Natural Resource and Environmental Accounts for Development Policy

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Final Report on a Seminar Held in Washington, D.C., April 13-14, 1993 by the Committee on the Environment of the OAS Permanent Council

Department of Regional Development and Environment
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Foreword

It is increasingly clear that the existing economic accounting framework - the national income accounts - fails to provide policy and decision-makers or the general public with essential information for steering economic progress into a sustainable path. Particularly, the national accounting system fails to value natural resources as productive economic assets. Thus, it makes no distinction between activities that make use of the sustainable yield of a nation's natural assets and those that deplete or degrade them.

This situation is changing. In recent years, a fundamental change has taken place in the way national governments and the international community measure and think about countries' economic performance. Leading economists now agree that national income accounting should treat natural resources as it does other tangible economic assets. Standard-setting agencies, such as the United Nations Statistical Office, have formulated new methodological guidelines. More and more industrialized and developing countries are constructing revised resource and environmental accounts in order to make them more relevant to sound environmental management and sustainable development. In our own hemisphere, while Canada and the United States have taken the lead in this initiative, other countries are also taking steps to initiate the process of revision. Those countries that have completed pilot accounting projects - including Canada, Costa Rica, Mexico, and Uruguay - have gained significant new insights into environment-development interactions and a more accurate basis for policymaking.

In serving as host of the seminar reported on in this document, the OAS is pleased to have provided, through a joint effort with the World Resources Institute, a pioneering hemispheric forum for discussion of the issues arising from its member countries' new and incipient accounting experiences. I am sure that the seminar's results will benefit all the institutions of the region working on environmental and accounting matters, and the wider development community as well.

Fernando González Guyer
Chairman, Committee on the Environment
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Summary

Background

The 1992 United Nations Conference on Environment and Development (UNCED) and its extensive preparatory process have reinforced the activities of the OAS related to sustainable development and integrated natural resources and environment management. Specific mandates for action by the OAS are contained in two documents approved by its General Assembly: the "Inter-American Program of Action for Environmental Protection" (1991) and "The Organization of American States and the Issues of Environment and Development" (1992).

As part of its response to these mandates and to Agenda 21, the General Secretariat of the OAS has recently conducted two regional meetings of experts and government officials. The Inter-American Seminar on Environment and Development, held in Washington, D.C., on September 8 and 9, 1992, defined specific technical cooperation efforts to meet the needs of various Latin American subregions in resolving issues of environment and development. The second meeting, the Seminar on Natural Resource and Environmental Accounts for Development Policy, which was undertaken by the Commission on the Environment of the OAS Permanent Council, is the subject of the present report.

Description and results

The Seminar took place at OAS headquarters on April 13 and 14, 1993, under the auspices of the World Resources Institute (WRI) and the Department of Regional Development and Environment (DRDE) of the OAS. It brought together experts and officials responsible for national income accounting from countries in the hemisphere to consider how natural resource and environmental accounting (NREA) could be introduced into national income accounts and used to formulate development policy.

Ninety-four people attended, including 54 representatives from 30 member states, 14 participants from 9 international development assistance institutions, 13 participants from nongovernmental organizations, and 13 staff members of the General Secretariat. Fourteen official documents were specifically prepared for the seminar, including case studies from Brazil,

Canada, Colombia, Costa Rica, Mexico, and Uruguay, and background material from WRI, the United Nations Development Program (UNDP), the United Nations Statistical Office (UNSO), the U.S. Agency for International Development (AID), the World Bank, the OAS, and the Inter-American Statistical Training Center (CIENES). The agenda of the meeting and the list of participants appear in Appendixes 1 and 2, respectively.

The meeting proved most successful, not only as a means of exchanging the latest information on NREA among OAS member states, but also in defining a concrete program of hemispheric cooperation. It produced four important results: (1) it brought together the principal officials responsible for national income or environmental accounts from almost every country of the Americas; (2) it provided information on the status of the NREA systems being developed in the region, allowing a useful exchange of views among experts and officials on experiences gained and lessons learned; (3) it provided participants with information on the kind of NREA-related assistance that the development agencies participating in the meeting could provide; and (4) it generated a proposal for a coordinated regional program on NREA, involving mutual cooperation between member states and support from development agencies.

Outline of case studies

Countries with NREA programs in progress presented their experiences in a panel discussion. The panelists included Jerry Gravel, Canada; Camilo Montoya, Colombia; Raúl Solórzano S., Costa Rica; Antonio Rodriguez Gonzalez and Ronaldo Seroa da Motta, Brazil; Hector de Alzua Romo and Roberto López Pérez, Mexico; and John P. Hoehn, Uruguay. Background papers they had prepared were distributed at the meeting and are available to requesting institutions from the Department of Regional Development and Environment of the OAS (see Appendix 3 for the list of documents). The papers and presentations are summarized below.

No national NREA program was reported at the Seminar for **Brazil.** However, the Brazilian panelists presented two studies that suggest the presence of lively independent efforts and debates on NREA within the country. The first paper discusses the main topics and some of the issues that the Government should take into account in implementing a NREA system, at national and regional levels. It deals with the evolution of national accounts since the inclusion of environmental accounts was first considered, the content of and principles involved in environmental accounting, the relevance of regional accounts and international data, the dimensions and productivity of natural resources in Brazil, the importance of physical indicators, and the relationship between environmental accounting and sustainable development. The independent development of regional accounts is emphasized in view of the large size and resource diversity of the country. A classification of the country's resources is proposed as follows: (a) soils; (b) nonrenewable resources (mineral); (c) renewable resources (biomass); (d) water resources; (e) environment deteriorated by clearly identified agents; (f) environment deteriorated in the past (or at present by unidentified agents).

The second paper presents estimates of depletion costs of mineral and forest resources in Brazil using two alternative forms of measurement: the net-price and user-cost approaches. In the case of minerals, estimates of annual depletion costs and factors according to each method show very distinct values. In particular, the difference in magnitude of estimated depletion costs is very large. The difference is also large and significant in the case of forest resources. With the net-price approach, forest depletion costs

represent almost 100 percent of the total value of agricultural production. With the user-cost approach, this figure reached a maximum of 36 percent in 1980.

In **Canada,** Statistics Canada is the central statistical agency; its reports cover all aspects of the national economy and social conditions. It has been active in the field of environmental statistics for almost 20 years. In 1978 it published a compendium of such statistics, Human Activity and the Environment, which has been updated twice, in 1986 and 1991. It is working closely with Environment Canada - the federal department responsible for combating pollution and ensuring proper management of resources - in developing and reporting environmental statistics.

Canada's Green Plan (1990) set out a comprehensive environment policy, detailing funding for existing statistical programs and proposing new directions. Statistics Canada received Green Plan funding to develop accounts aimed at showing the effect of economic activity on the environment. These accounts were to be either extensions of existing parts of the Canadian System of National Accounts or satellite or supplementary accounts.

Four sets of environmental accounts were proposed. The first would include natural resource stocks and flows in national balance sheet accounts and stock-flow reconciliation accounts. A pilot project was proposed for both a renewable (forest) and a nonrenewable (oil) resource. These pilot accounts are now well under way; physical and monetary data are being developed for both stocks and flows. A second set of accounts would use the input-output framework to identify resource use. Again, both physical-quantity and money-value data have been developed in a pilot account tracing fuel use. A third set of accounts would use the input-output framework to identify the output of waste and pollutants associated with the level of economic activity. A study of greenhouse-gas emissions by industry and commodity has recently been completed. A fourth set of accounts would cover environmental expenditures on, e.g., pollution prevention or clean-up activity. While many conceptual problems remain, initial conceptual development and some exploratory data collection have begun.

In **Colombia,** the government has formulated a comprehensive and ambitious national Environmental Account Program. Great importance has been attached to broad participation by institutions involved in policymaking and environmental accounting and to strengthening them. An Interagency Committee on Environmental Accounting was created in 1992, composed of authorities from the national institutions responsible for formulating economic policy, allocating and controlling government expenditures, managing natural resources, and preparing national income accounts, together with representatives from the private sector, nongovernmental organizations, and academic institutions.

In developing a Colombian accounting system, the Interagency Committee has emphasized the use of other countries' experience, the discussion of alternative paths for developing the system, and the provision of training for officials and technical staff of participating institutions. Three main lines of action were defined:

1. Constructing physical accounts (stocks and flows) for three natural resources. Three regional corporations-autonomous public entities responsible for the development and zoning of specific regions of the country - are preparing methodological proposals for the construction of natural-assets accounts in each region. A national project to prepare natural-resource inventories through cartographic records and satellite imagery is being drawn up.

2. Developing conceptual and methodological bases for both integrating the new accounts

with the existing national accounts system and constructing "green" macroeconomic indicators.

3. Analyzing the size and composition of government spending on the management and conservation of natural resources and developing a proper reclassification of such spending.

In **Costa Rica** the Tropical Sciences Center, a private, not-for-profit research institute located in San Jose, has undertaken the compilation of natural-resource accounts covering Costa Rica's forests, soils, and fisheries over the years 1970 to 1989. The project was undertaken in cooperation with the WRI, and received support from the Costa Rican Ministry of Natural Resources and Mines and from the Central Bank, which compiles the national accounts. International cooperation was manifested in financial assistance from AID, the International Development Research Center (IDRC) of Canada, the Netherlands Ministry of Foreign Affairs, and the Noyes Foundation in New York. The results of the study have been presented in joint publications by the WRI and the Tropical Sciences Center.

The methodology of the Costa Rican natural-resource accounts is compatible with the guidelines recently developed by the UN Statistical Office. Forest accounts were based on detailed estimates of timber stocks, disaggregated by species type, region, and ecological zone. Year-by-year estimates of timber losses through deforestation, burning, timber harvesting, and other sources were compared with estimates of growth, reforestation, and regeneration. Value accounts were based on detailed estimates of stumpage values, disaggregated by species, geographic zone, and year.

Soil and forest accounts were based on detailed geographic information system mappings of bioclimate, topography, soil types, and land uses. Soil-erosion rates were then estimated by applying the universal soil-loss equation. Value accounts were constructed using the nutrient-replacement-cost method.

Fishery accounts were constructed from a bioeconomic model of resource depletion in the Gulf of Nicoya, Costa Rica's principal coastal fishery. Data on yields and fishing effort were used to estimate a sustainable yield curve, which, combined with information on fishing costs, provided an annual estimate of resource rent and asset value in the Gulf of Nicoya fishery. Resource-depletion estimates were derived directly from changes in the fishery's asset value.

In the aggregate, the natural-resource accounts indicate annual depletion averaging approximately 5 percent of Costa Rica's GDP, rising to almost 9 percent in 1989 and offsetting more than one third of gross capital formation.

In **Mexico,** a case study was carried out in 1990-91 by the National Institute of Statistics, Geography, and Informatics (INEGI), UNSO, and the World Bank. The system of satellite accounts developed by UNSO was used as the overall analytical framework. A system of economic and environmental accounts (Sistema de Cuentas Económicas y Ecológicas de Mexico, SCEEM) was developed by reformatting the standard system of national accounts and adding new areas of concern: oil depletion, deforestation, land use, and degradation of environmental assets.

The study involved four stages. First, a standard net domestic product (NDP) was calculated by deducting from gross domestic product (GDP) the depreciation of produced-asset balances. Second, an adjusted net product was obtained by deducting the depletion of oil and other nonproduced assets. Third, an assessment was made of the degradation of nonproduced assets that affects the quality of life and is brought about by such occurrences as pollution of water and air, erosion of soils, use of groundwater, and the deposit of solid wastes. Fourth, land-use concerns and deforestation were incorporated into the

accounting framework; the depletion of forests over and above their maximum sustainable yield was counted as depletion costs.

Depletion and degradation were first assessed in physical terms and then expressed in monetary units by different methods of valuation. The resulting NDP for 1985 was around 42 billion pesos. The first environmentally adjusted net domestic product (EDP), obtained by deducting environmental costs related to depletion and land use from NDP, was 94 percent of traditional NDP. The second environmentally adjusted NDP (EDP2), obtained by further deducting degradation costs, was 87 percent of NDP.

