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INTEGRATED ENVIRONMENTAL AND ECONOMIC ACCOUNTING

A CASE STUDY FOR MEXICO

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ABSTRACT

This paper presents the results of a case study carried out in 1990 and 1991 jointly by UNSO, the World Bank, and the National Institute of Statistics, Geography, and Informatics (INEGI) in Mexico, with the objective of integrating and linking environmental and economic information and to explore whether environmentally-adjusted national product aggregates for Mexico can be derived. This work was carried out within the overall analytical framework developed in UNSO's Draft Handbook on Environmental Accounting. Given that environmental and economic information has traditionally been collected by different agencies, a special effort was made to establish contacts between INEGI, the Urban and Environment Ministry (SEDUE), and other relevant agencies with data and expertise in these areas.

The analysis took as a starting point the standard System of National Accounts for Mexico (Sistema de Cuentas Nacionales de Mexico - SCNM). Economic information from the SCNM was reformatted, and subsequently the following areas of environmental concern were integrated: (a) oil depletion, (b) degradation of environmental assets, and (c) deforestation and land use. The resulting system is termed System of Economic and Environmental Accounts for Mexico (Sistema de Cuentas Economicas y Ecologicas de Mexico - SCEEM). The analytical data used in this case study refers to 1985, a year for which detailed input-output information was available, which facilitated the development of the SCNM to the SCEEM. The case study work consisted of four main areas, as described below.

First, the standard analysis of SCNM, which derives the GDP was expanded to include produced asset balances. Depreciation of those assets was estimated, which then was deducted from the GDP to arrive at the (standard) NDP. Second, oil depletion concerns were addressed and the assets forests and groundwater were analyzed. Depletion of oil represents an economic cost (so-called user cost) that needs to be subtracted from gross product along with other corrections to arrive at the adjusted net product. Additional finds of oil reserves contribute to capital accumulation (but without being reflected in the flow accounts). Third, degradation concerns were considered, covering not only air and water pollution, but also soil erosion, ground water use and the deposit of solid wastes. Degradation affects the quality of non-produced assets (e.g. water, air). The linkage between these and the economy is complex. In general, degradation affects more immediately the quality of life than economic production. Fourth, land use concerns and deforestation were included in the accounting framework. Forests are essentially a renewable resource. But if they are depleted over and above the maximum sustainable yield, a depletion cost also needs to be calculated.

Accounting for depletion and degradation in physical terms is an important first step, which can indicate how traditional economic aggregates are affected. However, for an integrated economic and environmental analysis, it is essential that environmental variables be expressed in the same monetary units as the economic variables. This requires valuation. There are three approaches used in valuing the natural assets and changes therein. The first method calculates the value of stocks of assets as the sum of discounted values of future income streams, and the value of changes in the stock of natural assets is based on the changes in future income streams as a consequence of additions to the reserves of natural assets, or depletions. The second approach calculates the user cost of depletion such as by the El Serafy method. The third type of valuation, which is only used for valuing quality changes in the natural assets, is based on the cost of avoiding such changes (avoidance cost approach). These general criteria translate into more specific methods for each of the natural resources and environmental concerns covered in the SCEEM.

GDP for 1985 is 47,391 million pesos. Depreciation of produced capital is 5,331 million pesos. Therefore, NDP is 42,060 million pesos. Two Environmentally-Adjusted net Domestic Products (EDPs) are calculated. EDP1 is derived by deducting from NDP the environmental uses related to depletion, deforestation and land use; it is estimated to be 39,662, i.e. about 94% of the of the traditional NDP. EDP2 is obtained by further deducting the cost of degradation, and is estimated to be 36,448 million pesos, i.e. about 87% of NDP.

In terms of the shares of final consumption and capital accumulation in the various net products, the results are as follows. Final consumption is 83% of the traditional NDP and net capital formation is 11%. When changing to EDP1, final consumption increases to 88% of EDP1 and net capital accumulation is less than 6%. Net accumulation of economic assets would be nearly 12% of EDP1, but the effect of this increase is eliminated because a large part of the net accumulation in economic assets is directly taken from the environment (the environmental capital is reduced by 6% of EDP1). When extending the analysis to EDP2, final consumption is further increased to nearly 96%, and net capital accumulation becomes a negative -2%, which is the net result of an increase in net accumulation of economic assets to nearly 13% of EDP2 and a decrease of environmental capital which amounts to -15% of EDP2.

While the macro results presented above are interesting, they do not provide the information that would be needed for operational governme : policies. Therefore, in the present study, not only the macro effects have been identified but efforts have also been made to identify the depletion and degradation caused by different sectors. The sectoral analysis focuses on three elements, i.e. value added, the use of economic assets including produced as well as non-produced assets, and also on the environmental protection expenses made by different sectors.

In reviewing the results of this pilot study, one needs to keep their tentative nature in mind. First, a number of environmental and resource concerns were not covered (e.g. biodiversity, ecosystem services, fisheries, marine environment, historical monuments). Second, the work represents only an initial pilot effort. The main emphasis in the first stage of developing the SCEEM was on identifying the relationship between different economic aggregates and environmentally adjusted aggregates. There was less emphasis on the quantitative accuracy of the environmental adjustments. Follow-up studies, to be undertaken by INEGI and others, are intended to improve the accuracy of data or estimates in selected areas, and also to provide analyses for other years, so that the effects of environmental adjustments on growth can be determined.

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INTEGRATED ENVIRONMENTAL AND ECONOMIC ACCOUNTING

A CASE STUDY FOR MEXICO

I. INTRODUCTION

The present report includes the conclusions of a joint project carried out in 1990/91 by the UN Statistical Office, the World Bank and the Mexican "Instituto Nacional de Estadistica, Geografia e Informatica" (INEGI), with partial funding from UNDP, to compile, on an experimental basis, environmentally adjusted economic aggregates for Mexico. The aggregates were to be developed within an analytical framework of environmental accounts linked to the national accounts of Mexico, and based on concepts elaborated in the UNSO's Draft Handbook on Environmental Accounting (United Nations, 1990).

This paper, summaries and analyses the quantitative results of the data compiled. The Annexes present a detailed account of data sources and valuation methods and include the quantitative results of the project in considerable detail.[1]

This paper covers the following topics. In Section I.A information is given on the orientation and organizational context of the work on environmental accounting in Mexico. Section II of the paper deals with the environmental concerns that are addressed. Section II.A includes a description of the environmental concerns, distinguishing between three concerns, i.e. oil extraction, deforestation and land use, and degradation concerns. Section II.B summarizes for each of the concerns, the data sources of physical environmental indicators that are compiled in order to measure the impact of the concerns, the adjustments that are made to these data in order to use them for integrated economic-environmental analysis, and the principles of valuation applied in order to arrive at monetary valuation of the environmental impacts. More details on data sources, compilation methods and valuation are presented in the Annexes of the report. Section III describes and analyzes the effects of incorporating data into an accounting framework for joint economic-environmental analysis, called *Sistema de Cuentas Economicas y Ecologicas de Mexico* (SCEEM). SCEEM is introduced in this section in a gradual manner. It starts in Section II.A.1 with a presentation of the traditional Mexican national accounts framework for economic analysis, called the *Sistema de Cuentas Nacionales de Mexico* (SCNM), and extends SCNM to SCEEM in Section III.A.2, successively integrating in the analysis the resource balances in physical terms that reflect oil extraction (Section III.A.2.b.(1)), deforestation and land use (Section III.A.2.b.(2)), and degradation concerns (Section III.A.2.b.(3)), and applying the valuations developed in Section II.B.2 and in the Annexes, to arrive at an SCEEM macro analysis in monetary terms which permits a comparison of SCNM and SCEEM aggregates (Section III.A.2.c.). In Section III.B the macro aggregates in monetary terms are broken down by

[1] Since the annexes are voluminous, they are not included as a part of this paper. However, they can be obtained by writing to the Bank's Environment Department (Room S-3049) or the United Nations Statistical Office.

economic activities which permits comparative evaluation of environmental impacts and use of natural resources by different economic activities in Mexico.

The analytical data presented in the tables throughout the paper refer to 1985. In that year in which a detailed input-output table for Mexico was compiled, which facilitates the adaptation of SCNM to the integrated economic and environmental analysis of SCEEM.

A. General Orientation of the Pilot Project

There has been much discussion in Mexico about environmental concerns and a variety of studies have been carried out to quantify the impacts on production and the quality of life.[2] Public opinion and politicians in Mexico are aware that many of the environmental concerns are linked to economic activities and that environmental impacts can be mitigated through a combination of incentives and regulations affecting economic activities. In order to assess the economic ramifications of environmental interventions, there is a need to link economic analysis with analysis of environmental impacts. Such linkage makes it possible to determine in which economic activities environmental regulations would be most effective from an environmental point of view and at the same time be optimal from an economic point of view. The development of such a linkage between economic and environmental accounting was an important objective of this pilot study.

One of the difficulties encountered in developing a joint economic-environmental analysis was the separation between different disciplines which deal with economic analysis and with analysis of environmental impacts. In Mexico, as in many other countries, the different orientations of economic and environmental analysis are not only reflected in different disciplines and experts supporting those disciplines, but are also represented by different institutions. In preparing government policies in fields related to the present study, the two disciplines are mainly represented by INEGI, which has developed macro economic accounts that are used by the government in economic policy making, and SEDUE, which is the focal point in the government for environmental policy making. The first step in implementing the project in Mexico was to establish the necessary contacts between experts in economic accounting in INEGI and resource accounting in SEDUE and other Mexican institutions dealing with natural resources.

An accounting framework was developed which could be used as the quantitative instrument through which environmental data analyzed by SEDUE and other Mexican institutions, and macro economic data elaborated by INEGI, could be linked. The joint economic-environmental accounting framework SCEEM is based on the *System of Economic Environmental Accounts* (SEEA)[3]. SEEA was adapted to the Mexican circumstances and requirements, such that economic accounts included in SCNM and compiled by INEGI, and

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[2] For example the recent report "Mexico in Transition: Towards a New Rate for the Public Sector" (World Bank Report No. 8770-ME, May 22, 1991) discusses environmental policy issues in considerable details.

