisms for implementation. Only in the forest sector is there specific forestry legislation, the other sectors such as water, soils, and bio-diversity are partly covered by laws from other ministries such as the agriculture ministry.

The laws state the objectives of natural resource preservation but do not describe the mechanisms for its fruition, without addressing the illicit or irrational use of resources. Urgent proposals are needed for the rational planning and management of natural resources which need to be put into law, mobilized, and applied through effective institutional mechanisms.

A training programme is also needed to enable professionals to adequately implement control and management of their sector with a proven methodology of how to implement economic and regulatory instruments. In addition, the constitution clearly states that local communities have the right to organize themselves and be represented at the municipal level. Therefore, instead of waiting for institutional clarification, local people could start to develop an environmental consciousness and promote the process of sustainable development.

THE DETERIORATION PROCESS OF FORESTS, SOILS, BIODIVERSITY AND WATER SOURCES IN MEXICO[15]

Mexico is predominantly mountainous and flanked by two seas at distinct temperatures producing large differences in climate and rainfall, which creates four distinct ecological zones: dry, temperate, wet and dry tropical.

The decline in the quality and quantity of natural resource occurred concomitant with industrialization based on these very same resources. The resulting land degradation and loss of biodiversity are serious problems. Despite the countries potential, forestry activity forms less than 1% of GNP and shows a negative trade balance, as the country imports between 30-40% of domestic needs.

The authors cite the lack of policy and institutional support to promote forest activity. Around 80% of forests are in public hands, concessions for exploitation have been granted in 40% of this area, but the state only receives around 1% of the profits. Forestry unlike cattle raising requires a large amount of capital and is therefore unattractive to small producers. Between 1979-90 the agricultural area grew by 39%, cattle raising by 15% and forested areas were reduced by 13%. Today only 25% of the territory is covered with trees.

Forest exploitation has failed to capitalize on alternative forest products, which have lacked development principally because of a lack of markets. Only the best strands have been selected for their superior commercial value; tropical forests are the most sought after and are being cut at around 2% per year. Sixty five percent of the volume of wood is extracted by approximately 20 million Mexicans for fuel and charcoal production.

The major cause of deforestation are changes in agricultural production towards cash crops and cattle raising, the opening up of the agricultural frontier with maize growing, and urban expansion. Population growth and the services that they require is also a factor, but their needs can be catered for with a sustainable use of resources. Cattle raising has been supported by international credit and government policies.

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[15] Summary in English of the report "Los procesos de deterioro de bosques, suelos, biodiversidad y aguas continentales en México" (LC/R.1541, 30 May 1995), prepared by Messrs. Juan Carlos Toledo and Salvador Anta.

1. Land degradation in Mexico

Vast areas of the country have been altered by urbanization and an extension of the agricultural frontier, change of land use, inappropriate technology, population growth, loss of traditions. More fragile soils are increasingly being cultivated, with less fallow land, lack of organic fertilizer, overgrazing, and over exploitation. This outlook has been driven by the search for maximum profits in the short term.

Water erosion is a severe problem, approximately two thirds of the country is affected especially in 60% of the surface area which is arid or semi-arid, leaving it susceptible to wind erosion. Around 20% of the country suffers from salinity caused by poor water quality and drainage. Considering the different processes of land degradation, one can conclude that 97% of the land area is affected in some form or other.

2. Biodiversity

Mexico is extremely rich in bio-diversity with a large percentage of endemic species, which depend upon diverse habitats. The authors believe that preserving biodiversity is not possible unless humans receive a fair share of the benefits, and take a greater local role in resource management.

Mexico possesses 12% of the terrestrial species in the world, and is amongst the top 7 countries in the world for biodiversity, many plants and flowers are extremely rare and should be preserved for their medicinal use both now and for future generations.

