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CARMEN RODRÍGUEZ MORILLA
M. ALEJANDRO CARDENETE
GASPAR. J. LLANES DÍAZ-SALAZAR

Centro de Estudios Andaluces
CONSEJERÍA DE LA PRESIDENCIA

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ESTIMATION OF A SOCIAL AND ENVIRONMENTAL ACCOUNTING MATRIX

C. R. Morilla
Universidad de Sevilla

M. Alejandro Cardenete
G. J. Llanes Díaz-Salazar
Universidad Pablo de Olavide

RESUMEN

En este trabajo presentamos una metodología para desarrollar un sistema de medición estadístico, económico y medioambiental, híbrido, ésto es, que integra los datos físicos de las estadísticas oficiales sobre recursos de agua y emisiones de gases a la atmósfera, con las estadísticas económicas que reflejan el flujo circular de la renta. Este sistema se aplica a la realidad española en el año 2000. A través de una ampliación de la lógica inherente a las tablas Input-Ouput y a la matriz de contabilidad social, obtenemos la matriz de contabilidad social medioambiental que incluye las cuentas ambientales (SAMEA). El interés de tener esta matriz de híbrida, con estadísticas económicas y ambientales integradas, es doble, tanto por su interés descriptivo como analítico.

Palabras claves: Marco Input–Output, Matrices de Contabilidad Social, Medioambiente, Técnicas de Actualización, Metodología de Entropía Cruzada.

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ABSTRACT

In this work we present a methodology to build a hybrid economic, social and environmental statistical measurement system, that is, one that integrates the physical data from the official statistics on water resources and atmospheric emissions together with the economic and social monetary statistics that reflect the economic functioning. This system is applied to Spanish reality on year 2000. Through an extension of the logic inherent to input-output tables and the Social Accounting Matrix (SAM), the Social Accounting Matrix including Environmental Accounts (SAMEA) is built. The interest of having this hybrid matrix on which statistical measurements of economic and environmental facts are integrated is double, both descriptive and analytical.

Keywords: Input–Output Tables and Analysis, Social Accounting Matrices, Environmental, Updating Techniques, Cross Entropy Method.

JEL Code*: C68; Q51; Q56; Q58.*

1. INTRODUCTION.

Restlessness and social awareness on the environmental problems caused by human activity have led to the establishment of rules that aim to foresee and make social and economic development compatible with the viability of natural systems, in what has been called sustainable development[1]. Two problems which are altering the climate processes and provoking grave unbalances in the health of ecosystems are especially relevant: the one derived from the scarcity and quality of water resources and that other related to the polluting emissions into the atmosphere which cause the so-called greenhouse effect.

To analyze those impacts, it is necessary to have at our disposal certain analytical tools that will allow us to assess the situation and draw the most probable scenarios, in order for us to be able to plan strategies and design the most adequate economic and environmental policies.

In this context, this work presents a methodology to build a hybrid economic, social and environmental statistical measurement system, that is, one that integrates the physical data from the official statistics on water resources and atmospheric emissions together with the economic and social monetary statistics that reflect the economic functioning. This system is applied to Spanish reality on year 2000.

Through an extension of the logic inherent to input-output tables and the Social Accounting Matrix (SAM), the Social Accounting Matrix including Environmental Accounts (SAMEA) is built. The interest of having this hybrid matrix on which statistical measurements of economic and environmental facts are integrated is double, both descriptive and analytical:

- On the one hand, the SAMEA contains a high degree of detailed data regarding economic and environmental transactions and flows which allow to visualize the network of direct connections that exist between economy and society, that is, between activity branches and institutional sectors and, at the same time, between the latter and the environment, thus offering an x-ray or static image of the whole picture. With these matrices Spain's economic structure is defined from an economic, social and environmental perspective. The existing relations between output, demand, supply, incomes, the economic relations with the rest of the world, the generation of available incomes, their distribution between saving and consumption, etc. are visualized and all of them are put in relation to the environment, both through the inputs used from nature and through the waste generated and the process of reusing it.

[1] See the Agenda 21 and the conclusions of the World Summit on Sustainable Development held in Johannesburg in year 2002. The Sixth European Community Action Programme on the Environment "*Environment 2010: the future is in our hands*" (2002) contains the political lines of the European Union on environmental matters.

- In the second place, once assumptions on the economic agents' conduct and structure and on their environmental context are incorporated, the structure of the SAMEA is the statistical support that allows to develop static or dynamic multi-sector models, from the most simple SAM multipliers expanded to include the environment (SAMEA multipliers), typically linear, to the more complex applied general equilibrium or eco-environmental computable models (AGEM-ECO). With the help of both types of models it is possible to appreciate the direct, indirect and induced structures of the interdependencies that exist beyond the social and economic development model and its environmental repercussions.

This work is part of the presentation of the theoretical-analytical frame that allows integrating environmental and economic accounts. The antecedents and the most recent extensions of the economic and environmental hybrid accounts system are here presented. The processing of the 2003 United Nations "System of Integrated Economic and Environmental Accounting" (SEEA-03)[2] is detailed. The Social and Environmental Accounting Matrix for Water Resources and Emissions (SAMEA-ESP-2000) is then quantified, using only data from the official statistics of the Spanish National Statistics Institute (Instituto Nacional de Estadística, INE).

2. THE SOCIAL AND ENVIRONMENTAL ACCOUNTING MATRIX (SAMEA) IN THE CONTEXT OF HYBRID FLOW SYSTEMS: ANTECEDENTS AND THEORETICAL DEVELOPMENT.

The new SEEA-03 dedicates its fourth section to hybrid flow accounts, through a matrix presentation in which physical and monetary data are combined as to put in relation economic flows with the absorption of natural resources and the generation of waste.

A hybrid flow accounting system can be defined as "a matrix analytical frame in which the registration of physical flows is made so that it is compatible with the presentation of the economic transactions derived from the national accounts" (SEEA-03, sections 4.5 and 4.6).

The idea of confronting physical and monetary data had its conceptual antecedents in the works of Leontief (1970), Cumberland (1996), Daly (1968), Isard (1969), Ayres and Kneese (1969) and Victor (1972), which introduced the analysis of "physical economy" in the input-output models. The data systems used by these authors in their models included physical data taken from the environment and connected to monetary data referred to the economic structure.

These approaches conceive economic systems differently from how conventional schemes do; particularly, they consider an economic system to be a system open to nature, with which it exchanges both energy and materials. In addition, according to certain authors (Ayres, 1989; Georgescu-Roegen, 1971; Ayres and Kneese, 1969; and Ayres, 1999 among others), it is an entropic system, meaning that in it the generation of waste can never be considered a mere externality but something inherent to the economic process itself.

These ideas were later developed in the works of Keuning (1993 and 2000); Keuning and Timmerman (1995); Keuning, Van Dalen and De Haan (1999) and Stahmer (2002), and assumed by statistical institutes in countries such as Norway, Denmark, Germany, the Netherlands and others, which developed methodological schemes in order to incorporate the environment into the economic accounting systems from an input-output perspective (NAMEA).

The most innovative proposal considers the three nuclei with which sustainable development is usually associated, and combines the monetary economic accounts with the social and the environmental accounts in a matrix system, producing what in specialized literature is called "System of Social and Environmental Accounting Matrices and its Extensions" (SESAME).

The SESAME allows to combine synthetically, systemically and orderly different satellite accounts related to various topics (demography, labour, health, tourism, environment, etc.) which can be expressed in monetary or other type of units (weigh, time, etc.) and which are connected to each other and to a central core provided by the national economic accounts, thus guaranteeing the system's global coherence. The incorporation of these individual modules will only depend on the possibilities, priorities and statistical resources available. This frame provides an instrumental basis for later modelling analysis and for the obtaining of structural indicators from just one totally coherent statistical system; in addition, those indicators will be expressed in the most adequate units considering the described phenomena, thus allowing to asses in a systemic and non-isolated manner the interactions between the different economic activities, the environment, employment, the social consequences, etc.

The main module in the SESAME frame consists of the extension of a Social Accounting Matrix (SAM) through the incorporation of Environmental Accounts expressed in physical terms (Figure 1).

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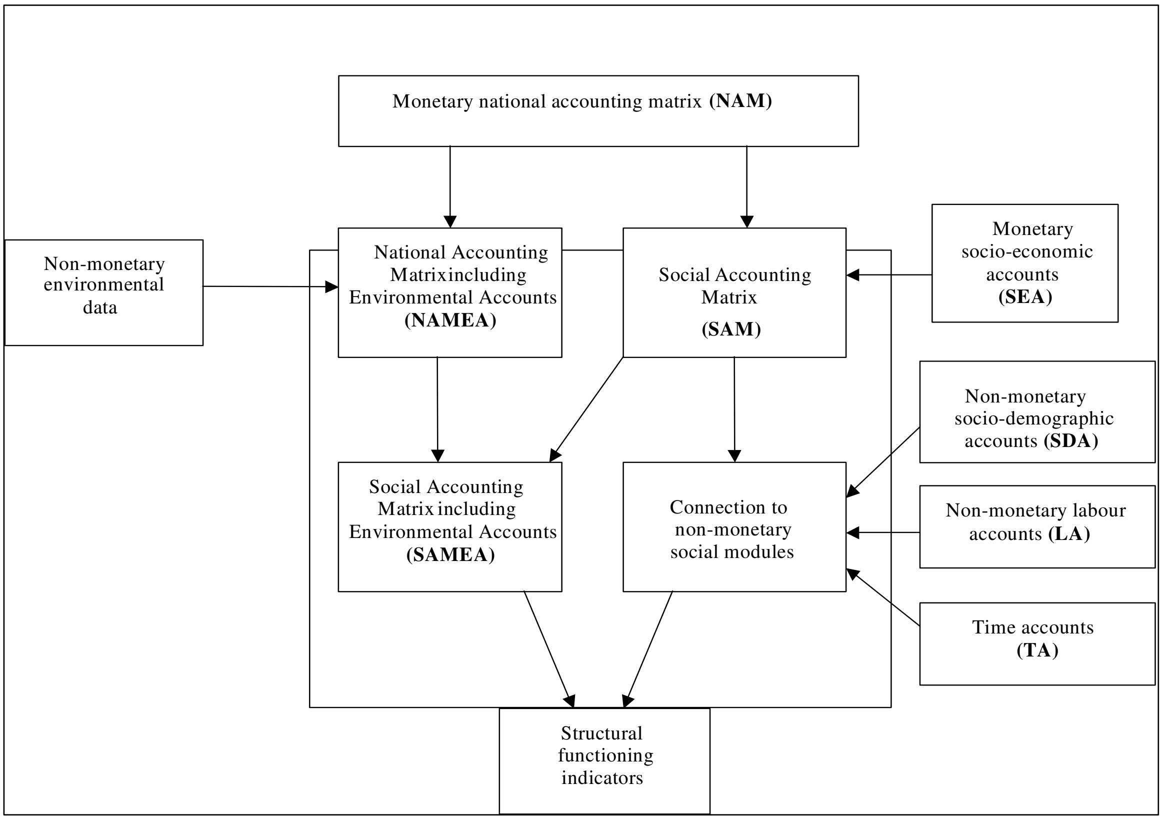
[2] *System of Integrated Environmental and Economic Accounting 2003*, subscribed by the United Nations, the European Commission, the World Bank, the Organization for Economic Cooperation and Development (OECD) and the International Monetary Fund (IMF).

