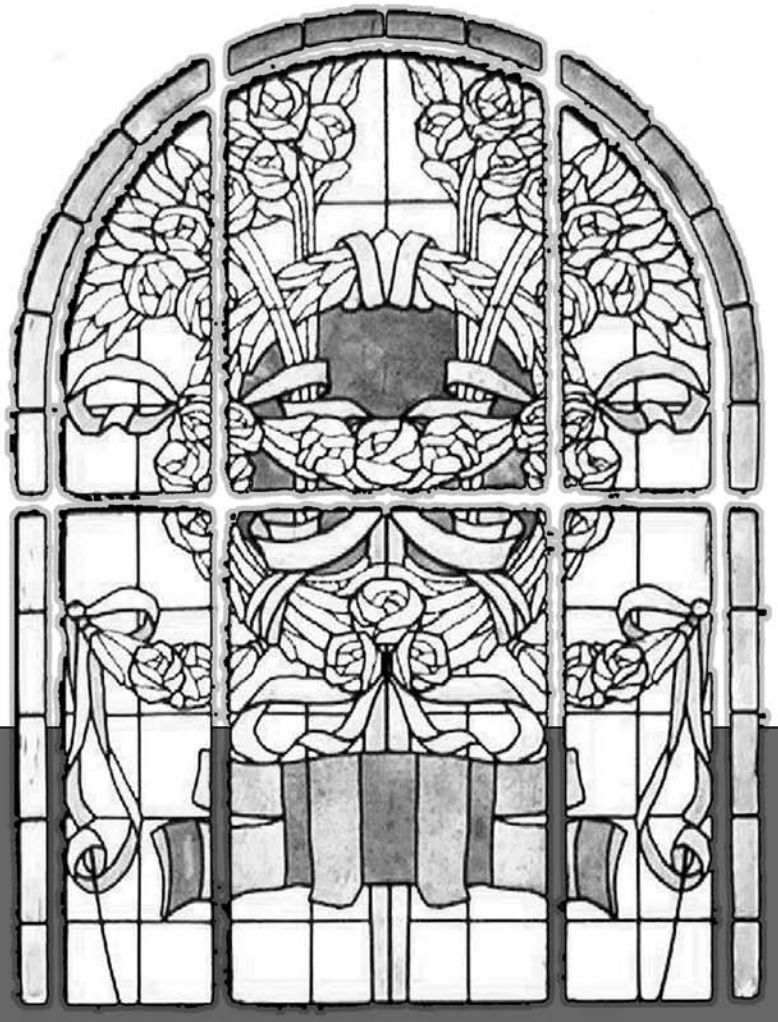

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DEVELOPMENT POLICIES AND THE ENVIRONMENT: USING ENVIRONMENTAL ACCOUNTS FOR BETTER DECISION MAKING

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The *Public Investment Evaluation Unit* (UVAL) provides technical support to public administrations, by developing, testing and disseminating *ex ante*, ongoing and *ex post* evaluation methods for public investment projects and programmes. One of the aims is to improve effective spending and better performance of European structural funds. The Unit is part of the network of national and regional evaluation units.

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Dipartimento per le Politiche di Sviluppo
Ministero dell'Economia e delle Finanze

Istat

Development policies and the environment: using environmental accounts for better decision making

Abstract

Thanks to the use of standardised methodologies and the simultaneous presentation of economic and environmental data within an integrated framework consistent with national accounts, Environmental Accounting allows detailed and systematic analyses of the interaction between the economy and the environment. This type of information can become a valuable tool to support territorial development policies, especially if it is made available at the regional level. This paper is the result of joint work carried out by the Department of Development Policies (Public Investment Evaluation Unit) of the Ministry of Economy and Finance and the National Accounts Directorate of the Italian National Statistics Institute, promoted in the context of a national knowledge management program ("Programma di Diffusione delle Conoscenze", CIPE acts 36/2002 and 17/2003). The purpose of the paper is to identify ways in which environmental accounting can improve the design, monitoring and evaluation of development policies and to highlight the value-added of this type of data, in comparison to other sources of information on the environment. Indicators derived from environmental accounts can help decision-makers choose which territories, economic activities and sectors of the environment should be supported and to what extent, by providing a quantified measure of the existing trade-offs between variables. A conceptual framework on the use of environmental accounts for development policies is followed by remarks on the priorities for further improvement of the accounts at various territorial levels. The development of a pilot set of regional aggregates is foreseen in the short term within this project. The methodological results as well as the pilot applications can provide relevant indications for the design of development policies. Within a wider perspective, insights arising from this paper may be useful to support the application of the bill on Central and Local Government Environmental Accounting currently under discussion in Parliament.

Ambiente e politiche di sviluppo: le potenzialità della Contabilità ambientale per decidere meglio

Sommario

Tramite la standardizzazione delle metodologie e l'integrazione di informazioni ambientali e economiche in un quadro rispondente ai criteri della contabilità nazionale, la Contabilità ambientale consente di condurre analisi sistematiche delle interazioni tra economia e ambiente. Questo tipo di informazioni, specialmente se disaggregate a livello regionale, possono divenire uno strumento prezioso di supporto alle politiche di sviluppo territoriali. Questo lavoro, frutto della collaborazione tra il DPS (Unità di Valutazione degli Investimenti Pubblici – UVAL) del Ministero dell'Economia e delle Finanze (MEF) e la DCCN (Direzione Centrale della Contabilità Nazionale) dell'ISTAT nel quadro del "Programma di Diffusione delle Conoscenze" (delibere CIPE 36/2002 e 17/2003), si propone di individuare le potenzialità di utilizzo di informazioni di contabilità ambientale per le politiche di sviluppo, evidenziando il valore aggiunto di queste analisi rispetto ad altre tipologie di informazione ambientale. Gli indicatori desunti dai conti ambientali possono infatti aiutare i decisori a scegliere quali territori, settori economici e comparti ambientali privilegiare e in che misura, fornendo una quantificazione dei *trade-off* esistenti tra ciascuno di questi elementi. Ad un quadro concettuale per l'uso di dati di contabilità ambientale, seguono considerazioni sulle priorità per la compilazione di tali conti a diversi livelli territoriali. Il proseguo del lavoro prevede, a breve termine, l'elaborazione pilota di alcuni aggregati regionali. Sia le riflessioni metodologiche che le applicazioni sperimentali possono fornire spunti utilizzabili per contribuire alla definizione delle politiche di sviluppo, e, in una prospettiva più ampia, per sostenere eventualmente l'attuazione della legislazione in materia di Contabilità ambientale dello Stato, delle Regioni e degli Enti Locali attualmente all'esame del Parlamento.

This paper has been prepared by an inter-institutional workgroup comprising members from Istat, Cesare Costantino, Federico Falcitelli, Aldo Femia and Angelica Tudini, and members from the Ministry of Economy and Finance's Department for Development Policies, Raffaello Cervigni and Aline Pennisi.

We wish to thank Fabrizio Barca, Laura Raimondo, Vittoria Buratta and Alfonsina Caricchia for their support to the project and for their comments to previous versions of the text. Federico Nusperli has provided valuable information needed to understand the relations between Regioanl Public Accounts and EPEA/RUMEA accounts. Franca Acquaviva has managed the editorial revision. Finally, we should like to thank all those who took part in the seminar held at CNEL on 28 June 2005 for their contributions to the discussion.

Susan Grace translated into English the original italian version of the paper.

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I Introduction and summary

I.1 Introduction

By now, integration of the environmental dimension in development programmes and projects is a cornerstone of national and EU policies, as formally ratified by the European Council of Gothenburg and reaffirmed at the highest level by the European Constitution. An essential requisite for such integration is the availability of adequate information to evaluate the implications of the environmental sustainability of decisions relating to development. Environmental accounting, via the standardisation of both environmental and economic information in accordance with national accounting criteria, already makes it possible to carry out systematic analyses of the interactions between the economy and the environment at national level and to compare different countries' performances.

This paper presents the first results of a research project carried out jointly by the Public Investment Evaluation Unit of the Ministry of Economy and Finances' Department for Development Policies (DPS) and by Istat's National Accounts Directorate as to the possible use of environmental accounting tools to support development policies, especially as regards those policies aimed at reducing imbalances amongst the territories. The research, launched within the context of a national knowledge management programme ("Programma di Diffusione delle Conoscenze", set up as per CIPE Resolutions 36/2002 and 17/2003) has the following objectives (Figure I.1):

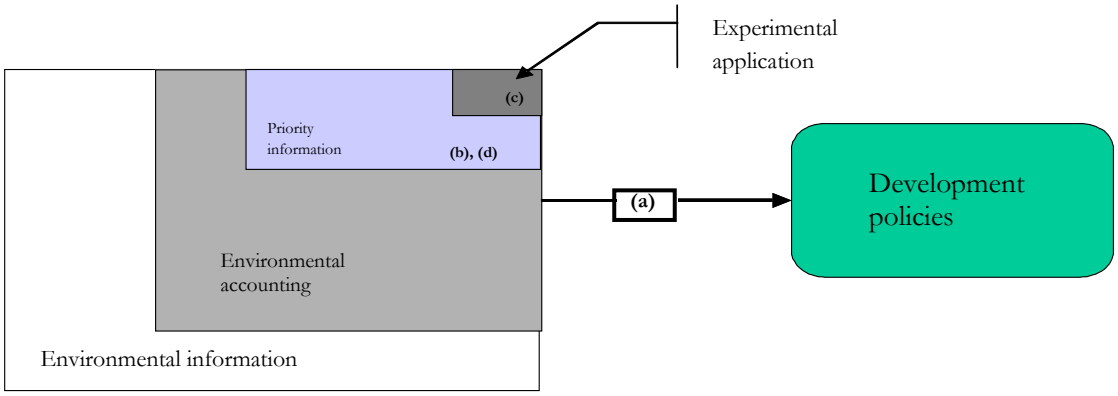
a) to define an overall conceptual reference framework that illustrates the potential use (and value added with respect to other types of environmental information) of environmental accounting information, broken down – where suitable – at regional level, for the design, monitoring and evaluation of development policies;

b) to identify, in practical terms, a subset of especially important environmental accounting aggregates for development policies, on the basis of i) strategic priorities of current national and Community development programmes, ii) feasibility (in financial, organisational and institutional terms, etc.) of the collection and processing of data broken down at territorial level as requested in the various cases;

c) to draw up, by way of example on an experimental basis and for a limited number of regions, estimates of some of the aggregates defined above in letter b);

d) to formulate general hypotheses – in terms of time, costs, management and organisational methods – in order to start up a system of periodic production of selected environmental accounting data on a regional scale.

Figure I.1 Overview of the DPS-Istat research



Legend:
(a): Definition of a conceptual reference framework
(b): Definition of a set of priority environmental accounting information
(c): Some estimates relating to some environmental accounting data at regional level
(d): Hypotheses of a regular environmental accounting data collection system for development policies

Source: MEF, DPS - Istat, National Accounts

The research begun by Istat and the DPS is the first in Italy that allows for a comparison in operational terms between experts on the supply side of environmental accounting and experts on the potential users side. Besides favouring shared knowledge of the information contained in environmental accounting, the research can also hopefully help policy makers in their requests to official statistics bodies for further developments on this subject.

The paper is organised as follows. Chapter II provides a summary of the main features of environmental accounting as a discipline within official statistics, and the principal environmental accounts are illustrated, also by means of examples and applications.

Chapter III proposes a methodological procedure, by which to identify the possible uses of environmental accounting for the design and evaluation of development policies. This procedure is based on an operational definition of the concept of development policy (highlighting the role of capital expenditure). Furthermore, development policies are presented as a sequence of various types of resource allocation decisions (allocation of resources among the territories, sectors of economic activity, beneficiaries of

financing), and some examples are provided as to the use of environmental satellite accounts for specific types of policies.

Chapter IV then addresses possible priorities in terms of updating and fine-tuning the environmental accounting tools currently available in Italy.

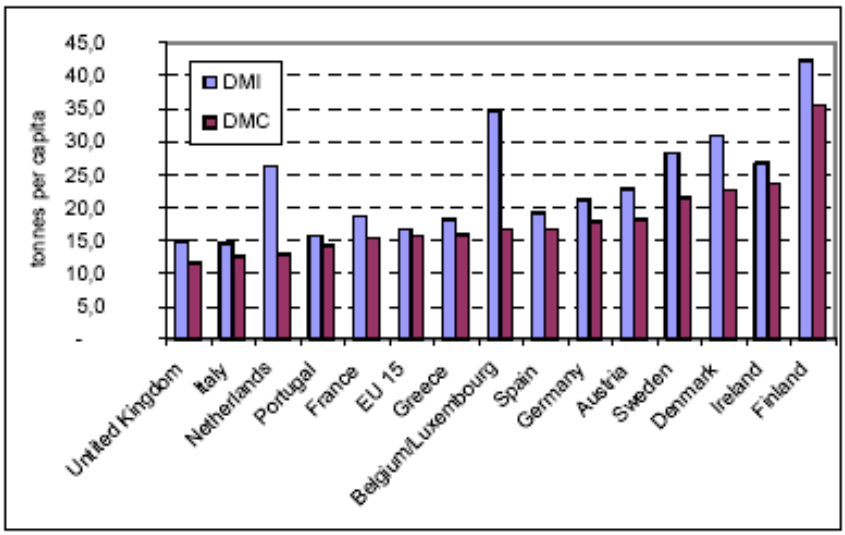
I.2 Summary

Environmental accounting: features and contents

In the field of official statistics, environmental accounting is the branch that systematically and comprehensively deals with the inter-relations between the economy and the environment or, more generally, between the natural system and the anthropic system. Such interrelations are described by means of a variety of internationally standardised accounts, each of which focuses on specific aspects of the relationship between the economy and the environment. One common feature is the connection with national accounts, via a coherent system of definitions and classifications, and thus the possibility to compare correlated economic and environmental facts.

Specifically, by means of economy-wide material flow accounting (*Material Flow Accounting* – MFA) it is possible to draw up an overall balance sheet of the of material exchanges between the anthropic system and the natural system and to define useful indicators for an initial evaluation of relations between the economy and the environment. Compared with the relevant socio-economic variables (GDP, population, etc.), these indicators make it possible to analyse, for example, the eco-efficiency of economic systems, the intensity of the use of natural resources in production processes, the level of "materialism" of lifestyles, etc. Figure I.2 provides an example of two typical MFA indicators which, put in relation to the population, give a concise measure of the pro-capita consumption of natural resources: the direct material input and domestic material consumption, which include all materials extracted in the country and destined to use along with materials contained in the imports. Unlike the first, the second indicator does not include exported materials and represents the quantity of material that remains incorporated in investment goods or durables or is returned to the natural environment in a degraded form after undergoing transformations in the economic system.