Mexico contains every variety of ecosystem in the world; there are 55 species of pine tree of which 85% are endemic to Mexico. The Gulf of California is rich in marine mammals and birdlife. There are 336 species of flora and fauna in danger of extinction, 51% of which are endemic; of the 801 threatened species, 55% are endemic, of the 1130 rare species, 53% are endemic.

Reliable information is needed regarding habitat characteristics and causes of destruction, which are usually social, cultural or economic, with a detailed inventory of where action can be taken.

At a country and world level, society is becoming more sensitive to the impacts of agricultural production, cattle raising, deforestation, population growth and the impact of modern technology, and the effects of the processes upon regional and global biological equilibrium.

The agricultural revolution in the sixties and seventies greatly reduced the variety of seeds available. The loss of bio-

diversity is caused by the destruction, deterioration and fragmentation of habitats accelerated by deforestation, invasion by other species, contamination of soils, water and air, and the change in world climate. Gene banks have been proposed for the conservation of genetic material.

3. Characteristics of water resources in Mexico

The National Water Commission was created in 1989, and for ease of analysis the country was divided into 14 regions corresponding to the 14 major river basins. There are 5,125m3 of water available annually for every Mexican, but in some regions such as Bajo California and Sonora, supply is limited and may provide problems by the end of the century.

Population growth has slowed from 3.4% in 1970 to 2% in 1990 and an estimated growth of 1,5% at the turn of the century. This has occurred in parallel with a rapid urbanization, causing problems of demand satisfaction and the supply of services; 20% of energy comes form hydroelectric sources, principally in the southeast.

Sixty one percent of water is used for hydroelectric power, 30% for irrigation, 5% for industry, and 4% for urban use; 60% of domestic water comes from underground sources and 40% from surface sources. Thirty percent of cultivated land is irrigated, and 67% of this water comes from surface water and 32% from aquifers. In arid and semi-arid zones a grave problem exists with the overexploitation of aquifers for irrigation purposes.

Agriculture is responsible for the largest waste discharge into water sources (46%), mainly composed of untreated chemical residues, causing severe contamination problems in estuaries and port areas, with increased sediment. Many of the problems are caused by a short term vision and profit seeking mentality.

Councils have taken measures to treat 13% of wastes generated, 50 plants are under construction, and a further 75 under study. When these are in operation the amount of wastes treated will increase 29%. It is estimated that 40% of the drinking water system needs to be rehabilitated. A national monitoring system initiated by UNEP is in operation.

Regarding the contamination and overuse of water, four factors stand out: urban development, lack of clean industrial technology or treatment of wastes, intensive and specialized agriculture and cattle raising with organic discharges. All these activities are economically dynamic but they must search for a way to effectively incorporate environmental aspects into their planning and functioning.

FISCAL AND NON-FISCAL ECONOMIC INSTRUMENTS OF ENVIRONMENTAL MANAGEMENT IN MEXICO. General framework and freshwater resources[16]

Environmental management in Mexico has traditionally been viewed in strictly regulatory terms, however given the severity of rising environmental problems a new focus is required. One of these possible avenues, the author suggests is the use of economic instruments. The overall objective is to arrive at sustainable development which requires the efficient use of economic, regulatory and legal instruments and the participation of a multiplicity of actors.

Fiscal controls arise from the idea that there is an optimal level of resource use based on costs and benefits. On the other hand, economic incentives promote the idea of an interchange between economic agents but without considering the social or environmental consequences, thereby creating externalities. In Mexico, at the present time, negative externalities occur when there is no incentive to alter damaging behavior. In the case of positive externalities, no incentives are offered to continue beneficial actions.

The solution is to take into consideration all the negative and positive consequences of actions, and discourage, or encourage them accordingly. The following suggestions are based on this idea:

- "He who pollutes - pays"
- "He who uses - pays"
- "He who conserves - receives rewards"

Economic instruments assure that there is no bias against the environment and they are a way of raising revenues for other instruments and controls, and consequently at a lower cost. Care must be taken in cases where there is doubt about the consequences of using a resource or where a species is close to extinction. In these cases it may be better to use regulatory instruments.