Figure 1. System of Social and Environmental Accounting Matrices and its Extensions (SESAME)



Source: Stahmer (2002)

2.1 The structure of the SAMEA.

Table 3 shows the summarized theoretical structure of a Social and Environmental Accounting Matrix. It is possible to observe that the structure of this data presentation includes the following elements:

- Regarding the environmental aspect, it contains a flow matrix expressed in physical units, disaggregated in two sub-matrices: one that includes production and consumption waste, and a second one that shows the flows of natural resources that the productive system uses as inputs as well as the waste reabsorbed by the system.

- Regarding the economic aspect, it contains a Social Accounting Matrix (SAM) which includes, expressed in monetary units, the flows associated to the economic sphere, that is, those related to production and consumption activities, as well as those referred to the later distribution and redistribution of the former flows.

This frame is a system of matrices and includes –following the 1993 System of National Accounts (SNA-93) and the 1995 European System of Accounts (ESA-95)– two types of SAMEA: one of them contains input-output tables with a combined use-make formulation (differentiating purchase price flows from basic price flows) while the other contains symmetric input-output tables, considering the different product flows as total or domestic. Therefore, the system must incorporate 5 tables:

- one that includes the use-make formulation of total flows at purchase prices;
- a second one with an use-make formulation of total flows at basic prices;
- a third one with an use-make formulation of domestic flows at basic prices;
- a fourth one with a symmetric formulation by homogeneous branches of total flows at basic prices, and finally,
- last table with a symmetric formulation of domestic flows at basic prices.

Table 1. The summarized structure of a SAMEA.

<table>
<tr><th>SAMEA</th><th>National economy</th><th>The rest of the world's economy</th><th>National environment</th><th>The rest of the world's environment</th></tr>
<tr><td>National economy</td><td colspan="2" rowspan="2">SAM:
Product flows,
income distribution and
expenditure structure of the institutional sectors</td><td>Residents' emissions</td><td>Residents' emissions in the rest of the world</td></tr>
<tr><td>The rest of the world's economy</td><td>Non-residents' emissions</td><td></td></tr>
<tr><td>National environment</td><td>Natural resources inputs</td><td>Exported natural resources</td><td></td><td></td></tr>
<tr><td>The rest of the world's environment</td><td>Imported environmental inputs</td><td></td><td></td><td></td></tr>
<tr><td>National economy waste</td><td>Reabsorbed or processed waste</td><td></td><td></td><td>Outgoing waste flows to the rest of the world</td></tr>
<tr><td>The rest of the world's economy waste</td><td>Reabsorbed or processed waste</td><td></td><td>Incoming waste flows from the rest of the world</td><td></td></tr>
</table>

Source: Own elaboration.

According to Stone (1962), the most relevant characteristics of a SAM are the following[3] :

- A SAM contains a simplified model of the economy's functioning in a specific year.
- This model presents the form of a square matrix: all its cells represent monetary flows, received or paid in consideration of the actual flow of a certain good or right. The *(i,j)* cell corresponds to the payments made by sector "j" to sector "i" on that specific year.
- The rows show incomes or monetary resources.
- The columns show outlays or monetary uses.
- The SAM total addition by rows is equivalent to its total addition by columns, something which shows the accounting balance between uses and resources.
- Another basic characteristic of this matrix is that the activity branches and/or products and the different accounts in the National Accounts appear identically distributed in rows and columns: goods and services; output; exploitation; primary income assignment; secondary income distribu-

[3] See also Pyatt and Round (1985).

tion; income use and accumulation of the different institutional sectors and the foreign sector.

Both the SNA-93 and the ESA-95 use a SAM presentation methodology, with a greater data detail and accounts and accounting balance breakdown than in the previous SNA-68 system. It is possible to observe that this type of presentation allows to obtain consecutive accounting balances, from the value added to the saving and the economy's financing capacity or need[4]. Also, it is stated in the SNA-93 that the format for this type of matrix must be flexible, according to the type of analysis, the available statistical data and the objectives of the study.

As it is possible to observe that in each SAM (inside the SAMEA) incorporates the information provided by the Input-Output Framework, either in an origin-destination or in a symmetric version, with as many details as it is considered necessary.

The information described in the Input-Ouput Framework does not reflect in a complex manner the economic cycle, since it does not put in relation the process of production and demand with that of income generation and use. This is exactly one of the main contributions of the SAM: to describe how the productive process influences the generation of disposable income and this, in its turn, determines consumption, saving, investment and the financing needs of the different institutional sectors (ESA-95: section 8.133). The so-called closure matrix[5] of the SAM income cycle incorporates all the information obtained from the National Accounts not relative to the productive sphere but to income assignment and later redistribution; that is why the breakdown of the closing accounts is related to the institutional sectors.

2.2 The physical flow account represented by the Environmental Accounts.

The Environmental Accounts are linked to the measurement of certain environmental problems such as atmospheric and water pollution and waste generation, and intend to describe the pressure and flows of the economic activity on the environment (emissions) and the use of physical environmental natural resources (environmental inputs) as well as society's response to reduce or eliminate such pressure (recycling, reusing or treatment).

The physical flows included in these accounts are classified according to the type of material and energy they contain, and respective of their origin and destination, as inside the limits established in the previous section. Three are the types of physical flows that can be differentiated: natural resources, waste and product flows, although from a SAMEA perspective the latter are not considered in physical terms – their

[4] See tables 8.19 to 8.22 on the ESA-95 and tables 20.5 to 20.7 on the SNA-93.
[5] The term "closure matrix" is taken from Cardenete and Sancho (2003).

description is made through the monetary account provided by the SAM, as pointed out before[6].

A global view of the flows which take part in the SAMEA according to their origin and destination is summarized in Table 2 , which includes the product and income distribution flows, expressed in monetary units, and the natural resources and emission flows, expressed in physical units.

Table 2. SAMEA flows according to origin and destination.

	Type of flows	Origin	Destination
Physical units	Natural resources	*Environmental sphere* National environment The rest of the world's environment	*Economic sphere* Intermediate consumption Final consumption *The rest of the world's economy*
	Emissions	*Economic sphere* Industry Families The rest of the world's economy *Environmental sphere* National environment The rest of the world's environment	*Economic sphere* Intermediate consumption (reusing and recycling) Capital formation (dumps) *Environmental sphere* National environment The rest of the world's environment
Monetary units	Products and income distribution	*Economic sphere* Industry Production *The rest of the world's economy* Imports	*Economic sphere* Intermediate consumption Capital formation Final consumption *The rest of the world's economy* Exports

Source: SEEA-03 and own elaboration.

It is possible to observe that the SAMEA contains a simplified model of the functioning of an economy and its relations to the environment.

Thus, it is to be noticed that the products obtained as a consequence of productive activities are originated inside the national economic sphere or imported from the rest of the world; these products incorporate the natural resources extracted from the environment (national or foreign) and are destined to be used in the same period of time as that on which they were created, to produce other products (intermediate consumption), to satisfy final needs (final consumption), to be used as capital in the production of other products for more than one period of time (accumulation) or to be exported.

Each production or consumption activity generates different types of waste: gas emissions from fuel burning, water pollution, or discarded products once they are not needed anymore. These wastes generated by the economy can also be reabsorbed by the productive system (through recycling, reusing or treatment) or

[6] The physical accounting of product flows is the object of the methodology related to matter and energy balances already applied in other countries (Germany, Denmark, Finland and others), which, from a physical input-output table perspective, intends to quantify the extraction of materials and energy from the environment, the transformation processes of these materials inside the economy and the generation of waste resulting from production and consumption activities, excluding the transformations that occur inside the environment (see Stahmer et al., 1998

they may be imported, in order to reuse them (including the controlled spilling deposits), and also exported. Through this process the resident institutional sectors (households, companies, non-profit institutions serving households [NPISHs] and public administrations) obtain an income which they further distribute and redistribute through the different payments related to property incomes, transfers (current and capital) and taxes.

To add to the traditional input-output frame the current income and accumulation accounts of the institutional sectors, as they are represented in a SAM, is extremely interesting if we want to have at our disposal a complete picture, not only of the interaction between environment and economy, but also of the role played by each unit involved. The disaggregation of the different concepts and agents included and put in relation on each SAMEA account in order to capture the aspects related to the environment considerably improves this system's analytical virtues.

2.3 Experiences on the application of hybrid flow systems.

The consensus reached on hybrid systems at an international level has positively affected their application, although this process is much conditioned by the availability of the statistical information needed to create this type of accounts.

The System of Integrated Economic and Environmental Accounts (SEEA-93) meant a great impulse that helped many countries to further the implementation of these systems, although, undoubtedly, the greatest progress has been made in the territory of the European Community.

The process of adapting the SEEA to Europe started with a document elaborated in 1994 by the European Commission and entitled "*European Union directions in relation to Environmental Indicators and Green National Accounts: the integration of the Economic and Environmental Information Systems*". This initiative was later assumed by EUROSTAT (1996) which established a favourable frame for the integration of environmental and economic accounts in European countries, the so-called NAMEA system that had already been applied in the Netherlands through the research developed by Keuning et al. (1999).

The pilot studies made by EUROSTAT were first centred in the application of the NAMEA model to atmospheric emissions (EUROSTAT, 1999 and 2001), and at the moment a joint application is being tried on other issues, such as water and the expenditure on environmental protection.

Nevertheless, some European countries have promoted, through their corresponding institutions, more ambitious economic and environmental integration systems, being those of the Netherlands and Germany the most relevant ones.

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and Strassert, 2000 and 2002).

Based on the research led by De Haan, Keuning and Bosch (1994), De Haan and Keuning (1996), and Keuning, Van Dalen and De Haan (1999), hybrid flow systems were developed in the Netherlands which constituted a precedent at the international level. Presently, the Statistical Bureau in that country is annually developing SAMEA-like systems of social and environmental accounting matrices connected to matrices that summarize the qualitative aspects of the environmental pressure resulting from production and consumption activities (greenhouse effect, acidification, eutrophication, etc.).

In Germany the most significant progress has been achieved in the field of material and energy flow accounting and in SAMEA-like systems that provide detailed disaggregations in many of their accounts[7]. For example, the household account is presented in age or income segments, and disaggregations in taxes are also introduced aiming to distinguish those of environmental character.

Outside Europe, some countries have developed NAMEA-like applications, the case of Japan being especially relevant. Among its present projects, Japan includes the elaboration of social and environmental accounting matrices (Ariyoshi and Moriguchi, 2003).

At Spain's national level, this type of data systems which integrates the economic and environmental aspects is little developed: no official estimate has ever been made in the field of social accounting matrices. Nevertheless, the Spanish National Statistical Institute (Instituto Nacional de Estadística, INE) has considerably progressed in the development of Environmental Accounts related to water, waste, material flows and environmental protection accounts, applying the directions given by EUROSTAT. Despite this, a greater connection is needed to put in relation economic and environmental accounts inside a common framework.

3 ESTIMATION OF THE SPANISH SOCIAL AND ENVIRONMENTAL ACCOUNTING MATRIX FOR WATER RESOURCES AND EMISSIONS ON YEAR 2000.

3.1 Estimation of the Social Accounting Matrix on year 2000.

It is stated in the SNA-93 that the format of the Social Accounting Matrix must be flexible, according to the type of analysis, the available statistical information and the objectives of the study. Considering this, the present work gives an estimate of the SAMEA which incorporates a Social Accounting Matrix for Spanish economy on year 2000 adapted to:

[7] The elaboration of physical input-output tables connected with economic accounts sets a very important precedent.