[3] SEEA is the accounting framework that is included in the Draft Handbook on Environmental Accounting which is being developed by a consultant to the United Nations Statistical Office. In the remaining text, reference will be made either to SEEA or the Handbook.

resource balances known by experts from SEDUE and other Mexican institutions working in the area of natural resources, were separately identified. This facilitated discussion and further reconciliation of common concepts, valuations, etc., and also made it possible to confront available economic and environmental data sets, which were used in the past for separate analyses, and use them in a joint analysis to bring out the interactions between economic activities and environmental effects. Furthermore, within the resource balances of SCEEM, a distinction was made between different resource balances representing different environmental concerns, so that the quantitative interactions between economic activities and each of those environmental concerns could be separately assessed.

In line with the orientation of SEEA, SCEEM was compiled in an integrated manner, with much emphasis on identifying, quantifying and establishing the relation between the environmental effects on different macro economic aggregates and less emphasis on quantitative accuracy of the environmental adjustments. The reason for this emphasis is our belief that first the orientation of the integrated environmental-economic analysis should be established, thus integrating expertise, concepts and data, and only at a later stage when there is common understanding of concepts and format of such integrated analysis, data improvements can be attempted, which would not only lead to improved accuracy of isolated data, but would also lead to improvements in the integrated analysis.

The development of SCEEM in its present format should be considered as a feasibility study aimed at integrating economic and environmental data bases and analyses. Once accomplished, it is necessary to carry out further studies which would improve the reliability of the data and develop more detailed data sets with a similar orientation. For instance, after completion of the environmental project in Mexico, detailed studies may be carried out with regard to soil erosion caused by agricultural production or with regard to air and water pollution caused by economic activities in the Federal District of Mexico. In such studies, economic and environmental data would have to be compiled in the same classification detail and on the basis of compilation methods that are compatible in terms of valuation, estimation procedures, etc.

Improvement of data for integrated environmental and economic analysis should not be the only objective of future activities in environmental accounting, though. There should be also much emphasis on further developing the rudimentary analyses of environmental impacts on growth and performance, which are presented in Sections III.A.2.c and III.B.2 of the paper. Only through such improvements of the analytical tools would the improved data have an impact on policy making through the replacement of traditional economic analyses by integrated analyses that are based on environmentally adjusted aggregates.

II. ENVIRONMENTAL CONCERNS ADDRESSED AND MEASURED

A. ENVIRONMENTAL CONCERNS ADDRESSED

The environmental concerns examined as part of the project activities deal with quantitative and qualitative effects on natural resources. They are grouped together in the present report in three main groups: oil extraction concerns, deforestation and land use concern,

and thirdly the degradation concerns. The first two groups are also called the depletion and land use concerns.

The oil depletion concern is dealing with the quantitative exhaustion of a natural resource which is an important source of revenues for the Mexican economy. It is reflected in oil extraction and findings of new oil reserves. The traditional economic aggregates do not take into account any allowance for depletion which constitutes a loss of future revenues; in other words, the oil resources are considered as free goods in traditional economic analysis. The oil depletion aspect is analyzed separately from environmental impacts i.e. the air and water pollution caused by oil extraction and the subsequent oil refining activities; these environmental impacts, which affect the quality of natural resources (air, water), are dealt with under the degradation concern described below.

The deforestation and land use concerns deal with two aspects of deforestation. These include the loss of timber as a result of commercial and non-commercial logging at a speed beyond the capacity of nature to replace it through natural growth, and the transfer of unexploited forest areas to uses in economic activities, either in the form of agricultural land, land used for holding cattle or land transferred for the purpose of urbanization. The transfer of land also effects the practice of cultivation which is sometimes carried out by burning forests for temporary cultivation and abandoning the land after a few harvests. Both the logging of timber and the transfer of forest areas to economic uses generally involve not only the exhaustion of depletable resources --timber and forest land --, but also the destruction of these natural resources as eco-systems. While the latter loss of the forest as an eco-system is an environmentally critical concern, it is not dealt with under the deforestation and land use concern as defined here, which solely deals with the quantitative reduction of two natural resources, i.e. timber and forest land.

The degradation concerns do not deal with the quantitative exhaustion of natural resources, but rather with the qualitative degradation of the eco-system. They include in the present study the contamination of air and water through the generation and deposit of residuals, and also the environmental impact of leaving garbage and solid wastes behind as a result of production, including domestic production activities of households. Also covered under the degradation concerns are land erosion and ground water loss.

In further analysis of the impacts of the three types of environmental concerns in Section III, it has been assumed that the quantitative depletion and land use concerns of oil extraction, deforestation and land use presented above have an immediate impact on the productive and income generating capacity of the Mexican economy. The depletion of oil and the loss of trees immediately affects the future income generating capacity of the oil extraction and logging activities. Also land transferred from the environment to economic activities in agriculture, livestock holding, and for purposes of urbanization will have an immediate (in this case positive) impact on the income generating capacity of economic activities. The qualitative degradation concerns, on the other hand, have almost immediate effects on the welfare of the population and long run effects on the productive and income generating capacity. The effects are on the quality of life through effects of air, water and solid waste pollution on health, through the effects of land erosion on the quality of recreational areas, and through ground water loss which immediately affects households in their consumptive activities. Ultimately, the degradation concerns will have an impact on production, either through health effects of workers in the production processes or through secondary effects on growth of products in agriculture, fishing and forestry which in turn affects the generation of net product in these economic activities. These secondary effects on production are, however, more difficult to identify and analyze because many effects -- and not

only environmental ones --may operate together, and time lags of the effects on production may be very considerable.

The distinction between immediate effects on production and the long-run effects on production through primary effects on well-being, does not entirely coincide with the distinction between the two groups of concerns. Oil depletion may also have a long run effects through the air and water pollution caused by oil extraction activities. Deforestation may have severe long run effects, as the loss of the eco-systems may affect the productivity, particularly in agriculture, and through health effects the productivity of workers in other industries, and in general may have a deteriorating effect on the quality of life. On the other hand, some of the degradation effects such as land erosion and ground water loss may have immediate effects on productivity, particularly in agriculture.

B. Measurement and Valuation of Environmental Impacts

1. Data sources

The compilation of additional data on physical indicators with regard to balances of natural assets was accompanied by an extension of the present SCNM to include asset balances of produced assets as well. The information used to extend the SCNM in this manner took as a point of departure the SCNM data regarding gross capital formation. Additional information was obtained from the Economic Census 1986, supplemented by data from the Census of Commerce and Services 1980, and the Survey of Capital Formation in the Enterprise Sector, both carried out in 1980 by the Banco de Mexico.

A variety of data sources were used for compiling physical indicators that reflect the three types of environmental concerns mentioned above. They are summarized below and described in detail in the Annexes.

With regard to oil, information on proven reserves of oil is obtained from published information by the publicly controlled Mexican Petroleum Company PEMEX. Annual extraction data are also obtained from this source. New discoveries are not published but obtained as a residual from the published data on oil deposits and oil extraction.

Information on the (opening and closing) stock of forest resources was obtained from the National Forest Inventory, a report prepared by the Secretaria de Agricultura y Recursos Hidraulicos. The report included information on land surface covered by forests expressed in hectares and also data on the volume of trees in cubic meters. There was no detailed information on the type of trees. The same Secretaria de Agricultura and Recursos Hidraulicos also compiled a Regional Inventory of the Use of Land, which provided information on land use in general and not only for forest areas. Information on changes in the use of land were obtained on the basis of assumptions which are based on studies about the relation between increases in the use of land and the corresponding growth of agricultural production, growth of production in cattle farming and growth of urban centers. As a result of these assumptions, decreases in the forest area over time could be calculated.

Data regarding the degradation concerns were compiled with regard to land erosion, air and water pollution, ground water use, and the generation of solid wastes.

Land erosion was estimated on the basis of the General Ecology Report elaborated by the Comision Nacional de Ecologia. The report identifies areas with very severe, severe and

moderate land erosion and presents an average erosion per hectare (27.54 ton/ha) at the national level. The information on erosion/ha was applied to the areas used for agriculture, cattle farming and forestry and thus national totals in tons were derived and allocated to the three economic activities mentioned. Reconditioning of soil, resulting in the elimination of some of the soil erosion, was deducted from soil erosion in agriculture.

The main source of information on air pollution were reports resulting from a long term program carried out by the Federal District of Mexico, called the "Programa Integral Contra la Contaminacion Atmosferica (1989). Based on the results of this project, contamination coefficients could be calculated for five types of contaminants, i.e. sulfur dioxide, nitrogen oxide, hydrocarbons, carbon monoxide and full suspended particles The contamination coefficients related the emission of these substances to the number of motor vehicles, the output of the oil refining industry, the output of electricity plants and output of other manufacturing industries. The coefficients were used to calculate national totals for each of the contaminants, based on the total number of vehicles in Mexico and the output of a variety of industries causing air pollution.

The extent of water pollution was measured in terms of biochemical demand of oxygen (DBO). This is an effective measure because additional oxygen is needed in order to break down excess of organic substances found in the water. The sources of information were private studies. Contamination coefficients expressed in DBO's were estimated for a variety of industrial sectors and also per capita to cover water pollution by households. Application of the coefficients to output in each industry and total population provided national totals on DBO's.

Information on ground water resources was obtained from a variety of reports, but the main one was the General Ecology Report prepared by the Comision Nacional de Ecologia. The use of ground water was estimated on the basis of water used per capita and water used per unit of industrial production in a number of industries including agriculture, cattle farming, and electricity production. The reduction in the ground water resources would be the difference between this use and what is annually replenished through precipitation.