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[16] Summary in English of the report "Instrumentos fiscales y no fiscales en la gestión ambiental en México. Marco General y recurso agua dulce" (LC/R.1543, 30 May 1995), prepared by Messrs. Carlos Toledo and Salvador Anta with Hugo Contreras.

1. Use of fiscal and non-fiscal instruments in mexican environmental policy

In keeping with growing environmental problems, the 1971 Control and Pollution Law was converted into the General Ecological Equilibrium and Environmental Protection Law in 1988. This is considered to be one of the most efficient systems in Latin America, which includes the use of Environmental Impact Assessment Studies (EIA's), management plans, popular demands. However, economic instruments such as these still require the backing of the law to be fully effective.

There have been experiences of pricing policy which unfortunately had the opposite effect to that intended, with a deterioration in the environment, indicating the need to apply regulations and incentives with care. For example, an irrigation subsidy has caused salinity problems through excessive use of water. Another important point, is that the decision making process in Mexico is highly centralized, which tends to discourage participation. Therefore a decentralization process is also important together with the correct instruments for effective environmental management.

2. Policy instruments for the management of forests, soils and biodiversity

In order to implement regulatory or economic instruments it is first important to have sufficient information concerning the resource base in qualitative and quantitative terms, which usually requires a study. In Mexico, these types of study have been marginalized and have yet to form part of an integral development plan. Of 34 plans elaborated, only 3 have been incorporated due to:

- A lack of technical, methodological and conceptual proficiency.
- Poor implementation of environmental law.
- Lack of participation.
- Lack of mechanisms to apply the studies in practical terms.

EIA's are required by law and are presented to the National Ecological Institute, but unfortunately this institute lacks manpower to properly carry out its functions. A management plan is also required in forested areas. These instruments, however, involve increased costs for those companies involved, who tend to be interested in the short rather than the long term.

In 1994 three guidelines were published in regard to the forestry sector:

- Guidelines to avoid soil and water contamination.
- Recommendations so as not to harm the flora and fauna.
- Recommendations to preserve biodiversity.

These extra costs for forestry companies are no real incentive for long term management, and furthermore they are difficult to control.

The government has created a number of restricted areas to control indiscriminate extraction and degradation, but this policy has created problems of supply for the forestry companies, and prices have risen accordingly. In areas like Chiapas there are problems of vigilance, and technical ability to manage the forest on a medium and long term basis. The use of protected areas should be viewed more as an emergency measure.

As a way of raising money for conservation, debt greening became popular in the nineteen eighties as a way to finance investigation, reduce the public debt, improve influence of environmental groups, and offer professional training in conservation techniques.

The author stresses the advantages of debt greening highlighting that ownership of national territory is not transferred, and remains administered by appropriate national bodies.

Natural reserves also offer the possibility to cover an entrance fee for use of the areas, though administrative, legal, and institutional difficulties have to be overcome.

For many years Mexico used a guarantied or fixed price system for farmers, which led to overuse of the land, and discrimination against small producers who as a result found the prices of basic goods rising. These distortions in the market were tackled by a new instrument called PROCAMPO, based on the quantity of hectares planted, but there are problems with this system because it fails to consider tropical areas and tends to encourage greater deforestation.

The national reforestation programme has been hampered by the poor survival rate of seedlings and a lack of sound management.

3. Water

Contaminated water is the most serious health problem in Mexico, and an analysis of water administration clearly shows the over emphasis that has been placed on economic criteria.

In 1991, a system of contaminating rights was established with the idea that the contaminating person or company must pay the cost of recuperating the water, and must seek government permit first before dumping untreated waste water.

The National Water Commission is responsible for administering the new law and carrying out tests for water quality. In the case of excessive contamination, the Commission has the power to close the offending installation, and emit sanctions and penalties based upon the quantity of chemicals and suspended solid waste. A series of tariffs is set to encourage minimal contamination in volume and by concentration of dangerous substances. At the end of 1994, 373 projects were registered and their wastes subject to the Commissions control. The cost of water control was added to the project cost over 30 years.