- the ESA-95 criteria,
- while it benefits from all the official statistical information published by the Spanihs Statistical Institute (INE, *Instituto Nacional de Estadística*): the Input-Output Table (IOT) and the Spanish National Accounts (base year 2000).

The system of matrices elaborated applies the ESA-95 criteria in a more reduced presentation form. According to the operative needs of the work, the different disaggregated accounts in the matrix structure of the SNA-93 and the ESA-95 are aggregated in the structure of tables 1 to 5 in the statistical annexe. Five versions are presented and detailed:

- A first version that contains a formulation including a combined use-make table at purchase prices[8] (SAMEA-ESP_pa, table 1 in the annexe).
- A second version that contains a formulation including a combined use-make table at basic prices (SAMEA-ESP_pb, table 2 in the annexe).
- A third version that contains a formulation including a combined use-make table for domestic goods at basic prices (SAMEA-DOM-ESP_pb, table 3 in the annexe).
- A fourth version that contains a formulation including a symmetric table by homogeneous branches at basic prices (SAMEA-ESP-RAH_pb, table 4 in the annexe).
- A fifth version that contains a formulation including a symmetric table by homogeneous branches for domestic goods at basic prices (SAMEA-DOM-ESP-RAH_pb, table 5 in the annexe).

These distinctions are relevant for researchers. SAMEAs which incorporate a combined origin-destination table (ODT) and SAMEAs which incorporate a symmetric input-output table (SIOT) by homogeneous activity branches can be used as complementary tools for economic analysis because each of them presents different advantages.

3.1.1 SAM with a combined use-make formulation.

The SAM part of the SAMEA matrices that includes an input-output table with a combined origin-destination formulation can be built yearly if the following data are available:

- The annual origin and destination tables, at purchase or basic prices, differentiating the do-

[8] This is the scheme normally used in handbooks and works developed internationally.

mestic origin of the goods and services used in the production process (total or domestic).

- The institutional sector accounts in the Spanish National Accounts and the estimates of both property incomes and transfers between the institutional sectors and the rest of the world in order to estimate the so-called income cycle closure matrix.

However, the Spanish National Accounts cannot provide the estimates of property income and transfers between the institutional sectors and the rest of the world: the total amount of current uses and current resources for each institutional sector is the only information available in this respect from the National Accounts.

3.1.2 Imputation procedure of the intersectorial income flows.

The so-called closure matrix in the SAM income cycle needs to incorporate all the information on property incomes, current and capital transfers from the institutional sectors accounts in the Spanish National Accounts developed by the INE. However, the Spanish National Accounts do not directly provide data on the monetary flows between the different institutional sectors and between them and the rest of the world: only the total amount of its outlays and payments is known, and that means it is necessary to estimate these intersectorial monetary flows. In order to estimate these matrices for year 2000, the so-called *cross entropy*[9] *methodology* has been adapted to the pursued objectives.

3.1.3 SAM with a formulation by homogeneous activity branches.

Let us remember that in a symmetric use-make table, both origin and destination are condensed. The latest symmetric table available is the one estimated by the INE for year 2000 with its base on the same year. In this case, once the closure matrix is estimated, there are no more estimate difficulties for year 2000 (for later years an updating proposal is included further on in our study). Obtaining these total or domestic goods and services versions is done following the theoretical scheme proposed in tables 4 and 5 in the annexe[10].

3.2 Estimation of the Atmospheric Emissions Account for year 2000.

The Atmospheric Emissions Account tries to put in relation in a coherent and ordered manner the eco-

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[9] Developed by Robinson et al. (2001) for the IFPRI (International Food Policy Research Institute). This method, more flexible and refined, improves the traditionally used RAS method.

[10] Tables 1 to 5 in the statistical annexe incorporate the summarized estimate of the five SAM formulations proposed and included in the SAMEA system, with details for four activity branches and/or products, five institutional sectors and the rest of the world. These matrices can also be visualized in electronic format and including 33 activity branches and products.

nomic flows generated by the production and consumption system with the polluting substances that this system pours into the atmospheric environment. Both types of flows are classified according to the activities which produce them.

The integration of polluting gas flows with economic flows in the same accounting system requires, nevertheless, that both types of data are based in similar accounting definitions and rules. The integration will of course be different for each version of the SAMEA system that is offered: the origin-destination version and the symmetric version. This is relevant in that the information on polluting gases is usually associated in statistical data to non-homogeneous branches, and therefore is most adequate for an origin-destination formulation. However, since symmetric formulations require working with homogeneous branches, it will be necessary for this reason to modify the original information in order to adapt it to this last configuration.

The data used to generate this account come from the estimates elaborated by the INE, which are normalized with the methodology used by EUROSTAT, although a different aggregation has been implemented in order to integrate those data in the SAMEA system and to express them in units which are equivalent from the point of view of the environmental pressure that the flows cause. Indeed, these atmospheric emission flows are expressed in physical units (generally in metric tonnes), but it must be taken into consideration that the different types of gases have in many cases different impact intensities so that their flows must be expressed, in order to make them comparable, in units which are equivalent. This implies using some conversion factors that allow to adjust the different gases to their potential environmental impact.

After this, greenhouse gas emissions can be classified according to their origin:

- Those from productive activities: they are generated by the different activity branches classified by their main activity and estimated according to the “resident unit” criterion[11].

- Those from household consumption: they mainly include the ones generated by the use of private transportation and heating[12].

Tables 3 and 4 show the Emissions Account, which contains total gas-by-gas emissions and their aggregation expressed through environmental indicators. It is presented with a disaggregation of 4 main activ-

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[11] This is not the case, for example, of the methodology used by the IPCC (Intergovernmental Panel on Climate Change), which is the basis of the Kyoto Protocol. In it, international transportation emissions are not attributed to any specific nation. It is the same for emission inventories such as CORINAIR, that estimate emissions considering the burning processes and the geographical, not the political, territory.

ity branches plus the household sector, according to the classification used in the SAMEA system (in the electronic annexe, it is disaggregated in 33 branches compatible with the A31 in the CNAE). Tables 6 and 7 in the statistical annexe contain this information by homogeneous branches. It has also been necessary to estimate the emissions of residents in foreign countries and of domestic non-residents in order to move from the domestic effect to the national effect. Considering the non-availability of this information, the estimate has been done attending to the information on emissions coming from household and monetary consumption, as it appears in the Spanish National Accounts.

Table 3. Atmospheric emissions account for Spain on year 2000. Homogeneous activity branches.

Homogeneous activity branches	SO_x	NO_x	NMOVCs	CH_4	CO	NH_3	CO_2	SF_6	N_2O	PM_{10}	PFC	HFC
Units	t	t	t	t	t	t	Thousands of t	Kg	t	t	Kg	Kg
1 Primary	6.324	217.953	1.098.474	1.046.955	171.409	332.477	10.626	0	51.873	56.745	0	0
2 Industry and energy	1.355.774	608.910	390.012	145.320	541.716	21.467	186.769	8.920	11.843	76.517	54.686	532.795
3 Construction	10.580	28.894	220.284	10.495	15.458	2.872	3.761	0	560	4.071	0	0
4 Services	80.814	299.967	204.690	456.887	204.385	25.863	47.536	477	8.589	23.521	541	27.960
EMISSIONS CAUSED BY DOMESTIC ECONOMIC ACTIVITIES	1.453.493	1.155.724	1.913.460	1.659.658	932.967	382.679	248.692	9.397	72.865	160.853	55.227	560.755
Emissions caused by non residents' domestic activities (transportation)	4.515	6.446	290	14	186	0	299	0	8	591	0	0
Emissions caused by residents' activities in the rest of the world (transportation)	2.950	33.321	2.424	61	4.155	2	3.168	0	94	261	0	0
EMISSIONS CAUSED BY RESIDENTS' ACTIVITIES	1.451.928	1.182.599	1.915.594	1.659.705	936.936	382.681	251.561	9.397	72.951	160.523	55.227	560.755
EMISSIONS CAUSED BY DOMESTIC HOUSEHOLDS	25.324	307.800	356.626	35.489	1.631.801	5.704	55.292	0	4.841	35.004	330	276.188
Emissions caused by non residents' domestic households	2.084	25.334	29.353	2.921	134.310	469	4.551	0	398	2.881	27	22.732
Emissions caused by residents' households in the rest of the world	354	4.303	4.986	496	22.814	80	773	0	68	489	5	3.861
EMISSIONS CAUSED BY RESIDENTS' HOUSEHOLDS	23.594	286.769	332.259	33.064	1.520.305	5.314	51.514	0	4.510	32.612	307	257.317
TOTAL DOMESTIC EMISSIONS	**1.478.817**	**1.463.524**	**2.270.086**	**1.695.147**	**2.564.768**	**388.383**	**303.984**	**9.397**	**77.706**	**195.857**	**55.557**	**836.943**
TOTAL RESIDENTS' EMISSIONS	**1.475.522**	**1.469.368**	**2.247.853**	**1.692.769**	**2.457.241**	**387.995**	**303.075**	**9.397**	**77.461**	**193.135**	**55.534**	**818.072**

Source: INE. Satellite accounts on atmospheric emissions. Year 2000. Base change. Own elaboration.

Table 4. Environmental indicators - Spain on year 2000. Main activity branches.

Main activity branches	Environmental impact		
	Greenhouse effect (1)	Oxone layer depletion	Acidification (2)
Units	thousands of t	thousands of t	t
1 Primary	**40.075**	**1.329**	**23.385**
2 Industry and energy	**198.429**	**815**	**51.016**
3 Construction	**2.684**	**233**	**272**
4 Services	**50.026**	**356**	**5.821**
EMISSIONS CAUSED BY DOMESTIC ECONOMIC ACTIVITIES	291.215	2.733	80.494
Emissions caused by non residents' domestic activities (transportation)	**302**	**4**	**211**
Emissions caused by residents' activities in the rest of the world transportation)	**3.198**	**23**	**454**
EMISSIONS CAUSED BY RESIDENTS' ACTIVITIES	294.111	2.752	80.738
EMISSIONS CAUSED BY DOMESTIC HOUSEHOLDS	58.087	724	4.473
Emissions caused by non residents' domestic households	**4.781**	**60**	**368**
Emissions caused by residents' households in the rest of the world	**812**	**10**	**63**
EMISSIONS CAUSED BY RESIDENTS' HOUSEHOLDS	54.118	675	4.167
TOTAL DOMESTIC EMISSIONS	**349.301**	**3.457**	**84.967**
TOTAL RESIDENTS' EMISSIONS	**348.229**	**3.426**	**84.905**

Notes: (1): We have considered that methane (CH_4) affects equally the greenhouse effect and the ozone layer depletion.
Also, for the conversion of HFC we have considered the average of the conversion factors corresponding to the different types that conform them.
(2) We have considered that nitrogen oxides (NO_x) affect equally the ozone layer depletion and acidification.

Source: INE. Satellite accounts on atmospheric emissions. Year 2000. Base change. Own elaboration.

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[12] It would be as well necessary to consider the absorption of carbon (the amount of emissions captured by the forest biomass), if we think that -even if the INE offers no estimate- it is important to register it, especially since the Kyoto

3.3 Estimation of the Water Accounts.

Water, as a natural resource, has got both economic and environmental functions. On the one side, it is a fundamental input for economic activities; on the other, it is an environment on which productive and consumption activities pour different kinds of waste.

The basic objective of the Water Accounts is to integrally order the information (physical and monetary) related to water resources in a coherent format which is useful to facilitate their management.