Figure I.2 Direct Material Input and Domestic Material Consumption in the EU-15 – 2000 (tonnes per capita)

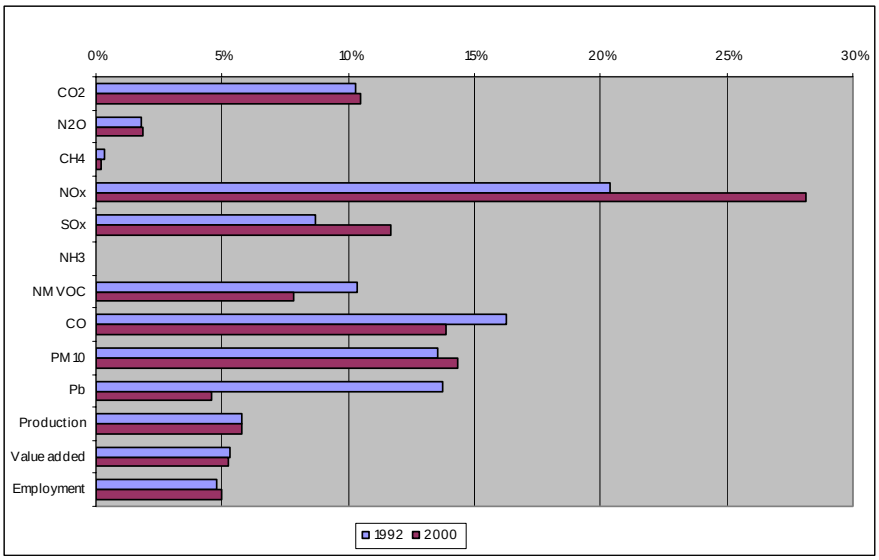


Source: "Zero Study: Resource Use in European Countries – an estimate of materials and waste streams in the Community, including imports and exports using the instrument of material flow analysis" European Topic Centre on Waste and Material Flows, March 2003, Copenhagen

The NAMEA (*National Accounts Matrix including Environmental Accounts*) offers a more detailed analysis of pressures placed on the environment by the economic system. In this account, the main environmental pressures generated by the various production activities and household consumptions – measured in physical units – are compared with their corresponding national accounting economic aggregates. Two different joint results of the production activity carried out are provided for each economic sector: on the one hand, the economic values created (production, value added, employment) and, on the other, the environmental pressures generated to produce said values (atmospheric emissions, wastes, direct extractions of virgin resources, etc.). In particular, every economic activity is linked both to the pressures directly caused by production processes typical of the sector, as well as to those generated by the activities that support production (for example, transportation on the enterprise's own account and the heating of work places). For households, the environmental pressures generated by different consumptions (for example, atmospheric emissions generated by private transportation and the heating of residential buildings) are linked to household expenditures incurred to acquire products whose use is at the root of the pressures at issue (for example, fuel). The NAMEA allows for the construction of indicators that are of immediate use for policies. For example, this is the case, of the "environmental profile" of a given economic sector, that allows (as in the case of transportation

illustrated in Figure I.3) for a comparison between the contribution provided to the national economy by the sector under examination (in terms of value added, employment, etc.), with the corresponding contribution to environmental pressure (measured by the relative share of total emissions of the different pollutants).

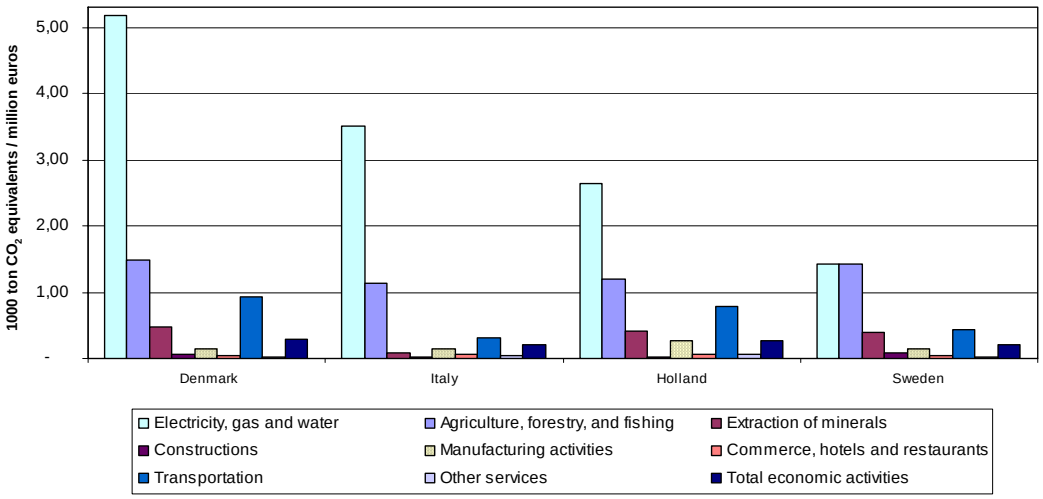
Figure I.3 Environmental profile for the "Transport" sector. Italy – 1992 and 2000



Source: Istat

The NAMEA also allows for comparisons between countries in terms, for example, of intensity (total and by individual economic sector) of greenhouse gas emissions per unit of product (Figure I.4).

Figure I.4 Production intensity of greenhouse gases (CO_2, N_2O, CH_4) in some European countries by economic activity – 2000 (thousands of tonnes of CO2 equivalent/million euros)

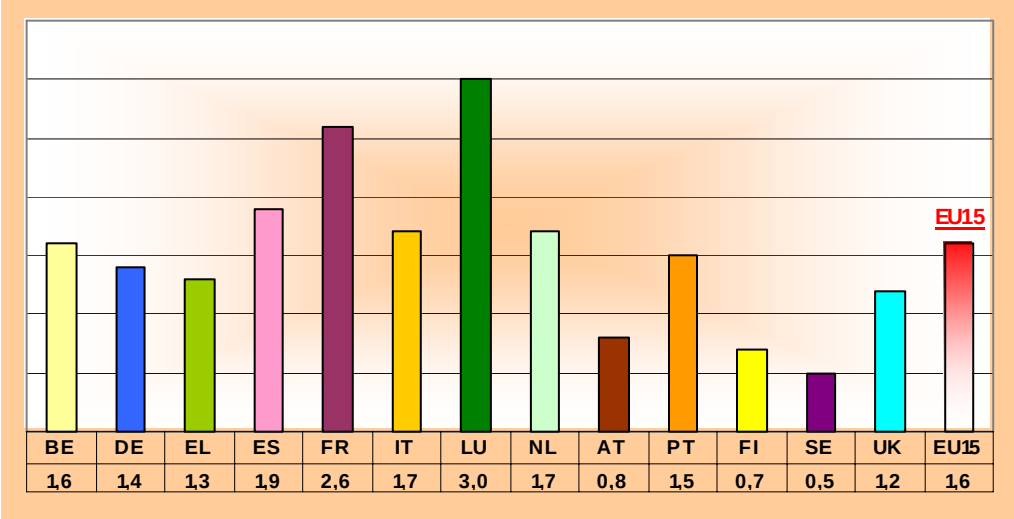


Source: Istat

Alongside environmental pressures, another aspect of interaction between the economy and the environment addressed by environmental accounting regards the socio-economic system's responses to environmental problems, caught especially via analyses of environmental protection expenditures, to which the EPEA *(Environmental Protection Expenditure Account*) is devoted. The main objective of the EPEA is to analyse the demand and supply of environmental protection services (ex.: wastewater management, soil cleanup, etc.), as well as to establish, in the last analysis, who bears the financial burden of environmental protection and to what extent. The account separately reports the expenditures incurred by all of the economy's institutional sectors. As specifically regards the General Government (GG), aggregates calculated in a manner coherent with those in the EPEA have become part of the core system of national accounts, set up in accordance with the SEC95[1]. On the basis of such data, Figure I.5 compares the relative weight of public expenditure for environmental protection (calculated as a share of total expenditure by the GG) in different European countries .

[1] see Eurostat, 1996.

Figure I.5 Expenditure for environmental protection on the part of the General Government in the EU-15 Member States(*) – 2000 (percentages of total public expenditure)



(*) Data are not available for Denmark and Ireland

Source: Eurostat, 2004, *Statistics in focus*, *Trends in selected general government expenditure by function of EU Member States*, Luxembourg

The environmental accounting tools illustrated above correspond to the types of accounts to which the European strategy for the development of environmental accounting gives the highest priority. Additionally, other accounts are being developed by Istat and, in general, such activity is in line with the regular production of environmental accounts in the European Statistical System[2]. As happens in other EU countries, the aggregates produced by Istat are on a national scale. However, activities for the development of environmental accounts on a regional scale have begun, especially as regards the NAMEA and public expenditure for environmental protection, placing Italy a step ahead in the international context. If developed at regional level, environmental accounting tools would allow for a comparison of the various territories and identification of imbalances not only in terms of natural patrimony, but also in terms of the eco-efficiency of production and consumption activities. Such an information base would contribute to enrich the concept of territorial imbalances and

[2] Environmental accounting of the European Statistical System includes the following main types of environmental accounts: Economy-wide accounts and balances of material flows, NAMEA-type accounts broken down by economic sector, SERIEE environmental economic accounts – which include, in addition to the above illustrated EPEA account, the satellite expenditure account for the use and management of natural resources (*Resource Use and Management Expenditure Account, RUMEA*) – and asset accounts of natural resources (referring distinctly to the different natural resources of interest).

would aid the designing of policies in which the economy and the environment are integrated rather than parallel fields.

Development policies: definition and main features

Generally speaking, development policies can refer to any and all government decisions aimed at either directly or indirectly helping to conserve and increase the stock of public and private capital of a given population. This definition implicitly includes the idea that development (understood as an increase in the economic well-being of the population as a whole) cannot take place without an adequate allocation of resources to maintain and increase the production system's capacity to generate income. This capacity, in turn, is linked to the quality and quantity of capital goods (tangible and intangible) that can be utilised by economic agents.

In a nutshell, development policies determine or influence decisions about the allocation of income to either *current* expenditure (private consumptions and current expenditure on the part of the General Government) or *capital expenditure* (public and private investments). Whereas current expenditure generates "well-being" in the present, capital expenditure lays the groundwork for future prosperity. This definition of development policies comprises:

i) decisions regarding the amount, composition and selection of categories of beneficiaries, as well as the territorial distribution of public capital expenditure (expenditure policies for development);

ii) decisions regarding tax levies (identification of tax bases, tax rate structures, exemption system, etc.), insofar as such decisions impact on private choices regarding the maintenance and/or formation of capital *stock* (fiscal policies for development);

iii) decisions regarding market regulations, insofar as the promotion of market competition and liberalisation - especially for public utilities – influences enterprises in their decisions to invest resources in the conservation or growth of capital *stock* (regulation policies for development);

iv) decisions regarding activities to boost the Public Administration's technical and administrative capacities, to the extent that they impact on the quantity and especially on the quality of public and private investment expenditure.

The assesment made focuses primarily on the potential use of environmental accounting tools for the design and valuation of the first type of policies (expenditure policies). This does not exclude the fact that some information produced by environmental accounting can also be relevant to fiscal, regulatory and capacity building policies for development.

Of the various ways to categorise capital expenditure for development, the following are taken into consideration:

a) the final development objective pursued, typically qualified by the source of the resources utilised (ordinary to expand the stock of capital *tout court* or additional resources to reduce territorial imbalances, financed by either Community structural funds or by the national fund for under-utilised areas);

b) the expenditure sector, which determines the "form of capital[3]" (produced capital, human capital, natural capital, knowledge capital, social capital, etc.) that the public expenditure sustains;

c) the destination of expenditure, which can be used to boost different types of capital, such as public capital via the building of infrastructures (tangible or intangible), or private capital via transfers to either enterprises (to support expansion of their production capacity) or to households (typically to aid the purchase, construction or restructuring of residential buildings);

d) the level of government responsible for taking decisions regarding capital expenditure (Central government, Regional government, Local authorities).

Environmental accounting can offer the different levels of government[4] information that is helpful to taking decisions for specifying the final development objective, determining the (public or private) ownership of the capital targeted for expansion and identifying the target sector (transportation, education, environment, etc.).

Resource allocation decisions and the policy cycle

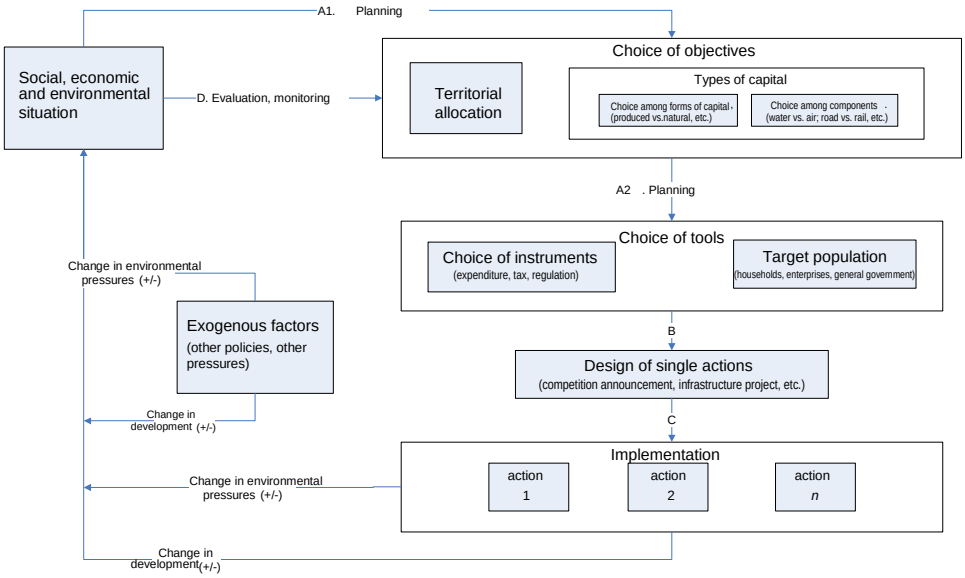
Every decision regarding expenditure has a legal and administrative basis in norms and acts (EU directives and regulations, national laws and regulations, etc.) which regulate, from the point of view of procedures and financial statements, the programming,

[3] The concept of form of capital is discussed more thoroughly in the paper.