The generation of solid wastes was only calculated for the household sector; industrial wastes were not covered. The main source of information was the General Ecology Report prepared by the Comision Nacional de Ecologia which provided information on the daily average generation of solid wastes at the national level (.693 kg) and at the Federal District level (.987 kg). The report distinguishes between different solid residues, which are grouped together in the preparation of data between biodegradable and non-biodegradable. This information was used together with population data to arrive at a national level of solid waste generation by households.

2. Valuation

As will be shown below in Section III, environmental accounts in physical terms can give indications of the direction in which environmental cost and capital would affect the traditional economic aggregates. However, for an integrated analysis, it is essential that environmental variables be expressed in the same monetary units as the economic variables.

There are two types of criteria used in valuing the natural assets and changes therein. The first type calculates the value of stocks of assets as the sum of discounted values of future income streams and the value of changes in the stock of natural assets is based on the changes in future income streams as a consequence of additions to the reserves of natural assets, or depletions. The second type of valuation, which is only used for valuing quality changes in the natural assets, is based on the cost of avoiding such changes. These general criteria translate into more specific methods for each of the natural resources and environmental concerns covered in SCEEM.

For exploitation of oil and timber reserves, two alternative valuation methods are used. The first one is the net rent method as developed in projects carried out by the World Resources Institute projects (Repetto 1989) and the second one is the method developed by El Serafy (1989), which is based on the calculation of a depletion allowance. The net rent method calculates the value of natural resources in the ground as the difference between the market value of lumber and oil and the cost it takes (including a normal profit) to extract this resource for commercial exploitation. The net rent value is calculated separately for opening and closing stocks as well as for changes in those stocks as a result of depletions and additions.

The method developed by El Serafy values the natural resource as a function of the sum of the discounted values of future income streams that are generated by it. It assumes that a part of operating surplus of mining and forestry would have to be reserved for re-investment (depletion allowance) in order to assure that the sum of the discounted income streams (covering net operating surplus and compensation of employees) over the limited life of the natural resources would be equal to the sum of discounted income streams over an infinite period, obtained if net product was reduced by the depletion allowance, and the depletion allowance were re-invested. The amount of the depletion allowance per unit of production is obtained as a result of these assumptions. The values based on the net rent and El Serafy methods have their own economic meaning and are therefore used in combination in the integrated analysis of Section III.A.2.c(2).

The value of land is generally based on the sum of the discounted value of future income streams in the different economic activities in which land is used. It is calculated separately for forest land, land used in agriculture, land used for holding of livestock and land used for urban needs. In each type of economic activity the value per ha of land is based on the sum of the discounted values of net value added per year per ha of land. In the case of forest land, the value of the land is based on net value added in forestry. Only forest land as an environmental asset has been given an economic value; other land not used for economic purposes other than forest land has not been valued. Revaluation of land within the same activity between the beginning and end of the period is not taken into account, only changes in the value of land when transferred from one activity to another.

All types of degradation have been valued on the basis of avoidance cost per unit of contaminant or other unit of degradation. In the case of land erosion this cost is valued as the cost of fertilizer to maintain the productivity of the land as it was before erosion took place. For ground water loss, the cost was assumed to be equal to what it would cost to re-inject water into underground water reservoirs. The cost of water and air pollution was estimated on the basis of the cost it would take to reduce such pollution to acceptable levels.

III. ACCOUNTING FOR ENVIRONMENTAL IMPACTS ON ECONOMIC ACTIVITIES

The aim of the work on environmental accounting is to reflect in quantitative format the effects of environmental concerns in existing economic analysis. In order for the integrated environmental and economic analysis to have maximum effect, the existing analysis taken as a point of departure, should be the one that is frequently used as a basis for government policy decisions and furthermore includes a maximum number of variables in which environmental impacts could be incorporated. The analysis which best fits these conditions in the Mexican case is input-output analysis which is based in Mexico on the highly developed data base of SCNM. It

is convenient to take SCNM as point of departure when developing SCEEM, as the SCNM data base and its analytical features are easily understood by both users and producers of such statistics in Mexico, where in the past extensive use has been made of input-output data and analyses for policy purposes. By structuring SCEEM in a manner similar to SCNM, both producers and users of SCNM can easily compare the data base of SCNM with the expanded data set of SCEEM and can thus appreciate how aggregates of SCNM change when redefined in SCEEM. Also, for analytical users it would be easy to see how the SCEEM analysis would differ from the analysis that is traditionally carried out in the context of SCNM.

The present section starts in Section A with a macro analysis of the economic and environmental data, followed in Section B by a similar analysis in which separate economic activities are identified.

A. MCRO ANALYSIS

1. "Sistema de Cuentas Nacionales de Mexico" (SCNM)

Table III.1.1 is a simplified presentation of the present national accounts of Mexico (SCNM). With help of this table some basic features of SCNM can be described.

Behind the present national accounts of Mexico, i.e. SCNM, there is a very simple analytical model, which serves a variety of analyses. The simple model includes a supply and use identity and production functions.

ENVIRONMENTAL ACCOUNTS MEXICO
Supply/use Tables & Balance Sheets

Table III.1.1: Mexico I/O Scheme (SCNM)
(billion, Mexican pesos)

	Economic Activities			
	Production	Rest of World	Final Consumption	Produced Capital
Economic Supply Total	P 75,706,918	M 4,897,328		
Economic Uses Total	Ci 28,315,216	Ex 7,305,293	C 34,948,897	I 10,034,840
Gross Product	Y 47,391,702			

The supply and use identity can be written as

$$P + M = Ci + C + I + Ex \qquad (i)$$

in which:

P = production
M = imports

Ci= intermediate consumption
C = final consumption
I = gross capital formation (or investment)
Ex= exports

A second identity defines gross product or value added (Y) as the difference between production and intermediate consumption, i.e.

$$Y = P - Ci \qquad \text{(ii)}$$

When substituting this income definition into the first identity, a third identity is derived which links gross product and expenditures:

$$Y = C + I + (Ex - M) \qquad \text{(iii)}$$

The supply and use identity (i) is represented in Table III.1.1 as the identity between the totals of the second and third row, i.e. 75707(P)+4897(M) = 28315(Ci)+34949(C)+10035(I)+7305(Ex).[4]

The product identity (ii) is shown in column (1) as the difference between total economic supply or output (P) minus total economic uses or intermediate consumption (Ci); i.e. gross product (Y) is 47392(Y)=75706(P)-28315(Ci).

The third product-expenditure identity (iii) is not immediately obvious from the presentation of the table; it is reflected in the identity between Y on the one hand and the sum of C, I and (Ex-M) on the other, i.e. 47391(Y)=34949(C)+10035(I)+[7305(Ex)-4897(M)].

[4] For ease of presentation, the last three digits of the figures presented in the tables are omitted in the text.

ENVIRONMENTAL ACCOUNTS MEXICO Supply/use Tables & Balances Sheets				
Table III.1.2: Enlarged I/O Scheme with Produced Asset Balances (billion, Mexican pesos)				
	Economic Activities			
	Production (1)	Rest of World (2)	Final Consumption (3)	Produced Capital (4)
Opening Assets Prod. Assets				Ko. p. ec 111,162,310
Economic Supply Total	P 75,706,918	M 4,897,328		
Economic Uses Total	Ci 28,315,216	Ex 7,305,293	C 34,948,897	I 10,034,840
Depreciation	Depr. 5,331,186			-Depr. (5,331,186)
Net Product	Yn 42,060,516			In 4,703,654
Revaluation Prod. Assets				Rev. p. ec
Closing Assets Prod. Assets				K1. p. ec 115,865,965

The first step in deriving SCEEM, in which asset balances of environmental assets or natural resources play an important role, is to expand SCNM with the corresponding asset balances of produced assets, which are not regularly compiled in Mexico, but which form an integral part of the SNA. This expansion of SCNM, which is represented in Table III.1.2, changes the input-output scheme from one that can only be used for static analysis of the input-output type to a dynamic input-output model in which capital output ratios can be identified and used in analysis of growth. The extended scheme of Table III.1.2 includes three additional elements as compared to the scheme of Table III.1.1, i.e.

$K0_{(p.ec)}$ = opening stock of produced assets
$K1_{(p.ec)}$ = closing stock of produced assets
Depr = depreciation

The three elements are used to define the additional asset balance identity, which explains the relation between the opening and closing stocks of produced assets ($K1_{(p.ec)}$, $K0_{(p.ec)}$) on the basis of changes in produced capital. Further changes are reflected in (net) product and (net) capital formation. Both were defined gross in Table III.1.1 and are replaced by net versions after deduction of depreciation in Table III.1.2.

The asset balance presented in the last column of the table has the following format:

$$K1_{p.ec} = K0_{p.ec} + (I\text{-}Depr) + Rev_{p.ec}$$

One element, $Rev_{p.ec}$, standing for revaluation of produced economic assets is added for the purpose of completeness. However, in Table III.1.2 no value has been entered for this element as revaluation of produced assets is not taken into account in the additional data that were compiled. The asset balance in monetary units, as presented in Table III.1.2 therefore takes the following quantitative format:

$$115866(K1_{p.ec})=111162(K0_{p.ec})+[10035(I)-5331(Depr)]$$

As one of the elements which explains the change in the value of produced assets is depreciation, incorporation of depreciation is an essential element of changing the static i/o model of SCNM to a dynamic one. The incorporation of asset balances in the expanded version of SCNM is therefore accompanied by a corresponding change from using gross product (Y) in Table III.1.1 to net product (Yn) in Table III.1.2, and this changes the national accounts identity presented above as follows (page 11):

$$Yn = C + In + (Ex - M)$$

in which Yn and In are net product and capital formation concepts from which depreciation has been deducted.