One of the problems with the law is that the largest potential user of water –agroindustry– is exempt from control, meaning they have little incentive to improve the quality of their wastes. Furthermore, industry can tap into the public waste system without any control whatsoever. The fixed quota idea does not reflect the degree of toxicity in the waste or the ecological damage this could produce. Furthermore an overall blanket payment does not offer any incentive to reduce the degree of toxic waste. The level of fines does not adequately cover the cost of recovery, but an increase would cause severe problems for companies and those people administering the water supply and wastes.

Local legislation needs to be adopted to counter this problem, and to amplify the waste criteria to cover substances other than chemical and suspended waste. Such a move may be considered premature, because it would involve greater costs for those companies that self declare their wastes, a practice open to abuse. The lack of local legislation has meant that many councils have failed to cover the appropriate fines for political reasons.

There is a high vigilance cost involved which at present the Commission is unable to cover, emphasizing the need for greater economic incentives for water control.

The author suggests that the Commission should not only cover those responsible for the contamination but cover for the amount and toxicity, and devise instruments that can substitute for the system of self-declaration. The experiences of some European countries could be useful to adapt successful methods to the Mexican reality.

The implementation of economic incentives in Mexico has had some positive results, but the system of water rights needs to be improved to provide further incentives to reduce the quantity and toxicity of waste water.

APPLICATION OF ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN THE DOMINICAN REPUBLIC[17]

The eighties were a turning point and a period of economic crisis for the Dominican Republic due to a fall in the international price of primary products and hence the failure of the agro-exporter model. This led to balance of payment problems, devaluation of the currency, inflation, and a speculative financial environment.

The structural adjustment undertaken was hardest felt in the labour market, reducing real wages and opportunities, exacerbating poverty, increasing rural-urban migration, leading to a whole new group of micro-entrepreneurs in the informal sector. This adjustment also encouraged new activities such as services and tourism, which along with increasing poverty utilized and encroached even further upon natural resources.

According to government and IBD figures, of the 7.2 million inhabitants in 1994, 95% are living in poverty and roughly half live in urban areas, the largest being the capital with 22% of the population. Unemployment is running at 26.2% and is one of the fundamental causes of deforestation, being related to many social problems.

The authors emphasize the point that the structural adjustment reforms may have stabilized macro-economic indicators, but with severe social and environmental costs. Therefore these policies cannot be considered an appropriate road for sustainable development.

In social terms, the elimination of subsidies on food staples and other basic goods and services were prejudiced against the poor leading to greater hardship. The elimination of the natural gas subsidy effectively pushed up its price and affected the demand for competitive products, such as an increased demand for coal and wood as fuels, with the obvious negative effects upon the environment.

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[17] Summary in English of the report "Aplicación de instrumentos económicos para la gestión ambiental y el desarrollo sostenible en la República Dominicana" (LC/R.1551, 30 May 1995), prepared by Mr. Pedro Julio Bona and Ms. América Bastidas.

The opening up of the economy to the free market has permitted the entrance of cheaper products, manufactured and produced under different conditions, which has reduced consumption of domestic products. On the other hand, exports have only been concentrated in small niches in foreign markets (principally USA), taking advantage of rich soils left after forestry burning. In general the opening up of the economy in this way reduces the production and exports of traditional products, and only provides opportunities for specialized products that are able to find a niche in foreign markets whilst tending to exploit rich natural resources in a non-sustainable way.

The GATT agreement is but an extension of these tendencies highlighted above, and is the formalization of these arrangements. For example, the lowering of import tariffs has encouraged the import of used cars from the USA, which are cheap because the majority use leaded fuel which was outlawed in the US in 1975, as links were established between leaded fuels and brain damage in children. Therefore it can be said that the Dominican Republic has been importing negative environmental externalities from the USA.