Efforts were made to assess the effects of depletion and degradation not only on the overall economy, but also on different sectors. Follow-up studies, by INEGI or others, are expected to improve data and estimates in selected areas.

In **Uruguay,** national accounts are prepared by the Central Bank, which is currently working on changing the basic year for the system. This is a major effort that will probably be followed by the development of an NREA system. An independent environmental account pilot project was conducted in 1991 as part of the National Environmental Study executed by the Government and the OAS with IDB funding. The project involved the preparation of soil physical accounts and a proposal for the establishment of an NREA system in the country.

The objective of the soil accounts was to obtain a physical measure of soil depreciation on agricultural lands through an estimation of historical erosion rates in those lands. Estimates of erosion rates were derived from an application of the universal soil loss equation and based on detailed information on soil types, topography, climate, crop types, and technology of production. Estimates of 24 and 36 ton/hectare were obtained as, respectively, averages for net and gross erosion rates. These figures are high as compared with, say, the 12 ton/hectare observed in the United States for average net soil loss.

The soil-account results suggest that economic and technology policy have a significant impact on soil loss in Uruguay, and the environmental accounts have an important role to play in the analysis and formulation of environmental policy. Soil accounts show, for instance, that soil loss would decline by 13% if the current mix of crop subsidies and taxes was shifted to a policy based on market prices, and by 29% if existing conservation technology was extended to all agricultural areas in Uruguay.

On the basis of the experience gained with the application of the soil accounting methodology, a proposal was prepared for extending its use to other natural resources of the economy. Guidelines and criteria were provided for the step-by-step development of a national NREA system.

Issues and conclusions

The following issues raised and conclusions reached are derived not only from discussions and presentations during the meeting, but also from a short statement on NREA implementation issues submitted by many participants before the event and from comments received on the proposal for a hemispheric program.

The participants agreed that throughout the hemisphere there is a growing awareness of the need to introduce natural-resource and environmental accounting into national income accounts and to use it in the formulation of development policy, even though a standard or generally accepted methodology is still in the process of development. Participants also recognized the many purposes that NREA systems can

accomplish, even at an early stage of development, and their low cost in relation to the magnitude of the problems they may help to solve.

The vital role of NREA systems in improving macroeconomic accounting and environmental management, and as a tool for policy- or decision-making was widely accepted by national institutions in charge of national accounts or environmental matters. Most of the official participants expressed the interest of their governments or institutions in establishing NREA systems, especially if they could obtain appropriate knowledge and assistance.

The introduction of new accounting frameworks in the hemisphere has so far been uneven. A few countries (notably Canada, the United States, and to a lesser extent Mexico, Colombia, Costa Rica, and Brazil) are taking concrete steps to adopt the new systems, and even to develop their own methodologies to deal with specific resources. Some other countries, including Chile and Argentina, have launched research efforts outside of government. Most of the others are in various exploratory or preparatory stages, or have not yet launched serious NREA efforts.

Among the countries that have already initiated the process of establishing NREA systems, some (Mexico, Colombia, Peru) are seeking to follow a standard accounting framework, that of the United Nations Statistical Office (UNSO), while the others (Brazil, Canada, Costa Rica, the United States, Uruguay) that have proceeded independently of the UNSO have nonetheless used methodologies that are fundamentally compatible, although adapted to the particular needs of the country or institution involved.

The experience reported at the Seminar also showed that while some countries sought to correct or improve macroeconomic data, mainly by revising national income accounts, others concentrated on sectoral or resource-specific data, seeking to deal with specific issues or policies. Since national aggregates are built up from sectoral accounts, these approaches are convergent. It is to be expected that the institutions in charge of national accounts would emphasize a more comprehensive accounting, and institutions responsible for environmental matters or specific resources might initiate sectoral accounts. Moreover, from the expositions of the IDB and World Bank representatives, it can be inferred that the IDB is concentrating on the sectoral approach as part of its work with individual projects or structural adjustment loans, while the World Bank is formulating a work program encompassing both aspects. The UNSO is attempting to reconcile the two approaches by providing a common framework that may be used in whole or in part, and at different levels of aggregation.

Many participants stressed the need to develop common technical language and standards that facilitate both communication between member states on this subject and international comparisons of performance. Some also found it desirable to develop a common framework for determining and prioritizing information needs, especially for developing member countries. The current work of UNSO is of great importance in both regards, but creating appropriate mechanisms of information and assistance for a continuous application of that work in all hemisphere countries remains a challenging task. A coordinated effort by member countries and development agencies is required.

The participants agreed that member countries could benefit greatly from a systematic exchange of information and ideas on accounting methodologies, practical applications, valuation techniques, studies in progress, etc. Establishing a system of information gathering, updating, and dissemination to facilitate that exchange would be useful. The creation of an information network was formally proposed during the meeting and accepted as a very desirable goal.

The participants strongly supported the provision of training on NREA through regional programs. Different institutions of the region, especially those supported by development agencies, could usefully provide specialized courses, workshops, and in-service training for officials and technical staff of institutions responsible for the preparation of national income or resource-specific accounts. The representative of CIENES described the NREA training program that this institution will be initiating in the near future.

Proposal for a hemispheric program

In view of many of the foregoing issues, and of the interest shown by participants in establishing some form of the NREA system in their countries, a proposal was made at the end of the meeting for the creation of a hemispheric program on NREA to coordinate and strengthen the initiatives and actions of countries and development institutions in this field, especially through cooperative efforts.

A committee was formed to draft a proposal for such a program, and the OAS was asked to serve as its secretariat. The Committee included representatives from Barbados, Brazil, Colombia, Peru, Uruguay, Venezuela, UNSO, UNDP, and the OAS. The OAS General Secretariat prepared an initial draft and circulated it among the committee members, who made some contributions of their own and gave widespread support to the proposal.

The proposed Program will support national activities to establish or develop NREA systems and will facilitate technical and financial assistance from multinational, bilateral, and nongovernmental organizations. It will not centralize such activities or assistance in a new international office, but will further the initiatives of countries and development agencies whenever this support is deemed desirable, cost-effective, and acceptable to the parties involved.

Its specific objectives are to facilitate the exchange of information between member states; to promote the development of common technical concepts, definitions, and quantitative indicators, so as to permit meaningful international comparisons; to promote financial and technical assistance from development agencies to NREA-related activities; to enhance the impact of such programs by coordinating or combining them; and to complement them with other appropriate cooperative activities, including the direct provision of technical assistance and training.

The principal activities of the Program are the following: (a) to exchange information among countries, especially through periodic inter-American meetings; (b) to coordinate approaches and methodologies, especially through continuous interactions with UNSO; (c) to provide training, including regional courses or seminars, and in-service training for government officials and technical staff from institutions involved with NREA; and (d) to provide technical and financial assistance to national institutions interested in developing or applying NREA systems.

Each of these activities will be executed by various mechanisms and institutions, with assistance from development agencies such as UNDP, UNSO, the World Bank, the IDB, OAS, AID, and the Canadian International Development Agency (CIDA). The Program will have a secretariat responsible for overall execution, including the coordination of activities of institutions executing individual components. This secretariat could be located at the headquarters of a regional institution with statistical competencies-such as the OAS, CIENES, the UN Economic Commission for Latin America and the Caribbean (ECLAC), or some other. Initially, the DRDE of the OAS will act as secretariat of the Program and the Committee will

provide policy and operational guidelines.

The Program will initially last three years. Each year, it will tentatively involve two hemispheric technical meetings for experts and officials of member countries; 36 months of technical assistance to national institutions; financial support to two national NREA projects, especially those that promise methodological or other advances with spillover benefits within the hemisphere; two two-week inter-American courses or seminars on NREA; and information-exchange activities. At present, external financing is being sought for this Program.

Presentations

Opening remarks

Amb. Fernando Gonzalez Guyer
Chairman
Committee on the Environment OAS Permanent Council

I should like first of all to extend a cordial welcome to the participants in this Seminar on Natural-Resource and Environmental Accounts.

I also want to take this opportunity to express our appreciation for the invaluable collaboration and technical support provided by both the Department of Regional Development and Environment (represented by its Director, our friend Kirk Rodgers) and the World Resources Institute (represented by Robert Repetto), without which this event would not even have been conceivable.

I wish to share with you my impression that today we are attending the opening of a truly novel experience. We have gathered a select group of high-level technical experts and representatives of international and nongovernmental agencies around the same table with the people directly responsible for formulating national accounts in more than 30 nations of this hemisphere. As Chairman of the Committee on the Environment, which has sponsored this event, I am gratified to see the OAS serving as the host and venue for such a significant meeting.

As you probably know, the OAS is not a newcomer to environmental matters. As we like to recall, by 1963 the OAS already had a Natural Resources Unit, now the Department of Regional Development and Environment, which for the past 30 years has been providing technical assistance in Latin America and the Caribbean. This means - to give you a general idea of our precocity in this area - that the OAS institutionalized its activities in environmental matters 10 years before the Stockholm Conference. Thus we bring to bear considerable history and experience accumulated over three long decades, which to some degree explains the origins of this unique meeting.

More recently, a very important milestone in this extensive history is undoubtedly the Inter-American Program of Action for Environmental Protection, formally adopted in June 1991 during the OAS General Assembly in Santiago, Chile, which contains a detailed list of objectives and action measures directed to the member states and guidelines for regional cooperation in environmental matters. I have asked the Secretariat to make the text of this Program available to all participants because I think it will be very helpful in providing the broader context of our concerns and activities in this sphere.

As you will see from this document, the third action measure recommends that the member states study "the possibility of revising national accounts in light of the experience of countries that keep national environmental accounts, so as incorporate into them the impact produced by natural resource use." That is to say, this seminar falls

squarely within the objectives established in our environmental action plan and represents a very specific contribution to the attainment of the goals that the General Assembly set out in Santiago in June 1991.

Then came the Rio Conference on Environment and Development (UNCED), a monumental event. The documents from that meeting reflect the same concerns. Thus, for example, Principle 16 of the Rio Declaration establishes that "national authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the costs of pollution," a concept that is repeated later in various chapters of Agenda 21.

We are faced, it seems, with a true categorical imperative that assails us from all directions: from regional forums and from the highest universal forum, UNCED, in which all our presidents participated, but also from public opinion and from the nongovernmental organizations that speak for a genuine universal demand to conceive and put into practice new models for development that will allow all of us to enjoy a full life without endangering our very survival on this earth. An individual's lifetime is notoriously brief, as we all know, but the species displays a stubborn longevity.

The central question of this era, and one that echoed throughout the Rio Conference in June of last year, seems to be how to make the transition to a sustainable global future. A sustainable society would be one capable of perpetuating itself for generations - in other words, not one devoted to gorging upon itself, as modem societies seem to be doing with a passion that is surely worthy of a better cause.

It has been said that a sustainable society is (1) a society whose rate of consumption of renewable resources does not exceed the rate of regeneration of ecosystems: (2) a society whose rate of consumption of nonrenewable resources does not exceed the rate of generation of renewable substitutes: and (3) a society whose rate of pollution does not exceed the environment's capacity for assimilating it. This would give us six "rates" or "indicators" to be used more or less systematically in our accounts if we are trying to define with some degree of precision what we mean by a "model for a sustainable society."

The challenge facing us now is to include real environmental costs in economic prices, to "internalize" them, as the Rio Declaration says, and to revise or reinvent the economic indicators so as to avoid confusing costs with benefits and depredation of natural capital with income.

All moderately well-informed citizens of our countries keep up with and understand the trends in macroeconomic indicators such as the "gross domestic product," the "fiscal deficit," the "trade deficit," or the "foreign debt" because they know or at least guess what effect these figures will have on their everyday lives in the medium or long term. Our hope should be that in the not-too-distant future notions like "environmental deficit," "ecological debt," or others that we shall be discovering or inventing in the course of time will arouse the same kind of attention in the public at large with respect to the economic health of our societies and the quality of life of our people, both present and future generations.