[4] The considerations formulated in this paper primarily refer to decisions taken at national and regional level, as these directly impact on around two thirds of total capital expenditure. They often impact indirectly on expenditures that fall under the competency of local authorities and correspond to the territorial scales typical of environmental accounting aggregates.

commitment and expenditure of resources. Given that these norms and acts are generally very diverse (and tend to change over time) at first, it might seem difficult to identify common features by which to examine the potential use of environmental accounting tools. In order to bring into focus the possible value added of environmental accounting tools, a schematic representation of the corresponding decisional processes is proposed. Figure I.6 identifies, above and beyond the various differences characterising the various provisions that regulate expenditure policies for development, some cornerstone features that are presumably present in every policy. In any case, such policies will have to determine *where* to spend (territorial breakdown of resources), *what component of the capital stock* is to be expanded, what *type* of capital (public or private) is to be used to sustain growth, and– in cases where expenditure is aimed at increasing private capital – which *types of enterprises* are be to sustained with the investments.

Figure I.6 Resource allocation decisions and the policy cycle scheme



Source: MEF, DPS - Istat, National Accounts

From this perspective, the *policy maker's* key problem, is represented as a sequence of decisions to be taken in order to allocate, in the best way possible, the available financial resources, and can be further broken down, for analytical purposes, into the following decisions:

choice of objectives:

- selection of territorial priorities (among Regions, among Provinces, etc.);
- selection of priorities among different forms of capital: for example, transport infrastructures or factories (produced capital) *versus* education (human capital) *versus* water quality (natural capital);
- selection of priorities within each form of capital: for example, in the category of natural capital, air quality *versus* water quality; in the category of public produced capital, roadways *versus* railways; within the category of human capital, education *versus* professional training).

choice of tools:

- the mechanism to use: expenditure instruments, tax levies, regulation instruments;
- identification of the target population, meaning the beneficiaries (households, enterprises, general government) of the public work or the subjects whose behaviour is the object of desired change; and, within each type, choice of the subsets (for example, among enterprises, selection of the manufacturing industry).

The possible use of environmental accounting tools

How is each of the above described resource allocation decisions taken? In schematic terms, the *policy maker* will choose amongst territories, forms of capital, tools, etc. in such a way as to maximise an "objective function". During this process, account is taken of economic, environmental and social objectives, albeit with each being assigned a different weight, and despite constraints as to the information and knowledge available.

Such constraints include: a) empirical evidence on some variables characterising the behaviour of economic systems (such as per capita income, enterprises investment activities, banks' lending activities); b) "a priori" hypotheses on some fundamental cause-and-effect relations among variables (for example, per capita income is low in certain areas because of the low level of investment on the part of enterprises due, in turn, to instances of credit rationing); c) expectations that are more or less formalised and quantitatively defined as to the relation between policy interventions, reactions of the economic system (and/or environmental system) and final results in terms of objective variables.

The better the information available to the decision maker, the higher the quality of the decisional process. This is true as regards the information used to a) reconstruct the framework of the relevant empirical evidence b) confirm, modify or refute hypotheses concerning the cause-effect link; c) formulate reasonable expectations about the impacts of policy decisions.

Among the various types of statistical information, environmental accounting tools can improve the stylized representation of the reality that the decision maker can use to take a decision. In order to illustrate this, three cases of actual application of the schematic representation of the decisional processes are examined: the national programming of development, the regional programming of development, and incentive policies to enterprises. In each of these three cases, a plausible sequence of questions that the *policy maker* will ask in the various stages of the process is imagined and the value added provided by environmental accounting data (compared with other types of data coming from official statistics) throughout the process is disclosed. The examples suggest that the value added in terms of information provided by environmental accounting can be evaluated according to two different, but complementary, perspectives: a) from the point of view of the contribution made at every stage of the decision process by the various types of environmental accounts, and b) from the point of view of the contribution that each type of account can provide at the different decision stages.

a) The contribution of value added made by environmental accounting at the individual decision stages

There are cases in which environmental accounting is able to provide information not otherwise available from other sources (for example, NAMEA-type data regarding environmental pressures broken down by sector of economic activity, usable in various moments in the case of incentives to enterprises); and other cases in which environmental accounting can provide more complete and/or more detailed information compared with other sources, thereby setting up a more functional support to the definition, monitoring and evaluation of development policies (ex. the data of SERIEE accounts with respect to Regional Public Accounts, or data from the asset accounts of natural resources compared with other available statistics, which are often incomplete and, at any rate, not organised within a single, coherent framework such as that of the asset accounts).

In decisions pertaining to the **allocation of resources among territories,** the use of the environmental accounts is unquestionably the most widespread and analytical. The

information makes it possible to take into account the differences in the respective environmental situations deemed capable of impacting on the gaps in development. In particular, there can be certain criteria by which to allocate greater financing to regions that have more degraded natural resources, are subject to relatively greater environmental pressures or are currently characterised by relatively low environmental protection expenditure.

In decisions pertaining to the **allocation of resources among forms of capital,** the information garnered from environmental accounts can lead the *policy maker* to allocate resources to some forms of natural capital: a) in the case of a reduction in the quantity or quality of the resource; b) when the area's most important and/or dynamic economic sectors greatly depend on certain natural resources and/or have a strong impact on them. Indeed, in such cases, the degradation of the natural resources in question can, in the medium- to long-term, compromise the prospects for development of key economic sectors.

The contribution from environmental accounting is reduced for decisions regarding the **choice of mechanism** (expenditure, fiscal and/or regulation policies), for which it is probable that considerations of equitable distribution, general economic equilibrium, etc, come into play.

In contrast, the environmental accounting information appears especially important for **the choice of operators and target subjects.** Environmental accounts can also provide indications for the fine-tuning of the parameters of intervention tools (for example, determination of the price changes needed to bring about changes in behaviour). In particular, the use of environmental accounting data makes it possible to disclose the *trade-off* between the decrease in environmental pressures and possible impacts on income, employment, etc.

b) The value added of the individual environmental accounting tools

There are environmental accounting tools that, by their very nature, provide useful support for some decisions, but not for others. This is the case of material flow accounts and asset accounts of natural resources. Given that, whatever the territorial

scale of the analysis, such accounts produce aggregate information at economy-wide level, they are not particularly useful as regards the choice of policy instruments[5].

On the other hand, there are environmental accounting tools able to provide useful support for some decisions, different as they may be, by favouring the reading of certain information at times and the reading of other information at other times. This is the case of the NAMEA and EPEA/RUMEA[6], as the information comes directly from the economic accounts (by sectors of economic activity and institutional sectors), and thus they can be read at various levels and for various objectives. For example, if taking a decision about allocating resources among different forms of capital, the policy maker might first read through the NAMEA-type data in order to verify if the economic sectors that pollute more are the same ones that "drive" the economy, as such information influences decisions about what weights to assign the economic and environmental factors in the objective function. A more thorough and analytical reading might be carried out in the stage of territorial allocation and/or choice of tools, during which it is important to systematically compare the economic and environmental performance of all sectors of the economy in all territories.

The asset accounts of natural resources and the EPEA and RUMEA accounts provide a framework of the state of the environment of a given territory and of the intensity of the responses to environmental pressures on the part of public and private operators, respectively. This information, especially when examined in time series, can advise the policy maker as to where to concentrate efforts in the territory, favouring the allocation of resources to territories having more degraded environments (quality) or to those having the greatest depletion of natural resources (quantity). It can also serve to justify the policy maker's choice of sector (water, air quality, forests, fauna reserves, etc.) and to avoid an overlapping of efforts, by demonstrating that the selected sector receives less attention on the part of both public and private operators via a valuation in trends in environmental protection expenditure on the part of households, enterprises and public authorities.

[5] As defined in this paper, meaning the choice of mechanism and identification of the policy's target population.
[6] Besides the previously illustrated EPEA, this refers to the satellite expenditure account for the use and management of natural resources (*Resource Use and Management Expenditure Account – RUMEA*).

Priorities for further development of environmental accounts

The environmental accounts regularly produced by Istat are those assigned the highest priority by European strategy for environmental accounting; they are also the ones that are most regularly produced at international level. The considerations that can emerge from this research on priorities are to be seen within a general reference framework defined by the European Statistical System.

The further possible developments of Istat environmental accounts, both at national level and as concerns possible extension to local level, is connected to the means of handbooks and operational guides available. Priorities aimed at maximising the benefits of additional efforts are linked to a) the contribution that certain advancements can give in terms of information support to the definition, implementation and monitoring of development policies and b) criteria of technical and financial feasibility.

a) Importance for development policies

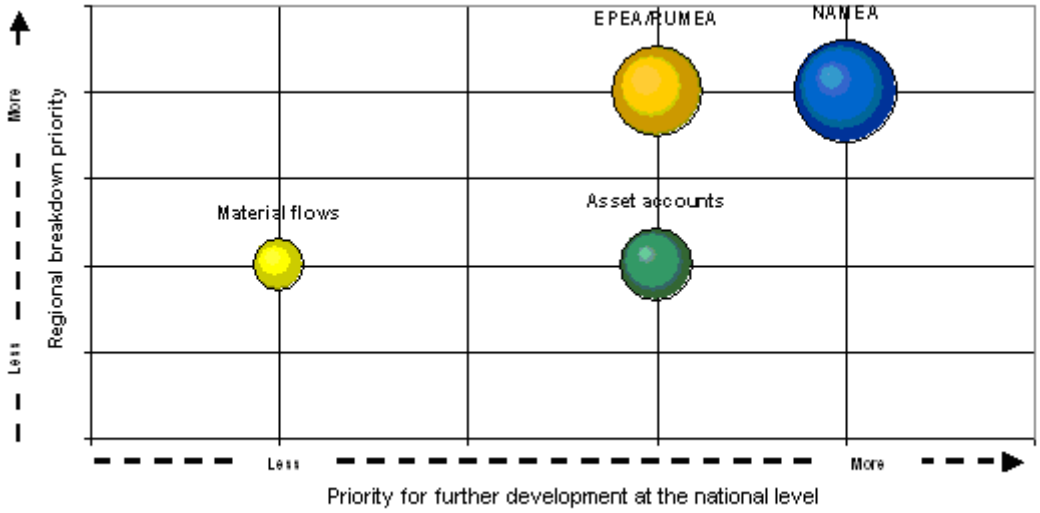
As regards the first type of priority criteria, by combining the four types of accounts (material flow accounts, asset accounts of natural resources, NAMEA, and EPEA/RUMEA) with the three main types of resource allocation decisions (choice of territories, choice of forms of capital, choice of instruments), with the two territorial levels of information (national, regional), thereby obtaining a total of 24 cases (4×3×2), one produces an initial, incomplete list of possible ways environmental accounting can contribute to the processes of design and evaluation of development policies.

By assigning each of these combinations a judgement concerning the value added of environmental accounting in terms of information (high, average, low) that schematically summarises the analysis carried out in the document, it is possible to determine (Figure I.7) the relative positions of the four types of tools as regards their potential use and relevance both at national level (along the horizontal axis) at regional level (along the vertical axis) and in general (distance from the origin of the axes). In the last case, the overall evaluation is also emphasised in the graph by the larger or smaller size of the coloured bubbles.

This initial analysis indicates that the NAMEA is the tool that could offer the most benefits to development policies, considering both the statistical information at national level as well as the development of statistics at the level of the individual regions. The EPEA/RUMEA accounts rank next (with analogous benefits obtained from the

breakdown by region and somewhat less significant benefits as regards their further development on a national scale). The following position goes to asset accounts, for which one can expect limited uses for the choice of tools and, finally, the material flow accounts[7].

Figure I.7 Comparative qualitative evaluation of the potential use and relevance of the different environmental accounting tools



Source: MEF, DPS - Istat, National Accounts

It is important to point out a series of *caveat* that must be considered in order to correctly interpret the results of such an analysis of priorities and to circumscribe its validity:

- the indications provided concern the ranking of instruments, but not necessarily the ranking of priorities in terms of the increase of information for a *given* environmental accounting *tool* (extension of the information to national level versus a regional breakdown): for example, the position of asset accounts in Figure I.7 should not be interpreted as meaning that for such accounts the development of national data takes priority over their regionalisation, but rather that the benefits of such

[7] As concerns the material flow accounts, a more indepth study appears particularly useful for the future in the light of the results of the debate recently begun within the OECD as to the interpretation and use of indicators derived from this type of environmental accounts. This refers to the initiative launched as part of the implementation of the recommendations of the OECD's Council in 2004 regarding the material flows and the productivity of the resources (see OECD, 2004), in particular to follow up on related requests put forward by the Heads of State and of Government of the G8 countries.

development are superior with respect to the case of material flow accounts, similar with respect to EPEA and inferior with respect to NAMEA;

- for simplicity's sake, the analysis is carried out supposing that only one instrument is used at a time. A more complex analysis would regard the joint use of more than one instrument (for example, the joint use of asset accounts and the EPEA, both broken down by region, in order to evaluate the adequacy of environmental expenditure in a certain region in relation to the state of conservation – or degradation – of the region's natural resources);
- for simplicity's sake, all types of decisions are deemed equally important, whereas, in general, for some policy makers, certain decisions could be more urgent or important than others;
- judgements as to the usefulness of different environmental accounting tools regard the use of accounts in general and could differ considerably in specific situations. For example, the characteristics of a particular region from the point of view of the endowment of natural capital (for example, dependence on other territories for natural resource supplies) could be such that the asset accounts of natural resources prove more useful than other environmental accounts such as the NAMEA or the EPEA;
- the degree of priority assigned to the accounts is valued exclusively with reference to their potential use for development policies and within the conceptual framework proposed in this work. Such a scheme, proving useful and necessary for the purposes of the analysis carried out, necessitates, among other things, a simplified approach to the various questions, which, in reality, are rather complex. Thus the first recommendations made at this stage can require closer examination.

b) Feasibility

On the basis of the evaluation of the potential use and relevance of environmental accounts, some elements regarding their feasibility – as concerns both the expansion of data production at national level as well as their breakdown at regional level – allow for the definition of a line of reasoning on the priorities. The time period to be considered is more or less long, depending on whether or not feasibility studies with positive results have already been carried out or, at any rate, whether or not there are any other difficulties in terms of application.

From a short-term perspective, the current situation reveals a good level of feasibility as concerns the regional breakdown of aggregates on atmospheric emissions and the direct extraction of material from the natural environment, which are regularly produced with reference to the national economy (NAMEA). Moreover, the evaluations pertaining to the potential use and relevance of information indicate a particularly high level of interest in the NAMEA aggregates, given that one must assume there is a certain variability among regions in the technology adopted by the different economic sectors and in the behaviours of final consumers, factors on which the quantities of emissions and extractions depend.

A good level of feasibility is also associated with the production of regional aggregates on environmental expenditure (EPEA and RUMEA, with the experience acquired in the case of the EPEA being more solid also with respect to the NAMEA). On the other side, despite the lower level of potential use and relevance compared with the NAMEA, there is unquestionable interest in development in this direction because expenditure behaviours on the part of local governments as well as enterprises operating at the territorial level vary from region to region.