The case of sugar highlights the impact upon domestic agro-industry, because the low tariff on the import of manufactured goods allows industrialized countries the opportunity to sell off their out-of-date machinery to developing countries. Meanwhile the export of sugar must compete with other countries using up-to-date technology and the Dominican Republic must rely upon preferential trading terms and special treatment from USA to sell in their markets.

In the future, it may be even more difficult for certain agro-industries to compete on world markets with the threatened introduction of a green label, which will stipulate certain norms and standards before products can be exported to northern countries. In order to compete, these industries will have to invest in green technology and waste control measures which is a growing industry dominated by northern firms. In summary the GATT agreement is a way of cementing links with the world capitalist market with worrying consequences for the economy, social conditions, and the environment in the Dominican Republic.

1. A brief summary of the environmental situation

The Dominican Republic shares an island with Haiti in the Caribbean, and can be divided into seven geographical regions with distinct climates. The country is rich in bio-diversity which has suffered due to uncontrolled exploitation particularly in coastal zones.

In the sixties, an inventory of natural resources was conducted, which gave the first clue to the relationship between

the environment and the economy. The report shows that over 50% of the soils are suitable for shrubs or trees, and then, the cultivation of coffee, and cocoa using agro-forestry techniques is an immediate possibility. Unfortunately, to date, little attention has been given to these mixed cropping techniques, and commercial use has been mainly monocrop and extractive, with minimal consideration of environmental consequences or long term planning.

In general, precipitation is reasonable, with a potential of 21,000 M3, and a projected demand for the turn of the century of 4,500M3. Many of the valleys suffer from a shortage of rainwater, and therefore irrigation would seem essential for any kind of agricultural recovery. Before a national water plan can be carried out, a diagnosis must be conducted, especially in areas where knowledge is incomplete. Irrigation efficiency is less than 20% because the majority of canals were constructed over 30 years ago.

Institutional and policy weaknesses have been responsible for non-sustainable activities or have promoted certain uses with the inappropriate use of subsidies, which affect the cost/benefit analysis of investments. The criteria for these incentives has been purely economic explaining the encroachment into national reserves, non-sustainable production techniques such as the use of agro-chemicals, and consequent degradation of resources.

The import substitution model imported much of the technology (which was often used and outdated) and the raw materials as well, except in the case of agro-industry. This policy had immediate effects upon the environment because old technology is highly contaminating. At the end of the seventies environmental impact assessments were required but were not subject to strict control, and were inadequately applied.

There are no current figures for the rate of deforestation in the country, but rural demand for fuel and the need to import wood for other uses suggests the rate is significant. Hardwoods are illegally extracted to make furniture, and softwoods for fuel, small industry, and other needs. Only 15% of the territory retains its tree cover, and in urban zones 50% of families are still dependant upon wood for cooking.

Legislation has taken a restrictive nature which ironically has at the same time accelerated forest decline. The mining law dates back to 1962, and there is a river basin management law dating back to 1977. The agrarian code in 1972 strengthened the agrarian reform, but failed to halt the two processes of rural-urban migration, and encroachment upon fragile areas.

This legislation is perceived to act against the rural population, ignoring any social connection between the community and the forest. A project is underway in the Southeast incorporating community management of softwood forests, which hopefully can be replicated elsewhere.

The economy has traditionally been based on agricultural products, but tourism is rapidly becoming the most important foreign exchange earner. Little attention is paid to the potential of tourist activities or the connection between industry and clean beaches. It is seldom appreciated that the environment is in conflict with tourist activities and mining.

Whilst the National Tourist Plan foresees the need and asks for an environmental impact assessments, there are no economic instruments that support or regulate their use. In practice, impact studies are presented with a project as a formality, and not properly revised for lack of personnel and administrative structure.