The concept of gross national product and the economic accounting related to it are among the most significant inventions of the 20th century. Its political and economic impact are still difficult to gauge accurately. But what is certain is that current accounting systems, starting with the System of National Accounts codified by the United Nations, which gained almost unanimous acceptance and which treats natural resources differently from other tangible goods, merely send the wrong signals to political decision makers by ignoring the destruction of nature in the name of economic progress. Using these accounting methods, a country may appear to be in a state of blissful prosperity even if it is irreversibly depleting the sources of its well-being and seriously compromising its future economic survival.

This is true to some extent for all countries, without exception. Even though since the Stockholm Conference in 1972 more than 100 environmental ministries or their equivalent have been established, even though thousands of laws and decrees have been enacted, even though countless legal instruments have been signed at the global and regional levels and just as many international declarations have been issued, it is still unfortunately true that in all

countries, those who are too concerned about the environment are still excluded or isolated from the decision-making process in key areas, particularly with regard to economic decisions.

Explicitly or implicitly, the environment continues to be perceived as a constraint on economic development. Perhaps the time has come to acknowledge fully the substantive difference between the concepts of development and growth, because a sustainable society is, precisely, a society more concerned with development than with growth, much more interested in becoming "better and more complete" and not just "bigger." Under this approach, the idea of the effort to overcome this traditional dichotomy would not be to create a new breed of "environmental accountants" or "natural-resource bookkeepers" operating as a kind of specialized police charged with poking here and there into the national accounts books, but rather to integrate the environment naturally into the economic orbit and the economy into the environmental orbit, not in a spirit of confrontation but rather of perfect harmony - in other words, to establish a new "eco-nomy."

It is for this that we are meeting here in Washington. We are gathered here to begin to design economic indicators for the next century. But it is not my intention, nor is it my place, to broach the technical aspects of the topic, but rather to turn the floor over as soon as possible to the specialists, who will be better qualified to enlighten us as to the long and rocky road that lies ahead.

To conclude my performance of the role assigned to me, I feel called upon to say that the backdrop of this joint effort that brings us together in Washington is fundamentally political. Political in the most genuine and noble sense of the word - a clarification that seems imperative these days, when anything political is universally disparaged. Political as referring to affairs of the "polis," i.e., of the city, the community, and the common good.

This attempt to integrate nature into the economy, and by extension into national accounts, has a profound ethical basis. It requires considerable amounts of ingenuity and technical capacity but, most of all, an enormous amount of solidarity and brotherly love, without which the effort will be meaningless and surely condemned to failure.

The most optimistic among us hold that the world still contains enough energy, materials, money, and environmental flexibility, and above all enough human virtue, that the necessary movement towards that sustainable society we are seeking is still possible. It is now up to us to ensure that the optimists are not proved wrong.

Introductory remarks

Juan Guillermo Espinosa
Inter-American Statistical Training Center (*CIENES*)

It is a great honor to me to have been invited to this meeting, because I truly believe that this meeting could not be more critical in terms of contributing substantive elements to the future study of natural-resource and environmental accounts. I should like to suddenly have the gift of eloquence, of being able to say things clearly and succinctly, so that I could tell you how important it is to develop these methodologies, these approaches - in short, this new practice. As the Ambassador said earlier, the real import of this meeting is that today we undertake this task.

I feel deeply honored to share this table with Ambassador Fernando Gonzalez, who presides over the Committee on the Environment of the OAS Permanent Council and who, as he mentioned, has been deeply concerned with these matters for a long time. I also feel greatly honored to be able to express briefly some views, some theories, on some specific generalities, as colleague said, in the company of Robert Repetto, who is the Vice President of the World Resources Institute, an institution that has lately been doing extraordinary and very interesting work in defense of the environment and biodiversity.

I see this meeting (I may be repeating the Ambassador here) as the beginning of a new phase of work, in which governments and nongovernmental institutions, international organizations both regional and global, seek to take the first steps in the formidable task of inventorying, studying, and evaluating the potential of our environment to

ensure that the future use of species, natural resources, and ecosystems will be more equitable and sustainable.

I could perhaps spend a good deal of time describing the experiences I have witnessed both in our center and elsewhere relating to the development of these new methodologies, the search for this new system. But I especially wish to point out that in the absence of adequate information or criteria for valuing our natural resources properly, the national accounts on production and income that most of our countries are now using will inexorably continue to lead us to analyses and evaluations of our economies that do not reflect the true level of sustainability of the economic development process.

It would take me a long time to list all the disadvantages of the current national accounts systems. One omission is that there are no economic indicators to measure sustainable economic growth and economic development in the long term. Conventional economic statistics do not send correct signals to decision makers, including negative and positive consequences, even when the negative consequences to our countries are, frankly, disastrous.

More specifically, natural resources are not considered capital goods that may be subject to depreciation, and therefore the depletion of these resources is not recorded. Secondly, economic indicators do not reflect the deterioration in environmental quality and its consequent effect on human welfare. What is most incredible is that the costs of environmental protection, of preventing or undoing the damage done to the environment, are recorded in such a way that they tend to increase the national product or income - when in fact they represent a social cost that often yields no results in the maintenance of environmental quality until much later.

As has been recalled here, some time ago, in response to this situation, the United Nations Statistical Office in New York, in cooperation with many international agencies and the statistical offices of many countries, initiated what I would call the major effort to formulate methodologies for integrated economic environmental accounting. This effort, which seeks to improve the interrelationship between the environment and development, is in my judgment a great step forward that has been a long time in the making. Nevertheless, it represents only the first step in developing methodologies to better measure the role of the environment as a natural capital resource and also a sink for the by-products of production processes.

Only with these first steps can we later tie these methodologies to the systems of national accounts without modifying the central nucleus of the current system. This indicates, to some extent, that after so many years of effort, so many meetings, and so much discussion, the process is slow-moving and even more time is needed to achieve the proper integration we seek between environment and development.

The current revision of the United Nations System of National Accounts includes a revision of many concepts, definitions, and classifications of environmental accounting. Nonetheless, when I say that the central nucleus of the system has not yet been changed, it is because there is still no consensus on how to incorporate environmental costs and benefits into it. Nor is there a universally accepted method for valuing natural resources in monetary terms. This indicates the objective limitations we often face in our work, which today are leading towards the establishment of a system of satellite accounts that will permit close ties with the national accounts system without altering the basic framework. For this reason, many countries are working on sectoral accounts as a more specific, defined objective that will give policymakers a clear, focused vision in each of the areas of economic activity.

A minimal comment on the present situation, then, is that the status quo is clearly unacceptable and that a fundamental and crucial condition of this new, reformulated system we seek is first of all that it generate statistics on environmental resources. Only afterwards will come the possibility of linking these statistics with the economic and financial statistics. Nothing can be done in our countries without your assistance in first establishing a base of statistics on natural resources and the environment, which is why I believe that this meeting is so critical. The integrated, harmonized system can then be established, once the bases for natural-resource and environmental accounting is in place.

A second point I wish to make is that the most important element of this major effort carried out by the United Nations Statistical Office and all the international agencies and countries that have cooperated in this undertaking is

not so much the new mechanisms or techniques it introduces as the new concept of development it represents. On one hand, the concepts involved in this system can undoubtedly make it easier to improve the measurement of the real product in our economies by beginning to take into consideration the scarcity of natural resources and the effect of environmental changes. But on the other hand, they are laying what I would call the bases for a new direction for development, which should now be sustainable not only in the conventional economic sense but in the environmental aspect, which is our greatest concern.

There is another result of these initiatives to establish natural-resource and environmental accounts. All of us have seen that in our countries we usually move to protect the environment after the fact, or when the situation has already become a serious problem. In most cases, our authorities and politicians claim that there was nothing they could have done, when they were not even aware of the economic significance of investing resources in advance because they had no criteria or indicators to show them what this would mean later.

Thus, I would say that establishing an accounting system that begins to take the environment into consideration will make it explicit that failing to address environmental problems now will result in having to do so later, usually with significantly greater effort and expense and often at greater risk of failure. Establishing this accounting system will help us to determine what I would call the high cost of inaction. That is, we will now be able to establish much more accurately the price our societies must pay for doing nothing, which almost always turns out to be quite a bit higher than preventive measures.

For this reason, I am convinced that this is a critical task and that we must set about it without delay. Having said that, I should add that we must particularly bear in mind that when we apply methods to gather and analyze environmental data to track environmental trends and estimate environmental costs, what we are doing is reformulating the bases of economic policy in a manner that now begins to encompass all the effects of development, negative as well as positive. We are, in short, doing nothing less than transforming the bases upon which policymakers take their decisions. We must understand that we are not merely applying new methodologies and tools; we are dealing with the nucleus of a new strategy that, first and foremost, will take biodiversity and environment into consideration and will make our development somewhat more humane.

I should perhaps share with you my persistent observation of recent years that the problem is not so much inaction as inadequacy. That is, there is a dearth of statistics with which to begin the work. This is what I consider the crucial point of this meeting.

What lies ahead basically depends on your will to initiate this task. Thus, the institutions represented here are of the utmost significance in making available to us, before too long, an accounting of our natural resources that will enable us to speak more substantively and pertinently. I consider this meeting an extraordinarily important occasion because I see here professionals and technical experts from all the countries of the region, which means that in one way or another this issue has reached every comer of the hemisphere.

Secondly, I also find it encouraging to see so many participants, which means that this issue now enjoys strong and substantially more extensive support than it had twenty or even ten years ago. But, even so, it is important to keep in mind, as this meeting shows, that this is not a task just for a handful of intellectuals or for a single government or for one or another national or international agency. This profound change can only be achieved with the participation of all of you. Nothing can be accomplished without the cooperation of each and every one of you and of each of your institutions.

I must confess that I am tremendously pleased that this meeting is being held here at the Organization of American States, because it is our home. Despite having limited resources, as was mentioned earlier, it has participated in and contributed to this undertaking for many years now. But material resources are not all that counts. We have gathered a group of professionals and technical experts who have also worked in these areas, on these issues, for many years and who - which is perhaps even more important - are deeply interested in collaborating to make things better in our region than they were yesterday.

In short, I believe that we are here, as the Ambassador said, because a great change is ahead for us. Not just change for the sake of change. I was reminded this morning of a German poet who said, "To be better I know I must change, but even if I change I do not know whether I will be better." In our case, I would say that, first of all, we need a change that will rescue us from our present antiquated mode of development, which has caused so much poverty and environmental degradation in our countries.

The challenge we face is to succeed, all of us together, in charting the course for this change, in setting a new direction for development in our countries that will be economically and environmentally sustainable: that will go beyond considerations of growth, investment, employment, balance of payments, and many other indicators that do not always represent the natural resources or the life of our countries. What we must do now, in fact, is incorporate our biodiversity - our rivers, our forests, our natural resources, in sum, the entire generous planet that sustains life for current and future generations.

What can policymakers learn from natural-resource accounting?

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I. The need for natural-resource accounting

Whatever their shortcomings, and however little their construction is understood by the general public, national income accounts are undoubtedly one of the most significant social inventions of the twentieth century. Their political and economic impact can scarcely be overestimated. However inappropriately, they serve to divide the world into "developed" and "less developed" countries. In the "developed" countries, whenever the quarterly GNP figures emerge, policymakers stir. Should they be lower, even marginally, than those of the preceding three months, a recession is declared, the strategies and competence of the administration are impugned, and public political debate ensues. In the "developing" countries the rate of growth of GDP is the principal measure of economic progress and transformation.

The national accounts have become so much a part of our life that it is hard to remember that they are scarcely 50 years old. They were first published in the United States in the year 1942. It is no coincidence that the period during which these measures have been available, with all their imperfections, has been the period within which governments in all major countries have taken responsibility for the growth and stability of their economies, and during which enormous investments of talent and energy have been made in understanding how economies can be better managed. Forecasting the next few quarterly estimates of these statistics has become, with no exaggeration, a hundred-million-dollar industry.