Within the framework of asset accounts some parts of the forest accounts seem feasible at regional level, especially some physical aggregates relative to the size of stocks in terms of volume of timber and in terms of forest area. In general, the endowment of natural resources in terms of quality and quantity differs among regions and thus, in line of principle, the development of such accounts deserves high priority. Nevertheless, in terms of feasibility, the development of this type of account in the immediate future is limited to the production of the aforementioned aggregates.

Apart from this consideration, it is also important to look at flows between the various regions that are significant from an economic-environmental viewpoint, in other words, the imports and exports of natural resources (as input in the economy) as well as pollutants generated at regional level. The need for such information would be met in the material flow accounts, even if their compilation at regional level does not seem feasible in the immediate future.

In short, the initial priorities that can be set by combining the observations on feasibility just presented with the previous ones pertaining to the relevancy for development policies are: the rapid regional breakdown of the NAMEA and EPEA/RUMEA aggregates, the development of some asset accounts, where possible, at regional level;

and, in the medium- to long-term, the production of material flow accounts at regional level.

Conclusions

In conclusion, the results thus far reached by the MEF-Istat research, indicate, from the point of view of methodology, a series of possible significant uses of environmental accounting data for development policies. In the second part of the research, the production of some accounts broken down at regional level will make it possible to illustrate, by means of concrete cases, the possible informative and analytical value added of environmental accounting tools for decisions pertaining to policy. Moreover, more detailed indications regarding technical and financial feasibility will be provided. This information combined with the analysis of relevancy and usability could make it possible to propose more precise hypotheses regarding the priority of the different accounts, as to their use for development policies.

As regards the debate about the environmental accounting bill, which explicitly calls for the use of Istat environmental accounts, the approach herein adopted to analyse the question of integration between environmental decisions and economic decisions does not take account of institutional innovations – to be faced on legislative grounds – and is developed exclusively on the grounds of economic-environmental reasoning and on the basis of statistical technique. Though recognising that, once in effect, the bill would introduce a precise assumption of responsibility on the part of governmental bodies, nevertheless, during completion of the legislative procedures, the environmental accounting information can already be integrated in the policy implementation processes without any change in legislation, via opportune administrative and governmental acts (CIPE resolutions, ministerial decrees, etc.).

In terms of process, the technical partnership created by matching experts on the side of the supply of environmental accounts and on the side of potential users in the field of development policies is a fundamental result of this work. Besides favouring a shared knowledge of the information contained in environmental accounts, the hope is that this partnership can ultimately assist *policy makers* in the use of such information, and in the formulation of requests to official statistics bodies for additional developments on this subject.

II Environmental accounting as an integrated environmental and economic information system: tools and main applications

II.1 Principal types of environmental accounts and the current situation in Europe and Italy

II.1.1 Distinctive features of environmental accounts

Integrating economics and the environment with a view to sustainable development regards two equally important aspects. Though sometimes viewed as an indistinct whole, there are actually two fields that need to be considered separately:

a) one pertains to decisions and programming, in other words those activities aimed at impacting on the reality of phenomena deemed relevant from an economic and environmental point of view;

b) the other pertains to making the necessary information available, in other words those activities aimed at providing a suitable statistical representation of the phenomena in question, thus forming cognitive support for the decision makers.

Official statistics comprise various components. Included amongst them is a system of integrated environmental and economic accounting, by definition forming part of the second of the above fields. It is especially important and stands out from the other instruments that produce statistical information on the environment due to the uniqueness of the data produced (Box A).

First of all, environmental accounts have features that distinguish them from some other tools. For even though other tools are sometimes able to produce new information based on official data, comparatively speaking, they belong to the field of utilisation of statistical information. In this sense, and not only, the environmental accounting of official statistics differs, for example, from tools specifically designed to analyse and diffuse environmental information such as Reports on the State of the Environment, or with respect to various forms of environment-related valuations studies, such as strategic environmental assessment, environmental impact assessment and environmental assessment connected to EU structural funds, or, more generally, from the processes of defining and implementing policies, plans and programmes[8].

[8] Such tools, here considered as forming part of the use of official statistical information, can utilise the aggregates of integrated environmental and economic accounting along with other environment statistics.

Environmental accounts differs from other statistical information on the environment as they form part of what are known as "satellite accounts" to the system of National Accounts (Box B). This distinction makes environmental accounting a tool that strongly favours a joint reading of economic facts[9] and environmental facts as well as their related comparison.

In this context, the systematic comparison between economic facts and environmental facts is carried out by referring to some specific "topics", defined by narrowing the field of observation to basic categories of phenomena, and by utilising particular "tools" for the representation of statistical information.

All of the "topics" somehow regard economic-environmental interaction. Therefore, amongst other things, they can all be recognised in relation to the different components of the DPSIR model (Box C). Said model, widely used in the production, analysis and reporting of environmental data, provides a useful conceptual framework also as regards the various types of information produced by environmental accounting. Table II.1 provides a summary breakdown of the "topics" of environmental accounting, indicating for each area the nature of the phenomena analysed (stock or flows), as well as the main component of the DPSIR model to which the phenomena considered can be traced.

[9] As described in the national accounts.

Box A – Environmental accounting, a component of official statistical information

As is true of most official statistical information, environmental accounting is not designed for a specific user. In the Italian national statistical system (Sistan), as in the leading European democracies and in the more statistically advanced countries, the national system of environmental accounts is designed to meet the needs for knowledge expressed by institutions, citizens and firms as well as international organisms, especially Community needs in the case of EU member states. An essential characteristic of such a system is that it is developed in accordance with some fundamental requisites of official statistics , which, by their very nature, are required to provide information via the maximum level of reliability and dependability of the datum. Environmental accounting, as all other types of official statistics, are produced guaranteeing the respect of requisites such as relevancy, completeness, comparability in space and time, flexibility and transparency. Some of these requisites are aimed at ensuring the high quality of the information with regard to contents. In particular, the objective is to ensure not only the relevance of the information and how well it matches the needs for knowledge about the phenomena investigated, but also the completeness, as incomplete information can prove to be slanted. Moreover, in order to ensure their profitable use, the environmental accounting aggregates are integrated with other information sources, thanks to the adoption of a shared framework of definitions, classifications and theoretical reference schemes, and are organised in a flexible manner so they can be utilised for different problems and analyses. Additionally, there is a requisite aimed at tangibly facilitating the use and correct understanding of the information produced: transparency, which is ensured via documentation of the production process and the "meta - information".

Box B – "Satellite accounts"

"Satellite accounts" are set up to supplement the core system of the national accounts. Their purpose is to either provide detailed analyses of specific functions of the economic system or to examine some phenomena not included in the scope of the central framework. The satellite accounts are set up according to concepts, definitions, classifications and schemes that are either coherent or can be compared with the rest of national accounting in such a way as to ensure an integrated reading of the two types of accounting. The national accounting guidelines provide principles and directions for the development of satellite accounts and identify two main types (see SNA93, Chapter XXI, United Nations, 1993b):

1. Accounts aimed at analysing a particular function of the economic system not yet explicitly described as such in the national accounts central framework (ex.: tourism, environmental protection, etc.). These are called "internal" or "functionally oriented" satellite accounts. The flows that they analyse are already reported in the core system, where, however, they are "hidden" due to the classification system used. This type of satellite account makes them visible through a process of "deconsolidation" aimed at highlighting the economic transactions linked to the carrying out, financing, use, etc. of activities and products related to the function being studied. It essentially amounts to developing an 'of which' item of National Accounts for a specific function.
2. Satellite accounts aimed at describing new and/or alternative concepts with respect to those already described in the National Accounts (ex.: environmental accounts in physical units), known as "external" or "integrated" satellite accounts. They involve the registration of new information and thus the extension of the domain of analyses of National Accounts. It essentially amounts to a new, additional item.

Integrated environmental and economic accounting includes both of the above types of satellite accounts. Specifically, the various environmental expenditure accounts are functional (or internal) type satellite accounts. In contrast, the accounts that include physical data relating to the environmental pressures imposed by the economy or physical data relating to the stock and to variations in the amount of natural resources are integrated (or external) type satellite accounts.

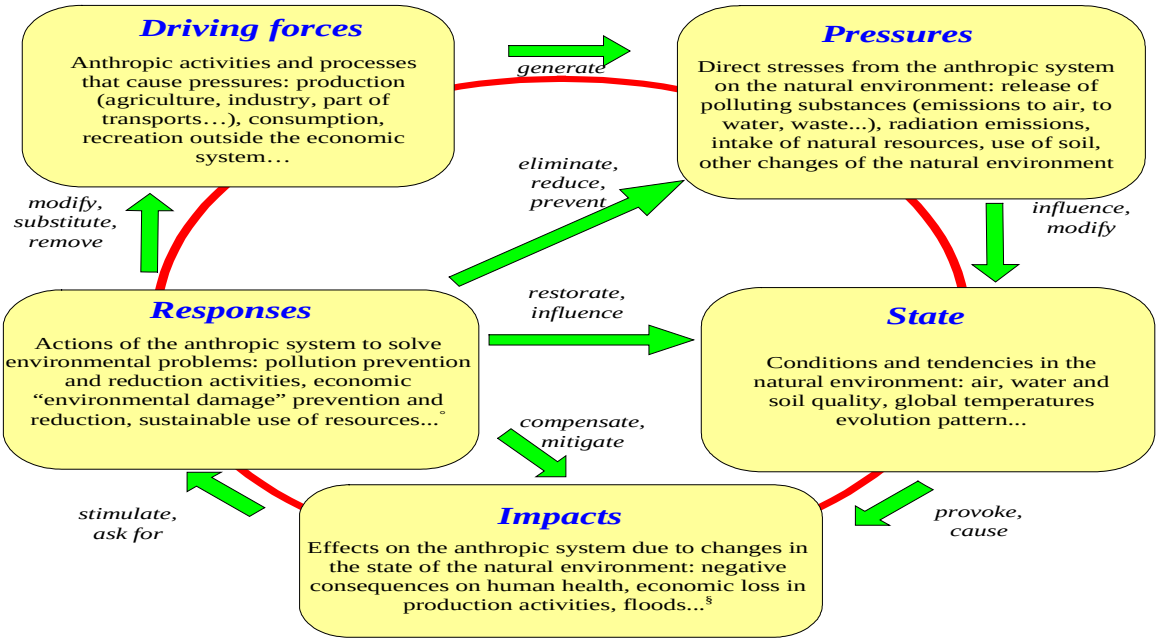
The related manuals for the various types of environmental accounting satellite accounts are prepared by defining and specifying, with respect to the environment, the general satellite accounting principles outlined in Chapter XXI of SNA93.

The phenomena outlined in Table II.1 in correspondence with the various topics are subjects of interest not only in environmental accounting, but in the majority of environmental data and statistics. The specific feature of environmental accounting is that the approach, which is reflected in the way the topics are formulated, seeks to be analogous with some aspects of economic accounting. In particular, the analogy between produced capital and "natural capital" or "natural patrimony" [10] is played on.

[10] This concept is thoroughly explained in the manual entitled "*Integrated Environmental and Economic Accounts 2003*" (SEEA2003), the main reference point at international level for analyses of the interaction between the economy and the environment in accordance with the framework of the satellite accounts (see *United Nations et al.*, 2003). In said manual, the concept is developed in a coherent and complementary way with respect to the concept of capital adopted in the system of national economic accounts. This concept is discussed further on in paragraph III.3.

Box C – The DPSIR model: *Driving forces-Pressures-State-Impact-Response*

The DPSIR model – *Driving forces-Pressures-State-Impact-Response* – provides a conceptual reference framework especially suited to both the description and study of various environmental problems as well as the related policy intervention, thereby constituting a fundamental reference point for all research and international debate regarding environmental information (OECD, 1993; Eurostat, 1999a).
The DPSIR model (Figure C.1) is based on the explicit explanation of general causal linkages: humankind, with all of our activities, (*Driving forces* or *Pressures* or *Determinants*) directly interact with the natural environment through physical exchanges that produce stress (*Pressures*). The conditions of the natural environment (the *State*) tend to be modified in response to such pressures. In turn, changes in environmental conditions are often harmful to humans, generating perceivable *impacts* on the human system. Thus a first causal cycle draws to a close with the effects, for the most part negative, of human activity on the anthropic system, through the deterioration of the nature sustaining such activity. In its turn, the anthropic system tends to react (giving responses) to environmental change, to eliminate the causes or the consequences. Responses are directed at both the immediate causes of the impacts (changes in state) as well as the deeper causes, going to the start of the process back to the very pressures and "factors" that generate them. The circle thus closes once again, with society's reaction to the negative consequences of its own development.



Source: MEF, DPS - Istat, National Accounts

Thus, the objective is to quantify the stock of available natural capital, its use and deterioration[11], as well as the economic resources needed to maintain it[12].

[11] Economic accounting generally valuates the replacement cost (depreciation).
[12] Economic accounting talks about maintenance (ordinary and extraordinary).

Table II.1 Main topics of environmental accounting

Main topics	Main phenomena	Types of phenomena	Stage of the DPSIR circuit
Amount and state of the natural patrimony	Amount of the various natural resources (forests, inland waters, subsoil assets, animal resources, etc.); Qualitative state of the various natural resources and different environmental *media* (quality of the forests, water, air, etc.).	STOCK	STATE
Use, degradation and depletion of the natural patrimony	Amount of intake of different natural resources; Emission (currently or potentially) of pollutants (atmospheric emissions, wastewater, waste, etc.); Phenomena of degradation and change of quality of the environment.	FLOWS	PRESSURES
Defensive expenditures	Prevention and reduction of use of natural resources and of pollution and degradation; Restoration of environmental damage due to excessive use of resources and/or excessive pollution and degradation.	FLOWS	RESPONSES

In the end, the variety of phenomena considered in environmental accounting is reflected in the considerably detailed information provided. First of all, the natural patrimony is broken down in relation to the various resources (forests, inland waters, subsoil resources, etc.) and the various environmental media (air, the various habitats considered in their entirety, etc.) of which it is comprised. Secondly, account is taken of the functions that natural capital carries out with respect to the anthropic system. These essentially include:

- supplying raw materials and resources for the production and consumption processes (*resource functions*);
- absorbing production and consumption processes' waste products (*sink functions*);
- providing a *habitat* to all living species including humans (*service functions*); some functions, such as air for breathing or water for drinking, are vital (*survival functions*), but there are others such as the natural landscape and space for recreational activities, (*amenity functions*).

The main topics are thus dealt with in detail, by distinguishing amongst the different elements of the natural patrimony and by considering the different functions that it carries out. Information is presented using the specific unit of measure of the phenomenon analysed, basically in physical units.

The particular "tools" used to present statistical information in environmental accounting give rise to various types of satellite accounts (asset, flow, in physical and monetary terms, etc.). These are developed with reference to the different main topics by reworking some economic accounting schemes.