These accounts can be considered either as flow accounts or as natural resources accounts and they put in relation water's economic and environmental aspects, allowing to know, in addition, those flows' total balance.

The data used to generate the Water Accounts come from estimates elaborated by the INE. These accounts describe the flows (physical and monetary) associated to economic activities and their relation with the water resources[13] in a way compatible with the SEEA-03. Nevertheless, it has been necessary to modify some aspects of this information, as well as to work with a disaggregation of these accounts by 33 branches, before integrating them in a global system. This way, physical flows are presented considering some of the pressure exerted by the development of economic activities on water resources through:

- water collection;
- the return flows for water losses or wastewater spilling;
- the different responses to reduce or eliminate this pressure, such as the collection and processing of residual waters.

Figure 2 illustrates the main existing water flows between nature and the economy. The economic system, through its production and consumption activities, takes water from the physical system of continental or ocean water resources, either directly or through companies dedicated to the collection, treatment and distribution of water (N. 41 in the National Classification of Economic Activities, CNAE). Once processed by an economic unit, water constitutes an input that will be used as intermediate or final consumption. As a result of the productive and consumption processes wastewater is generated which – when not used by economic units – will be spilled directly to the natural environment or constitute an input for those companies dedicated to the collection and processing of residual waters (N. 90 in the CNAE), through which they will finally return to the environment in a less noxious state.

The central core of this information is therefore exclusively limited to the water taken for self-

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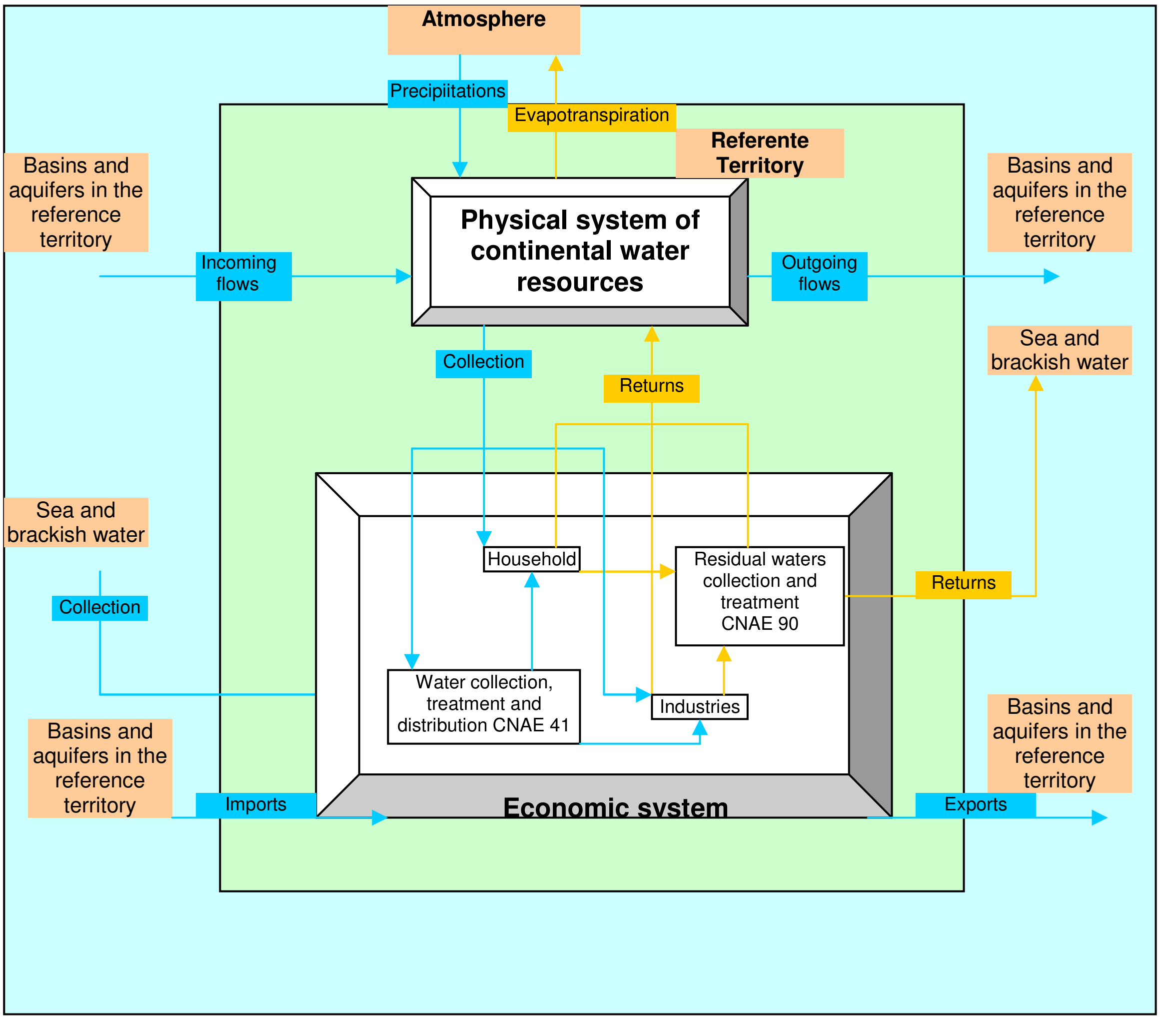
Protocol takes it into account when it comes to assessing atmospheric emissions.

[13] See the *Methodology to Elaborate Water Accounts* (available in the Internet at www.ine.es).

consumption or produced in order to be channelled as an economic product through supplying networks, thus excluding the water improper for human consumption. In this context, water accounts exclusively refer to the part of the hydrological system[14] composed of masses of superficial and underground water in the corresponding territory, the so-called *continental water system* (lakes, water reservoirs, rivers and aquifers). Some aspects, particularly the quality of the water taken or returned to nature, even if important to characterize the resources and the quality of the water existing in nature, are not treated in the frame previously presented, since they are still not available through official statistics.

Figure 2. General description of the main water flows.



Source: adapted from INE (2003).

Water collection consists in the extraction and/or collection of water from nature in order to store it for its

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[14] The hydrological system in a certain territory is composed of the water in the atmosphere, sea and ocean water

later use. The water collected may come from continental waters, be them superficial (rivers, lakes, reservoirs, etc.) or subterranean (those obtained through test drilling), or from other less important water resources associated to continental waters, including rain and sea water.

Table 5. Water flows balance between the economy and the environment. contains a summary of the water resources balance on which the main chapters in these accounts are disaggregated in 4 main activity branches defined by the CNAE. Table 8 in the statistical annexe contains this information by homogeneous branches. Data are expressed in physical terms (millions of litters collected, distributed, spilled or consumed and thus incorporated into the economy). From this balance an indicator is also obtained that we have called "apparent water consumption incorporated into the economy" (AWC). It is obtained this way:

AWC = Total water collection
- Water supply
+ Distributed water consumption
- Spilled wastewater
+ Collected wastewater
- Total water return flows.

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and the water on the surface and in the subsoil.

Table 5. Water flows balance between the economy and the environment.

Main activity branches. Units: millions of cubic meters		Water collection			Water distribution		Water consumption			Residual waters to the public sanitation system		Water returns			Apparent physical water consumption remaining in the economy
		Continental	Non-continental	Total	Water losses through distribution	Water supply	Distributed	Directly collected	Total	Discharged	Collected	From leakage, irrigation or sanitation	Direct	Total	
1	Primary	24.069,7	220,6	**24.290,4**	3.423,4	18.560,3	18.923,4	5.730,1	**24.653,5**	**19,1**	**0,0**	12.544,7	11,1	**12.555,8**	**12.078,6**
2	Industry and energy	13.006,8	198,8	**13.205,6**	1.001,0	4.282,3	435,1	8.923,3	**9.358,4**	**266,9**	**0,0**	1.001,0	6.753,8	**7.754,8**	**1.336,7**
3	Construction	0,0	0,0	**0,0**	0,0	0,0	36,3	0,0	**36,3**	**16,9**	**0,0**	0,0	0,0	**0,0**	**19,4**
4	Services	138,1	276,7	**414,8**	0,0	0,0	905,3	414,8	**1.320,1**	**508,8**	**2.909,1**	2.555,9	87,7	**2.643,5**	**1.076,9**
TOTAL ECONOMIC ACTIVITIES		**37.214,7**	**696,1**	**37.910,7**	**4.424,4**	**22.842,5**	**20.300,1**	**15.068,2**	**35.368,3**	**811,8**	**2.909,1**	**16.101,6**	**6.852,5**	**22.954,1**	**14.511,6**
Households		0,0	0,0	**0,0**	0,0	0,0	2.542,4	0,0	**2.542,4**	**2.097,4**	**0,0**	0,0	0,0	**0,0**	**445,1**
TOTAL DOMESTIC		**37.214,7**	**696,1**	**37.910,7**	**4.424,4**	**22.842,5**	**22.842,5**	**15.068,2**	**37.910,7**	**2.909,1**	**2.909,1**	**16.101,6**	**6.852,5**	**22.954,1**	**14.956,6**
Non residents in the national territory		0,0	0,0	**0,0**	0,0	0,0	33,1	0,0	**33,1**	**27,3**	**0,0**	0,0	0,0	**0,0**	**5,8**
Residents in the rest of the world		0,0	0,0	**0,0**	0,0	0,0	5,0	0,0	**5,0**	**4,2**	**0,0**	0,0	0,0	**0,0**	**0,9**
Total residents' household consumption		0,0	0,0	**0,0**	0,0	0,0	2.514,4	0,0	**2.514,4**	**2.074,3**	**0,0**	0,0	0,0	**0,0**	**440,2**
TOTAL RESIDENTS		**37.214,7**	**696,1**	**37.910,7**	**4.424,4**	**22.842,5**	**22.814,5**	**15.068,2**	**37.882,7**	**2.886,0**	**2.909,1**	**16.101,6**	**6.852,5**	**22.954,1**	**14.951,7**

Source: Environmental Water Accounts. Year 2000. INE. Own elaboration.

3.4 Integration of physical data into the SAMEA.

For the integration of physical data referring to the Environmental Water and Greenhouse Gas Emissions Accounts in the frame of the SAMEA, it is necessary to differentiate the origin-destination formulation and the symmetric or homogeneous branches version, given that each of these two configurations, as it has already been stated, aims at different objectives.

Water and greenhouse gas emission flows, as obtained in the precedent sections, are associated to the production of the different activity branches classified by their main activity. This information can be appropriately integrated in the SAMEA through an origin-destination formulation, as shown in tables 1, 2 and 3 in the annexe. These tables present the SAMEA with a breakdown of 4 homogeneous activity branches, and of 33 activity and/or product branches in the annexe, according to the P31 in the 1996 National Classification of Products by Activities (CNPA-96) and the A31 in the CNAE-93.

The integration of environmental accounts in the combined symmetric input-output formulation of the SAMEA demands an estimate of those flows associated to homogeneous activity branches. Therefore, an estimate has been done by implementing the following process:

- The technical coefficients of water emission or consumption related to production by activity branches are obtained.
- Considering the monetary origin table corresponding to year 2000, flows are disaggregated product-by-product.

For this reason, the data of environmental accounts, classified by main activity branches, and those of the symmetric input-output SAMEA version, classified by homogeneous branches, do not coincide.

The estimate of the SAMEA by homogeneous branches is shown in tables 4 and 5 in the statistical annexe with a breakdown of 4 homogeneous activity branches, and of 33 activity branches and/or products in the annexe, according to the P31 classification in the CNPA-96 and to the A31 in the CNAE-93.