2. Degrading processes and underlying socio-economic forces

In agriculture, little is known about light application of chemicals or about organic farming. In some areas, due to the monocrop and capital intensive methods, the concentration of chemicals can be perceived in the air and in polluted water supplies. There is a lack of regulation on behalf of the state, and technical knowledge regarding their correct application to avoid health risks and immunity developing by certain pests.

The changes in productive structure have directly forced poor rural farmers to move to overcrowded urban areas or encroach upon fragile natural ecosystems prone to erosion, where their cut and burn techniques further degrade soils.

Land degradation is caused by a number of factors such as salinity, excessive use of chemicals, lack of conservation techniques on steep slopes, and clearcutting in upper river basins. This loss has serious consequences for agriculture, biology, and hydroelectric sources which will suffer premature sedimentation.

Nickel, gold and silver is extracted in raw form to be processed abroad. These activities have caused deforestation in the affected zones and contamination of water sources, creating conflicts with local people.

The principal tourist center lies on the north coast, but development is characterized by inadequate planning and contamination of water resources.

Energy is provided from hydroelectric sources (17%) and the rest comes from imported oil; demand exceeds supply leading to frequent and prolonged power cuts. Despite this excess demand, there are no policies to conserve industrial or domestic energy, nor programs to introduce non-contaminating renewable energy sources such as solar panels.

The disposal of solid waste is causing severe environmental problems with a limited capacity for processing, as councils lack resources and capacity for adequate treatment. There remains considerable ignorance in regard to the environment, and a lack of research and investigation. An inventory of resources is required and an evaluation of policy instruments for their sustained use.

3. Characteristics of environmental management

Environmental management is the responsibility of the water, forestry, national parks, agriculture, and natural resources institute, a national planning office, and a national environmental commission created in 1987 with multi-institutional input. There is also a Commission of Ecological Health, and a commission formed to follow up the Rio summit agreements, and to forge cooperation between the various institutes previously mentioned.

There are 22 protected areas in the Dominican Republic, equivalent to 14% of the country. Management of these areas has traditionally been weak, lacking administration and management policies. Also in the coastal areas there is a lack off coordination between the relevant organizations.

The middle of the seventies was marked by a rapid increase in the growth of NGO's, many dedicated to community participation and education programmes that consider the environment in development planning. One of the national universities is also offering a masters in environment and ecology, along with several other post graduate forestry courses in universities and institutes.

4. Diagnostic of management instruments and environmental policy

Despite a growing environmental consciousness amongst ecologists about the need for environmental management, this awareness has not been transferred to decision making levels with the desired orientation towards sustainable development.

Environmental policy is extremely limited, plagued by a lack of institutions, trained personnel, legal coherence, a maze of organizations that block management, lack of regulations for economic initiatives directly linked to the environment, the contribution of the private sector to the chaos, and a lack of respect for the regulations that exist.

The inability to organize institutionally can be illustrated by the fact that an international private company had to be brought in to manage the collection of the capital's waste. Furthermore:

- The mining regulations have no provision for the environment.

- The protection of existing bio-diversity areas is done on an ad hoc basis. No real system of protected areas exits. EIA's are largely carried out to satisfy international investors and donors, but their application is inhibited by a lack of experience, methodologies and qualified personnel.

- No coherent exploitation policies exist for coastal zones.

- There are 63 forestry laws, 2 executive orders, and 3 resolutions in existence from the end of the last century. In spite of the abundant forestry regulation and the creation of national parks and protected areas, wood production has steadily increased, and the state is unable to control powerful private companies that are consistently able to acquire forestry concessions.

- The disperse criteria and functions of official bodies inhibits their ability to design coherent environmental policy. A forestry incentive law is causing negative effects by allowing a 90% exemption from taxes on profits for all new forestry activity. Furthermore, a grant of 60 pesos per tree for poor farmers is inoperative without efficient implementation mechanisms.

- The expansion of tourist activity has created a boom of private beaches, violating public access and rights.