An especially important example in this sense is that of asset accounts of natural resources (Box D), which are based on the general structure of asset accounts and adjusted to the case of a natural resource. Via the balance of variations, these accounts indicate straight away if a process of depletion of the natural capital stock is underway and the extent of the phenomenon.

Another example regards the environmental protection expenditure accounts. Designed to analyse an economic system function that is not explicitly addressed in the system of traditional economic accounts, they regard a specific phenomenon from amongst those dealt with in the broader field of environmental defensive expenditure (Box E).

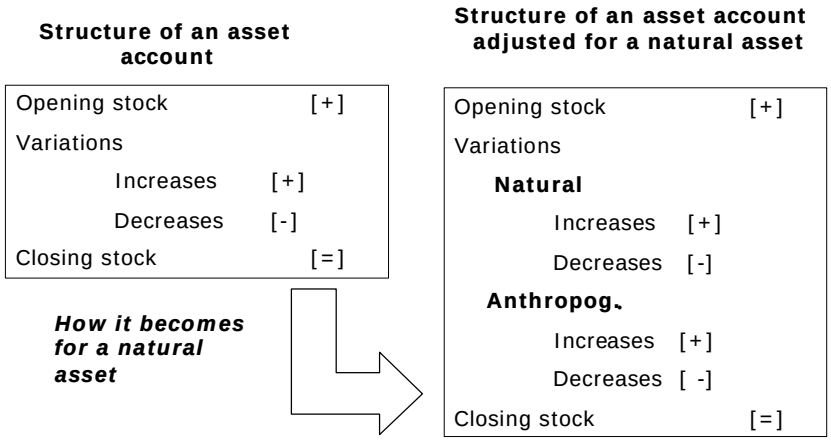
Box D – Asset accounts of natural resources

In general, as regards produced capital, an asset account is arranged to quantify in monetary terms (Figure D.1):

1. the amount of the asset at the start of a specific accounting year (opening stock);
2. the changes taking place during the accounting period (ex. one year), in other words, flows pertaining to increases (ex. new acquisitions) and to decreases (ex. consumption, losses, etc.);
3. the amount of the stock at the end of the accounting period, calculated as the algebraic sum of the preceding amounts.

In this type of account, the plus or minus sign of the balance of flows immediately indicates whether a process of accumulation (plus sign) or a process of depletion (negative sign) of capital took place during the period under consideration.
Applied to the case of a natural resource, the general layout of an asset account is adjusted in the manner illustrated in Figure D.1.

Figure D.1 General structure of an asset account adjusted to the case of a natural resource



Source: MEF, DPS - Istat, Head Office of National Accounting

In addition to opening and closing stock data – quantified in physical terms as for all the other amounts - the asset account of a natural resource reports flow data distinguishing between variations due to natural causes and those due to anthropic causes. The respective balances of the natural variations, of the anthropogenic variations and of the total of variations allow us to derive indications on the more or less sustainable use of the resource. This is especially true in the case of "renewables", meaning those resources that naturally replenish themselves during a reasonable period of time, so as to result in a process of accumulation to be passed on to future generations (such as forests or water). These resources differ from "non-renewables", meaning those resources whose process of regeneration takes place over an extremely long period of time (such as subsoil resources) .
For example, in the case of a renewable resource such as forests, the balance of variations in the asset account can be interpreted as follows:

- balance of natural variations (ex. natural growth of forests; loss of forests due to fires produced by natural causes or other natural disasters): the balance sign indicates if the natural phenomenon, independently of changes induced by humankind, have caused a process of accumulation (+ sign) or depletion (-sign);
- balance of anthropogenic variations (ex. cutting down of forests; loss of forests due to arson; reforestation activities): the balance sign indicates whether or not humankind's actions alone, independently of changes produced by natural phenomena, have resulted in a process of accumulation (+ sign) or depletion (- sign). In other words, this balance reveals if humankind's activities alone have tended to solely deplete the capital or, on the other hand, if they are coupled with restoration activities;
- closing balance of variations: the balance sign indicates if, on the whole, during the year, there was a process of accumulation (+ sign) or depletion (- sign), due to the combined effect of humankind's actions and those of natural mechanisms.

Box E – Environmental defensive expenditure

The document SEEA2003 defines the different types of environmental defensive expenditure (United Nations *et al.*, currently being published):

1. Expenditure aimed at *directly protecting environmental functions*, meaning spending for interventions that directly impact on environmental functions (either qualitatively or quantitatively):
   - 1.1. Expenditure aimed at *preventing* the deterioration of environmental functions (ex. use of more environmentally friendly technologies; adoption of energy saving or water saving measures, etc.);
   - 1.2. Expenditure aimed at *restoration* of deteriorated environmental functions (ex. clean up of polluted sites, replenishment of water-bearing stratums, reforestation, etc.);
2. Expenditure aimed at *combating the negative effects of the deterioration of environmental functions*, meaning spending for interventions that do not directly impact on environmental functions, but rather impact on the consequences deriving from the deterioration of environmental functions:
   - 2.1. Expenditure aimed at *avoiding* the effects of the deterioration of environmental functions when such deterioration is neither avoided nor restored (ex. double glazing windows for noise protection, relocating to a less polluted area, etc.);
   - 2.2. Expenditure aimed at *offsetting* the effects of deterioration of environmental functions without removing them (ex. medical treatment for conditions brought on by pollution).

In the field of environmental accounting of official statistics, attention is generally focused on the first type of expenditure, that aimed at *directly protecting environmental functions*. With reference to the DPSIR model described earlier, these correspond to the socio-economic system's "responses" designed to contain the "pressures" placed on the environment by humans and to conserve/restore the "state" of the environment. In contrast, the objective of the second type of expenditure is to combat repercussions on the anthropic system (called "impacts" in the DPSIR model) resulting from the modification (deterioration) of environmental functions.

This type of accounting typically analyses the function under consideration (environmental protection) from some fundamental perspectives (Box F). On the supply side, this is done by disclosing the economic resources used to produce environmental protection goods and services (wastewater management, more environmentally friendly products, etc.). On the demand side, this is done by disclosing the expenses incurred by users to purchase goods and services whose purpose is to protect the environment. As regards financing, this is done by disclosing transfers of financial resources amongst various subjects, in virtue of which some operators bear part of the financial burden of environmental expenses incurred by some users.

A third example is that of integrated economic and environmental accounts (NAMEA – *National Accounts Matrix including Environmental Accounts*). By allowing for a joint reading of economic and environmental variables, a comparison between economic results and the related environmental performance can be made for the various groupings of economic or consumption activities (Box G). Indeed, for the various production activities and various final household consumption activities, there is a comparison between the economic indicators (production, value added, employment, final consumption) and the corresponding indicators of environmental pressure (indicators related to the pressures generated by those levels of production and consumption).

Box F – Environmental protection expenditure accounts

The accounting structure essentially consists of three types of tables, drawn up to respond to different categories of questions, as illustrated below.
How much of the production system is absorbed, in terms of turnover, investments, employee, etc., by activities producing environmental protection goods and services? How much of the production is carried out for third parties by operators specialised in environmental protection activities ("specialised producers", such as municipal enterprises) and how much is instead carried out *a latere* with respect to other activities or for one's own use and consumption to reduce self-produced environmental pressures ("non-specialised producers")? To what extent does the General Government (GG) assume responsibility for such production (breakdown by institutional sector)? To what extent do the various sectors of economic activity assume responsibility for the production of environmental protection goods and services (breakdown by sector of economic activity)?

Table to analyse expenditure connected to the production (supply) of environmental protection goods and services

Economic aggregates connected to the production of environmental protection goods and services	Producers of environmental protection goods and services				Total
	Specialised producers		Non-specialised producers		
	GG	Others	GG	Others	
Production costs	x	x	x	x	x
Value of production	x	x	x	x	x
Turnover	x	x	(x)	(x)	x
Investments	x	x	x	x	x
Employee	x	x	x	x	x

LEGEND: x = the transaction exists; (x) = the transaction exists only for those that sell their own production to third parties, and does not exist for those that produce for their own use and consumption

Who utilises the production of goods and services reported in the previous table and to what extent? For what type of use (final consumption, intermediate consumption, investments)?

Table to analyse expenditure connected to the use (demand) of environmental protection goods and services

Types of expenditure for the use of environmental protection goods and services	Users of environmental protection goods and services			
	GG	Enterprises	Households	TOTAL
Final consumption	x	-	x	x
Intermediate consumption	-	x	-	x
Investments	x	x	-	x
TOTAL	x	x	x	x(*)

LEGEND: x = the transaction exists; - = the transaction does not exist by definition

(*) = total value of production reported in the previous table (excluding cost items included in the purchasers' price and not in the value of production as, for example, transport and distribution margins)

Do the various users entirely bear the cost for the purchase of the environmental goods and services they use (reported in the previous table) or is the cost in part borne by other insttutional sectors? To what extent does each institutional sector finance environmental protection expenditure incurred by other sectors (for example, financing flows from households and enterprises to the GG by means of fees, charges and taxes that finance the cost of certain services purchased by the GG for collective consumption; grants provided by the GG as an incentive to choose environmentally friendly investments (ex. the adoption of environmentally friendly technologies)? In the end, to whom and to what extent does the financial burden for environmental protection fall?

Table to analyse the financing of expenditure for the use of environmental protection goods and services

Financing sectors of expenditure incurred by users	Users of environmental goods and services			
	GG	Enterprises	Households	TOTAL
GG	x	x	x	x
Enterprises	x	x	x	x
Households	x	x	x	x
TOTAL(*)	x	x	x	x

(*) = to the total of the column of the previous table

Box G – Matrix of economic accounts integrated with environmental accounts

An indicator of environmental pressure allows for the quantification, in physical terms, of the pressure exerted in a territory with reference to a specified environmental "theme" (for example, the indicator CO_2 emissions for the problem of climate change)and to carry out a comparison between territories. A system of *sectoral indicators of environmental pressure* calculates environmental pressures, with reference to selected environmental problems, having as its domain of analysis the various anthropic activities that generate such pressures. The *NAMEA (National Accounts Matrix including Environmental Accounts)* produces a system of *integrated economic and environmental indicators* (Figure G.1) that makes it possible to jointly analyse the relative contribution of each economic or consumption activity to a specific environmental problem and the relative contribution of the same activity to the economy as a whole. This makes it possible to answer questions such as: how important is the economic sector that contributes most to the problem of climate change (in terms of CO_2 emissions) to the territory's economy (in terms of value added, employment, etc.)?

Figure G.1 – Structure of a national accounting matrix including environmental accounts

Economic activities and household consumption	Economic aggregates				Environmental pressures: pollution		Environmental pressures: intake of natural resources		
	Production	Value Added	Employment	Final Consumption	Atmospheric Emissions	Water Emissions	Fossil Fuels	Minerals	Biomasses
Agriculture and forestry									
Industry									
Services									
Household consumption: - transport - heating - other									

Legend: the grey cells indicate occurrences that by definition are not applicable

Source: MEF, DPS - Istat, National Accounts

The statistical information provided by environmental accounting differs from other types of statistical information on the environment because it utilises special tools, such as those discussed above, to analyse the topics. It is the very use of these tools that give environmental accounting some of its unique properties:

- mathematical relationship between the different aggregates (in the same or in different tables);
- systematic linkage between economic and environmental information. This link is sometimes explicit, as in the case of systems of integrated economic and environmental indicators, but is, in any case, ensured by the fact that generally the concepts, definitions, and classifications utilised in environmental accounting are coherent with those utilised in national accounting. Thus, for example, it is possible to compare the environmental protection expenditure incurred by different economic sectors with each sector's total expenditure or the trend of specific economic aggregates with the trend of selected physical indicators of environmental

pressure in the same territory, the same economic sectors, the same institutional sectors, etc.

The above features, which illustrate the distinctive nature of environmental accounting, form the cornerstone of some elements of this discipline's value added. These elements are outlined in Table II.2

Table II.2 Distinctive features and value added of environmental accounting

Key features	Connected elements of value added
System framework, determined by the use of accounting tables (accounting equations link the various aggregates)	Helps to structure existing data, making them consistent with each other. It offers a comprehensive framework within which every piece of information finds its place and meaning.
Mathematical relationship between figures	Reinforces the conceptual link amongst various data, already existing thanks to the tool's "features", in virtue of the mathematical relations that link the various aggregates of the same accounting table or the aggregates reported in different accounting tables; In some cases, it allows for access to missing information via calculation; Some balances can be immediately interpreted from the perspective of environmental sustainability, such as the balances of different types of variations reported in the natural resources asset accounts, which indicate whether or not a process of impoverishment of the assets in question is underway.
Systematic linkage between economic and environmental information	Favours the integrated reading of economic phenomena and the related environmental phenomena via assurance of maximum coherency with the concepts, definitions, classifications, tables and methods utilised for the economic statistics and, especially, the national accounts.

II.1.2 Main types of environmental accounts

As to contents, the European Statistical System provides for the drawing up of different main types of accounts, identified in the European strategy for environmental accounting [13] (Table II.3).

The accounts and balances of material flows at economy wide level (Economy Wide Material Flow Accounting, EW-MFA) are aimed at achieving an overall balance of material exchanges between the anthropic system and the natural system. Specifically, the accounts report material flows that the economic system takes from nature for the purposes of production and consumption (input), accumulates within itself, and returns to the natural environment (output) in physical terms. All of the amounts are quantified with a common unit of measure, the mass unit. The EW-MFA provides a series of indicators, in addition to a balance sheet of the various flows considered. The principal

[6] see Eurostat, 2002d.

objective is to allow for a comparison between the trend in the use of resources and in the production of waste materials and the trend of the economy and consumption (Box H).