The aim of national income accounting is to provide an information framework suitable for analyzing the performance of the economic system. The current system of national accounts reflects the Keynesian macroeconomic model that was dominant when the system was developed, largely through the work of Richard Stone, Simon Kuznets, and other economists writing in the English tradition. The great aggregates of Keynesian analysis - consumption, savings, investment, and government expenditures - are carefully defined and measured.

But Keynes and his contemporaries were preoccupied with the Great Depression and the business cycle; specifically, with explaining how an economy could remain for long periods of time at less than full employment. The least of their worries was a scarcity of natural resources. Unfortunately, as Keynesian analysis largely ignored the productive role of natural resources, so does the current system of national accounts.

In fact, natural-resource scarcity was of little concern to 19th-century neoclassical economics, from which tradition Keynesian and most contemporary economic theories are derived. Gone were the dismal predictions of Ricardo, Malthus, Marx, and other earlier classical economists that scarcity of agricultural land in industrial economies would cause stagnation or collapse because of rising rents and falling real wages. In 19th-century Europe, steamships and railroads were markedly lowering transport costs, while food grains and raw materials were flooding in from North America, Argentina, Australia, Russia, and the imperial colonies. What mattered to England and other industrializing nations was the pace of investment and technological change.

The classical economists had regarded income as the return on three kinds of assets: natural resources, human resources, and invested capital (land, labor, and capital, in their vocabulary). The neoclassical economists virtually dropped natural resources from their model, and concentrated on labor and invested capital. When these theories were applied after World War II to problems of economic development in the Third World, human resources were also left out, on the ground that labor was always "surplus," and development was seen almost entirely as a matter of savings and investment in physical capital. Ironically, low-income countries, which are typically most dependent on natural resources for employment, revenues, and foreign-exchange earnings, are instructed to use a system for national accounting and macroeconomic analysis that almost completely ignores their principal assets. It is not far from the truth that the system of national accounts represents one of the last vestiges of British colonialism.

As a result, there is a dangerous asymmetry in the way we measure, and hence the way we think about, the value of natural resources. Man-made assets - buildings and equipment, for example - are valued as productive capital. The increase in the stock is recorded as capital formation. Decreases in the stock through use are written off against the value of production as depreciation. This practice recognizes that a consumption level maintained by drawing down the stock of capital exceeds the sustainable level of income. Natural-resource assets are not so valued, and their loss entails no debit charge against current income that would account for the decrease in potential future production. A country could exhaust its mineral resources, cut down its forests, erode its soils, pollute its aquifers, and hunt its wildlife and fisheries to extinction, but measured income would not be affected as these assets disappeared.

The proper definition of income encompasses the notion of sustainability. In accounting textbooks and economics principles, income is defined as the maximum amount that the recipient could consume in a given period without reducing the amount of possible consumption in a future period. This income concept encompasses not only current earnings but also changes in asset positions. The depreciation accounts reflect the fact that unless the capital stock is maintained and replaced, future consumption possibilities will inevitably decline. Thus, proper evaluation of changes in the stock of assets is crucial as a way of evaluating the sustainability of an economic development strategy. In resource-dependent countries, failure to extend this concept to the capital stock embodied in natural resources, which are such a significant source of income and consumption, is a major omission and inconsistency.

Underlying this anomaly is the implicit and inappropriate assumption that natural resources are so abundant that they have no marginal value. This is a misunderstanding.

Whether they enter the marketplace directly or not, natural resources make important contributions to long-term economic productivity, and so are, strictly speaking, economic assets. Many are under increasing pressure from human activities and are deteriorating in quantity or quality.

Another misunderstanding underlies the contention that natural resources are "free gifts of nature," so that there are no investment costs to be "written off." The value of an asset is not its investment cost, but the present value of its income potential. Many billion-dollar companies have as their principal assets the brilliant ideas and inventions of their founders: the Polaroid camera, the Apple computer, the Lotus spreadsheet, for example. These inspired inventions are worth vastly more than any measurable cost to their inventors in developing them, and could also be

regarded as the products of genius - free gifts of nature. Common formulas for calculating depreciation by "writing off investment costs (e.g., straight-line depreciation) are just convenient rules of thumb, or artifacts of tax legislation. The true measure of depreciation, which statisticians have tried to adopt for fixed capital in the national accounts, is the capitalized present value of the reduced future income stream obtainable from an asset because of its decay or obsolescence. Thus, in the same sense that a machine depreciates, soils depreciate as their fertility is diminished, since they can produce only at higher costs or lower yields.

Codified in the United Nations system of national accounts closely followed by most countries, this bias provides false signals to policymakers. It reinforces the false dichotomy between the economy and the "environment" that leads policymakers to ignore or destroy the latter in the name of economic development. It confuses the depletion of valuable assets with the generation of income. Thus it promotes and seems to validate the idea that rapid rates of economic growth can be achieved and sustained by exploiting the resource base. The result can be illusory gains in income and permanent losses in wealth.

The United Nations System of National Accounts (SNA) recognizes certain natural resources, such as forests, land, and subsoil minerals, as assets in national balance sheets, the "stock" accounts. The recommended treatment for natural resources in the balance sheet accounts is very similar to the recommended treatment of other capital assets. If possible, the assets' values should be derived from market transactions; otherwise, the accounts should be based on the discounted present value of estimated future income flows derived from the assets. However, the income and product accounts are not treated consistently with these balance-sheet accounts. On the income side, for example, the total value added from resource extraction is included in wages and salaries, in rental incomes, and in company profits. In other words, the total value of natural-resources current production, net of purchased inputs, is imputed to current income.

The problem is that, in contrast to the treatment of man-made capital assets, there are no accounting entries in the flow accounts for changes in natural-resource stocks. Notwithstanding the economic significance of wasting natural resources, the SNA does not provide a debit on the product side of the national income accounts to show that depreciation of natural resources is a form of disinvestment. And it does not provide a depreciation factor on the income side to show that consumption of productive natural-resource assets must be excluded from gross income.

Indeed, natural-resource assets are legitimately drawn upon to finance economic growth, especially in resource-dependent countries. The revenues derived from resource extraction finance investments in industrial capacity, infrastructure, and education. A reasonable accounting representation of the process, however, would recognize that one kind of asset has been exchanged for another, which is expected to yield a higher return. Should a farmer cut and sell the timber in his woods to raise money for a new barn, his private accounts would reflect the acquisition of a new asset, the barn, and the loss of an old asset, the timber. He thinks himself better off because the barn is worth more to him than the timber. In the national accounts, however, income and investment would rise as the barn is built, but income would also rise as the wood is cut. Nowhere is the loss of a valuable asset reflected. This can lead to serious misestimation of the development potential of resource-dependent economies, by confusing gross and net capital formation. Even worse, should the proceeds of resource depletion be used to finance current consumption, then the economic path is ultimately unsustainable, whatever the national accounts say. If the same farmer used the proceeds from his timber sale to finance a winter vacation, he would be poorer on his return, and no longer able to afford the barn, but national income would only register a gain, not a loss, in wealth.

Consider the sad exemplary tale of Kiribati, the small atoll republic in Micronesia, which depended throughout the 20th century on its phosphate mines for income and government revenues. While the mines ran, gross domestic product was high and rising, but the mining proceeds were treated as current income rather than as capital consumption. When the deposits were mined out in the 1970s, income and government revenues declined drastically, because far too little had been set aside for investment in other assets that would replace the lost revenues.

II. The scope of natural-resource accounting

A growing body of expert opinion has recognized the need to correct the SNA's environmental blind spots. Many leading economists, including several Nobel prizewinners, have identified the need for better accounting for natural resource assets. A number of member nations of the Organization for Economic Cooperation and Development, including Canada, Prance, Germany, the Netherlands, Japan, Norway, and the United States, have set up or are working on systems of environmental accounts.

The French natural-patrimony accounts, for example, are intended as a comprehensive statistical framework to provide authorities with the data they need to monitor changes in "that subsystem of the terrestrial ecosphere that can be quantitatively and qualitatively altered by human activity."[1] Like their Norwegian counterparts, these accounts cover nonrenewables, the physical environment, and living organisms. Since material and energy flows to and from economic activities form only a subset of these accounts, they are conceptually much broader than the national income accounts, and are compiled largely in physical terms.

[1] P. Cornière, "Natural Resource Accounts in France. An Example: Inland Water," in Organization for Economic Cooperation and Development, Information and Natural Resources. Paris, 1986.

Such environmental statistics may well encourage decision-makers to consider the impacts of specific policies on the national stock of natural resources. However, physical accounting by itself has considerable shortcomings. It does not lend itself to useful aggregation: aggregating wood from various tree species in cubic meters obscures wide differences in the economic value of different species. Aggregating mineral reserves in tons obscures vast differences in the value of different deposits due to grade and recovery costs. Yet maintaining separate physical accounts for particular species or deposits yields a mountain of statistics that are not easily summarized or used.

A further problem is that accounts maintained only in physical units do not enable economic planners to understand the impact of economic policies on natural resources and thereby integrate resource considerations into economic decisions - presumably the main point of the exercise. Yet there is no conflict between accounting in physical and in economic units because physical accounts are necessary prerequisites to economic accounts. If the measurement of economic depreciation is extended to natural resources, physical accounts are inevitable by-products.

The limits to monetary valuation are set mainly by the remoteness of the resource in question from the market economy.[2] Some resources, such as minerals, enter directly. Others, such as groundwater, contribute to market production and can readily be assigned a monetary value although they are rarely bought or sold. Others, such as noncommercial wild species, do not contribute directly to production and can be assigned a monetary value only through quite roundabout methods involving many somewhat questionable assumptions. While research into the economic value of resources that are remote from the market is to be encouraged, common sense suggests that highly speculative values should not be included in official accounts.

[2] Ibid.

In industrial countries where pollution and congestion are mounting while economies are becoming less dependent on agriculture, mining, and other forms of primary production, the focus has been on "environmental accounting" rather than natural- resource accounting. Several approaches to developing more comprehensive systems of national income accounting go well beyond the scope of natural-resource accounting.

There are sound reasons to begin by focusing on accounting for natural resources: the principal natural resources, such as land, timber, and minerals, are already listed in the SNA as economic assets, although not treated like other tangible capital, and their physical and economic values can be readily established. Demonstrating the enormous costs to a national economy of natural-resource degradation is an important first step in establishing the need for revamping national policy.

Developing countries whose economies are dependent on natural resources are becoming particularly interested in developing an accounting framework that accounts for these assets more adequately. Work is already under way in

the Philippines, China, Thailand, India, Brazil, Chile, Colombia, Costa Rica, El Salvador, and other countries.

III. Setting up natural-resource accounts

Physical accounts

Natural-resource physical stocks at any time and changes in those stocks during an accounting period can be recorded in physical units appropriate to the particular resource. The basic accounting identity is that opening stocks plus all growth, increase, or addition less all extraction, destruction, or diminution equals closing stocks. Although the following discussion refers to petroleum reserves and timber stocks as examples, the principles are applicable to many other resources.

Petroleum resources consist of identified reserves and other resources: identified reserves can be divided into proven reserves and probable reserves. Proven reserves are the estimated quantities of crude oil, natural gas, and natural gas liquids that geological and engineering data indicate with reasonable certainty are recoverable from known reservoirs under existing market and operating conditions; i.e., prices and costs as of the date the estimate is made. Probable reserves are quantities of recoverable reserves that are less certain than proven reserves. Thus, one limit on the stock of reserves is informational. Additional proven reserves can usually be generated by drilling additional test wells or undertaking other exploratory investments to reduce uncertainty about the extent of known fields. The boundary between reserves and other resources is basically economic. Vast quantities of known hydrocarbon deposits cannot be extracted profitably under current conditions. They are thus known resources, but cannot be counted as current reserves, although price increases or technological improvements might transform them into reserves in the future.

For other mining industries, geological characteristics tend to be known with more certainty, so there is less distinction between proven and probable reserves but a sharp division between economic reserves and total resources. Many minerals are present at very low concentrations in the earth's crust in almost infinite total amounts. Technological changes in mining and refining processes have markedly reduced the minimum ore concentrations that can be profitably mined, correspondingly expanding mineral reserves.