4 CONCLUSIONS.

The development of this research has allowed tackling in depth a topic still quite new, considering the scarce bibliographical references found, at least in the Spanish national context: hybrid flow systems and, particularly, the System of Social and Environmental Accounting Matrices (SAMEA). At the same time, an application has been implemented that integrates a Social Accounting Matrix with the environmental accounts on water and atmospheric emissions in the context of Spanish reality on year 2000. This application is more descriptive than exhaustive, and tries to show the potential and capacity this accounting tool presents for an analysis that aims at integrating economy and environment. As we see it, a more ambitious application, such as those implemented in other European countries, must wait until we have provided ourselves with more ambitious socio-economic and environmental information systems, the kind those accounting systems demand.

The most relevant aspect of this research is that it presents an original integrated economic and environmental information system which resolves reasonably well the integration of three basic pillars in the modern accounting system: the Input-Output Table, Spanish National Accounts and the available Environmental Water and Emissions Accounts. The design achieved is enriching and, through its enlarged multipliers, allows calculating the multiple impacts between, on the one hand, productive economy, distribution processes and the redistribution of incomes, and, on the other, two relevant environmental aspects: the greenhouse effect and the water resources.

Starting with the main objective proposed, that is, the contribution to the improvement of the National Accounts statistical presentation system by integrating in it the environmental perspective, this research has allowed us to from a theoretical point of view, the most relevant contribution has consisted in presenting a systematization of the general reference frame that helps to place and understand better the proposal finally adopted by the United Nations in the sense of integrating in the same accounting scheme information of different natures: the SEEA-93 and its later reformulation, the SEEA-03, taken as the methodological basis for this research. From a methodological point of view, the main contributions is the construction of a SAMEA system for Spain adapted to the SEEA-03 and to the official statistics available, and applied to water resources and to greenhouse gas emissions. This SAMEA has been presented in its two main versions: one with an use-make formulation and one symmetric or by homogeneous branches, for each of them aims at different goals. The structure of this presentation means a progress when compared to the usual Input-Output Table presentations in Spain and in the EU.

In the proposed SAMEA system, a first set of tables incorporates a combined use-make table (UMT), the one most adequate when it comes to analyzing first order relations, since it allows to visualize the basic structural relations in the economy and their interactions with the environment, as well as to calculate the direct effects without having to formulate additional hypotheses, thus providing a more detailed information. Three versions are offered with this formulation: totals at purchase prices, totals at basic prices and domestic goods at basic prices. The presentations at purchase and basic prices allow visualizing the important influence of the transportation and commercial distribution processes on final market prices.

Symmetric versions join the goods and services account and the production account into one and, therefore, incorporate in their formulation a symmetric input-output table that includes details on homogeneous branches at basic prices. This structure is relevant if we want to obtain the so-called SAMEA multipliers whose function is to clarify the direct repercussions and those induced by the interrelations generated between productive and institutional sectors. Two versions are offered: one at basic prices that serves as a basis to calculate enlarged multipliers, and a domestic one that makes it possible to calculate the impacts on the economy and/or on the national environment.

Finally, from a statistical point of view, the main contributions are:

- The estimation of a satellite system of environmental accounts referred to water resources and atmospheric emissions by using the proposal presented in the SEEA-03 and applying it, in physical terms, on year 2000. Based on the information provided by the INE, the integration of these accounts in the frame of a SAMEA has required a process of adaptation and reformulation conditioned by the double presentation perspective applied: use-make and symmetric.

- The estimate of a Social Accounting Matrices System for year 2000, according to the structures of the SNA-93 and the ESA-95 and based on the estimate of the Input-Output Table for year 2000 and on the information available from the Spanish National Accounts.

Also, we have put before the scientific community the utility of this integrated accounting information system as a guide when dealing with economic and environmental policies.

Nevertheless, we would like to finish this work offering some suggestions which will certainly help improve its possible applications. In brief, it is about incorporating new official statistical data that will allow analyzing in detail some aspects of great interest in relation to fiscal, personal income distribution or environmental policies. In order to do that, it would be necessary to disaggregate different chapters and agents present on each account in the SAMEA as to capture their interesting social and environmental aspects. It can thus be appreciated that the SAMEA, as an integrated accounting information system, can be, despite its limitations, an important tool to help us find our way when dealing with economic and environmental policies, that is, a useful tool to understand the present and better plan the future.

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7 TABLES.

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Table 1. Spanish Social and Environmental Accounting Matrix. Water resources and Greenhouse effect gases. Year 2000.

Combined origin-destination version at purchase prices. Details on four products, four main activity branches, five institutional sectors and the rest of the world.

Units: millions of euros, millions of water cubic metres and thousands of CO_2 tonnes.

MCS-ESP_pa_2000

Columns 1–19 (1–6: Goods and services account by products; 7–10: Production account by main activity branches; 11–14: Exploitation account by factors of production categories; National economy — 15–19: Primary income assignment account by institutional sectors)

Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Goods and services account by products: Primary (1)							3.091	22.003	399	4.561									
Industry and energy (2)							10.755	212.379	40.260	83.886									
Construction (3)							219	1.357	28.433	14.119									
Services (4)	10.402	87.385	0	-97.788			2.106	55.819	10.659	134.340									
Residents' external consumption (5)																			
Non residents' internal consumption (6)																			
Production account by main activity branches: Primary (7)	38.775	1.136	314	930															
Industry and energy (8)	0	396.181	355	14.239															
Construction (9)	47	532	123.285	3.471															
Services (10)	182	4.392	1.539	609.569															
Exploitation account by factors of production categories: Labour (11)							4.492	68.189	30.754	208.741									
Taxes: Net taxes on products (12)	-2.158	36.604	5.906	19.351															
Other net taxes on production (13)							-988	-428	548	3.764									
Capital (14)							[illegible]	[illegible]	[illegible]	166.270									
National economy — Primary income assignment account by institutional sectors: Non-financial societies (15)											0	0	0	110.510	5.870	4.786	1.064	489	6
Financial institutions (16)											0	0	0	10.553	12.935	26.751	10.666	4.832	63
Public administrations (17)											0	60.554	3.876	9.915	3.496	2.069	355	189	2
Households (18)											312.020	0	0	124.227	9.109	17.811	3.957	2.429	23
NPISHs (19)															73	138	54	25	0
Secondary income distribution account by institutional sectors: Non-financial societies (20)															85.868				
Financial institutions (21)																13.364			
Public administrations (22)																	60.900		
Households (23)																		464.314	
NPISHs (24)																			
Disposable income use account by institutional sectors: Non-financial societies (25)																			
Financial institutions (26)																			
Public administrations (27)																			
Households (28)						32.738													
NPISHs (29)																			
Net estate variation account by institutional sectors: Non-financial societies (30)																			
Financial institutions (31)																			
Public administrations (32)																			
Households (33)																			
NPISHs (34)																			
Non-financial assets acquisition account (35)																			
Rest of the world: Current (36)	6.193	166.876	18	26.363	5.561						915				10.397	12.259	4.365	1.977	26
Accumulation (37)																			
TOTAL (38)	53.441	693.107	131.417	576.134	5.561	32.738	41.155	410.775	127.335	615.681	312.935	60.554	3.876	255.488	127.748	77.178	81.362	474.255	629
ENVIRONMENT — Water collection: Continental (39)							24.070	13.007	0	138									
Non-continental (40)							221	199	0	277									
Residual water reusing, treatment and processing (41)							0	0	0	2.909									
Total water used and reused by the economy (42)							24.290	13.206	0	3.324									
ENVIRONMENT — Water consumption: Distributed (43)						33	18.923	435	36	905									
Directly collected (44)							5.730	8.923	0	415									
Total (45)					0	33	24.654	9.358	36	1.320									

Columns 20–38 and Environment (20–24: Secondary income distribution account by institutional sectors; 25–29: Disposable income use account by institutional sectors; 30–34: Net estate variation account by institutional sectors; 35: Non-financial assets acquisition account; 36–37: Rest of the world; 38: TOTAL; ENVIRONMENT: E1 Water returns through: leakage (irrigation and sanitation); E2 Direct water returns; E3 NET FLOWS FROM THE ENVIRONMENT TO THE ECONOMY; E4 Greenhouse effect emissions to the national environment; E5 Greenhouse effect emissions to the rest of the world's environment)

Row	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	E1	E2	E3	E4	E5
Primary (1)								0	14.648	0						1.100	7.639		53.441					
Industry and energy (2)								7.243	167.079	0						53.737	117.767		693.107					
Construction (3)								0	3.391	0						83.890	9		131.417					
Services (4)								101.117	212.633	5.426						26.891	27.144		576.134					
Residents' external consumption (5)									5.561										5.561					812
Non residents' internal consumption (6)																	32.738		32.738				4.781	
Primary (7)																			41.155	12.545	11	12.078	40.075	
Industry and energy (8)																			410.775	1.001	6.754	1.337	198.429	
Construction (9)																			127.335	0	0	19	2.684	
Services (10)																			615.681	2.556	88		49.725	3.198
Labour (11)																	759		312.935					
Net taxes on products (12)																	851		60.554					
Other net taxes on production (13)																	980		3.876					
Capital (14)																			255.488					
Non-financial societies (15)																	5.022		127.748					
Financial institutions (16)																	11.378		77.178					
Public administrations (17)																	906		81.362					
Households (18)																	4.679		474.255					
NPISHs (19)																	55		629					
Non-financial societies (20)	0	3.120	0	4.486	0												18		93.492					
Financial institutions (21)	3.778	70	105	14.009	17												160		31.503					
Public administrations (22)	18.209	3.443	90.079	126.711	104												1.441		300.887					
Households (23)	6.193	13.620	78.859	18.226	910												4.203		586.326					
NPISHs (24)	344	144	817	4.129	205												914		7.060					
Non-financial societies (25)	64.620					0	0	0	0	0									64.620					
Financial institutions (26)		10.956				0	0	0	0	0									10.956					
Public administrations (27)			127.378			0	0	0	0	0									127.378					
Households (28)				415.873		-228	1.673	0	0	0									450.056				54.118	
NPISHs (29)						0	0	0	0	0									5.824					
Non-financial societies (30)						15.518					0	0	5.196	0	0			829	21.543					
Financial institutions (31)							6.210				906	217	0	0	0			0	7.333					
Public administrations (32)								9.103			-1.767	0	4.642	1.088	0			4.197	17.263					
Households (33)									23.289		980	4.670	2.520	46	5			1.042	32.552					
NPISHs (34)										115	14	67	113	0	0			67	376					
Non-financial assets acquisition account (35)						49.330	3.073	9.915	23.456	283						-25			165.568					
Current (36)	348	150	3.649	2.893	0														241.990				302	
Accumulation (37)											75	0	476	334	37	-25	25.326		26.223					
TOTAL (38)	93.492	31.503	300.887	586.326	7.060	64.620	10.956	127.378	450.056	5.824	21.543	7.333	17.263	32.552	376	165.568	241.990	26.223						
Continental (39)																			37.213			14.958		
Non-continental (40)																			696			-37.911		
Residual water reusing, treatment and processing (41)																			2.909					
Total water used and reused by the economy (42)																			40.820			22.954		
Distributed (43)									2.509										22.842					
Directly collected (44)																			15.068					
Total (45)									2.509										37.911					

Notes:

(a) In the Economy part: in normal print the monetary data from the Input-Output Frame; in bold print the data from the income cycle closure matrix, and on dark background and white print the accounting balances.