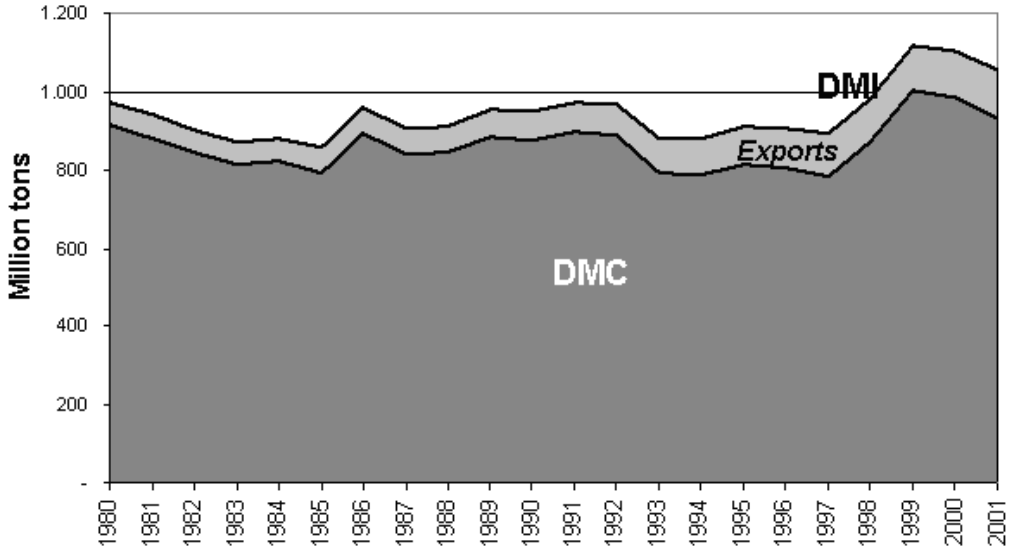
Table II.3 The main types of environmental accounts in the European Statistical System

Type of account	Main objective
Economy-Wide Material Flow Accounting	To construct an economy-wide balance sheet of material flows between the anthropic system and the natural system, in order to analyse the use of natural resources and establish the relation between said use and the economic trend
NAMEA type flow accounts	To report physical flows taking place between the economy and the environment (atmospheric emissions, use and pollution of water, use of energy, etc.), in correspondence with the economic activities that generate them and with the respective economic parameters (production, value added, employment, etc.)
Economic Accounts for the environment	To report economic transactions connected with the environment (environmental protection expenditures, environmental taxes, etc.) and to describe the economic activities that produce environmental goods and services (also called "eco-industries")
Asset accounts of natural resources	To construct an asset account in physical terms for a given natural resource (initial and closing stock, increases and decreases during the period due to both natural and anthropic causes). Account is taken of the quality of the resource by means of appropriate indicators and/or by breaking down the account into quality classes.

Box H – Examples of indicators, analyses and balance sheets derived from material flow accounts

Within the framework of material flow accounts there are different indicators corresponding to different definitions of the quantity of material flows in the economic system. The most widely known is the Total Material Requirement, which utilises so broad a definition that it also includes unused material flows as well as flows caused only indirectly by the economy under examination. The extreme opposite of this definition is the Internal Extraction indicator, which exclusively refers to materials extracted in the territory under consideration and destined to use. The indicators shown in figures H1 and H2, Domestic Material Consumption (DMC) and Direct Material Input (DMI), stand between these two extremes as, in addition to domestically extracted material, they also include imported material. In contrast to the DMI, the DMC does not include exported materials and represents the quantity of material that, following transformations undergone in the economic system, remains incorporated in investment goods and durables or is retuned to the natural environment in a degraded form. Figure H.1 shows *DMI* and *DMC* trends in Italy between 1980-2001.

Figure H.1 Direct Material Input and Domestic Material Consumption – Italy, Years 1980-2001 (millions of tonnes)

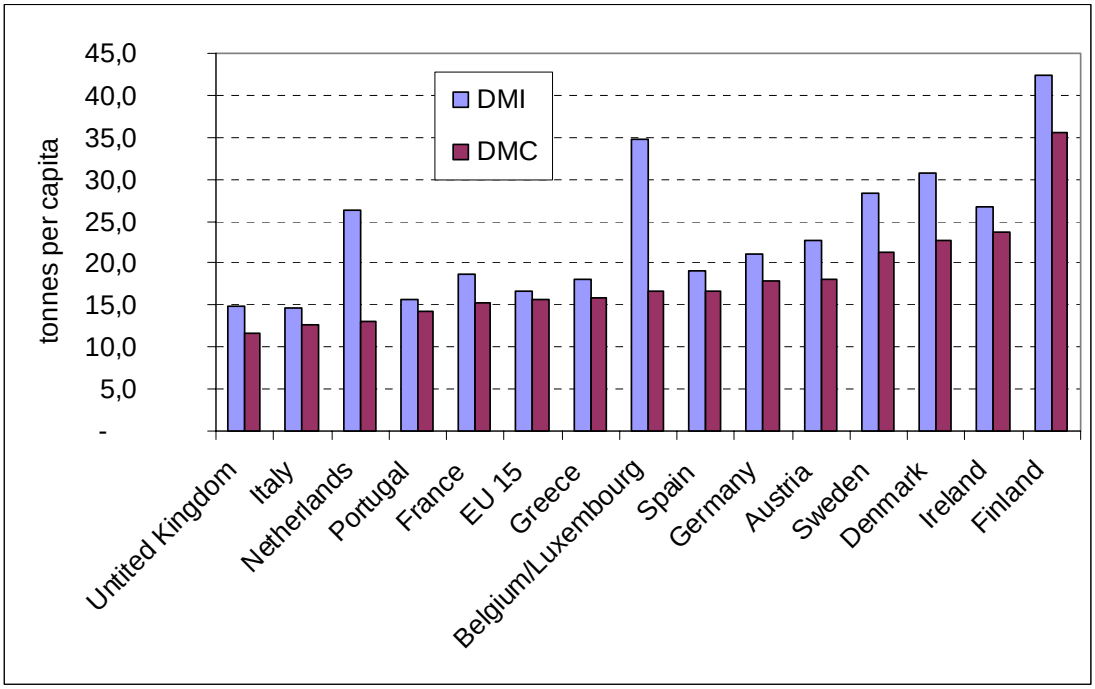


Source: Istat

As clearly seen above, the short-term trends of the two indicators are wholly similar and, in more recent years, conditioned by the unexpected growth in *DMI*. This was especially true in the two-year period 1998-1999, due above all to the sharp increase in the extraction of building materials. Due also to the changes in more recent years, it is not possible to discern a clear, long-term trend. Compared with its starting level, the *DMC* first fell to 86 per cent in 1997 before rising to 103 per cent in 2001. In comparison, the *DMI* rose during the same period from 92 per cent to 109.5 per cent of its initial level. In physical terms, exports tend to increase on a regular basis and, indeed, they more than doubled between 1980 and 2001 (up 112 per cent). At the end of the period, they represented 11.4 per cent of *DMI*. This indicates how greater pressure on the natural environment, connected to the (both domestic and foreign) use of the material resources needed for domestic production, result from a need to meet foreign demand. The monetary aggregate that best corresponds to *DMC* is the total of the resources for domestic use, calculated as GDP plus the value of imports minus the value of exports. Whilst the *DMC* remained more or less at the same levels during the period under consideration, available economic resources grew by almost 48 per cent: this underlines a strong tendency to detach the value of purchased goods and services received in Italy from the quantity of material accumulated in or dispersed to the environment. Nevertheless, is should be noted that this increase in the "ecological efficiency" of consumptions specifically regards direct material flows. Thus, it is relative and not accompanied by a reduction in flows in absolute terms, a condition needed for a more likely move towards sustainability.

A comparison between Italy and other EU countries is provided in Figure H.2.

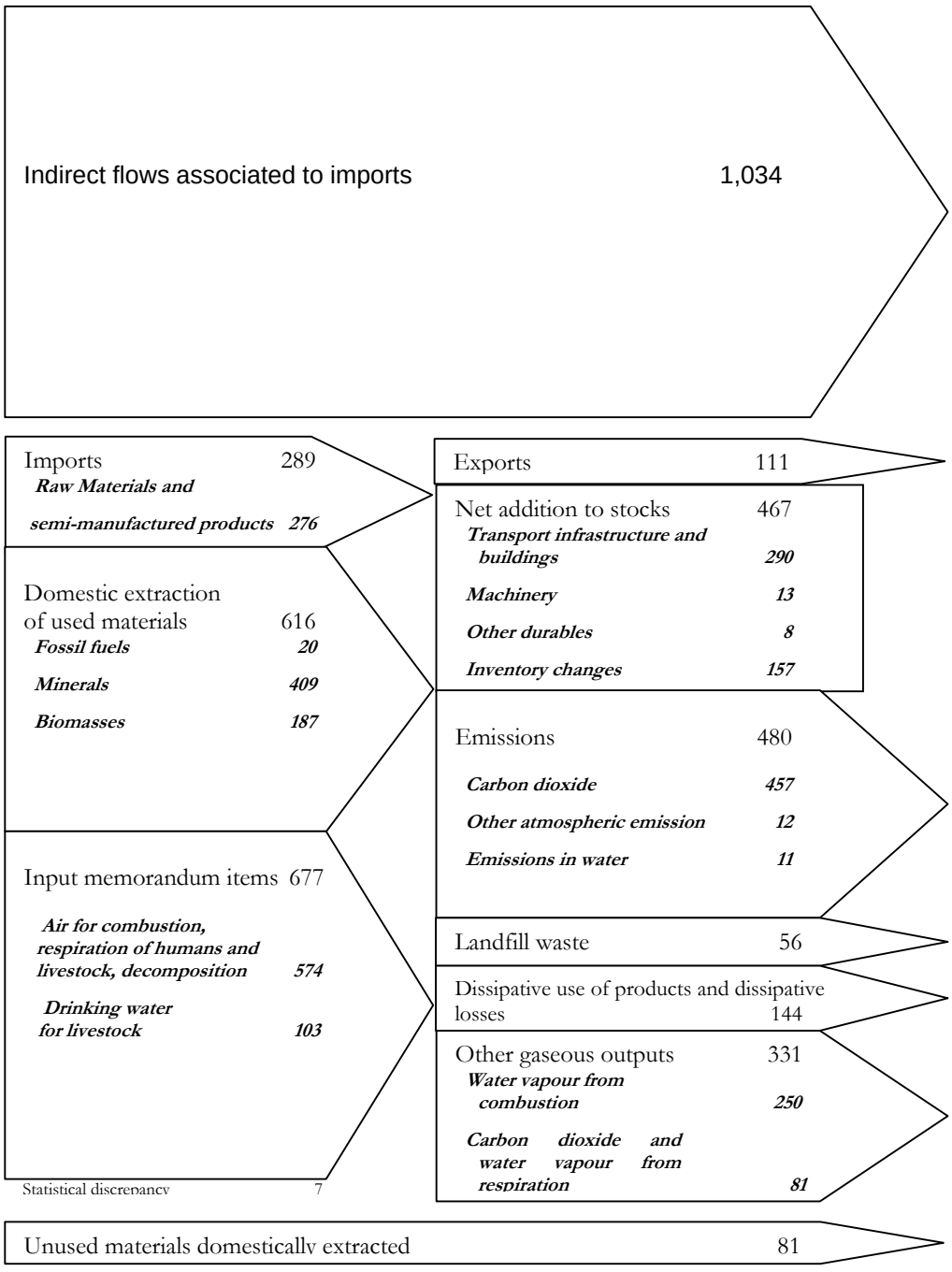
Figure H.2 Direct Material Input and Domestic Material Consumption in the EU-15 – 2000 (tonnes per capita)



Source: "Zero Study: Resource Use in European Countries - An estimate of materials and waste streams in the Community, including imports and exports, using the instrument of material flow analysis" European Topic Centre on Waste and Material Flows, March 2003, Copenhagen.

In order to carry out a deeper analysis, it is useful to consider the complete balance of material flows relating to a particular year . Figure H.3 shows material flows caused by the Italian economy in 1997.

Material Balance, Italy 1997, millions of tonnes



Source: Istat

The estimates shown refer not only to actual input and output flows, but also to unused materials linked to domestic extractions and to material movements only indirectly related to the Italian economy, meaning those indirectly associated with imports. The input and output flows are reported on the left- and right-hand side of the figure, respectively. Specifically, one can note the importance of imported products (289 million tonnes) compared with domestically extracted materials (615 million tonnes). On the output side, notice should be taken of the substantial level of material flows that produce an increase in the stocks accumulated in the anthropic system (467 million tonnes). In line with the principle of material conservation, outgoing flows and the accumulation of stock balance incoming flows (unless there is a statistical discrepancy due to the incompleteness and imprecision of the data base). In order to verify, on the part of existing statistical information, compliance with the accounting constraints imposed by the principle of material conservation, the balance sheet makes it possible to visualise the existing relationship between the use of resources and the production of waste that is hazardous to the natural environment. In particular, the balance sheet highlights how, with 469 million tonnes of gas emitted, the atmosphere is the main receiver of wastes produced by human activity. In contrast, the amount of landfill waste totals 56 million tonnes. The upper part of the figure (indirect flows associated to imports) indicates the relevant amount of virgin material extractions and of the waste returns to nature that are carried out outside national territory to produce goods imported by Italy. Such flows, indirectly activated by the Italian economy to satisfy the country's needs, total 1034 million tonnes, reaching a level that equals two thirds of total direct inputs, therein including auxiliary inputs such as water and air included in products and emissions.

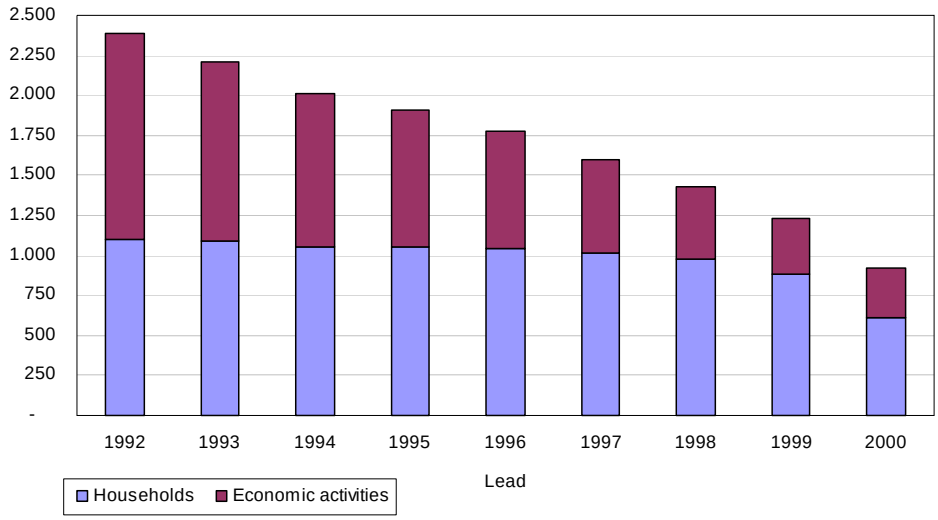
NAMEA (*National Accounts Matrix including Environmental Accounts*) type accounts describe the interaction between the economy and the environment utilising the logic of national accounts to ensure the comparability of socio-economic data (products, revenue, employment, etc.) with those relating to pressure exerted by human activity on the natural environment. This comparison is possible due to the fact that, from time to time, the socio-economic and environmental parameters refer to the same entities, or rather to homogeneous groupings of economic or consumption activities. In practice, a single matrix presents traditional economic accounts (economic module) and environmental accounts (environmental module) side-by-side. The economic module, also called NAM, contains the principal flows reported by the national accounts, expressed in monetary units. The environmental accounts illustrate, in a manner coherent with the economic part, that is, in relation to the same production and consumption activities, the pressures exerted by said activities on the natural environment, expressed in appropriate physical units. The organisation of data makes it possible to compare, for example, an activity's percentage contribution to economic development (in terms of production, employment, revenues, etc.) with the corresponding percentage contribution to pollution generated economy wide (in terms of polluting atmospheric emissions, waste production[14], etc). Examples of analyses that can be carried out with information gathered from the NAMEA are reported in Box J.