2. *Sistema de Cuentas Ecologicas e Economicas de Mexico (SCEEM)*

a. Conceptual Framework of SCEEM

SCEEM takes SCNM as point of departure in its design, while introducing a number of modifications. It includes a wider asset boundary, covering not only produced assets, but also non-produced natural or environmental assets. Based on the wider asset boundary, SCEEM includes imputations for additional expenditure items which are related to depletion and degradation of non-produced assets. Furthermore, taking into account the imputed items, SCEEM incorporates modified concepts of net product or value added, which are derived by deducting not only the traditional cost items, but also imputed items which correspond to environmental cost of depletion and degradation. Finally, SCEEM changes the concept of capital formation as used in the traditional analysis of SCNM and introduces a new concept of capital accumulation which takes into account not only changes in produced assets as a result of production and depreciation of such assets, but also changes in the stock of non-produced assets resulting from new finds of non-produced assets and deteriorations of non-produced assets as a consequence of economic activities.

The modified features of SCEEM can be easily appreciated from the presentation of Table III.2. They can be compared with the features of the traditional SCNM which is identified by the shaded areas in the table.

SCEEM in Table III.2 includes two additional columns for the incorporation of asset balances of non-produced assets alongside those of the produced assets that were included in SCNM. The first additional column refers to non-produced assets that are directly "used" in economic activities together with produced assets; both groups are labeled economic assets. The second additional column refers to assets that are only "affected" by economic activities--so-called environmental assets. Economic assets are used as production factors in the generation of output, and production analysis requires that full balances including stocks of economic assets are available. Environmental assets are not considered as production factors in this sense; their contribution to the generation of output is not fully understood and/or perceived in existing analysis and this is generally reflected in the non-availability of information on asset balances including data on stocks of those assets.

In the case of Mexico, oil reserves and land used in agriculture, livestock management and urbanization are treated as non-produced economic assets, while water (including ground water), air, soil (lost through erosion) and also all forests will be dealt with as environmental assets. Forests are included as environmental assets because it was not possible to distinguish in the data between virgin forests and forests that are used for commercial logging and which should have been treated as an economic asset in the same manner as oil. Both ground water and soil are treated as non-produced environmental assets either because their contribution as a production factor to the generation of output is not sufficiently clear (ground water) and/or because no asset balances could be obtained from available data (soil).

Corresponding to the incorporation of a wider asset boundary in SCEEM, additional cost are incorporated which reflect the use and/or deterioration of non-produced assets as a result of economic activities. In Table III.2 two types of imputed costs are represented. The first type (Ci_{depl}) are imputed costs related to depletion and losses reflecting deterioration of land that is transferred from the environment to economic activities, and the second type of imputed cost (Ci_{degr}) covers the deterioration of the environmental assets as a consequence of economic activities. For purposes of this pilot study, the cost of depletion includes the cost of depleting oil, timber and ground water reserves. The imputed cost of land use refers to the trees -- representing the eco-system -- that are lost as a consequence of transfer of forest land to agricultural land, land used for holding of cattle and land used for the purposes of urbanization. The imputed cost referred to as cost of degradation includes the cost of air and water pollution, the cost associated with solid waste materials, and also the cost of land erosion and ground water loss.

Following the introduction of imputed cost items in SCEEM, two modified net product concepts are introduced, called Environmentally adjusted net Domestic Product 1 and 2 (EDP1 and EDP2). EDP1 -- or what is represented in the table as Yn1 -- is derived by deducting from NDP in SCNM the environmental uses related to depletion and land use, i.e.

$$Yn1 = Yn - Ci_{depl}$$

and EDP2 -- or Yn2 -- is obtained by further deducting the cost of degradation, i.e.

$$Yn2 = Yn - (Ci_{depl} + Ci_{degr})$$

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Table III.2: Sistema De Cuentas Economicas De Mexico (SCEEM) Basic Structure						
	Economic Activities					
	Production	Rest of World	Final Cons ump-tion	Economic Assets		Non-prod. Env. Assets
				Produced Assets	Non-prod. Assets	
Opening Assets				Ko.p.ec	Ko.np.ec	Ko.np.env
Economic Supply	P	M				
Economic Uses	Ci	Ex	C	I		
Depreciation	Depr			Depr		
Net Domestic Prod. (NDP)	Yn			In		
Environment Uses:					I.np.ec	-I.np.env
Depletion and Land Use Concerns	Ci.depl				-Dpl.np.ec	-Dpl.np.env
Env. Adj. Net Prod.	Ynl			IAn.ec1		-IAn.envl
Degradation Concerns	Ci.degr					-Degr.np,env
Env. Adj. Net Prod.	Yn2			IAn.ec2 (=IAn.ec1)		-IAn.env2
Revaluation				Rev.p.ec	Rev.np.ec	Rev.np.env
Closing Assets				K1.p.ec	K1.np.ec	K1.np.env

There are two reasons why a distinction is made between EDP1 and EDP2. The first is that the valuation of depletion cost and the cost of land use as summarized above is directly linked to the market value of the assets that are depleted or transferred to economic use. On the other hand, imputations for the cost of degradation are much less close to market valuations and therefore much more controversial elements in the analysis. A related reason is that the cost of depletion and land use taken into account in the calculation of EDP1 relates to the use of economic assets, whereas in the derivation of the EDP2 not only the cost of depletion of non-produced economic assets is taken into account, but also the cost of affecting non-produced environmental assets such as air, water (including ground water loss) and soil (soil erosion).

Another feature of SCEEM which is different from SCNM is in the introduction of two new concepts of net capital accumulation. One such concept refers to net accumulation of economic assets (IAn_{ec}) and another to net accumulation of environmental assets (IAn_{env}).

Net accumulation of economic assets is defined as the change in the productive capacity , i.e. capital used in production, including not only produced assets, but also non-produced economic assets. Net accumulation of environmental assets is the net change in the quantity and quality of environmental assets as a result of economic activities.

The enlarged concept of net accumulation of economic assets includes net capital formation and two additional elements related to non-produced economic assets, including an element representing "investments" in non-produced assets, which result from the transfer of environmental assets to economic activities ($I_{np.ec}$), and another element representing the depletion of non-produced economic assets ($Depl_{np.ec}$). In the case of Mexico, the "investment" element includes the transfer of land and mineral reserves to use in economic activities, while the depletion element refers to the depletion of oil. Depletion of timber and ground water is not included in net accumulation of economic assets, as timber and ground water are not treated as economic assets (see above page 11 but rather as environmental assets. Also excluded from net accumulation of economic assets is revaluation of produced assets ($Rev_{p.ec}$), non-produced economic assets ($Rev_{np.ec}$) and non-produced environmental assets ($Rev_{np.env}$).

The table distinguishes between net accumulation of economic and environmental assets related to Yn1 and Yn2, which are defined as follows:

$$IAn_{1ec} = IAn_{1ec} = In + (I_{np.ec} - Depl_{np.ec})$$

$$IAn_{1env} = -(Inp.env + Depl_{np.ec})$$
$$IAn_{2env} = -(Inp.env + Depl_{np.ec} + Degr_{np.ec})$$

When approaching Yn1 and Yn2 from the expenditure side, while using the above definitions of IAn_{ec} and IAn_{env}, the following identities hold:

$$Yn1 = C + (IAn_{1ec} - IAn_{1env}) + (Ex\text{-}M)$$
$$Yn2 = C + (IAn_{2ec} - IAn_{2env}) + (Ex\text{-}M)$$

Both identities show clearly the change in the traditional national accounts identity, after incorporation of environmental assets. Net accumulation of economic assets (IAn_{ec}) is only partly reflected in Yn. An important component of net accumulation of economic assets is directly based on the transfer of environmental assets to economic activities; and this is reflected in a negative entry for IAn_{env}.

b. SCEEM Applied to Environmental Concerns

The conceptual scheme explained above is applied below to the three environmental concerns separately.

(1) *Oil Extraction*

The incorporation of the oil extraction concern in Table III.3.1 is very simple. It includes only two elements of environmental uses, i.e oil depletion and new finds of oil, both of which are expressed in physical terms. Oil depletion (1265 million barrels) is shown as an extra environmental cost ($C_{i.depl}$) and a reduction in the value of non-produced economic assets ($Depl_{np.ec}$). New finds of oil (415 million barrels) is presented as an addition to non-produced economic assets ($I_{np.ec}$) and as a reduction in the quantity of environmental assets ($-I_{np.env}$).

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Table III.3.1: Enlarged I/O Scheme with Asset Balances (billion, Mexico pesos) and Adjustments for Net Changes in Oil Reserves (physical units)

	Economic Activities					Environ-ment	Physical Unit of Measure-ment
	Production	Rest of World	Final Consumption	Economic Assets			
				Produced Assets	Non-prod. Economic Assets	Non-prod. Env. Assets	
Opening Assets Prod. Asset Oil				Ko.p.ec 111,162,310	Ko.np.ec 71,750	Ko.np.env	mil. barrels
Economic Supply Total	P 75,706,918	M 4,897,328					
Economic Uses Total	Ci 28,315,216	Ex 7,305,293	C 34,948,897	I 10,034,840			
Depreciation	Depr 5,331,186			-Depr (5,331,186)			
Environmental Uses: Oil Extraction Concerns Oil Depletion New Finds of Oil	 Ci.depl 1,265				 -Depl.np.ec (1,265) I.np.ec 415	 -I.np.env (415)	 mil. barrels mil. barrels
Net Product: EDP1	Yn1			IAn1.ec		IAn1.env	
Closing Assets Prod. Assets Oil				K1.p.ec 115,865,965	K1.np.ec 70,900	Ko.np.env	mil. barrels

As a result of the incorporation of these two elements, there are changes in EDP1 as compared to NDP, and in net accumulation of economic assets as compared to net capital formation of SCNM in Tables III.1.1 and 2. Even though the environmental uses are in physical terms, it is easy to see the direction in which these macro aggregates would change. EDP1 (Yn1) would decrease with the amount of oil extracted ($C_{i.depl}$) and net accumulation would change as a result of the difference between what is extracted ($Depl_{np.ec}$) and the new finds of oil reserves ($I_{np.ec}$). The difference between the decrease of Yn1 and net accumulation of economic assets would be the decrease in non-produced environmental assets (oil reserves) that are transferred from the environment to economic uses ($-I_{np.env}$).