(b) In the Environment part: in bold print and shaded background the Environmental Accounts in physical terms, and on dark background and white print the accounting balances.

Sources: 1993 System of National Accounts (SNA-93); 1995 European System of Accounts (ESA-95) and ***The Handbook on Social Accounting Matrices and Labour Accounts*** **; 2003 System of Integrated Economic and Environmental Accounting (SEEA-03). Own elaboration.**

Table 2. Spanish Social and Environmental Accounting Matrix. Water resources and Greenhouse effect gases. Year 2000.

Combined origin-destination version at basic prices. Details on four products, four main activity branches, five institutional sectors and the rest of the world.

Units: millions of euros, millions of water cubic metres and thousands of CO_2 tonnes.

MCS-ESP-RAP_pb_2000	No.	Goods and services account by products						Production account by main activity branches				Exploitation account by factors of production categories				National economy: Primary income assignment account by institutional sectors					Secondary income distribution account by institutional sectors					Disposable income use account by institutional sectors					Net estate variation account by institutional sectors					Non-financial assets acquisition account	Rest of the world		TOTAL	ENVIRONMENT: Water returns through: leakage, irrigation and sanitation	Direct water returns	NET FLOWS FROM THE ENVIRONMENT TO THE ECONOMY (-)	Greenhouse effect emissions to the national environment	Greenhouse effect emissions to the rest of the world's environment
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38					
Goods and services account by products: Primary	1							3.018	21.943	405	3.640																	0	7.790	0						946	7.453		45.197					
Industry and energy	2							9.607	201.392	34.877	68.919																	4.755	92.537	0						47.777	109.254		569.117					
Construction	3							219	1.357	28.432	13.526																	0	3.177	0						78.791	9		125.511					
Services	4							3.719	68.437	15.463	140.783																	103.294	254.883	5.426						26.509	36.058		654.572					
Residents' external consumption	5																												5.561										5.561					812
Non residents' internal consumption	6																																				32.738		32.738				4.781	
Production account by main activity branches: Primary	7	38.775	1.136	314	930																																		41.155,	12.545	11	12.078,	40.075	
Industry and energy	8	0	396.181	355	14.239																																		410.775	1.001	6.754	1.337	198.429	
Construction	9	47	532	123.285	3.471																																		127.335	0	0	19	2.684	
Services	10	182	4.392	1.539	609.569																																		615.681,0	2.556	88		49.725	3.198
Exploitation account by factors of production categories: Labour	11							4.492	68.189	30.754	208.741																										759		312.935					
Taxes: Net taxes on products	12							-392	-1.570	575	10.038																	311	39.363							11.594	635		60.554					
Other net taxes on production	13							-988	-428	548	3.764																										980		3.876					
Capital	14							21.480	51.456	16.282	166.270																												255.488					
National economy – Primary income assignment account by institutional sectors: Non-financial societies	15											0	0	0	110.510	5.870	4.786	1.064	489	6																	5.022		127.748					
Financial institutions	16											0	0	0	10.553	12.935	26.751	10.660	4.832	63																	11.378		77.178					
Public administrations	17											0	60.554	3.876	9.915	3.496	2.069	355	189	2																	906		81.362					
Households	18											312.020	0	0	124.227	9.109	17.811	3.957	2.429	23																	4.679		474.255					
NPISHs	19															73	139	54	25	0																	55		629					
Secondary income distribution account by institutional sectors: Non-financial societies	20															85.868					0	3.120	0	4.486	0												18		93.492					
Financial institutions	21																13.364				3.778	70	105	14.009	17												160		31.503					
Public administrations	22																	60.900			18.209	3.443	90.079	126.711	104												1.441		300.887					
Households	23																		464.314		6.193	13.620	78.859	18.226	910												4.203		586.326					
NPISHs	24																				344	144	817	4.129	205												914		7.060					
Disposable income use account by institutional sectors: Non-financial societies	25																				64.620					0	0	0	0	0									64.620					
Financial institutions	26																					10.956				0	0	0	0	0									10.956					
Public administrations	27																						127.378			0	0	0	0	0									127.378					
Households	28						32.738																	415.873		-228	1.673	0	0	0									450.056				54.118	
NPISHs	29																									0	0	0	0	0									5.824					
Net estate variation account by institutional sectors: Non-financial societies	30																									15.518					0	0	5.196	0	0			829	21.543					
Financial institutions	31																										6.210				906	217	0	0	0			0	7.333					
Public administrations	32																											9.103			-1.767	0	4.642	1.088	0			4.197	17.263					
Households	33																												23.289		980	4.670	2.520	46	5			1.042	32.552					
NPISHs	34																													115	14	67	113	0	0			67	376					
Non-financial assets acquisition account	35																									49.330	3.073	9.915	23.456	283						-25			165.568					
Rest of the world: Current	36	6.193	166.876	18	26.363	5.561						915				10.397	12.259	4.365	1.977	26	348	150	3.649	2.893	0														241.990				302	
Accumulation	37																														75	0	476	334	37	-25	25.326		26.223					
TOTAL	38	45.197	569.117	125.511	654.572		32.738	41.155	410.775	127.335	615.681	312.935	60.554	3.876	255.488	127.748	77.178	81.362	474.255	629	93.492	31.503	300.887	586.326	7.060	64.620	10.956	127.378	450.056	5.824	21.543	7.333	17.263	32.552	376	165.568	241.990	26.223				14.958		
ENVIRONMENT – Water collection: Continental	39							24.070	13.007	0	138																												37.215			-37.911		
Non-continental	40							221	199	0	277																												696					
Residual water reusing, treatment and processing	41							0	0	0	2.909																												2.909					
Total water used and reused by the economy	42							24.290	13.206	0	3.324																												40.820			22.954		

ENVIRONMENT REMINDER

Water consumption	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Distributed	43						33	18.923	435	36	905																		2.509										22.842
Directly collected	44							5.730	8.923	0	415																												15.068
Total	45						33	24.654	9.358	36	1.320																		2.509										37.910

Notes:

(a) In the Economy part: in normal print the monetary data from the Input-Output Frame; in bold print the data from the income cycle closure matrix, and on dark background and white print the accounting balances.

(b) In the Environment part: in bold print and shaded background the Environmental Accounts in physical terms, and on dark background and white print the accounting balances.

Sources: 1993 System of National Accounts (SNA-93); 1995 European System of Accounts (ESA-95) and *The Handbook on Social Accounting Matrices and Labour Accounts*; 2003 System of Integrated Economic and Environmental Accounting (SEEA-03). Own elaboration.

Table 3. Spanish Social and Environmental Accounting Matrix. Water resources and Greenhouse effect gases. Year 2000.

Combined origin-destination version at basic prices. Details on four products, four main activity branches, five institutional sectors and the rest of the world.

Units: millions of euros, millions of water cubic metres and thousands of CO_2 tonnes.

MCS-ESP-DOM-RAP_pb_2000			Goods and services account by products						Production account by main activity branches				Exploitation account by factors of production categories				Primary income assignment account by institutional sectors					Secondary income distribution account by institutional sectors					Disposable income use account by institutional sectors					Net estate variation account by institutional sectors					Non-financial assets acquisition account	Rest of the world		TOTAL	Water returns through: leakage, irrigation and sanitation	Direct water returns	ENVIRONMENT: NET FLOWS FROM THE ENVIRONMENT TO THE ECONOMY (-)	Greenhouse effect emissions to the national environment	Greenhouse effect emissions to the rest of the world's environment
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38					
Goods and services account by products	Primary	1							2.821	17.880	405	3.487																	0	6.012	0						946	7.453		39.004					
	Industry and energy	2							8.040	115.372	28.474	57.931																	3.609	58.989	0						20.571	109.254		402.241					
	Construction	3							219	1.357	28.432	13.508																	0	3.177	0						78.791	9		125.493					
	Services	4							3.331	60.009	13.467	128.691																	103.294	253.177	5.426						24.756	36.058		628.209					
	Residents' external consumption	5																												5.561										5.561					812
	Non-residents' internal consumption	6																																				32.738		32.738				4.781	
Production account by main activity branches	Primary	7	38.775	1.136	314	930																																		41.155,(	12.545	11	12.078,(	40.075	
	Industry and energy	8	0	396.181	355	14.239																																		410.775	1.001	6.754	1.337	198.429	
	Construction	9	47	532	123.285	3.471																																		127.335	0	0	19	2.684	
	Services	10	182	4.392	1.539	609.569																																		615.681,(	2.556	88		49.725	3.198
Exploitation account by factors of production categories	Labour	11							4.492	68.189	30.754	208.741																										759		312.935					
	Taxes: Net taxes on products	12							-392	-1.570	575	10.038																	311	39.363							11.594	635		60.554					
	Other net taxes on production	13							-988	-428	548	3.764																										980		3.876					
Primary income assignment account by institutional sectors	Capital	14							21.480	51.456	16.282	166.270																												255.488					
National economy	Non-financial societies	15											0	0	0	110.510	5.870	4.786	1.064	489	6																	5.022		127.748					
	Financial institutions	16											0	0	0	10.553	12.935	26.751	10.666	4.832	63																	11.378		77.178					
	Public administrations	17											0	60.554	3.876	9.915	3.496	2.069	355	189	2																	906		81.362					
	Households	18											312.020	0	0	124.227	9.109	17.811	3.957	2.429	23																	4.679		474.255					
	NPISHs	19															73	138	54	25	0																	55		629					
Secondary income distribution account by institutional sectors	Non-financial societies	20															85.868					0	3.120	0	4.486	0												18		93.492					
	Financial institutions	21																13.364				3.778	70	105	14.009	17												160		31.503					
	Public administrations	22																	60.900			18.209	3.443	90.079	126.711	104												1.441		300.887					
	Households	23																		464.314		6.193	13.620	78.859	18.226	910												4.203		586.326					
	NPISHs	24																				344	144	817	4.129	205												914		7.060					
Disposable income use account by institutional sectors	Non-financial societies	25																				64.620					0	0	0	0	0									64.620					
	Financial institutions	26																					10.956				0	0	0	0	0									10.956					
	Public administrations	27																						127.378			0	0	0	0	0									127.378					
	Households	28						32.738																	415.873		-228	1.673	0	0	0									450.056				54.118	
	NPISHs	29																									0	0	0	0	0									5.824					
Net estate variation account by institutional sectors	Non-financial societies	30																									15.518					0	0	5.196	0	0			829	21.543					
	Financial institutions	31																										6.210				906	217	0	0	0			0	7.333					
	Public administrations	32																											9.103			-1.767	0	4.642	1.088	0			4.197	17.263					
	Households	33																												23.289		980	4.670	2.520	46	5			1.042	32.552					
	NPISHs	34																													115	14	67	113	0	0			67	376					
Non-financial assets acquisition account		35																									49.330	3.073	9.915	23.456	283						-25			165.568					
Rest of the world	Current	36					5.561		2.152	98.511	8.399	23.251	915	0	0	0	10.397	12.259	4.365	1.977	26	348	150	3.649	2.893	0	0	0	1.146	37.032	0						28.960			241.990				302	
	Accumulation	37																														75	0	476	334	37	-25	25.326		26.223					
TOTAL		38	39.004	402.241	125.493	628.209	5.561	32.738	41.155	410.775	127.335	615.681	312.935	60.554	3.876	255.488	127.748	77.178	81.362	474.255	629	93.492	31.503	300.887	586.326	7.060	64.620	10.956	127.378	450.056	5.824	21.543	7.333	17.263	32.552	376	165.568	241.990	26.223				14.958		
ENVIRONMENT: Water collection	Continental	39							24.070	13.007	0	138																												37.215			-37.911		
	Non-continental	40							221	199	0	277																												696					
Residual water reusing, treatment and processing		41							0	0	0	2.909																												2.909					
Total water used and reused by the economy		42							24.290	13.206	0	3.324																												40.820			22.954		

ENVIRONMENT REMINDER			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Water consumption	Distributed	43						33	18.923	435	36	905																		2.509										22.842
	Directly collected	44							5.730	8.923	0	415																												15.068
	Total	45						33	24.654	9.358	36	1.320																		2.509										37.910

Notes:

(a) In the Economy part: in normal print the monetary data from the Input-Output Frame; in bold print the data from the income cycle closure matrix, and on dark background and white print the accounting balances.