[14] In the case of wastes, the quantities produced represent a potential contribution to pollution.

Box J – Examples of analyses based on NAMEA aggregates

In the NAMEA, interaction between production activities and the natural environment is represented via a comparison, for each economic sector, of two joint results generated by the activity carried out: One side reports the economic values created (production, value added, employment) whilst the other reports the environmental pressures generated to create such values (atmospheric emissions, direct extractions of natural virgin resources, etc.). Thus, each economic activity is linked to both the pressures directly and exclusively caused by the typical production processes (for example, farming with the use of fertilizers), as well as those generated by the production support activities (for example, in the case of atmospheric emissions, transportation on the company's own account by means of company shuttles and the heating of work places). Households are held responsible for pressures generated by various consumption activities, which are compared with the expenses incurred by households to purchase products whose use is the root of the environmental pressures considered. For example, as regards atmospheric pollution, consideration is given to the emissions generated primarily by transportation on the household's own account and by heating.
NAMEA type data can be used to calculate the contribution from all production activities considered and households to the total emissions of specific pollutants. An example of this type of analysis is provided below in Figure J.1.

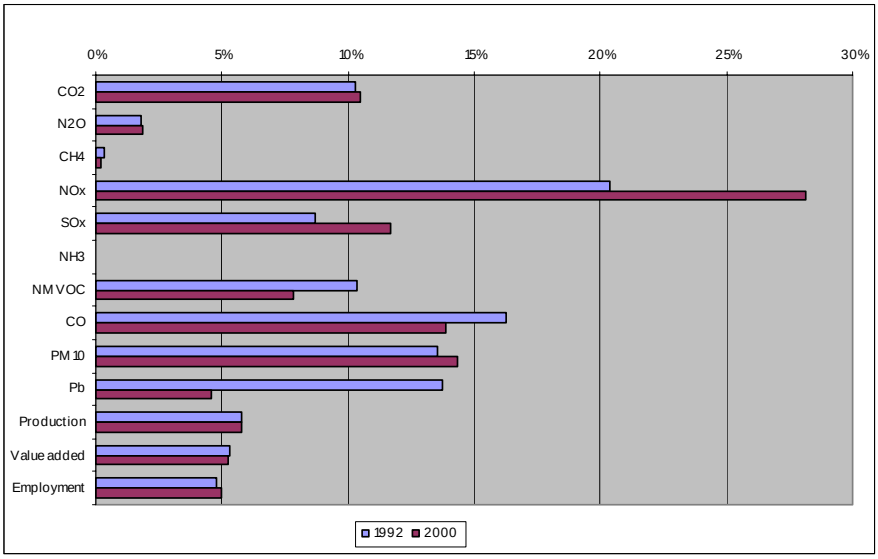
Figure J.1 Lead emissions produced by households and economic activities. Italy – 1992-2000 (tons)



Source: Istat

In a like manner, it is possible to calculate the contribution of a single activity or a grouping of economic activities to total emissions of one or more pollutants or to a particularly important *environmental concern*, such as the greenhouse effect (calculated as the sum of CO_2, N_2O and CH_4 emissions expressed in tonnes of "CO_2 equivalent" emissions).
More generally, the most important innovative contribution of this approach is the possibility to compare monetary data relating to production and consumption activities with physical data on the environmental pressures caused by the same activities.
At international level, there is widespread use of a type of comparison known also as an "environmental profile". In a chosen sector, a match is made between the contribution provided by the sector to the domestic economy (measured, for example, with reference to production, as a ratio between the sector's production and nationwide production in Italy) and the contribution coming from the same sector to the overall environmental pressure (measured, for example, for a given pollutant, as a ratio between the emission generated by the sector and the emission generated by all economic activities). Figure J.1 shows the environmental profiles regarding 1992 and 2000 for the Transport sector. One can observe how the increase (or decrease), between the two years considered, of the weight of a sector with respect to an economic or environmental variable does not necessarily correspond to an increase (decrease) in the level of the variable considered. An example is the observed increase in the contribution from the transportation sector to NOx emissions. In 1992 the sector was responsible for 20 per cent of the NOx emissions generated by the whole economy, whilst in 2000 this figure jumped to 28 per cent. However, at the same time, there is a drop in the sector's NOx emissions of around 34,000 tonnes. This drop was essentially due to the fact that the reduction in NOx emissions generated overall by other economic sectors between 1992 and 2000 (of around 571 thousand tonnes) is greater than the fall in the transportation sector's NOx emissions.

Figure J.2 Environmental Profile for the Transport Sector in Italy – 1992 and 2000

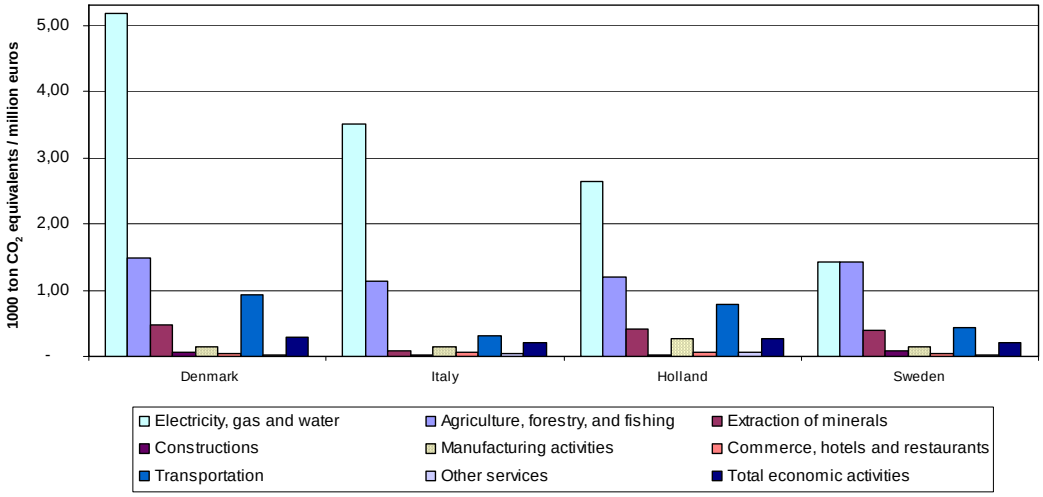


Source: Istat

It is also possible to calculate indicators such as the "emission intensity" of a particular pollutant, economic activity, or grouping of economic activities. This indicator is expressed as a ratio between emissions and production or value added. This ratio can be considered representative, as an inverse index, of the ecological efficiency of a given activity and be the basis for:

- different time period comparisons regarding one economic activity (a reduction in the ratio over time indicates an increase in ecological efficiency and vice versa);
- comparisons between different activities in the same country;
- comparisons amongst different countries (as in Figure J.3).

Figure J.3 Production intensity of greenhouse gases (CO_2, N_2O, CH_4) in some European countries by economic activity – 2000 (thousands of tonnes of CO2 equivalent/million euros)



Source: Istat

As regards environmental economic accounts, the most developed reference framework and methodology at international level is the European system of satellite accounts

SERIEE (a French acronym referring to the System for the Collection of Economic Information on the Environment). The system's most highly developed satellite account in terms of methodology and application is the EPEA (*Environmental protection expenditure account*). Said account focuses on various institutional sectors' environmental protection expenditure, understood as the prevention, reduction or elimination of phenomena of pollution or degradation (management of wastewaters, management of wastes, abatement of atmospheric emissions, soil cleanup, management of protected natural areas, etc.). The account's methodology and framework have been adopted by all leading international entities and were included in the SEEA2003 together with the CEPA (*Classification of Environmental Protection Activities and expenditures*), thereby making it a world standard (Box L). Another SERIEE satellite account, which has yet to be completely developed as regards framework and methodology, is the RUMEA (*Resource Use and Management Expenditure Account*), devoted to expenditures linked to the exploitation and depletion of the stock of natural resources (energy savings, production of energy from renewable sources, water savings, etc.).

Box L – The standard classification of environmental protection expenditure

The CEPA (*Classification of Environmental Protection Activities and expenditures*) is the international reference standard for different environmental accounting systems that include environmental protection accounts. This breaks down into 9 basic classes:

1. Protection of ambient air and climate
2. Wastewater management
3. Waste management
4. Protection of soil and groundwater
5. Noise and vibration abatement
6. Protection of biodiversity and landscapes
7. Protection against radiation
8. Research and development for environmental protection
9. Other environmental protection activities

In addition to being adopted at European level within the framework of the SERIEE system, for the purposes of EPEA (Eurostat, 1994b and 2002a), the CEPA has also been adopted by the United Nations, the OECD, the International Monetary Fund, and the World Bank as well as Eurostat in the SEEA2003 Handbook of National Accounting (United Nations *et al.*, currently being published). Moreover, Eurostat and the OECD utilise the CEPA to gather environmental protection data from EU Member States (Environmental protection expenditure and revenues – Questionnaire, OECD/Eurostat 2002 e 2004).

The CEPA has also been adopted by larger frameworks such as the international COFOG (Classification Of Functions of Government*)*, which regards all GG functions. (United Nations, 1999). This classification includes the "05. Environmental Protection" category, whose contents are based on the classification adopted for EPEA within the SERIEE framework.

It should be noted that EU law requires application of the COFOG within the European framework of the European Accounts System SEC95. Thus, EU Member States are obliged to present not only their national accounts, but also statistics regarding GG expenditure for the functions defined by the COFOG (see Istat, 2004a and 2004b). At national level, for some years now, following reform of the budgetary documents for Central Government administrations, the COFOG has been adopted into the framework of the Central Government budegtary documents for classifying expedniture items by "function-objective " (Law no.94 of 1997).

As regards the GG, aggregates calculated in line with those of the EPEA have become a central part of the National Accounts drawn up in accordance with the SEC95. This is because the classification adopted to analyse GG expenditure by function (COFOG) includes the environmental protection function defined by the CEPA (see Box L). Data

for environmental protection expenditure at regional level are made available by means of the Ministry of Economy and Finance's Regional Public Accounts, which are presently not yet wholly coherent with SERIEE and SEC95 standards and are less detailed from the point of view of environmental sectors (Box M).

Box M – Calculation of government expenditure on the environment within the SERIEE system and in Regional Public Accounts

There are three distinct sets of data on General Government environmental expenditure currently produced within the Italian national statistics system (Sistan):

1. data regarding GG expenditure by function in the National Accounts (ESA95), broken down according to the international COFOG classification (see Box L), which also includes the function "05 Environmental protection";
2. data regarding "environmental protection" expenditure relating to the EPEA satellite account (part of the SERIEE), broken down according to the international CEPA classification (see Box L), on which definition of the COFOG's "05. Environmental protection" function is based;
3. data on "environmental" expenditure at regional level produced by the Department of Development Policies (DPP) of the Ministry of Economy and Finance (MEF) in order to draw up the Regional Public Accounts (RPA).

The production of data on GG expenditure by COFOG function is mandatory for the Eu member states, according to the European regulation on National Accounts (ESA95). These data cover the entire public sector as defined in the ESA95 and refer to national level.
As is generally true of satellite accounts, the production of data with reference to the CEPA is more analytical than the production of data for national economic accounts, especially as regards break down by environmental sector. At the moment, such data cover Central Government (Ministries) and some regional administrations (see, for example, Regione Lazio, 2005).
The RPA data produced by the MEF refer to the larger public sector, including GG, defined in accordance with the ESA95, and all public authorities that carry out market activities (for example, large public enterprises). Focusing especially on an analysis of capital expenditures, these also include the reclassification by function of all expenditure, broken down into "sectors" and including some items devoted to the environment. At present, this is the only source that make this type of information available at regional level.
In Appendix 4 the three types of information are compared in detail, especially as regards the methodology of reclassification by function of GG budegtary documents used in various cases. Here attention is focused on comparing some elements of Istat's work on SERIEE and the RPA drawn up by the MEF. The comparisons specifically concern the following aspects of framework and methodology:

- the definition and classification of environmental expenditure;
- the method of reclassifying the budget accounts' functions ;
- the ways of applying the method of reclassification.

In the SERIEE system, a distinction is made between expenditure for "environmental protection", registered in the EPEA satellite account, and expenditure for the "use and management of natural resources", to which the RUMEA satellite account is devoted. The definition "environmental protection" and thus the EPEA, includes anything that pertains to environmental protection from a *qualitative* perspective. This includes protection from pollution (atmospheric emissions, wastewater, wastes, soil pollution, etc.) and from degradation (loss of biodiversity, soil erosion, salinisation, etc.). In contrast, the definition of "use and management of natural resources" and thus the RUMEA, regards everything relating to the *quantitative* availability of natural resources (water, energy resources, wild flora and fauna, etc.), in other words, their exploitation and those measures aimed at avoiding and at reducing their depletion. The SERIEE has currently seen the development and adoption at international level only of the classification of activities and expenditures for environmental protection – CEPA (see Box L) and not of a classification regarding the use and management of natural resources. As regards the latter, however, the field of analysis has been defined, though only in terms of broad categories (see Appendix 4). All of the categories of environmental expenditure included in the SERIEE are summarised in TableM1, and are compared with the RPA's environmental "sectors". These "sectors" include:

- two sectors that fall within the field of "environmental protection" as defined for the purposes of the EPEA and the ESA95 (Waste disposal and Sewerage and Wastewater treatment);
- two sectors that fall within the field of "use and management of natural resources" as defined within the context of the RUMEA (Water and Energy);
- a generic Environment sector, which, theoretically, can include both expenditure for the "environmental protection", and expenditure for the' "use and management of natural resources". In actual fact, based on the methods of reclassification actually utilised to produce the RPA, this sector primarily refers to environmental protection (in Table M1 the cases corresponding to the use and management of natural resources are in parentheses).

The comparison of the above definitions and classifications shows how the data produced with reference to SERIEE, especially as regards EPEA, are considerably more detailed from the viewpoint of an environmental sector breakdown. Moreover, the SERIEE, and especially the CEPA, cover activities that are instrumental to environmental protection, such as R&D, administrative activity, teaching, training and information (classes 8 and 9 of the CEPA). In contrast, in the RPA, these are classified in the environmental items only to the extent to which the original data sources adopt such sectorial allocations from the outset.