The asset balances of oil are presented in the column for non-produced economic assets, which show the following quantitative relation between closing and opening assets of oil in terms of million of barrels

$$K1_{np.ec} = K0_{np.ec} - (Depl_{np.ec} - I_{np.ec})$$
$$70900 = 71750 - (1265 - 415)$$

(2) *Deforestation and Land Use*

The concern of deforestation and land use is represented in Table III.3.2. It includes three separate elements of environmental uses, i.e. the logging of trees as part of the forestry activity (7626 thousand cubic meters), the transfer of forest land to economic activities in agriculture, livestock holding and urbanization (277589 ha), and finally the losses in terms of trees resulting from the transfer of land from the environment to economic uses (35474 thousand cubic meters).

The cost of logging of trees is presented as intermediate cost of production ($C_{i.depl}$) and as forests are treated as environmental assets (see above page 11), a counterpart reduction in non-produced environmental capital ($Depl_{np.env}$). The transfer of forest land to economic uses is reflected in an increase in non-produced economic capital ($I_{np.ec}$) and a decrease in non-produced environmental capital ($-I_{np.env}$). The transfer losses resulting from this transfer of land are shown as intermediate cost of the activity (i.e the construction industry, which is responsible for the output called "improvements to land"), which carries out the preparation of land for economic use ($C_{i.depl}$) and a reduction in environmental capital ($-Depl_{np.env}$).

EDP1 (Y_{n1}) is reduced as a result of logging cost and losses of trees due to the transfer of land to economic uses. Net accumulation of economic assets (IAn_{1ec}) as compared to net capital formation though, is increased with the amount of forest land transferred to economic uses. The difference between the reduction in Yn1 and the change in net accumulation of economic assets as compared with net capital formation, is entirely reflected in losses of environmental capital as presented in the column of the environment ($-IAn_{1env}$).

The asset balances that are affected by the deforestation and land use concerns are those for land in economic uses, which is presented in the column for non-produced economic assets, forest land which is included in the column for environmental assets, and timber which is also presented in this column. The three asset balances in quantitative form are as follows:

$K1_{np.ec} = K0_{np.ec} + I_{np.ec}$
140019157= 139741568 + 277589

land used for econonic purposes (hectares)

$K1_{np.env} = K0_{np.env} - I_{np.env}$
55800943 = 56078532 - 277589

forest land (hectares)

$K1_{np.env} = K0_{np.env} - Depl_{np.env}$
3082168 = 3125268 - (7626+55474)

trees lost (thousand cubic meters)

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Table III.3.2: Enlarged I/O Scheme with Asset Balances (billion, Mexico pesos) and Adjustments for Changes in Land Use and Deforestation (physical units)

	Economic Activities					Environ-ment	Physical Unit of Measure-ment
	Production	Rest of World	Final Consumption	Economic Assets			
				Produced Assets	Non-prod. Econ. Assets	Non-prod. Env. Assets	
Opening Assets				Ko.p.ec	Ko.np.ec	Ko.np.env	
Prod. Asset				111,162,310			
Timber						3,125,268	thou. cu. m
Land					139,741,568	56,078,532	hectares
Economic Supply	P	M					
Total	75,706,918	4,897,328					
Economic Uses	Ci	Ex	C	I			
Total	28,315,216	7,305,293	34,948,897	10,034,840			
Depreciation	Depr			-Depr			
	5,331,186			(5,331,186)			
Environmental Uses:							
Deforestation Concerns	Ci.depl					-Depl.np.env	
Logging	7,626					(7,626)	thou. cu. m
Forest Land Transfer to ec. uses					I.np.ec	-I.np.env	
					277,589	(277,589)	hectares
						-Depl.np.env	
Transfer losses	35,474					(35,474)	thou. cu. m
Net Product: EDP1	Yn1			IAn1.ec		-IAn1.env	
Closing Assets				K1.p.ec	K1.np.ec	Ko.np.env	
Prod. Assets				115,865,965			
Timber						3,082,168	thou. cu. m
Land					140,019,157	55,800,943	hectares

(3) Degradation

Table III.3.3 incorporates the effects of degradation. These include soil erosion in terms o. tons of soil lost, solid waste materials resulting from household activities -- also in tons -- , ground water used .n terms of thousand cubic meters, water pollution in terms of the Bio-chemical Demand for Oxygen (DBO) used by nature to destroy the foreign substances in the water, and finally air pollution in terms of tons of various chemicals that are emitted by industrial production processes. The cost of degradation is presented as environmental cost of production (Ci_{degr}), with counterpart entries in the column for the environment, representing the deterioration of environmental capital ($-Degr_{np.ec}$).

The effect of including these environmental uses is to lower EDP2 (Yn2) in comparison with NDP (Yn) included in the traditional SCNM. There is no effect on net accumulation, as all degradation effects are recorded as affecting non-produced environmental capital (see Section II.A). The difference between the negative effect on Yn2 and no effect on net accumulation of economic assets as compared to net capital formation is entirely reflected in the degradation effects reducing the quality of environmental capital ($-Degr_{np.env}$) presented in the column of the environment.

c. Comparison between SCNM and SCEEM Aggregates and Analyses, in Monetary Terms

In order to overcome some of the limitations of the above analysis in physical terms, a parallel analysis in monetary terms is presented below. The monetary values are derived by applying the valuations as described in Section II.B.2 in general terms and presented in the Annexes in more detail.

The monetary analysis is presented in two tables. Table III.4.1 includes the monetary valuation of the depletion and land use concerns, including oil extraction, deforestation and land use concerns. The table arrives at a concept of EDP1 (Yn1)as defined earlier in Table III.2. Table III.4.2 presents a similar analysis in monetary terms for the degradation effects which are added in this table to the monetary valuation of the depletion effects. After incorporation of both effects in the latter table, the concept of EDP2 (Yn2) is obtained.

(1) *EDP1*

Table III.4.1 reflects in monetary terms the same environmental effects as presented in tables III.3.1 and III.3.2. By applying valuations to the elements of the depletion concerns related to oil, deforestation and land use presented in those tables in physical terms, estimates are obtained for EDP1 and also for net accumulation of economic assets (IAn_{1ec}) and environmental assets ($-IAn_{1env}$). The net product and corresponding expenditure items are presented on the line for EDP1. As different values have been used for opening and closing stocks and flow items, revaluation elements ($Rev_{np.ec}$ & $Rev_{np.env}$) have been incorporated additionally in the table.

The national accounts identity without environmental adjustments, which was in Table III.1.2 formulated as:

$Yn = C + In + (Ex - M)$ or,
in quantitative terms:42060516=34948897+4703654+(7305293-4897328)

changes in Table III.4.1 to:

$Yn1 = C + (IAn_{1ec} - IAn_{1env}) + (Ex-M)$
or 39662772=34948897+(24245455-21939545)+(7305293-4897328)

The elements in the above expression that have changed are net product and net accumulation. All other elements are unaffected.

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Table III.3.3: Enlarged I/O Scheme with Asset Balances (billion, Mexico pesos) and Adjustments for Degradation of Air, Water and Land (physical units)

	Economic Activities					Environ-ment	Physical Unit of Measure-ment
	Production	Rest of World	Final Consumption	Economic Assets			
				Produced Assets	Non-prod. Econ. Assets	Non-prod. Env. Assets	
Opening Assets				Ko.p.ec	Ko.np.ec	Ko.np.env	
Prod. Asset				111,162,310			
Land							
Water							
Air							
Economic Supply	P	M					
Total	75,706,918	4,897,328					
Economic Uses	Ci	Ex	C	I			
Total	28,315,216	7,305,293	34,948,897	10,034,840			
Depreciation	Depr			-Depr			
	5,331,186			(5,331,186)			
Environmental Uses:							
Degradation Concerns	Ci.depl					-Degr.np.env	
Land							
Soil Erosion	420,992,059					-420,992,059	tons
Solid Wastes	18,228,157					-18,228,157	tons
Water							
Ground Water Use	2,456					-2,456	thou.cu.m
Water Pollution	2,359,275					-2,359,275	tons DBO
Air							
Sulfur Dioxide	6,646,070					-6,646,070	tons
Nitrog. Oxides	1,804,408					-1,804,408	tons
Hydrocarbons	2,383,030					-2,383,030	tons
Carbon Monoxide	17,967,872					-17,967,872	tons
Suspended Particles	477,529					-477,529	tons
Net Product: EDP2	Yn2			IAn2.ec (=IAn1.ec)		-IAn1.env	
Closing Assets				K1.p.ec	K1.np.ec	Ko.np.env	
Prod. Assets				115,865,965			
Land							
Water							
Air							

The table includes revaluations for oil, timber and land. The revaluations for oil and timber are residuals obtained as the difference between the value of closing minus opening stocks and the net changes due to new finds and depletions, which are all valued separately. The revaluation of oil and timber therefore includes two elements: the first one refers to the change in

the value of resources remaining between the opening and closing balance sheets, and the second element reflects the revaluation of the extracted oil or timber between the opening balance sheet and the moment of extraction.

The revaluation for land used in economic activities is negative. The reason is that land is transferred at its value as forest land, which is derived as the sum of discounted revenues accruing if all timber would be harvested for purposes of lumbering; this value was estimated to be 38.15 million pesos per ha. Once incorporated in the column for non-produced economic assets at this value, the land is then revalued to the value per ha of its use in economic activities. In most instances this value was much lower than the value per ha of forest land (agriculture: 2.64 mill. pesos/ha; livestock holding: 1.99 mill. pesos/ha); forest land that was changed to waste land after use in shifting agricultural cultivation was assumed to have no value after this use. In the case of urbanized land, the value was higher, i.e. 75.50 mill. pesos/ha. As a result of these generally lower land values in economic uses, the revaluation element (-18290) is negative in Table III.4.1.