(b) In the Environment part: in bold print and shaded background the Environmental Accounts in physical terms, and on dark background and white print the accounting balances.

Sources: 1993 System of National Accounts (SNA-93); 1995 European System of Accounts (ESA-95) and *The Handbook on Social Accounting Matrices and Labour Accounts*; 2003 System of Integrated Economic and Environmental Accounting (SEEA-03). Own elaboration.

Table 4. Spanish Social and Environmental Accounting Matrix. Water resources and Greenhouse effect gases. Year 2000.

Version with four homogeneous activity branches, five institutional sectors and the rest of the world.

Units: millions of euros, millions of water cubic metres and thousands of CO_2 tonnes.

MCS-ESP-RAH_pb_2000

Columns 1–12 (1–6: Production account by homogeneous activity branches; 7–10: Exploitation account by factors of production categories; 11–12: Primary income assignment account by institutional sectors — National economy)

Row account	No.	1	2	3	4	5	6	7	8	9	10	11	12
National economy — Production account by homogeneous activity branches: Primary	1	2.970	23.360	401	2.276								
Industry and energy	2	9.155	200.344	35.488	69.807								
Construction	3	212	1.350	28.035	13.937								
Services	4	3.530	65.951	14.986	143.934								
Residents' external consumption	5												
Non residents' internal consumption	6												
Exploitation account by factors of production categories: Labour	7	3.863	65.563	30.568	212.182								
Taxes: Net taxes on products	8	-390	-1.647	556	10.132								
Taxes: Other net taxes on production	9	-971	-391	545	3.713								
Capital	10	20.63	47.71	14.91	172.22								
Primary income assignment account by institutional sectors: Non-financial societies	11							0	0	0	110.510	5.870	4.786
Financial institutions	12							0	0	0	10.553	12.935	26.751
Public administrations	13							0	60.554	3.876	9.915	3.496	2.069
Households	14							312.020	0	0	124.227	9.109	17.811
NPISHs	15											73	138
Secondary income distribution account by institutional sectors: Non-financial societies	16											85.868	
Financial institutions	17												13.364
Public administrations	18												
Households	19												
NPISHs	20												
Disposable income use account by institutional sectors: Non-financial societies	21												
Financial institutions	22												
Public administrations	23												
Households	24						32.738						
NPISHs	25												
Net estate variation account by institutional sectors: Non-financial societies	26												
Financial institutions	27												
Public administrations	28												
Households	29												
NPISHs	30												
Non-financial assets acquisition account	31												
Rest of the world: Current	32	6.193	166.876	18	26.363	5.561		915				10.397	12.259
Rest of the world: Accumulation	33												
TOTAL	34	45.197	569.117	125.511	654.572	5.561	32.738	312.935	60.554	3.876	255.488	127.748	77.178
ENVIRONMENT — Water collection: Continental	35	22.838	12.344	376	1.657								
Water collection: Non-continental	36	209	187	4	296								
Residual water reusing, treatment and processing	37	0	0	0	2.909								
Total water used and reused by the economy	38	23.047	12.531	380	4.862								
ENVIRONMENT — Water consumption: Distributed	39	17.955	785	191	1.370		33						
Water consumption: Directly collected	40	5.435	8.602	135	896								
Water consumption: Total	41	23.391	9.387	325	2.266		33						

Columns 13–25 (13–15: Primary income assignment account by institutional sectors; 16–20: Secondary income distribution account by institutional sectors; 21–25: Disposable income use account by institutional sectors)

Row account	No.	13	14	15	16	17	18	19	20	21	22	23	24	25
Primary	1											0	7.790	0
Industry and energy	2											4.755	92.537	0
Construction	3											0	3.177	0
Services	4											103.294	254.883	5.426
Residents' external consumption	5												5.561	
Non residents' internal consumption	6													
Labour	7													
Net taxes on products	8											311	39.363	
Other net taxes on production	9													
Capital	10													
Non-financial societies	11	1.064	489	6										
Financial institutions	12	10.666	4.832	63										
Public administrations	13	355	189	2										
Households	14	3.957	2.429	23										
NPISHs	15	54	25	0										
Non-financial societies	16				0	3.120	0	4.486	0					
Financial institutions	17				3.778	70	105	14.009	17					
Public administrations	18	60.900			18.209	3.443	90.079	126.711	104					
Households	19		464.314		6.193	13.620	78.859	18.226	910					
NPISHs	20				344	144	817	4.129	205					
Non-financial societies	21				64.620					0	0	0	0	0
Financial institutions	22					10.956				0	0	0	0	0
Public administrations	23						127.378			0	0	0	0	0
Households	24							415.873		-228	1.673	0	0	0
NPISHs	25									0	0	0	0	0
Non-financial societies	26									15.518				
Financial institutions	27										6.210			
Public administrations	28											9.103		
Households	29												23.289	
NPISHs	30													115
Non-financial assets acquisition account	31									49.330	3.073	9.915	23.456	283
Rest of the world: Current	32	4.365	1.977	26	348	150	3.649	2.893	0	0	0	0	0	0
Rest of the world: Accumulation	33													
TOTAL	34	81.362	474.255	629	93.492	31.503	300.887	586.326	7.060	64.620	10.956	127.378	450.056	5.824
Water collection: Continental	35													
Water collection: Non-continental	36													
Residual water reusing, treatment and processing	37													
Total water used and reused by the economy	38													
Water consumption: Distributed	39												2.509	
Water consumption: Directly collected	40													
Water consumption: Total	41												2.509	

Columns 26–39 (26–30: Net estate variation account by institutional sectors; 31: Non-financial assets acquisition account; 32–33: Rest of the world; 34: TOTAL; 35–39: ENVIRONMENT — 35: Water returns through: leakage, irrigation and sanitation; 36: Direct water returns; 37: NET FLOWS FROM THE ENVIRONMENT TO THE ECONOMY; 38: Greenhouse effect emissions to the national environment; 39: Greenhouse effect emissions to the rest of the world's environment)

Row account	No.	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Primary	1						946	7.453		45.197	11.903	9	12.078,6	37.699	
Industry and energy	2						47.777	109.254		569.117	1.103	6.563	1.337	194.366	
Construction	3						78.791	9		125.511	124	56	19	4.045	
Services	4						26.509	36.058		654.572	2.970	224		54.803	3.198
Residents' external consumption	5									5.561					812
Non residents' internal consumption	6							32.738		32.738				4.781	
Labour	7							759		312.935					
Net taxes on products	8						11.594	635		60.554					
Other net taxes on production	9							980		3.876					
Capital	10									255.488					
Non-financial societies	11							5.022		127.748					
Financial institutions	12							11.378		77.178					
Public administrations	13							906		81.362					
Households	14							4.679		474.255					
NPISHs	15							55		629					
Non-financial societies	16							18		93.492					
Financial institutions	17							160		31.503					
Public administrations	18							1.441		300.887					
Households	19							4.203		586.326					
NPISHs	20							914		7.060					
Non-financial societies	21									64.620					
Financial institutions	22									10.956					
Public administrations	23									127.378					
Households	24									450.056				54.118	
NPISHs	25									5.824					
Non-financial societies	26	0	0	5.196	0	0			829	21.543					
Financial institutions	27	906	217	0	0	0			0	7.333					
Public administrations	28	-1.767	0	4.642	1.088	0			4.197	17.263					
Households	29	980	4.670	2.520	46	5			1.042	32.552					
NPISHs	30	14	67	113	0	0			67	376					
Non-financial assets acquisition account	31						-25			165.568					
Rest of the world: Current	32									241.990				302	
Rest of the world: Accumulation	33	75	0	476	334	37	-25	25.326		26.223					
TOTAL	34	21.543	7.333	17.263	32.552	376	165.568	241.990	26.223				14.958		
Water collection: Continental	35									37.215			-37.911		
Water collection: Non-continental	36									696					
Residual water reusing, treatment and processing	37									2.909					
Total water used and reused by the economy	38									40.820			22.954		
Water consumption: Distributed	39									22.842					
Water consumption: Directly collected	40									15.068					
Water consumption: Total	41									37.910					

Notes:
(a) In the Economy part: in normal print the monetary data from the Input-Output Frame; in bold print the data from the income cycle closure matrix, and on dark background and white print the accounting balances.
(b) In the Environment part: in bold print and shaded background the Environmental Accounts in physical terms, and on dark background and white print the accounting balances.

Sources: 1993 System of National Accounts (SNA-93); 1995 European System of Accounts (ESA-95); *Handbook on Social Accounting Matrices and Labour Accounts*; 2003 System of Integrated Economic and Environmental Accounting (SEEA-03). Own elaboration.

Table 5. Spanish Social and Environmental Accounting Matrix. Water resources and Greenhouse effect gases. Year 2000.

Version with four homogeneous activity branches, five institutional sectors and the rest of the world.

Units: millions of euros, millions of water cubic metres and thousands of CO_2 tonnes.