Eco-tourism to natural forested areas is still not regulated by the government which is presently considering various measures, such as tourist charges in national parks. A study on the optimum and sustainable level of visitors is needed. Other initiatives proposed are listed below:

- Concessionary rights for the exploration and exploitation of mining areas.

- Annual tax on profits.

- Incentives for energy conservation.

- A minimal charge for rubbish collection which could also be used to clean up the refuse dumps.

Finally it is still not decided who should bear the brunt of environmental considerations, either the modern industrial sector, or the rural farmers producing charcoal. This illustrates a political stalemate.

The Central Bank of the Dominican Republic is currently designing a set of alternative accounting statistics with the help of UNDP, based on an independent satellite assessment of natural resources. This is because the information that exists is dispersed in various institutions, and is poorly systematized.

5. Proposal

The proposals are made in reference to the actual state of the economic/environmental relationship and the state of actual institutions. Some command methods such as "The Polluter Pays Principle" cannot be utilized in the Dominican Republic due to institutional weaknesses.

In regard to economic policy, the authors suggest rationalizing land use, promoting silviculture, and subsidies for environmental conservation. This needs to start with a systematic inventory of the national territory to designate what the most rational use could be, followed by government incentives to initiate the change. A training and research programme is required, with an integration of research with private companies and a revision of intellectual property rights.

Social policy needs to be aimed at environmental health, education, community participation, and the generation of work in rural areas. Thirty percent of the population is without piped water concentrated in the shanty towns. The latest technology at the cheapest cost needs to be employed to service 95% of the population by the year 2000, at an estimated cost of (US$145 million).

The participation of the local community is essential for the selection of appropriate technology and its maintenance. The treatment of human wastes needs to follow the same procedure, with an integrated approach that takes into consideration local conditions supported by a nutritional educational programme. Community participation needs to be promoted through their respective organizations, and integrated with the public sector and NGO's.

The authors consider environmental education fundamental for sustainable environmental management, which should be aimed at specific groups, both in the community and in government, and the private sector decision making level. Courses and grants should be made available to ensure the concept of sustainable development is understood at all levels.

A series of general sectorial laws exist which would be complimented by regulatory and economic instruments such as:

- Planning for specific zones.
- Construction regulations.
- Control of industrial effluents.
- Adoption of control instruments of environmental impacts.

There are several instruments which have the common objective of rationalizing land use. One of the methods is to identify actual and potential conflicts and inappropriate uses on a map. National parks and protected areas need proper management plans, and research into the potential of these areas which will also serve the tourist industry.

River basins will benefit from an improvement in management techniques, and building regulations will conserve energy by the efficient use of natural resources.

The efficient application of economic instruments requires that market prices reflect the real conditions of the market. The trick in a market economy is to maximize the gains to each actor, which will not happen if companies are in the hands of the state.

Therefore the authors recommend the privatization of council and state functions, such as refuse collection. They also recommend the use of subsidies, and reducing tariffs to encourage imports of more modern technology (solar panels for example), and advocate using soft credits with a low or long pay back period to help buy clean technology. It will also encourage silviculture with trees of rapid growth rate, and the restructuring of upper river basin activity, and organic agriculture. The deposit system on beverages and other foods should be extended to other containers, such as batteries, pesticide drums, etc. They also recommend:

- A water use survey to identify areas and consumers of excessive amounts, establishing tariffs on commercial users.
- A contaminant discharge tax until companies are in a position to change to clean technologies.
- A programme to allocate and define property titles.
- Study the effect of gas subsidies, and remove import taxes on gas fires and slow wood burning stoves for rural areas.
- Improved inter-institutional coordination, promoted by the Rio commission which needs to be allocated the necessary funds for this task.

- Commission research into natural resources and the environment, promoting an inter-disciplinary approach.

- An environmental law for conservation and sustainable development, and an efficient system which concentrates information in one place.

- A system of valuing national resources and bio-diversity in economic terms, with periodic information bulletins.

- Consistency and promotion of debt greening schemes, and investment of the funds in correctly elaborated conservation projects.