The valuation used for oil and timber in Table III.4.1 is the net rent value, i.e the market value minus cost including a normal profit. An alternative value proposed by El Serafy (1989) suggests that both oil and timber be valued as the sum of discounted values of depletion allowances which would be needed to secure a continuous income stream (after deduction of the depletion allowance) even after the natural resource has been depleted. Both for oil and timber the depletion allowance is much lower than the net rent. For oil the net rent is 1162 pesos Mex./barrel and the depletion allowance is only 160 pesos Mex./barrel; for timber the net rent is 21.527 pesos Mex./cubic meter, while the depletion allowance is only 1.46 pesos/ cubic meter. If these much lower valuations would be applied to the extraction of oil and timber, the cost of depletion would be much lower and thus EDP1 would be higher. The quantitative result of these alternative valuations as presented in Table III.4.1. supplement, shows that EDP1 would increase from 39662772 to 41795147, and the element of revaluation due to extraction would be correspondingly decreased with the same amount from 84820456 to 82688082.[5]

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[5] The large differences between the two valuations are due to the long period in which oil and timber would be available. Several questions may be asked with regard to the alternative valuation. Would it indeed be feasible to find in a country like Mexico alternative investment potential that would be able to absorb the depletion allowances of oil and timber production. If that were the case, why would oil and timber not be exploited more rapidly? However, if resources were exploited more rapidly, prices of the products (oil and timber) may drop as a result of increased supply, and alternative investment possibilities may be reduced, which would result in lower interest rates. This would mean, that in the long run, the net rent method and the El Serafy method proposed by El Serafy (1989) may result in similar valuations.

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Table III.4.1: Enlarged I/O Scheme with Asset Balances and Adjustments for Oil Depletion, Land Use and Deforestation (billion, Mexico pesos)

	Economic Activities					Environ-ment
				Economic Assets		
	Production	Rest of World	Final Consumption	Produced Assets	Non-prod. Econ. Assets	Non-prod. Env. Assets
Opening Assets				Ko.p.ec	Ko.np.ec	Ko.np.env
Prod. Asset				111,162,310		
Timber						46,988,404
Oil					66,584,000	
Land					339,259,491	1,483,758,406
Economic Supply	P	M				
Total	75,706,918	4,897,328				
Economic Uses	Ci	Ex	C	I		
Total	28,315,216	7,305,293	34,948,897	10,034,840		
Depreciation	Depr			-Depr		
	5,331,186			(5,331,186)		
Environmental Uses:						
Oil Extraction Concerns	Ci.depl				-Depl.np.ec	
Oil Depletion	1,469,930				-1,469,930	
New Finds of Oil					I.np.ec	-I.np.env
					482,320	-482,230
Deforestation Concerns						
Logging	164,165					-Depl.np.env
						-164,165
Forest Land Transf. to ec. uses					I.np.ec	-I.np.env
					20,529,501	-20,529,501
Transfer Losses	763,649					-Depl.np.env
						-763,649
Net Product: EDP1	Yn1	Ex - M	C	IAn2.ec: 24,245,455		-IAn1.env
	39,662,772	2,407,965	34,948,897			-21,939,545
Revaluation				Rev.p.ec	Rev.np.ec	Rev.np.env.
Prod. Assets						
Timber						32,368,256
Oil					52,452,200	
Land					-18,290,522	
Closing Assets				K1.p.ec	K1 np.ec	Ko.p.ec
Prod. Assets				115,865,965		
Timber						78,428,847
Oil					118,048,500	
Land					341,498,470	1,463,228,905

(2) *EDP2*

Table III.4.2 presents the same degradation elements as were included in Table III.3.3 in physical terms. The elements are valued along the lines as described above in Section II.B.2, using valuations which are presented in the tables in the Annex for each of the degradation concerns. All counterparts of the degradation cost presented as $CI_{deg.}$ in the column for production are included in the column for the environment. None of the degradation therefore affects net accumulation of economic assets: the only effects are on net accumulation of environmental assets (IAn_{2env}).

The revised national accounts identity is presented in the row of net product, i.e.

$Yn2 = C + (IAn_{2ec} - IAn_{2env}) + (Ex\text{-}M)$

or 36448314=34890558+(24245455-25095664)+(7305293-4897328)

which is different in a number of respects from the traditional identity in SCNM defined in Table III.1.2 as

$Yn = C + In + (Ex - M)$ or, in quantitative terms:42060516=34948897+4703654+(7305293-4897328)

Table III.4.1, Supplement
EDP and Asset Balances Alternatively Valued on the Basis of Net Rent and A Depletion Allowances
(billion, Mexico pesos)

Opening Stock	
Timber	46,988,404
Oil	66,584,000
Oil	
New Finds of Oil	482,230
Depletion	
Valued on Basis of:	
Net Rent	(1,469,930)
Depletion Allowance	(202,400)
Timber, Net Reduction	
Valued on Basis of:	
Net Rent	(927,814)
Depletion Allowance	(62,969)
Adj. to EDP1	2,132,375
EDP1	39,662,772
EDP1.ADJ.	41,795,147
Revaluation, Based on	
Depletion Allowance	82,688,082
Net Rent	84,840,456
Adj. to Revaluation	(2,132,375)
Closing Stocks	
Timber	78,428,847
Oil	118,048,500

Net capital accumulation of economic assets minus that of environmental assets is negative as compared to a positive value for capital formation in economic accounting, and this results in a much lower value for Yn2 as compared to Yn. It should furthermore be noted that in the derivation of Yn2, an additional deduction has been made for environmental services produced by the government in the form of sanitation services. They are treated as intermediate consumption of (domestic) household production activities. As these expenditures (58339) are dealt with as final expenditures in SCNM, this treatment lowers final consumption (C) from 34948897 (in Table III.1.2) to 34890558 and correspondingly reduces Yn2 further as compared with its value in previous tables.

Table III.4.2 Enlarged I/O Scheme with Asset Balances including Adjustments for Degradation and Environmental Protection Expenditures (billion, Mexican pesos)

	Economic Activities					Environment
	Production	Rest of World	Final Consumption	Economic Assets		Non-produced Env. Assets
				Produced Capital	Non-prod. Econ. Assets	
Opening Assets				Ko.np.ec	Ko.np.ec	Ko.np.env
Produced Assets				111,162,310		46,988,404
Timber						
Oil					66,584,00	
Land					339,259,491	1,483,758,406
Water						
Air						
Economic Supply	P	M				
Total	75,706,918	4,897,328				
Economic Uses	Ci	Ex	C	I	I	I
Total	28,315,216	7,305,293	34,948,897	10,034,840		
of which: Env.	P.envp			P.envp		
Protect. services						
Industry	92,855			291,385		
Households	58,339					
Depreciation	Depr			-Depr		
	5,331,186			-5,331,186		
Environ. Uses	Ci.depl				I.np.ec	-Depl.np.env.
Oil Extraction, Deforest. & Land Use Concerns					-Depl.np.ec	
(total)	2,397,744				19,541,801	-21,939,545
Degrad. Concerns	Ci.degr.					-Degr.np.env.
Land						
Soil Erosion	448,880					-448,880
Solid Wastes	197,269					-197,269
Water						
Ground Water Use	191,568					-191,568
Water Pollution	662,456					-662,456
Air						
Sulfur Dioxide	234,792					-234,792
Nitrog. Oxides	137,442					-137,442
Hydrocarbons	127,409					-127,409
Carbon Monoxide	1,072,826					-1,072,826
Suspended Particles	83,427					-83,477
Sub-total Degradation	3,156,119					-3,156,119
Net Product: EDP 2	Yn2	Ex - M	C	IAn.ec2 (=IAn.ec1)		-IAn.env2
	36,448,314	2,407,965	34,890,556		24,245,455	-25,095,664
Degradation				Rev.p.ec	Rev.np.ec	Rev.np.env
Produced Assets						
Timber						32,388,256
Oil					52,452,200	
Land					-18,290,522	
Closing Assets				K1.p.ec	K1.p.ec	K1.p.ec
Produced Assets				115,865,965		
Timber						78,428,847
Oil					118,048,500	
Land					341,498,470	1,463,228,905
Water						
Air						

The incorporation of values for output of environmental protection services in the table, permits to compare those with the corresponding degradation effects. From the macro presentation in Table III.4.2 it can be observed that the total value of environmental protection services (151194=92855+58339) is only 5% of the total value of environmental degradation cost (3156119). It is questionable, however, how to interpret these figures, as it is not certain whether the degradation effects measured are gross, i.e. before the protection services were carried out, or are net values after incorporation of the effects of these services. Given the manner in which the degradation effects are estimated, however, it is more likely that at least some of the effects measured are gross effects and that therefore there is some double counting, because the cost of environmental protection services and the degradation they try to eliminate are deducted at the same time to arrive at EDP2.

(3) *Comparative Analysis of EDP1 & EDP2*

The analysis presented above is summarized in Table III.5 below. The table shows in dramatic form, how changes in net product from NDP to EDP1 and EDP2 would have consequences for analysis. In the case of NDP, the table shows that final consumption is 83% of NDP and net capital formation is 11%. When changing to EDP1, final consumption increases to 88% of EDP1 and net capital accumulation is less than 6%. It is true that net accumulation of economic assets would be nearly 12% of EDP1, but the effect of this increase is eliminated because a large part of the net accumulation in economic assets is directly taken from the environment (the environmental capital is reduced by 6% of EDP1). When extending the analysis to EDP2, final consumption is further increased to nearly 96% and net capital accumulation becomes a negative -2%, which is the net result of an increase in net accumulation of economic assets to nearly 13% of EDP2 and a decrease of environmental capital which amounts to -15% of EDP2.