			National economy: Production account by homogeneous activity branches						Exploitation account by factors of production categories				Primary income assignment account by institutional sectors					Secondary income distribution account by institutional sectors					Disposable income use account by institutional sectors					Net estate variation account by institutional sectors					Non-financial assets acquisition account	Rest of the world		TOTAL	ENVIRONMENT: Water returns through: leakage, irrigation and sanitation	Direct water returns	NET FLOWS FROM THE ENVIRONMENT TO THE ECONOMY ( )	Greenhouse effect emissions to the national environment	Greenhouse effect emissions to the rest of the world's environment
MCS-ESP-DOM-RAH_pb_2000			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
National economy – Production account by homogeneous activity branches	Primary	1	2.782	19.277	401	2.133																			0	6.012	0						946	7.453		39.004	12.545	11	12.078,6	37.699	
	Industry and energy	2	7.626	114.519	28.991	58.683																			3.609	58.989	0						20.571	109.254		402.241	1.001	6.754	1.337	194.366	
	Construction	3	212	1.350	28.035	13.919																			0	3.177	0						78.791	9		125.493	0	0	19	4.045	
	Services	4	3.154	57.692	13.130	131.522																			103.294	253.177	5.426						24.756	36.058		628.209	2.556	88		54.803	3.198
	Residents' external consumption	5																								5.561										5.561					812
	Non-residents' internal consumption	6																																32.738		32.738				4.781	
Exploitation account by factors of production categories	Labour	7	3.863	65.563	30.568	212.182																												759		312.935					
	Taxes: Net taxes on products	8	-390	-1.647	556	10.132																			311	39.363							11.594	635		60.554					
	Taxes: Other net taxes on production	9	-971	-391	545	3.713																												980		3.876					
	Capital	10	20.63	47.71	14.91	172.22																														255.488					
Primary income assignment account by institutional sectors	Non-financial societies	11							0	0	0	110.510	5.870	4.786	1.064	489	6																	5.022		127.748					
	Financial institutions	12							0	0	0	10.553	12.935	26.751	10.666	4.832	63																	11.378		77.178					
	Public administrations	13							0	60.554	3.876	9.915	3.496	2.069	355	189	2																	906		81.362					
	Households	14							312.020	0	0	124.227	9.109	17.811	3.957	2.429	23																	4.679		474.255					
	NPISHs	15											73	138	54	25	0																	55		629					
Secondary income distribution account by institutional sectors	Non-financial societies	16											85.868					0	3.120	0	4.486	0												18		93.492					
	Financial institutions	17												13.364				3.778	70	105	14.009	17												160		31.503					
	Public administrations	18													60.900			18.209	3.443	90.079	126.711	104												1.441		300.887					
	Households	19														464.314		6.193	13.620	78.859	18.226	910												4.203		586.326					
	NPISHs	20																344	144	817	4.129	205												914		7.060					
Disposable income use account by institutional sectors	Non-financial societies	21																64.620					0	0	0	0	0									64.620					
	Financial institutions	22																	10.956				0	0	0	0	0									10.956					
	Public administrations	23																		127.378			0	0	0	0	0									127.378					
	Households	24						32.738													415.873		-228	1.673	0	0	0									450.056				54.118	
	NPISHs	25																					0	0	0	0	0									5.824					
Net estate variation account by institutional sectors	Non-financial societies	26																					15.518					0	0	5.196	0	0			829	21.543					
	Financial institutions	27																						6.210				906	217	0	0	0			0	7.333					
	Public administrations	28																							9.103			-1.767	0	4.642	1.088	0			4.197	17.263					
	Households	29																								23.289		980	4.670	2.520	46	5			1.042	32.552					
	NPISHs	30																									115	14	67	113	0	0			67	376					
Non-financial assets acquisition account		31																					49.330	3.073	9.915	23.456	283						-25			165.568					
Rest of the world	Current	32	2.094	98.167	8.354	23.697	5.561		915				10.397	12.259	4.365	1.977	26	348	150	3.649	2.893	0	0	0	1.146	37.032	0						28.960			241.990				302	
	Accumulation	33																										75	0	476	334	37	-25	25.326		26.223					
TOTAL		34	39.004	402.241	125.493	628.209	5.561	32.738	312.935	60.554	3.876	255.488	127.748	77.178	81.362	474.255	629	93.492	31.503	300.887	586.326	7.060	64.620	10.956	127.378	450.056	5.824	21.543	7.333	17.263	32.552	376	165.568	241.990	26.223				14.958		
ENVIRONMENT – Water collection	Continental	35	22.838	12.344	376	1.657																														37.215			-37.911		
	Non-continental	36	209	187	4	296																														696					
Residual water reusing, treatment and processing		37	0	0	0	2.909																														2.909					
Total water used and reused by the economy		38	23.047	12.531	380	4.862																														40.820			22.954		
ENVIRONMENT – Water consumption	Distributed	39	17.955	785	191	1.370		33																		2.509										22.842					
	Directly collected	40	5.435	8.602	135	896																														15.068					
	Total	41	23.391	9.387	325	2.266		33																		2.509										37.910					

Notes:
(a) In the Economy part: in normal print the monetary data from the Input-Output Frame; in bold print the data from the income cycle closure matrix, and on dark background and white print the accounting balances.
(b) In the Environment part: in bold print and shaded background the Environmental Accounts in physical terms, and on dark background and white print the accounting balances.

Sources: 1993 System of National Accounts (SNA-93); 1995 European System of Accounts (ESA-95); *Handbook on Social Accounting Matrices and Labour Accounts*; 2003 System of Integrated Economic and Environmental Accounting (SEEA-03). Own elaboration.

Table 6. Atmospheric emissions account for Spain on year 2000. Homogeneous activity branches.

Homogeneous activity branches	SO_x	NO_x	NMOVCs	CH_4	CO	NH_3	CO_2	SF_6	N_2O	PM_{10}	PFC	HFC
Units	t	t	t	t	t	t	Thousands of t	Kg	t	t	Kg	Kg
1 Primary	6.324	217.953	1.098.474	1.046.955	171.409	332.477	10.626	0	51.873	56.745	0	0
2 Industry and energy	1.355.774	608.910	390.012	145.320	541.716	21.467	186.769	8.920	11.843	76.517	54.686	532.795
3 Construction	10.580	28.894	220.284	10.495	15.458	2.872	3.761	0	560	4.071	0	0
4 Services	80.814	299.967	204.690	456.887	204.385	25.863	47.536	477	8.589	23.521	541	27.960
EMISSIONS CAUSED BY DOMESTIC ECONOMIC ACTIVITIES	1.453.493	1.155.724	1.913.460	1.659.658	932.967	382.679	248.692	9.397	72.865	160.853	55.227	560.755
Emissions caused by non residents' domestic activities (transportation)	4.515	6.446	290	14	186	0	299	0	8	591	0	0
Emissions caused by residents' activities in the rest of the world (transportation)	2.950	33.321	2.424	61	4.155	2	3.168	0	94	261	0	0
EMISSIONS CAUSED BY RESIDENTS' ACTIVITIES	1.451.928	1.182.599	1.915.594	1.659.705	936.936	382.681	251.561	9.397	72.951	160.523	55.227	560.755
EMISSIONS CAUSED BY DOMESTIC HOUSEHOLDS	25.324	307.800	356.626	35.489	1.631.801	5.704	55.292	0	4.841	35.004	330	276.188
Emissions caused by non residents' domestic households	2.084	25.334	29.353	2.921	134.310	469	4.551	0	398	2.881	27	22.732
Emissions caused by residents' households in the rest of the world	354	4.303	4.986	496	22.814	80	773	0	68	489	5	3.861
EMISSIONS CAUSED BY RESIDENTS' HOUSEHOLDS	23.594	286.769	332.259	33.064	1.520.305	5.314	51.514	0	4.510	32.612	307	257.317
TOTAL DOMESTIC EMISSIONS	**1.478.817**	**1.463.524**	**2.270.086**	**1.695.147**	**2.564.768**	**388.383**	**303.984**	**9.397**	**77.706**	**195.857**	**55.557**	**836.943**
TOTAL RESIDENTS' EMISSIONS	**1.475.522**	**1.469.368**	**2.247.853**	**1.692.769**	**2.457.241**	**387.995**	**303.075**	**9.397**	**77.461**	**193.135**	**55.534**	**818.072**

Source: INE. Satellite accounts on atmospheric emissions. Year 2000. Base change. Own elaboration.

Table 7. Environmental indicators - Spain on year 2000. Homogeneous activity branches.

Homogeneous activity branches.	Environmental impact		
	Greenhouse effect (1)	Ozone layer depletion	Acidification (2)
Units	thousands of t	thousands of t	t
1 Primary	**37.699**	**1.258**	**22.124**
2 Industry and energy	**194.366**	**822**	**50.249**
3 Construction	**4.045**	**240**	**814**
4 Services	**55.104**	**413**	**7.307**
EMISSIONS CAUSED BY DOMESTIC ECONOMIC ACTIVITIES	291.215	2.733	80.494
Emissions caused by non residents' domestic activities	**302**	**4**	**211**
Emissions caused by residents' activities in the rest of the world	**3.198**	**23**	**454**
EMISSIONS CAUSED BY RESIDENTS' ACTIVITIES	294.111	2.752	80.738
EMISSIONS CAUSED BY DOMESTIC HOUSEHOLDS	58.087	724	4.473
Emissions caused by non residents' domestic households	**4.781**	**60**	**368**
Emissions caused by residents' households in the rest of the world	**812**	**10**	**63**
EMISSIONS CAUSED BY RESIDENTS' HOUSEHOLDS	54.118	675	4.167
TOTAL DOMESTIC EMISSIONS	**349.301**	**3.457**	**84.967**
TOTAL RESIDENTS' EMISSIONS	**348.229**	**3.426**	**84.905**

Notes: (1): We have considered that methane (CH_4) affects equally the greenhouse effect and the ozone layer depletion.
Also, for the conversion of HFC we have considered the average of the conversion factors corresponding to the different types that conform them.
(2) We have considered that nitrogen oxides (NO_x) affect equally the ozone layer depletion and acidification.

Source: INE. Satellite accounts on atmospheric emissions. Year 2000. Base change. Own elaboration.

Table 8. Water flows balance between the economy and the environment. Spain on year 2000. Homogeneous activity branches.

Homogeneous activity branches.		Water collection			Water distribution		Water consumption			Residual waters to the public sanitation system		Water returns			Apparent physical water consumption remaining in the economy
Units: millions of cubic meters		Continental	Non-continental	Total	Water losses through distribution	Water supply	Distributed	Directly collected	Total	Discharged	Collected	From leakage, irrigation or sanitation	Direct	Total	
1	Primary	22.837,7	209,3	**23.047,0**	3.248,4	17.611,5	17.955,1	5.435,5	**23.390,6**	**17,6**	**0,0**	11.903,4	9,4	**11.912,8**	**11.460,2**
2	Industry and energy	12.344,2	186,7	**12.531,0**	901,1	3.929,0	784,7	8.602,0	**9.386,6**	**261,5**	**34,2**	1.103,5	6.563,1	**7.666,6**	**1.492,8**
3	Construction	376,0	4,3	**380,3**	50,0	245,7	190,6	134,6	**325,2**	**17,7**	**0,2**	124,4	56,1	**180,5**	**127,2**
4	Services	1.656,8	295,7	**1.952,5**	224,9	1.056,3	1.369,7	896,2	**2.265,9**	**515,0**	**2.874,8**	2.970,3	224,0	**3.194,3**	**1.431,3**
TOTAL ECONOMIC ACTIVITIES		37.214,7	696,1	37.910,7	4.424,4	22.842,5	20.300,1	15.068,2	35.368,3	811,8	2.909,1	16.101,6	6.852,5	22.954,1	14.511,6
Households		0,0	0,0	**0,0**	0,0	0,0	2.542,4	0,0	**2.542,4**	**2.097,4**	**0,0**	0,0	0,0	**0,0**	**445,1**
TOTAL DOMESTIC		37.214,7	696,1	37.910,7	4.424,4	22.842,5	22.842,5	15.068,2	37.910,7	2.909,1	2.909,1	16.101,6	6.852,5	22.954,1	14.956,6
Non residents in the national territory		0,0	0,0	**0,0**	0,0	0,0	33,1	0,0	**33,1**	**27,3**	**0,0**	0,0	0,0	**0,0**	**5,8**
Residents in the rest of the world		0,0	0,0	**0,0**	0,0	0,0	5,0	0,0	**5,0**	**4,2**	**0,0**	0,0	0,0	**0,0**	**0,9**
Total residents' household consumption		0,0	0,0	**0,0**	0,0	0,0	2.514,4	0,0	**2.514,4**	**2.074,3**	**0,0**	0,0	0,0	**0,0**	**440,2**
TOTAL RESIDENTS		37.214,7	696,1	37.910,7	4.424,4	22.842,5	22.814,5	15.068,2	37.882,7	2.886,0	2.909,1	16.101,6	6.852,5	22.954,1	14.951,7

Source: Environmental Water Accounts. Year 2000. INE. Own elaboration.