Changes in oil and gas stocks may be classified under various headings: "discoveries," the quantity of proven reserves that exploratory drilling finds in new oil and gas fields, or in new reservoirs in oil fields; "extensions," increases in proven reserves because of subsequent drilling showing that discovered reservoirs are larger than originally estimated; and "revisions," increases in proven reserves because oil or gas firms acquire new information on market conditions or new technology. Extensions of and revisions to oil and gas reserves have historically been significantly larger than new discoveries. Reserve statistics generally produce very conservative estimates of the total resource stocks that will ultimately enter the economic system: actual production from new U.S. fields and reservoirs was over seven times the amount initially reported as discovered.

Reserve levels fall because of extraction and downward revisions. In the United States, oil and gas companies are required by the Securities and Exchange Commission to disclose net annual changes in estimated quantities of oil and gas reserves, showing separately the opening and closing balances, revisions of previous estimates (from new information), improved recovery (resulting from improved techniques), purchases and sales of minerals in place, extensions and discoveries, and production.[3]

[3] Financial Accounting Standards Board, working paper, 1982.

The accounting framework for timber resources in physical units could be expressed in hectares, in tons of biomass, or in cubic meters of available wood, although the last is probably the most important economic measure. As in the case of minerals, the total resource is larger than the economic reserve, since a substantial part of the total stock of standing timber in any country cannot be profitably harvested and marketed with current technologies and market conditions.

Additions to the timber stock can originate from growth and regeneration of the initial stock and from reforestation and afforestation. Reductions can be classified into production (harvesting), natural degradation (fire, earthquake, etc.), and deforestation by man. Separate accounts might be established for different categories of timber stands - for example, virgin forests, logged (secondary) forests, unproductive or protected forests, and plantations. In temperate forests, where species diversity is limited, timber stocks are further disaggregated by species.

Physical accounts can be constructed along similar lines for agricultural land. Land and soil maps and classification systems are used to disaggregate land into productivity categories. Changes in stocks of each land category within a period reflect various phenomena: conversion to nonagricultural uses; conversion to lower productivity classes through physical deterioration by erosion, salinization, or waterlogging; and conversions to higher productivity classes through physical improvements by irrigation, drainage, and other investments. A set of physical accounts for agricultural land would record stocks of land at each accounting date by productivity class, and flows among classes and to other land uses according to cause.

Similarly, physical accounts can be set up for other biological resources, such as wildlife or fish populations. The principles are essentially those of demography. Additions to initial populations are attributed to fertility, estimated from reproduction rates and the size of the breeding population, and in-migration. Subtractions from stocks are attributed to natural mortality, estimated from age-specific or general mortality rates, harvesting operations, other special sources of mortality, and out-migration.

Valuation Principles

The concept of economic rent is central to natural-resource valuation. Economic rent is defined as the return to any production input over the minimum amount required to retain it in its present use. It is broadly equivalent to the profit that can be derived or earned from a factor of production (for example, a natural-resource stock) beyond its normal supply cost. For example, if a barrel of crude oil can be sold for $10 and costs a total of $6 to discover, extract, and bring to market, a rent of $4 can be assigned to each barrel. In forest economics, the concept of "stumpage value" is very close to that of economic rent. Stumpage value represents timber sale proceeds less the costs of logging, transportation, and processing. Better-quality and more accessible timber stands will command a higher stumpage value.

Rents to natural resources arise from their scarcity, and from locational and other cost advantages of particular stocks. In principle, rents can be determined as the international resource commodity price less all factor costs incurred in extraction, including a normal return to capital but excluding taxes, duties, and royalties. Thus, the economic rent is equivalent to the net price.

This is equivalent to the economic rent in a Ricardian scarcity model, which assumes that resources from different "deposits" will be supplied at a rising incremental cost until profit on the marginal source of supply is completely exhausted. In this Ricardian model, rents rise on relatively low-cost, infra-marginal sources of supply.

It is also equivalent to a user cost in a Malthusian stock- scarcity model, which assumes that a homogeneous exhaustible resource is exploited at an economically efficient rate, a rate such that the profit on the marginal amount brought to market is equal to the expected return derived from holding the asset in stock for future capital gain. In such a Malthusian model, if the resource is being extracted at an efficient rate, the current rent on the last unit of resources extracted is thus equal to the discounted present value of future returns from a unit remaining in stock.

The gross operating surplus of the extractive sector in the SNA, represented by the sum of the profits made by all the different enterprises involved in resource-extraction activities, does not represent true rewards to factors of production alone but also reflects rents from a "one time only" irredeemable sale of a nonrenewable natural asset. The basic definition of income as the amount that can be consumed without becoming worse off is clearly being infringed as the value of the asset base declines.

Asset transactions in natural resources, such as competitive auction sales of rights to extract timber or minerals, closely follow estimated stumpage values or rents, with allowance for risk. Because holders of those rights can

usually hold the resources in stock or bring them to market immediately, the current rent or stumpage value tends to reflect the present value of the expected net income that can be derived from them in the future. This principle is readily extended to other resources: agricultural land can be valued directly on the basis of its current market worth, or indirectly as the present value of the future stream of net income, or annual rent, that can be derived from it. The value of subsurface irrigation water deposits can be estimated from market transactions in "water rights," or from a comparison of the value of agricultural land overlaying a usable known aquifer with that of otherwise equivalent land without subsurface water. Alternatively, it can be estimated as the present value of future rents, calculated as the difference between the costs (per cubic meter) of supplying the water for irrigation and the incremental net farm income attributable to the use of the water for irrigation.

In order for adjustments to national income accounts for changes in natural-resource stock to attain broad acceptance, a credible standard technique for valuing natural resources must be adopted that can be applied to a variety of resources by statisticians in different countries. That method must be as free as possible from speculative estimates (about future market prices, for example), and must depend on underlying data that are reasonably available to statistical agencies.

The three principal methods for estimating the value of natural-resource stocks are (1) the present value of future net revenues; (2) the transaction value of market purchases and sales of the resource in situ: and (3) the net price, or unit rent, of the resource multiplied by the relevant quantity of the reserve. The present-value method requires that future prices, operating costs, production levels, and interest rates be forecast over the life of a given field after its discovery. The present value of the stream of net revenue is then calculated, net revenue representing the total revenue from the resource less all extraction costs. The United Nations Statistical Office has recommended use of the present-value method when market values for transactions in resource stock are not available.

The net-price method applies the prevailing average net price per unit of the resource (current revenues less current production costs) to the physical quantities of proven reserves and changes in their levels. While the net-price method requires only current data on prices and costs, it will be equivalent to the other two methods if output prices behave in accordance with long-run competitive market equilibrium. The assumption here is derived from the theory of optimal depletion of exhaustible resources - that resource owners will tend to arbitrage returns from holding the stock into future periods with returns from bringing it immediately to market, adjusting current and future supplies until price changes equate those returns.

IV. What can policymakers learn from resource accounting?

Macroeconomic policy and structural adjustment

National accounts that incorporate natural-resource accounting provide a more adequate means of evaluating an economy's performance and progress toward sustainable development. The World Resources Institute has collaborated on a pioneering report using Indonesia as a case study. Over the past 20 years, Indonesia has drawn heavily on its considerable natural-resource endowment to finance development expenditures. Revenues from the production of oil, gas, hard minerals, timber, and forest products have offset a large share of government development and routine expenditures. Primary production contributes more than 43 percent of gross domestic product, 83 percent of exports, and 55 percent of total employment. Indonesia's economic performance over this period is generally judged to have been successful: per capita GDP growth averaging 4.6 percent a year from 1965 to 1986 has been exceeded by only a handful of low- and middle-income countries and is far above the average for those groups. Gross domestic investment rose from 8 percent of GDP in 1965, at the end of the Sukarno era, to 26 percent of GDP (also well above average) in 1986, despite low oil prices and a difficult debt situation.

Estimates derived from the Indonesian country case study illustrate how much this evaluation is affected by "keeping score" more correctly. Figure 1 compares the growth of gross domestic product at constant prices with the growth of "net" domestic product, derived by subtracting estimates of natural-resource depreciation for only three sectors: petroleum, timber, and soils. It is clear that conventionally measured gross domestic product substantially

overstates the growth of net income, after accounting for consumption of natural-resource capital. In fact, while GDP increased at an average annual rate of 7.7 percent from 1970 to 1984, the estimate of "net" national product rose by only 3.9 percent a year. In other words, half of the recorded growth was generated not by sustainable productivity increase, but by drawing down natural-resource assets.

The overstatement of income growth is actually considerably more than these depreciation estimates indicate, since only three natural resources are covered: petroleum, timber, and soils on Java and Bali. Other important exhaustible resources that have been exploited over the period, such as natural gas, coal, copper, tin, and nickel have not yet been included in the accounts. The depreciation of other renewable resources, such as nontimber forest products and fisheries, is also unaccounted for. When complete depreciation accounts are available, they will inevitably show a greater divergence between the growth in gross output and net income.

Other important macroeconomic estimates are even more badly distorted. Figure 2 compares estimates of gross and "net" domestic investment, the latter reflecting depreciation of natural-resource capital. This statistic is central to economic planning in resource-based economies. Countries, such as Indonesia, that are heavily dependent on exhaustible natural resources must diversify their asset base to preserve a sustainable long-term growth path. The extraction and sale of natural resources must finance investments in other productive capital. It is relevant, therefore, to compare gross domestic investment with the value of natural-resource depletion. Should gross investment be less than resource depletion, then, on balance, the country is drawing down rather than building up its asset base, and using its natural-resource endowment to finance current consumption. Should "net" investment be positive but less than is required to equip new labor-force entrants with at least the capital per worker of the existing labor force, then increases in output per worker and income per capita are unlikely.

Figure 1. Gross Domestic Product and Net Domestic Product in Constant 1973 Rupiah

In fact, the results from the Indonesian case study show that the adjustment for natural-resource asset changes is large in many years relative to gross domestic investment. In a few years the adjustment is positive, because of additions to petroleum reserves. In most years during the period, however, the depletion adjustment offsets a good part of gross capital formation. A fuller accounting of natural-resource depletion might conclude that in some years depletion exceeded gross investment, implying that natural resources were being depleted to finance current consumption expenditures.

Such an evaluation should flash an unmistakable warning signal to economic policymakers that they were on an unsustainable course. An economic accounting system that does not generate and highlight such evaluations is deficient as a tool for analysis and policy in resource-based economies, and should be amended.

Countries throughout Africa, Latin America, Eastern Europe, and north Asia are undergoing dramatic economic transformations, undoing decades of state intervention and market distortion. The international agencies of the World Bank and the International Monetary Fund are being called upon to support structural adjustment and stabilization programs with policy advice and capital flows.

How economic reforms should be designed to ensure a successful transition to sustainable economic progress is a matter of urgent concern. In all these regions now undergoing structural reforms, environmental degradation has been as obvious a symptom of the failure of the previous policies as economic collapse. Uncontrolled pollution, excessive environmental hazards, and overexploitation of natural resources have accompanied the decline of living standards. New economic policy packages must address and reverse ecological as well as economic deterioration.

In many developing countries the national balance sheet has deteriorated more from depreciation of natural resources than from foreign borrowing. In the Philippines, for example, depreciation in just three sectors - forests, soils, and coastal fisheries - averaged 4.5 percent of GDP per year in the dozen years leading up to the debt crisis, while foreign borrowing averaged only 4 percent of GDP. Unlike the highly publicized debt problem, however, resource depletion went unmeasured and largely unnoticed.

Figure 2. Gross Domestic Investment and Net Domestic Investment in Constant 1973

According to the IMF, the principal objective of short-term adjustment programs is to reduce the internal and external imbalances that lead to the unsustainable accumulation of domestic and foreign liabilities. But the rate at which a country can safely accumulate debt is related to the rate at which it is accumulating assets. If both should double within a given period, the process is probably not unsustainable. However, if liabilities are increasing while assets are declining, there is undoubtedly a problem. In the Philippines, this is what occurred.