Table III.5: Comparative Analysis of Expenditure Distribution of NDP, EDP1 and EDP2

	NDP	% Distr. Expend.	EDP1	% Distr. Expend.	EDP2	% Distr. Expend.
Net Product/Expenditure	42,060,516		39,662,772		36,448,314	
Final Consumption	34,948,897	83.09	34,948,897	88.12	34,890,558	95.73
Capital Accumulation, Net	4,703,654	11.18	2,305,910	5.81	-850,209	-2.33
Economic Assets	4,703,654	11.18	4,703,654	11.86	4,703,654	12.90
Environmental Assets			-2,397,744	-6.05	-5,553,863	-15.24
Exports-Imports	2,407,965	5.73	2,407,965	6.07	2,407,965	6.61

B. ANALYSIS BY ECONOMIC ACTIVITIES

1. Comparison of SCNM and SCEEM Aggregates by Economic Activities

The analysis above of environmental impacts on economic aggregates has been carried out in macro format, showing how main aggregates of net product are affected by the incorporation of depletion and degradation effects, how net capital formation changes into a concept of net accumulation which refers to all economic assets, produced as well as non-produced, and finally how final consumption and net product are affected by a different treatment of environmental expenditures that are included in final consumption of SCNM. While such macro analysis is useful, it does not provide the information that would be needed for operational government policies. Therefore below, the analysis has been extended to identify the depletion and degradation effects by economic activities and determine the sectors which are using the economic assets in their production processes. The sectoral analysis focuses on three elements, i.e. value added, balances of economic assets including produced as well as non-produced assets, and also the environmental protection expenses made by different sectors. The quantitative results of this study are reflected in Tables III.6.1 and III.6.2.

(a) *Value added*

Table III.6.1 presents a breakdown of the production data by economic activities, including not only the traditional output and intermediate consumption components, but also the values of depletion, degradation and land use effects. Environmental protection expenditures are also identified in the table for each industry and (domestic) household production activities, and presented as "of which" items that are reflected in the output and intermediate consumption figures of each industry. The net product concepts -- NDP, EDP1 and EDP2 -- have been identified in each of the three sections of the table: NDP is calculated first, followed by EDP1 after incorporation of the depletion and land use effects, and then EDP2 is calculated after incorporation of the degradation effects. The environmental uses presented are the same as in Tables III.4.1 and 4.2; the totals for the national economy between the present table and the previous two tables coincide.

An additional economic activity called household production activities is introduced in order to allocate the environmental impacts of household consumption. This column will not only include the environmental impacts of household consumption, but also the environmental expenses made by households. The environmental protection expenses made by government on behalf of households, which are treated in SCNM as final consumption and thus added to NDP, are deducted in the table for the calculation of EDP2 in the same manner as this was done in Table III.4.2 above.

The oil concern presented in the table only covers oil depletion which is recorded as environmental cost of the oil industry. New finds of oil are not dealt with in this part of the table, as they are treated as net accumulation of economic assets with a counterpart negative entry for net accumulation of environmental assets. The oil industry includes only extraction and not refining.

Table III.6.1: Breakdown of Production Data by Economic Activities
(billion, Mexican pesos)

	Agriculture	Animal Farming and Breeding	Forestry	Fishing, Hunting, etc.	Oil	Other Mining	Manufac-turing	Electric, Gas, Water	Construc-tion	Trade, Hotels & Restaurant	Transport, Storage & Communica-tion	Other Services (excluding Government	Government Services	Household Production Activities	Total Production Activities
Economic Supply Total	3,241,866	2,285,331	283,943	249,551	1,901,465	900,951	25,874,013	900,798	4,897,862	16,014,145	4,596,322	12,637,004	2,016,522	0	P 75,799,773
Economic Uses Total	619,948	1,003,947	35,676	94,512	229,920	354,982	14,805,379	451,937	2,827,735	2,707,691	1,431,195	3,180,714	664,435		Ct 28,408,071
of which: Envir. Protection services															
Industry			767		12,555	4,155	5,162	68,747				1,469			92,855
Households														58,339	58,339
Depreciation	261,074	171,435	22,805	20,097	200,091	138,686	2,285,025	119,029	351,550	231,712	761,207	764,701	3,774		5,331,186
NDP (Yn)	2,360,844	1,109,949	225,462	134,942	1,471,454	407,283	8,783,609	329,832	1,718,577	13,074,742	2,403,920	8,691,589	1,348,313		42,060,516
Environmental Uses:															Ct depl
Oil Concerns															
Oil Depletion					1,469,930										
New Finds of Oil															1,469,930
Deforest. Concerns															
Woods			164,165												
Forest Land Trnsf. to ec. use															164,165
Transfer Losses	137,687	517,983							53,602				54,377		763,649
EDP1 (Yn1)	2,223,157	591,966	61,297	134,942	1,524	407,283	8,783,609.	329,832	1,664,975	13,074,742	2,403,920	8,691,589	1,293,936	0	39,662,772
Degradation															Ct. degr
Land															
Soil Erosion	107,709	250,701	90,470												448,880
Solid Wastes														197,269	197,269
Water															
Ground Water Use	86,582	830					14,173	1,204				280	21,453	67,046	191,568
Water Pollution							424,849							237,607	662,456
Air															
Sulfur Dioxide					6,709		12,275	197,697			13,602	3,887		623	234,792
Nitrog. Oxides					3,164		11,629	48,394			56,901	1,515		15,839	137,442
Hydrocarbons					21,795		11,299	580			54,726	32		38,976	127,409
Carbon Monoxide					40,384		4,992	3,212			613,876	139		410,223	1,072,826
Suspended Part.					2,592		9,464	59,537			5,918	2,153		3,813	83,477
EDP2 (Yn2)	2,028,866	340,435	-29,173	134,942	-73,120	407,283	8,294,927	19,208	1,664,975	13,074,742	1,658,898	8,683,582	1,272,483	1,029,735	36,448,314

The deforestation concern includes two elements, i.e. logging and transfer losses due to the transfer of environmental land to economic uses. The depletion cost of logging is allocated to the forestry industry. Reforestation is assumed to be the result of forestry activities and therefore deducted from trees lost through logging of timber in forestry. The transfer losses are allocated to agriculture and animal farming and breeding, insofar they concern the losses due to transfer of environmental land to these economic activities. Losses allocated to agriculture also include losses due to forest fires and losses of trees due to the conversion of forest land into waste land; allocation of these losses to agriculture is based on the assumption that these losses are caused, for example, by shifting cultivation. Transfer losses due to the transfer of land for urbanization purposes is allocated to the construction industry, as this industry includes all the cost related to construction for purposes of urbanization.

Soil erosion is only identified for agriculture, animal farming and breeding, and for forestry. Ground water use is only measured for agriculture, animal farming and breeding, manufacturing, other services, government services and household production (i.e. consumption) activities.

Air and water pollution are mainly allocated to the oil industry, manufacturing, electricity production, transport, other services and household production activities. Solid wastes are assumed to be only generated by households in their capacity as consumers. Therefore all environmental impacts of solid wastes have been allocated to the column for household production activities.

(b) *Capital Stock and Capital Accumulation*

The balances of economic assets by economic activities are presented in Table III.6.2. The rows of the table include, for each sector, asset balances for produced assets and relevant non-produced assets. The table distinguishes between fixed assets and stocks. For the fixed assets, the asset balances include as columns the opening and closing stocks, gross fixed capital formation, consumption of fixed capital and net accumulation of economic, non-produced fixed assets. The closing balance of fixed assets is equal to the opening balance plus gross fixed capital formation, minus consumption of fixed capital plus net accumulation of non-produced economic assets. For stocks, the asset balances also include the opening and closing stocks as well as separate columns for changes in stocks of produced assets and non-produced assets. In this section of the table, closing stocks are equal to opening stocks plus changes in stocks of produced and non-produced assets.

The table refers exclusively to economic assets that are used in production and thus contribute directly to the generation of output and value added. The non-produced economic assets included in the fixed asset section of the table refer only to land used for agriculture, animal farming and breeding and land used for purposes of urbanization. The non-produced economic assets included in the stock section of the table cover only oil reserves. Other non-produced assets, such as standing timber, forest land and also air and water are not included in the table as these are treated as non-produced environmental assets.

Non-produced assets specified by industry are land used in agriculture and animal farming, and oil reserves depleted by the oil industry. Land used for purposes of urbanization is allocated to a group of industries together which include all except agriculture and animal farming, forestry, and oil and other mining.

Table III.6.2: Balance Sheets for Produced and Non-produced Economic Assets, Classified by Economic Activities
(million, Mexican pesos)

Concept	Opening Balance Fixed Assets	Net Capital Accumalation (including revaluation)			Closing Balance Fixed Assets	Opening Balance Stocks	Changes in Stocks		Closing Balance Stocks
		Produced Assets		Non Produced Assets			Produced Assets	Non Produced Economic Assets	
		Gross Fixed Cap. Formation	Consumption of Fixed Capital						
Total									
Produced Assets	103,156,227	9,048,296	5,331,186		106,873,338	8,006,083	986,544		8,992,627
Non-produced Assets	339,259,491			2,238,979	341,498,470	66,584,000		51,464,500	118,048,500
Agriculture									
produced Assets	5,559,424	398,062	261,074		5,696,412	61,472	-16,448		45,024
Non-produced Assets: Land Use	91,575,665			95,790	91,671,455				
Animal Farming and Breeding									
Produced Assets	3,797,518	280,611	171,435		3,909,994	155,676	80,981		236,657
Non-produced Assets: Land Use	207,572,243			434,336	208,006,579				
Forestry: Produced Assets	485,614	34,771	228,805		497,580	796	8,821		9,617
Fishing: Produced Assets	427,951	30,642	20,097		434,496	38,926	7,774		46,700
Extraction of Crude Oil & Gas									
Produced Assets:	5,235,811	167,754	200,091		5,203,474	246,185	26,583		272,768
Non-produced Assets: Oil									
New Findings: Oil								482,230	
Depletion. Oil								1,469,930	
Revaluation of Reserves								52,452,200	
Sub-total						66,584,000		51,464,500	118 048,500
Minings (excluding oil)									
Produced Assets	1,388,660	962,285	138,686		1,346,259	125,276	6,125		131,401
Sub-total Other Industries:									
Produced Assets	86,261,250	8,040,171	4,516,998		*89,784,423	7,377,752	872,708		8,250,460
Manufacturing	21,863,054	2,202,818	2,280,025		21,780,847	4,755,565	398,318		5,153,882
Construction	3,172,062	570,380	351,550		3,390,892	313,403	25,037		338,440
Elec., Gas and Water	7,321,540	1,184,763	119,029		8,387,274	64,573	4,266		68,839
Trade, Restaurant & Hotels	12,680,012	1,184,119	237,712		13,632,419	1,949,790	386,695		2,336,485
Communication ada Transp.	21,974,698	1,609,092	761,207		22,822,583	98,164	19,468		117,632
Services	19,249,884	1,288,998	764,701		19,774,181	196,258	38,923		235,181
Public Admin. and Defense			3,774						
No n-produced Assets: Land Use	40,111,582			1,708,853	41,820,436				

* The closing balance of fixed assets incorporates a deduction for consumption of fixed assets for goverment assets, even though no stocks of assets are measured for the government sector.

The balances of produced assets by economic activities were especially compiled for the purposes of the present analysis in order to be able to determine the total stock of produced as well as non-produced assets used in production. Opening and closing balances of produced fixed assets and stocks are obtained for all sectors, except for the government sector (public administration and defense).

Two revaluation elements are incorporated implicitly. The first one refers to revaluation of land when it is transferred from the environment (forest land) to economic uses. Contrary to what was done Table III.4.1 where land transferred was valued as forest land, land transferred to economic uses is valued in Table III.6.2 at its value in economic uses (in agriculture, livestock holding and urbanization). Therefore, any change in its value from forest land to land used for economic purposes is not explicitly presented in the table but included with net accumulation of non-produced economic assets. The other revaluation element concerning oil is explicitly included in the stock section of the table as changes in stocks of non-produced assets.

2. Comparative Analysis of Performance and Growth in SCNM and SCEEM

The information on value added and capital balances by activities can be used to assess each sectors' performance and growth potential, using alternatively estimates that are linked to NDP, EDP1 and EDP2. This is done in Tables III.6.3 and III.6.4 below. Table III.6.3 has three sections, i.e. one presenting alternative distributions of NDP, EDP1 and EDP2 by economic activities, a second section comparing the distribution of capital when using NDP or EDP1, and a third section comparing capital output ratios between the three types of concepts. Table III.6.4 compares the environmental protection expenses made by each sector with the corresponding values of degradation effects.

The first section of Table III.6.3 shows that there is a considerable change in the distribution of value added when environmental uses are incorporated. The sectoral contributions negatively affected are those of animal farming , forestry, and oil: The contribution of animal farming drops from 2.64% for NDP to 1.49% for EDP and to .93% for EDP2; the contribution of forestry drops from .54% through .15% to a negative contribution of -.08%; the oil sector's contribution drops from 3.50% through 0.00% to a negative -.20%. There are three sectors' contributions that increase or remain the same in the case of EDP1 and decrease again when degradation effects are taken into account for EDP2: The first sector is agriculture whose contribution remains the same between NDP and EDP1 (i.e. 5.61%) and decreases in the case of EDP2 to 5.57%; the contribution of electricity, gas and water increases from .78% to .83% in the case of EDP1 and decreases to only .05% when also degradation effects are taken into account for EDP2; transport, storage and communication is the other sector whose contribution increases from 5.72% to 6.06% for EDP1 and then decreases to 4.55% in the case of EDP2. On the other hand, the manufacturing contribution increases from 20.88% of NDP to 22.15% of EDP1 and 22.76% of EDP2, and the same applies to construction (4.09% of NDP, 4.20% of EDP1, 4.57% of EDP2) and there are minor increases for services, which are generally less depleting or degrading.

The second section of the table shows the changes in the distribution of capital between sectors, first including only produced assets (CAP), which is compatible with the concept of NDP, and then including produced as well as non-produced economic assets (CAP1), which is compatible with the concept of EDP1. CAP and CAP1 refer to average stock of capital between opening and closing stock, including changes in the closing stock due to revaluation. Only a CAP1 concept compatible with EDP1 is used, as there is no change in the stock of economic assets between EDP1 and EDP2. The changes in the capital distribution are particularly dramatic for agriculture whose capital contribution increases from 5.00% to 23.77%, animal farming where

the increases is from 3.57% to 51.74%, and for oil where it changes from 4.83% to 23.89%. The increase is matched by a dramatic decrease in the capital contribution of other industries which drops from 84.43% to 33.42% in spite of the land used for urbanization, which is included in this category.

The considerable changes in the value added contributions to net product and capital participations of each sector between NDP, EDP1 and EDP2, result in equally drastic changes in the third section of the table which examines the output/capital ratios, that are an indication of productivity in each sector. For agriculture (41.56% to 2.28%); animal farming (27.42% to .28%), forestry (45.38% to 12.34%) and oil (26.86% to 0.00%) there are considerable reductions, and for other industries there are minor reductions (37.93% to 26.49%). For the economy as a whole, this results in a reduction of the output capital ratio from 37.05% to 9.69%.

When comparing in Table III.6.4 the current and capital expenses by each industry on environmental protection services with the imputed value of degradation effects, there are also large differences. The average value of environmental protection expenses as a percentage of the total value of degradation effects for the economy as a whole is 23.26%. The percentage for individual industries is very high--i.e. more than 100%--for other mining and for electricity, gas and water. It is very low--i.e. less than 5%--for agriculture, animal farming and breeding, forestry, manufacturing and transport, storage and communication. Average percentages are found for oil, other services and also for household consumption.

Table III.6.3 Net Product Generated and Economic Assets Used in Economic Activities
Comparative Analysis Between NDP, EDP1 and EDP2
(billion, Mexican pesos)

	Agriculture	Animal Farming and Breeding	Forestry	Fishing, Hunting, etc.	Oil	Other Mining	Manufac-turing	Electric, Gas, Water	Construc-tion	Trade, Hotels & Restaurant	Transport, Storage & Communica-tion	Other Services (excluding Government	Government Services	Sub-Total Other Industries	Household Production Activities	Total Production Activities
Net Product																
NDP	2,360,844	1,109,949	225,462	134,942	1,471,454	407,283	8,783,609	329,832	1,718,577	13,074,742	2,403,920	8,691,589	1,348,313	36,350,582		42,060,516
% Distribution	5.61	2.64	0.54	0.32	3.50	0.97	20.88	0.78	4.09	31.09	5.72	20.66	3.21	86.42		100.00
EDP1	2,223,157	591,966	61,297	134,942	1,524	407,283	8,783,609	329,832	1,664,975	13,074,742	2,403,920	8,691,589	1,293,936	36,242,603		39,662,772
% Distribution	5.61	1.49	0.15	0.34	0.00	1.03	22.15	0.83	4.20	32.96	6.06	21.91	3.26	91.38		100.00
EDP2	2,028,866	340,435	-29,173	134,942	-73,120	407,283	8,294,927	19,208	1,664,975	13,074,742	1,658,898	8,683,582	1,272,483	34,668,815	-1,029,735	36,448,314
% Distribution	5.57	0.93	-0.08	0.37	-0.20	1.12	22.76	0.05	4.57	35.87	4.55	23.82	3.49	95.12		100.00
Economic Assets Used																
CAP	5,681,165	4,048,273	496,803	476,037	5,479,119	1,495,798	26,776,674	7,921,114	3,607,399	15,299,353	22,506,538	19,727,752	Non available	95,838,829	Non-applicable	113,516,025
% Distribution	5.00	3.57	0.44	0.42	4.83	1.32	23.59	6.98	3.18	13.48	19.83	17.38		84.43		100.00
CAP 1	97,304,725	211,837,664	496,803	476,037	97,795,369	1,495,798								136,804,839		409,406,417
% Distribution	23.77	51.74	0.12	0.12	23.89	0.37								33.42		100.00
Output/Capital Ratios (%)																
NDP/CAP	41.56	27.42	45.38	28.35	26.86	27.23	32.80	4.16	47.64	85.46	10.68	44.06		37.93		37.05
EDP1/CAP1	2.28	0.28	12.35	28.35	0.00	27.23								26.49		9.69

Table III.6.4 Intersectoral Comparison Between the Imputed Cost of Environmental Degradation and Environmental Protection Expenditures
(billion, Mexican pesos)

	Agriculture	Animal Farming and Breeding	Forestry	Fishing, Hunting, etc.	Oil	Other Mining	Manufac-turing	Electric, Gas, Water	Construc-tion	Trade, Hotels & Restaurant	Transport, Storage & Communica-tion	Other Services (excluding Government	Government Services	Sub-Total Other Industries	Household Production Activities	Total Production Activities
Environmental Degradation	194,291	251,531	90,470		74,644		488,681	310,624			745,022	8,007	21,453	1,573,787	971,396	3,156,119
Environmental Protect. Expend.																
Current			767		12,555	4,155	5,162	68,747				1,469		75,378	58,339	151,194
Capital			3,128		6,472	7,320	4	319,522				654		320,180	245,670	582,770
Total			3,895		19,027	11,475	5,166	388,269				2,123		395,558	304,009	733,964
Environmental Protect. Expend. As % of Env. Degradation			4.31		25.49	Very High	1.06	125.00				26.52	Not Applicable	25 13	31.30	23 26

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