Moreover, adjustment polices designed to reduce the accumulation of debt without consideration of their environmental impacts might inadvertently increase the loss of natural-resource assets. In the Philippines, restrictive stabilization policies sharply increased poverty and unemployment. Real wages fell more than 30 percent during the early years of the debt crisis, leaving 58 percent of the population below the poverty line. Poverty "pushed" households out of overcrowded rural areas, but not always to face unemployment in the cities. Instead, the prospect of gaining access to land sharply accelerated rural-to-rural migration into upland watersheds and coastal regions, intensifying the deforestation and erosion of upland watersheds and the overexploitation of coastal fisheries and mangroves. Succeeding waves of migrants spilled into fragile ecological areas - 2.5 million of them in the first half of the 1980s alone. With each harvest, the eroded soils yielded less and more migrants competed for land. Poverty drove agricultural workers from crowded lowland rice farms, but poverty also awaited them in the cities and the fragile uplands.

To be successful, stabilization programs should be designed to stabilize both sides of the balance sheet, reducing the decumulation of assets as well as the accumulation of debts. Otherwise, adjustment programs will not lead to sustainable development. The IMF, the World Bank, and other development agencies should base their macroeconomic analysis on an accounting system that treats natural resources as the important assets that they are, and extend their analyses to examine the potential environmental effects of adjustment programs.

Sectoral Policy

Natural-resource accounting is also extremely useful in formulating and evaluating sectoral economic policy. For example, the resource accounts drawn up for the Indonesian timber sector estimated the stumpage value or resource rents available from harvest of that country's natural tropical hardwood forests. As the accompanying table indicates, large resource rents have been generated by exploitation of primary forest.

Those forests are in very large part within the public domain, as national forests. The Government of Indonesia licenses concessionaires to extract timber under long-term contract. Many of the concession-holders are controlled by non-Indonesian interests, in partnerships with local elites. The Government captures some of the resource rents from the concessionaires through a variety of license fees, property taxes, royalties, and other charges. In theory, since the calculation of stumpage values makes allowance for a normal return on capital invested in the logging operation, the Government of Indonesia could have captured a large fraction of the available rents.

It was a small step from the estimation of sectoral accounts to the question whether the Government was actually collecting as much of the value from forest exploitation as it might. A leading Indonesian environmental organization, in cooperation with academic economists, undertook to examine the issue of rent capture, and found that in recent years the Government had succeeded in capturing only 10 to 15 percent of the resource rents, losing potential revenues of $2 billion annually - equivalent to 40 percent of annual official development assistance.

This study led to a reexamination of the supply of logs to domestic mills at prices well below international levels, of the lag in forest taxes behind inflation, and of weaknesses in the supervision of timber concessions. These issues are important not only for fiscal reasons, but also to promote more efficient and sustainable utilization of Indonesia's rich forests.

Table 1 FOREST RESOURCE ACCOUNTS, INDONESIA (1970-1976)

PHYSICAL UNITS (million m^3)	1970	1971	1972	1973	1974	1975	1976
Opening stock(1)	21713	21651	21587	21522	21450	21383	21325
Additions:							
Growth (2)	51.9	51.9	51.9	51.9	51.9	51.9	51.9
Reforestation (3)	1.3	3.4	5.5	7.6	9.7	11.8	13.8
Reductions:							
Harvesting (4)	10.0	13.8	16.9	26.3	23.3	16.3	21.4
Deforestation (5)	99.0	99.0	99.0	99.0	99.0	99.0	99.0
Degradation (6)	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Net change	62.4	64.1	65.1	72.4	67.3	58.2	61.3
(rounded)	(62)	(64)	(65)	(72)	(67)	(58)	(61)
Closing stock(1)	21651	21587	21522	21450	21383	21325	21264
UNIT VALUES (US$ per m^3)							
FOB export price	10.90	15.10	17.10	29.30	41.60	26.40	44.70
Harvesting costs	4.90	6.80	7.90	13.18	18.72	11.88	20.12
"Primary" rent (7)	6.00	8.30	9.20	16.12	22.88	14.52	24.58
"Secondary" rent (7)	3.78	5.23	5.80	10.16	14.41	9.15	15.48
MONETARY ACCOUNTS (US$ million)	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**
Opening stock	- -	105224	145064	160339	280137	396227	250782
Additions:							
Growth	196	271	301	527	748	475	803
Reforestation	0	0	0	0	0	0	0
Reductions:							
Harvesting	60	115	155	424	533	237	526
Deforestation & egradation	399	552	612	1073	1522	966	1635
Net change	-263	-396	-466	-970	-1307	-728	-1358
Revaluation:							
Opening stock	- -	32620	12764	97798	95039	-117258	140777
Closing stock	105525	145495	160823	281077	397468	251464	424581

Table 2 FOREST RESOURCE ACCOUNTS, INDONESIA (1977-1982)

PHYSICAL UNITS (million m^3)	1977	1978	1979	1980	1981	1982
Opening stock (1)	21264	21204	21144	21085	21028	20973
Additions:						
Growth (2)	51.9	51.9	51.9	51.9	51.9	51.9
Reforestation (3)	15.9	18.0	20.1	22.1	24.2	26.3

Reductions:						
Harvesting (4)	22.2	24.2	25.3	25.2	16.0	13.4
Deforestation (5)	99.0	99.0	99.0	99.0	108.0	108.0
Degradation (6)	6.6	6.6	6.6	6.6	6.6	6.6
Net change	60.0	59.9	58.9	56.8	54.5	49.8
(rounded)	(60)	(60)	(59)	(57)	(55)	(50)
Closing stock (1)	21204	21144	21085	21028	20973	20923
UNIT VALUES (US$ per m^3)						
FOB export price	47.50	46.70	85.21	106.93	95.84	100.59
Harvesting costs	21.38	21.05	29.84	34.24	37.93	41.00
"Primary" rent (7)	26.12	25.65	55.37	72.69	57.91	59.59
"Secondary" rent (7)	16.46	16.16	34.33	45.07	35.90	36.95
MONETARY ACCOUNTS (US$ million)	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**
Opening stock	423362	448617	439298	945662	1238129	983843
Additions:						
Growth	854	839	1782	2339	1863	1918
Reforestation	0	0	0	0	0	0
Reductions:						
Harvesting	580	621	1401	1832	927	799
Deforestation & degradation	1738	1706	3625	4759	4114	4234
Net change	-1464	-1149	-3244	-4252	-3178	-3115
Revaluation:						
Opening stock	26525	-8072	621808	296719	-251107	29225
Closing Stock	448617	439298	945662	1238129	983843	1009953

Table 3 FOREST RESOURCE ACCOUNTS, INDONESIA (1983-1984)

PHYSICAL UNITS (million m^3)	**1983**	**1984**
Opening stock (1)	20923	20875
Additions:		
Growth (2)	51.9	51.9
Reforestation (3)	29.6	35.3
Reductions:		
Harvesting (4)	15.2	16.0
Deforestation (5)	108.0	108.0
Degradation (6)	6.6	6.6

Net change	48.3	43.4
(rounded)	(48)	(43)
Closing stock(1)	20875	20832
UNIT VALUES (US$ per m^3)		
FOB export price	78.75	93.15
Harvesting costs	43.31	51.23
"Primary" rent (7)	35.44	41.92
"Secondary" rent (7)	22.33	26.41
MONETARY ACCOUNTS (US$ million)	**1983**	**1984**
Opening stock	1009953	602974
Additions:		
Growth	1159	1371
Reforestation	0	0
Reductions:		
Harvesting	539	671
Deforestation & degradation	2559	3027
Net change	-1939	-2327
Revaluation:		
Opening stock	- 408918	106424
Closing stock	602974	711725

Instituting a system of environmental accounts

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Before instituting a system of natural-resource and environmental accounts (an "NREA system"), a country must weigh many options and make important decisions. In particular, it needs to respond to a number of specific questions that have not been fully discussed among the countries of the hemisphere and that remain subject to debate and disagreement among the experts. Some of these questions are the following:

1. Should the new system be based on one of the approaches developed in other countries or on a combination of approaches that will be most beneficial for the particular country?

2. Should the basic focus of the system be to modify the existing system of national accounts or to

establish an independent or "satellite" system?

3. What should be the scope of the project and the amount of human and financial resources devoted to it?

4. What is the primary objective: to organize existing information scattered among different agencies in the country, to measure the country's economic performance after incorporating environmental variables, to make forecasts concerning these variables, or to formulate policies for managing natural resources and controlling environmental degradation?

5. Is the long-term goal of the system a standard international system that allows for comparison among countries, or an individualized accounting system adapted to the problems and priorities of the particular country?

6. Will the system be initiated immediately, through an evolutionary process, or after the international community reaches a consensus on an appropriate methodology?

7. Which of the country's agencies shall serve as the focal point and which ones shall generate specific information?

8. Which resources and pollutants shall be subject to accounting and which specific environmental problems are to be analyzed through this system?

9. How elaborate shall the system be in terms of sophistication of methodology, precision of data, and number of indicators?

10. What new data or information shall be generated for the exclusive use of the system?

11. To what degree shall the experience of industrialized nations on the foregoing points be applied?

12. Shall measurements be done in physical units alone or also in monetary units? If the latter, what means of valuation shall be applied?

13. How shall the information produced be channeled to the decision-making agencies?

In attempting to answer these questions, I shall group them into six main topics. However, it should be stressed that these responses represent only one point of view on an evolving issue that most of our countries have only recently begun to address. It is also worth noting that each of the approaches currently used reflects a certain position on most of these topics, which should be reconciled with that of the country intending to introduce the new system.

Topic 1: The starting point

In many developing and some developed nations, there is only a vague notion of the role of NREA systems and of the development of views on this topic, and decisions on adopting a new system therefore tend to be deferred. It is known, for example, that such systems improve upon the conventional system of national accounts by incorporating environmental variables. However, from this it is usually, though incorrectly, concluded that the purpose of the effort is simply to see to it that national accounts better fulfill their traditional role of providing indicators of the country's economic activity and income. Actually, the role of NREA systems may be much more ambitious.

In particular, NREA systems can (1) be instrumental in policymaking, not only with regard to macroeconomic variables, but also for managing individual natural resources and dealing with specific environmental problems; (2) provide a fundamental tool for the planning of sustainable development (actually, it is difficult to imagine a country carrying out such planning without specific data on the status and evolution of its natural assets); (3) organize and systematize existing information on natural resources, which is usually scattered among the country's various agencies; (4) allow the construction of quantitative models to predict the evolution, in quantity and quality, of the

stock of natural assets in alternative scenarios; and (5) enable the system of national accounts to provide relevant indicators of social well-being (including vulnerability), in addition to the conventional indicators of production and income. Achieving any of these objectives is reason enough for instituting some form of NREA system.

The other somewhat vague notion held in our countries is that the topic of environmental accounts is being discussed in a number of international forums, that no consensus has been reached about it, and that there is as yet no standard system, all of which is true. However, the dangerous conclusion drawn from this, especially when the true role of the new accounts is unknown, is that it is a good idea to wait until the entire issue is clarified before establishing a new system. What is probably not commonly known is that in all of these forums there has always been a consensus on the need for immediately initiating the process of establishing the new accounts, especially in developing nations, whose well-being is closely related to their natural patrimony. Actually, in view of the significant results achieved by the World Resources Institute in Indonesia and Costa Rica, it may properly be concluded that for most of our countries the most opportune time to begin the new system has already come and gone.

Topic 2: Selection of model and objectives

Perhaps the most difficult decision a country faces in starting the process of establishing an **NREA** system is selecting the approach, among the many that exist, to serve as a model or basis. At present, there are no fewer than nine approaches, of which six were developed by industrialized nations for their own individual use, and three by independent institutions for general use. The former are those of Canada, France, Japan, Holland, Norway, the United States, and Germany. The approaches for general application were developed by Repetto, the United Nation Statistical Office, and Peskin. The result is a confusing array of methodologies that sometimes inhibits the developing nations from taking any initiative in this area.

Two points may be made on the subject of selecting the appropriate NREA model:

> First, given that the assistance or financing available for developing new accounting systems is not plentiful and generally comes tied to a specific approach, the recipient country does not enjoy much discretion in selecting its approach. This problem is, however, not as important as it appears at first blush. As was said above, what matters at this moment is that the countries of the region initiate the new system, no matter what model it is based on, in order to obtain the attendant benefits immediately and to gain the experience required to set up a system adapted to their own values and needs. Throughout this entire process a clear distinction must be made between what the country seeks as a final product and what the model approach may provide; therefore, the country needs to develop a capacity not only to apply the model approach, but also to judge the merits of other approaches and evaluate their development in other countries.
>
> Secondly, to the extent that the country can exercise its discretion in selecting the approach, it is important to note that the most relevant decision for that country is not, as the literature seems to suggest, to select among alternative approaches, but rather to select among the alternative objectives that the country may pursue. Since each approach serves well-defined objectives, the country must first define its objectives and later derive the approach that best accomplishes them. The selection of objectives should determine the selection of approach, not vice versa.

Topic 3: The selection of the basic approach

As was said above, the most important objectives of the NREA systems are policymaking, the planning of sustainable development, the organization of existing information, the improvement of macroeconomic measurements, the use of quantitative models, and better assessment of social well-being. In seeking to achieve some of these objectives, the countries with NREA systems in progress have focused on one of two basic approaches: (1) modifying the national accounts to incorporate sustainability and environmental values, and (2)

establishing independent or "satellite" accounts to deal with specific resources or sectors or environmental problems.

The first approach is especially useful for examining the historical sustainability of the countries' development process, for improving macroeconomic measurements, and for developing new indicators of national well-being. The new "green" accounts are expressed in monetary values and refer mainly to natural-resource depletion and degradation (including losses from and increased vulnerability to natural disasters). Another correction is for the value of natural goods and services for which there are no markets. This approach has produced very interesting results, especially those obtained by the World Resources Institute in developing countries, which show that the real economic growth of such countries may be much lower than conventional measurements suggest and that the stock of certain resources has suffered dramatic losses in recent decades.

The second approach, that of establishing a "satellite" or independent system, is especially appropriate for (1) formulating policies on managing certain natural resources or resolving specific environmental problems; (2) reforming the national accounts system in the long term through an evolutionary process; and (3) making use of quantitative models to forecast or plan the development of priority resources. It includes the accounting of stocks and flows of natural resources or pollutants, initially in physical units; the economic valuation is added only when possible and necessary (for example, for policy analysis). The arithmetic used for stocks and flows is simple. This approach is also interesting because it permits analyzing the future evolution of natural resources and systems. It also provides valuable information and experience for designing new national accounts systems.

Three points may be made with regard to this topic:

1. As was said above, it makes little sense to recommend one approach over another: either is appropriate depending on the particular objective sought. One conforms to a standard accounting pattern, works with macroeconomic aggregates, and looks at the past; the other is more flexible, has limited coverage, and looks at the future.

2. These approaches are not really alternatives, except perhaps at the time of initiating the new system. If a country wishes to avail itself of all the advantages of environmental accounting, it will have to apply both approaches in the long term. But the combined system may require two agencies to serve as focal points, one for each approach. Thus the modification of the national accounts system may be centralized within the agency in charge of that system and the independent or "satellite" systems be managed by the agencies specializing in specific sectors or resources. The approach initially selected will therefore determine which agency will inaugurate the new system.

3. Both approaches may be designed in a pragmatic and progressive fashion in order to facilitate their immediate adoption in the country concerned and their later incorporation to a standard international system. Thus, when the first approach was applied in Costa Rica and Indonesia, only the accounts of a few important resources were selected for revision; other adjustments, such as quality changes or defensive expenditures, would be incorporated later on. In the case of Uruguay, where the second approach was used, a single resource, soil, was chosen and measured only in physical units; this experience will serve, however, as a basis for expanding the system to many other resources. Furthermore, either approach can be designed so that as it evolves it may be integrated with the other and at any point incorporated into the United Nations "satellite" system. The UN system has been designed in such a way that practically any efforts undertaken in environmental accounting may subsequently be incorporated into it.

Topic 4: Standardization of the system

An important objective of the new system is standardization, so that any of its results may be used for meaningful comparisons among countries. Nevertheless, it is our opinion that this objective should be maintained as a long-term goal - very long-term, in fact - and that the initial emphasis should instead be on resolving the most urgent problems

of the country involved through an accounting system adapted to those needs.

This opinion is based on four reasons: (1) the industri-alized nations with NREA systems in operation have not demonstrated any great desire to agree upon a standard international system and have concentrated instead on developing individualized systems, adapted to their own needs; (2) at present, our countries have specific needs for policy-oriented information, which justifies their gearing the new system to meet them; (3) the nature of these needs suggests that, even in the long term, the new system should retain important elements of its own, that is, not easily subject to standardization; and (4) specialized international forums have concluded that it is not possible at this time to establish a standard system. But the very experience gained by the countries through the implementation of the NREA systems will contribute to the formulation of such a system in the future.

Topic 5: Scope of the project

As was said above, there is a considerable consensus as to the advisability of carrying out NREA projects in developing nations, but not as to the amount of resources to devote to the effort. The experience of developed nations is not very enlightening in this respect, since the scope and complexity of the projects vary quite a bit from one country to another, ranging from the very ambitious (France) to the very basic (United Sates).

Information on the actual cost of the different NREA projects and approaches is also very limited, since no studies have been conducted on this point in spite of its enormous relevance. The work done in some developing nations such as Uruguay, Indonesia, and Costa Rica has not been very costly; however, these were only pilot projects, not the establishment of permanent systems. In developed nations, the cost of an active and permanent environmental accounting program may run into many millions of dollars.

In dealing with the scope of the project, the following points should be made:

1. It may be argued that in developing countries the scope should generally be more limited than in developed countries, given the great difference in the availability of financial, human, and technical resources. However, a strong counter argument is that in developing countries the society's income is much more dependent upon the natural-resources base and actual losses of such resources have been much more dramatic. Consequently, in our hemisphere the new accounting system may be a more important and pressing need in the developing than in the developed countries and thus warrant a more expensive project.

2. If a country is able to obtain sufficient foreign assistance and financing for this activity, it can "think big." But if, as is more likely, assistance is scarce or even nonexistent, there is really nothing wrong with "thinking small." The important thing is to begin immediately the task of quantifying the extent of our most pressing environmental problems and provide decision-making tools to resolve them. In this activity, perhaps more than in many others, it is very important to be realistic as to the amount of resources that one can count on. Very ambitious projects without a matching budget can be needlessly wasteful because they are almost always abandoned or deferred indefinitely before producing any concrete results. If resources are modest, it is much more worthwhile and practical to accept this situation from the outset and direct the system towards producing immediate, low-cost results, even if this means using basic, unsophisticated methods. The experience in Uruguay, for example, shows that even scarce resources permit significant results with great potential impact.

Topic 6: Initial design of the system

To determine the initial design of its NREA system, a country must answer the questions raised above about different variables: the resources and pollutants to be subject to accounting, the level of detail, the new information and data to be generated, the valuation methods, etc. What is of paramount importance is to distinguish clearly between long-term and short-term goals.

As has been said, in the long term a country can very well pursue all the objectives that environmental and resource accounting may achieve. These will of course include reforming the system of national accounts in accordance with the standard international model that may have been agreed upon in the United Nations. The path taken and the evolution towards this system may differ considerably from country to country, but the final result in this respect should be the same. It is worth noting, however, that the final result with respect to some elements of the overall system may differ greatly among countries, reflecting their different values and problems. Thus, for example, it is likely that the accounting in developed nations will continue to be concentrated on environmental pollution and degradation, while that of the developing countries will focus on the sustainability of the most important natural resources. In addition, more emphasis will surely be given to vulnerability to natural events, such as droughts, floods, hurricanes, volcanic eruptions, earthquakes, tsunamis, and desertification, all of which affect natural assets.

Moreover, although the long-term objectives may be similar, the short-term goals may be very different. It is precisely the combination of these short-term goals with a realistic project size that should provide the main criteria for the initial design of the system. Thus, the selection of the first resources and pollutants to be covered will depend on the initial goals. If a basic goal is to modify the national accounts, the resources chosen will be those whose loss would most seriously affect the national product; if, on the other hand, the intent is to formulate environmental management policies, the resources chosen will be those related to specific environmental problem.

It is important to keep in mind that the short-term objectives of the NREA system should arise from the country's environmental policy, since the accounting system is only a tool to implement such a policy. At present, a desirable policy for developing countries is to take advantage of available opportunities to reconcile economic growth with protecting and conserving the natural patrimony. The guiding principle in designing the NREA system, particularly at the outset, should be that it contribute to this strategy, and that it do so through significant, immediate, and low-cost results. If such results are possible, they will create an appropriate demand for the NREA system and provide the engine for its continued growth and development.

Appendix 1: Agenda

Tuesday morning: CONCEPTUAL ISSUES

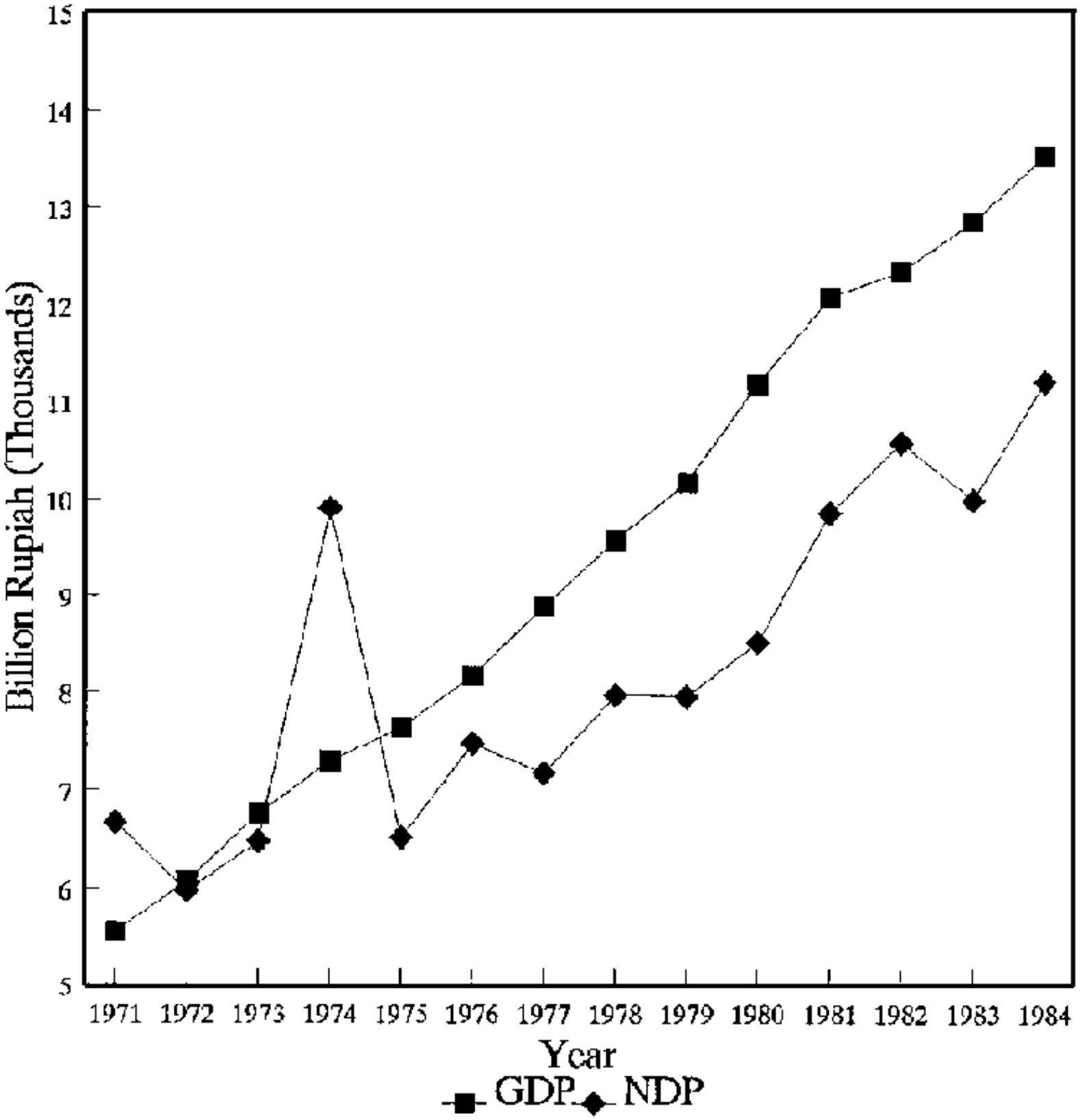
- o Opening and Welcome; *Ambassador Fernando González-Guyer, Chairman, Committee on the Environment, OAS Permanent Council*
- o The Importance of Appropriate Accounting Frameworks for Sustainable Development; *Juan Guillermo Espinosa, former Representative of Argentina-Chile to IDB; Senior Economist of CIENES, Chile*
- o What Can Resource and Environmental Accounts Tell Policymakers?; *Robert Repetto, Vice President, World Resources Institute*
- o Resources and Environmental Accounting in the U.N. System of National Accounts: Recent Development and Current Plans; *Peter Bartelmus, UN Statistical Office*

Tuesday afternoon: COUNTRY EXPERIENCE

- o Presentation of Costa Rica's Resource Accounts; *Paúl Solórzano, Tropical Science Center, Costa Rica*
- o Current Resource and Environmental Accounting Activities in the Hemisphere: case studies from Brazil, Canada, Colombia, Mexico, and Uruguay. *Discussion by Ronaldo Seroa da Motta, Jerry Gravel, Juan P. Molina, Hector de Alzua, and John Hoehn*

Wednesday morning: IMPLEMENTATION ISSUES

- o Instituting a System of Environmental Accounts: Issues for Developing Countries; *Alfredo Recalde, Senior Economist, Department of Regional Development and Environment*
- o The UNDP Program of Technical Assistance; *Michael Gucovsky, UNDP*
- o Bilateral and Multilateral Sources of Assistance. *Panel including Twig Johnson, AID; John Dixon, World Bank; Kirk Rodgers, OAS; and William Vaughan. IDB*
- o Closing by Chairperson


15
14
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Billion Rupiah (Thousands)
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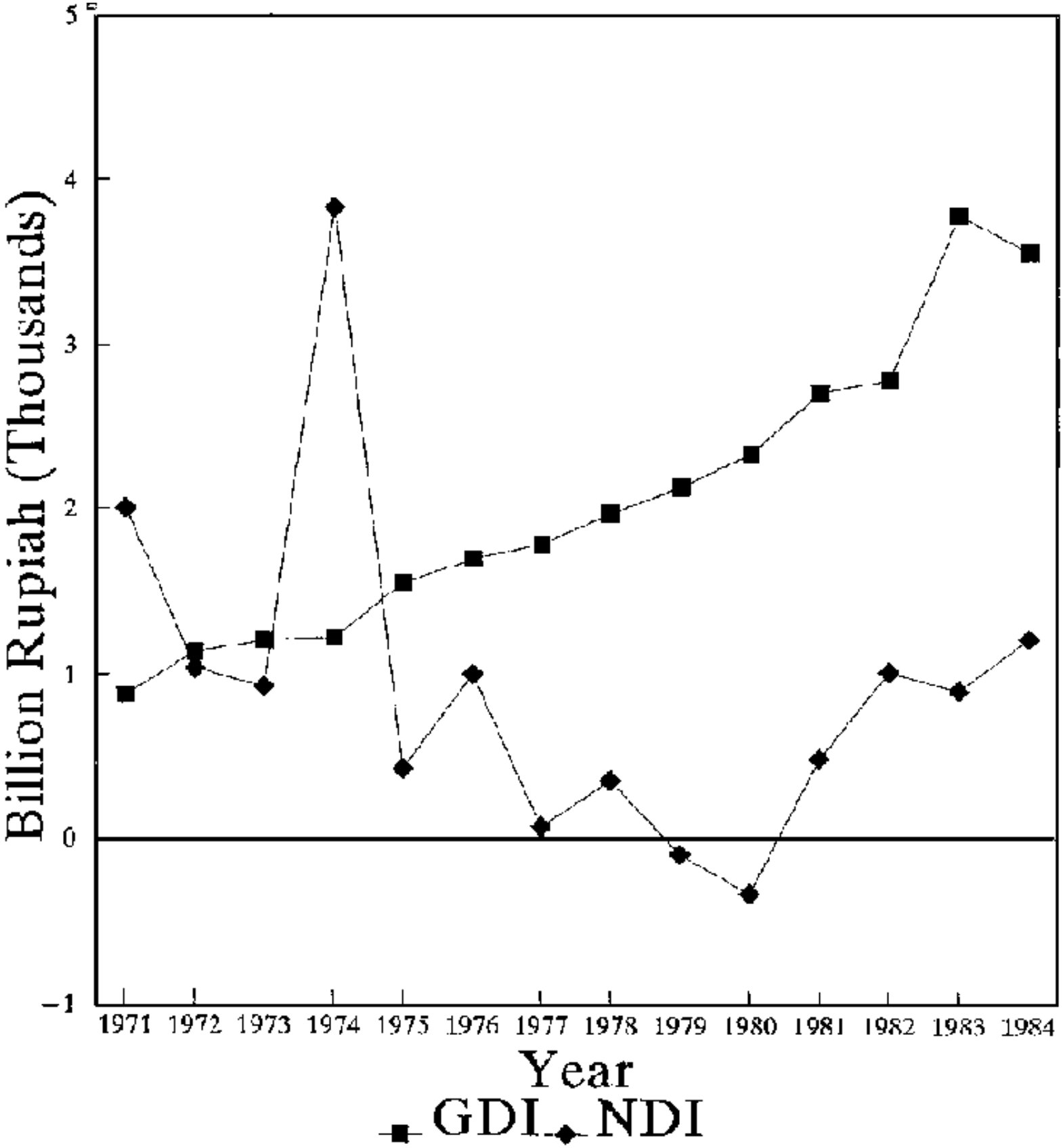
Year
GDP
NDP


Billion Rupiah (Thousands)
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4
3
2
1
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−1
1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984
Year
GDI
NDI

Appendix 2: List of participants

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Appendix 3: List of documents

1. Contexto y Perspectivas para un Programa de Estadísticas Ambientales en México; *Roberto López Pérez, Instituto Nacional de Estadísticas Económicas, Geográficas e Informáticas, México.*

2. What Can Policy makers Learn from Natural Resources Accounting?; *Robert Repetto, World Resources Institute, Washington, D. C.*

3. A System of Uruguayan Environmental Accounts: Framework and Project Priorities; *John P. Hoehn, Department of Agricultural Economics, Michigan State University, Michigan.*

4. Sistema Uruguayo de Contabilidad Ambiental: Alcance del Trabajo y Prioridades Iniciales del Proyecto; *John P. Hoehn, Department of Agricultural Economics, Michigan State University, Michigan.*

5. Economia e Meio Ambiente-Contas Ambientais; *António Rodriguez Gonzalez, Departamento de Planejamento e Avaliaçao, Secretaria de Planejamento, Orçamento e Coordenaçao, Brasil.*

6. A System of Integrated Environmental and Economic Accounts (SEEA); *Peter Bartelmus, United Nations Statistical Office, New York.*

7. Environment and Resource Accounts in the Canadian System of National Accounts; *Gerry Gravel, Statistics Canada, Canada.*

8. El Programa de Contabilidad Ambiental para Colombia; *Juan Patricio Molina y Camilo Montoya, Comité Interinstitucional de Contabilidad Ambiental de Colombia, Colombia.*

9. Measuring Sustainable Income: The Case of Mineral and Forest Depletion in Brazil; *Ronaldo Serôa de Motta, Instituto de Pesquisas Económicas Aplicadas* (*IPEA*)*, Ministerio de Planejamento, Brasil.*

10. Las Cuentas de Recursos Naturales de Costa Rica; *Raúl Solórzano, Centro Científico Tropical, Costa Rica.*

11. Natural Resource and Environmental Accounts: A World Bank Perspective; *John A. Dixon, The World Bank, Washington, D. C.*

12. National Accounts and the Environment: Experience of Mexico; *Héctor de Akua Romo, Instituto Nacional de Estadísticas Económicas, Geográficas e Informáticas, México.*

13. Conclusiones del Taller sobre Contabilidad de los Recursos Naturales y Desarrollo Sostenible; *Naciones Unidas, Costa Rica.*

14. Cuentas Ambientales: La Experiencia de Perú; *Aurelio Valdez Caro, Instituto de Estadísticas e Informáticas-INEI, Perú.*

15. La Puesta en Marcha de un Sistema de Cuentas Ambientales; *Alfredo Recaído, Departamento de*

Desarrollo Regional y Medio Ambiente, Organización de los Estados Americanos, Washington, D.C.

16. Esquema Referencial para la Producción de Estadísticas Ambientales (Sugerido por la Conferencia Interamericana de Estadísticas); *Centro Interamericano de Enseñanza de Estadísticas.*

THE ORGANIZATION OF AMERICAN STATES

The Organization of American States (OAS) is the world's oldest regional organization, dating back to the First International Conference of American States, held in Washington, D.C., on April 14, 1890. This meeting approved the establishment of the International Union of American Republics. The Charter of the OAS was signed in Bogota in 1948 and entered into force on December 13, 1951. The Charter was subsequently amended by the Protocol of Buenos Aires signed in 1967, which entered into force on February 27, 1970, and by the Protocol of Cartagena de Indias, signed in 1985, which entered into force on November 16, 1988, The OAS currently has 35 Member States. In addition, the Organization has granted Permanent Observer status to 27 States in Europe, Africa and Asia, as well as to the Holy See and the European Economic Community.

The basic purposes of the OAS are as follows: to strengthen the peace and security of the continent; to promote and consolidate representative democracy, with due respect for the principle of nonintervention; to prevent possible causes of difficulties and to ensure the pacific settlement of disputes that may arise among the Member States; to provide for common action on the part of those States in the event of aggression; to seek the solution of political, juridical and economic problems that may arise among them; to promote, by cooperative action, their economic, social and cultural development, and to achieve an effective limitation of conventional weapons that will make it possible to devote the largest amount of resources to the economic and social development of the Member States,

The OAS accomplishes its purposes through the following organs: the General Assembly; the Meeting of Consultation of Ministers of Foreign Affairs; the Councils (the Permanent Council, the Inter-American Economic and Social Council and the Inter-American Council for Education, Science, and Culture); the Inter-American Juridical Committee, the Inter-American Commission on Human Rights; the General Secretariat; the Specialized Conferences; the Specialized Organizations and other entities established by the General Assembly.

The General Assembly holds regular sessions once a year. Under special circumstances it meets in special session. The Meeting of Consultation is convened to consider urgent matters of common interest and to serve as Organ of Consultation under the Inter-American Treaty of Reciprocal Assistance (Rio Treaty), the main instrument for joint action in the event of aggression. The Permanent Council takes cognizance of such matters as are entrusted by the General Assembly or the Meeting of Consultation and Implements the decisions of both organs when their implementation has not been assigned to any other body, it monitors the maintenance of friendly relations among the Member States and the observance of the standards governing General Secretariat operations and also acts provisionally as Organ of Consultation under the Rio Treaty. The purpose of the other two Councils is to promote cooperation among the Member States in their respective areas of competence. These Councils hold one annual meeting and meet in special sessions when convoked in accordance with the procedures provided for in the Charter. The General Secretariat is the central and permanent organ of the OAS. The headquarters of both the Permanent Council and the General Secretariat is in Washington, D.C.

MEMBER STATES: Antigua and Barbuda, Argentina, The Bahamas *(Commonwealth of),*

Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica *(Commonwealth of)*, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States, Uruguay and Venezuela.