Table M.1 Classification of environmental expenditure in the SERIEE and the RPA

Environmental scopes	Environmental Domains included in the SERIEE		Environmental sectors included in the RPAs
ENVIRONMENTAL PROTECTION	**CEPA1994 categories (EPEA)**		
	1	Protection of ambient air and climate	Environment
	2	Wastewater management	Sewerage and wastewater treatment
	3	Waste management	Waste disposal
	4	Protection of soil and groundwater	Environment
	5	Noise and vibration abatement	
	6	Protection of biodiversity and landscapes	
	7	Protection against radiation	
	8	R&D for environmental protection	
	9	Other environmental protection activities	
USE AND MANAGEMENT OF NATURAL RESOURCES	**Categories of natural resources (RUMEA)**		
	I	Inland water	Water
	II	Forests	(Environment)
	III	Wild flora and fauna	(Environment)
	IV	Non-renewable primary energy sources (fossil fuels)	Energy
	V	Non-energy raw materials	(Environment)

LEGEND:

	Environmental protection in accordance with EPEA (SERIEE) and the ESA95 (COFOG)
	Use and management of natural resources in accordance with RUMEA (SERIEE)
	Not applicable

As regards methodology, both types of data are produced via functional reclassification of budget account even if they are of different types:

- Istat data regarding the EPEA are produced via "analytical" methods of reclassification, based on detailed analyses of individual expenditure items in the budget accounts (Istat, 2003; Istat, 2005);
- MEF data regarding the RPA are primarily produced by utilising "automatic" methods of reclassification, based on "bridge" systems, by which it is possible to pass from the functional classification adopted *ab origine* in the public finance documents to the "sectors" classification in the RPA, with limited "analytical" reclassification activity of the basic data sources.

The greater rapidity, by which "automatic" methods of transcoding can ensure an exhaustive analysis of the scope (the entire public sector) in reasonable time also introduces elements of systematic distortion. These are examined in detail in Appendix 4 and can be summarised as follows:

- exclusion of expenditures that should be included: this is due to the fact that via automatic methods it is possible to find environmental expenditures in budgetary documents only in those groups of items that specifically refer to the environment and the territory, not in the entire document. (for example, there is exclusion of some items such as grants to enterprises for environmental investments that are normally classified under functions labelled in relation to economic sectors that receive incentives: industry, transport, trade, etc.);
- inclusion of expenditure that should be excluded: this is due to the fact that the functions identified in the public accounts with labels referring to the environment and to the territory normally also include expenditures that do not regard environmental protection (for example, expenditure for the protection of anthropic infrastructure in the field of interventions of soil protection).

The ways in which the different methodologies of reclassification are applied in practice are also linked to the more or less restrictive definitions and classifications. The EPEA definition of environmental protection and the CEPA classification constitute an international standard assimilated by the COFOG (adopted by EU Regulation in the ESA95) and are thus binding in the phases of production and diffusion of data. Accordingly, only those expenditures that are actually pertinent to environmental protection can be thus attributed and it is necessary to appropriately break down expenses amongst the different CEPA categories. For this reason, for example, the expenditures reported in the budgetary documents for the integrated water service are broken down between expenditures for sewerage and treatment for the EPEA – class 2 of the CEPA – and expenditure for the distribution of water for the RUMEA. The definition and classification utilised in the context of the RPA, not subject to the restrictions of international standards, can, to the contrary, be adjusted, when disseminating the data, in relation to the characteristics of the basic data. For example, the expenditures for the integrated water service are generally reported in an aggregate item that includes both the "Sewerage and wastewater treatment" sector as well as the "Water" sector, in that a breakdown between the two sectors is not easily identifiable in the sources, if not by means of in-depth analyses of the basic data. Consequently, in cases such as this, the information provided in the RPA regarding environmental expenditure is even less detailed that than provided in accordance with the SERIEE (see Table M1).

The data produced by means of environmental expenditure accounts such as the EPEA can be analysed in many different ways. These include:

- analysis by individual industrial (or economic) sector: for example, public expenditure for environmental protection in relation to total public expenditure;
- comparison of the different institutional (or economic) sectors: for example the percentage distribution of the financial burden for environmental protection amongst enterprises, households and General Government;
- analysis of physical data linked to expenditure data: for example physical data on environmental protection equipment and plants (such as the capacity and population served by the water treatment plants) for analyses of efficiency; or physical data on pressures managed via environmental protection activities (such as waste management) for analyses of effectiveness or of the degree of application of the "polluter pays principle", etc.

An example is provided in Figure II.1, which shows the weight of public expenditure for environmental protection out of the total of GG expenditure in EU countries.

Figure II.2 provides an example of expenditure analysis for the different institutional sectors based on the EPEA relative to the waste management sector (Category 3 of the CEPA). In line with the approach illustrated in Box F, the aggregates first show how the supply of waste management services breaks down between specialised producers belonging to the public sector and private enterprises, highlighting to what extent some enterprises produce this type of service for their own use and consumption (ancillary production). On the demand side, utilisations are analysed by type of use (final consumption, intermediate consumption, etc.) and thus by type of user (households, enterprises[15], GG), leading to a calculation of national expenditure for waste management by user. Then, taking account of the transfers among different sectors of the economy, national expenditure by user is broken down by financer. This allows for calculations regarding, for example, the percentage of national expenditure that is self-financed by each user or the financial burden for waste management borne by each industrial sector, including self-financed expenditure and financing to other subjects.
Finally, the natural resource asset accounts are balance sheets expressed in physical terms, drawn up with reference to the different natural resources considered. They

[15] In the part regarding the utilisations "Other producers" include "Unspecialised producers" and the firms that exclusively use environmental protection services produced by others .

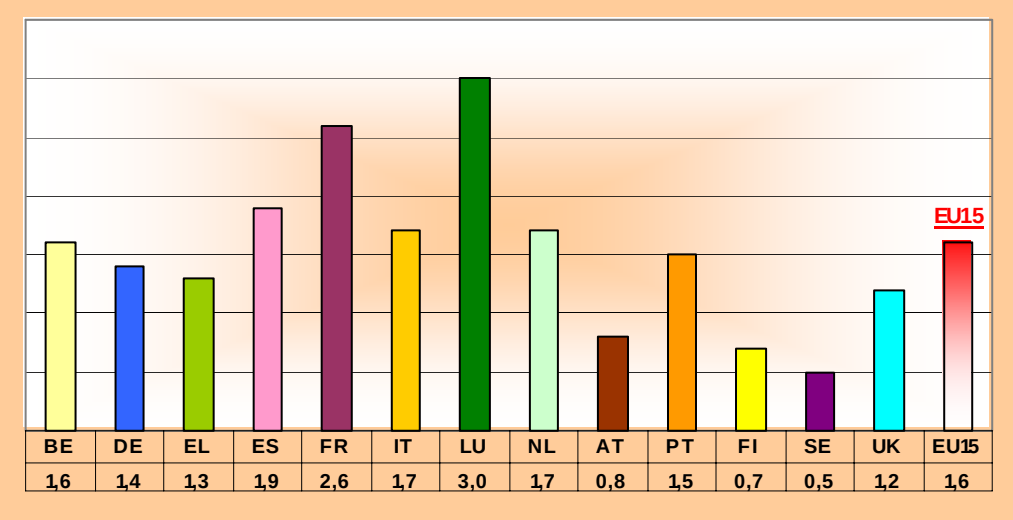
report the consistency of the opening and closing stock for the accounting period, as well as the variations clearly due to anthropic causes and to natural causes. The approach is essentially quantitative, meaning that the objective is to consider natural patrimony primarily from the viewpoint of its function of supply of raw materials to the economic system (*resource functions*). In order to also take account of the qualitative state of the resources, it is possible to draw up an asset account for the different classes of quality or to integrate it with appropriate quality indicators.

Through an adequate combination of various types of environmental accounts selected from amongst those previously introduced, it is possible to obtain tools (such as integrated environmental and economic accounts for forests, water and subsoil resources) for the study of specific resources. Depending on the case in point, more or less detailed NAMEA type flow accounts, economic accounts and asset accounts are drawn up with reference to a specific natural resource.

The national statistical institutes of EU Member States and other countries that refer to SEEA2003 work at the implementation of the different types of environmental accounts adopted in the European Statistical System[16]. Various products are produced within the framework of each type of account. These products are summarised in Table II.4, which illustrates the state of development of environmental accounting.

[16] A presentation of the international methodological context at world level is provided in Appendix 1.

Figure II.1 Environmental protection expenditure of Genral Government in the 15 EU Member States (*) – Year of reference 2000 (figures expressed as a per cent of total government spending)



(*) No data is available for Denmark and Ireland.

Source: Eurostat, 2004, *Statistics in focus*, *Trends in selected general government expenditure by function of EU Member States*, Luxembourg

Figure II.2 Some EPEA aggregates regarding the waste management sector, Italy – 1997 (millions of euros at current prices)

EP production at basic prices by EP producer

EP output, sales, investments	Specialised producers: General Government	Specialised producers: Enterprises	Ancillary producers	Total
Output of EP services	2.204,5	4.789,6	124,6	7.118,7
market	*2.204,5*	*4.789,6*	-	*6.994,1*
non market	-	-	-	-
ancillary	-	-	*124,6*	*124,6*
Sales	2.204,5	4.789,6	-	6.994,1
Investments	88,7	2.915,3	63,8	3.067,8

EP uses at purchasers' prices by kind of use

final consumption	capital formation	intermediate consumption	Total
3.292,9	-	*4.384,0*	*7.676,9*
-	-	-	-
-	-	*124,6*	*124,6*

EP uses at purchasers' prices by user

Uses	Final consumers: Households	Final consumers: General Government	Users: EP Producers: Specialised producers: GG	Users: EP Producers: Specialised producers: Enterp.	Users: Other producers	Total
Uses of EP sold output (market, non market	3.292,9	-	-	-	4.384,0	7.676,9
Uses of EP ancillary output	-	-	-	-	124,6	124,6
Investments for EP services	-	-	88,7	2.915,3	63,8	3.067,8
National EP expenditure by user	**3.292,9**	**-**	**88,7**	**2.915,3**	**4.572,4**	**10.869,3**

EP uses at purchases' prices by financer

Financers						
General Government	109,8	-	88,7	-	13,5	212,0
Corporations	-	-	-	2.915,3	4.558,9	7.474,2
specialised producers	-	-	-	*2.915,3*	-	*2.915,3*
other producers	-	-	-	-	*4.558,9*	*4.558,9*
Households	3.183,1	-	-	-	-	3.183,1
National EP expenditure by user	**3.292,9**	**-**	**88,7**	**2.915,3**	**4.572,4**	**10.869,3**
National EP expenditure auto-financed by user	**3.183,1**	**-**	**88,7**	**2.915,3**	**4.558,9**	**10.746,0**

Source: Istat

II.1.3 The current situation

Development of environmental accounting at international level is still underway with regard to both methodology and application.

The level of definition and standardisation of the methodologies of the different types of environmental accounts is uneven. As shown in detail in Appendix 2, especially for the EU, definitive and standardised methodologies (manuals, compilation guides, standard tables) are essentially available for:

- material flow accounts;
- the NAMEA for atmospheric emissions;
- the EPEA environmental protection expenditure account and statistics of the SERIEE system;
- some natural resource accounts (essentially for forests, water and subsoil resources).

At European level, the environmental accounts which most countries regularly use to produce statistical information (even if coverage is not always homogeneous as regards contents and years of reference) are[17]:

- material flow accounts;
- the NAMEA for atmospheric emissions;
- EPEA environmental protection expenditure account and statistics of the SERIEE system.

For these accounts, Istat is currently producing data on a regular basis, with the first historical series being regularly updated. The production of integrated environmental and economic accounts of natural resources is less advanced, especially due to gaps in the required basic data.

As in other EU countries, in Italy Istat production is mainly at the national level. Activities to develop environmental accounts at regional level have begun, especially with reference to the NAMEA and to public environmental protection expenditure, with the production of some first pilot applications.

[17] The production of these accounts has yet to be legally binding at European level. Only the production of data on environmental protection expenditure by industry and services' enterprises (needed in order to compile the EPEA) is required by EU law governing the production and transmission of structural business statistics.

An outline of the current situation of environmental accounting application in Italy and in the EU is provided in Appendix 3. As regards Italy, this same appendix also indicates the areas of development that currently seem more feasible, also as regards the production of data at regional level, as well as those that will take a longer time to develop (essentially due to a lack of basic data). A summary of the current situation in Italy is provided in Table II.4.

Table II.4 Summary of the current situation of environmental accounting developed in Italy by Istat

ENVIRONMENTAL ACCOUNTS		MAIN STATISTICAL INFORMATION PRODUCTS	TERRITORIAL SCALE (**)	
			NATIONAL	REGIONAL
Economy wide material flow accounts		Indicators of use of materials		
		Material flow balance sheets		
NAMEA-type accounts broken down by economic sector	Flow accounts of (current or potential) pollutants	Atmospheric emission accounts		
		Waste accounts		
		Wastewater accounts		
	Flow accounts of extraction of natural resources	Fossil fuel extraction accounts		
		Mineral extraction accounts		
		Biomass extraction accounts		
		Water extraction accounts		
		Endogenic vapour extraction accounts		
Environmental economic accounts (SERIEE)	Satellite account of environmental protection expenditure (EPEA) Satellite account of expenditure for the use and management of natural resources (RUMEA)	Economy-wide satellite accounts (all institutional sectors)		
		Statistics by institutional sector: Enterprises' expenditure Public Administrations' expenditure Households' expenditure	  	
		Environmental taxes		
		Statistics on the "eco-industries" (economic activities that produce environmental protection goods and services)		
Integrated environmental and economic accounts of natural resources	Asset accounts NAMEA-type flow accounts SERIEE-type economic accounts	Forests		
		Water		
		Subsoil resources		
		Use and coverage of soil		
		Other natural resources (ex. water resources, etc.)		

LEGEND

 **Produced regularly** (for all or part of the field of observation): historical series updated annually or under production

 **Work in progress** for the implementation of the first applications

 **Under study** to start-up works or to define application after the development phase

(*) as regards the SERIEE the products listed refer to both the EPEA and the RUMEA;

(**) as regards the SERIEE the observations apply to the EPEA; the RUMEA part is currently in a stage of study and of start-up of some applications.

II.2 The demand for economic accounting

On the demand side, various types of initiatives regarding environmental accounting have been developed in Italy since the 1990s, with growing attention being shown on the part of the government. A first significant "sign" was the national plan for the implementation of Agenda XXI, endorsed by the CIPE (Committee of Ministers for Economic Planning) at the end of 1993. The CIPE identified the setting up of a national accounting system as being one of the actions needed to give concrete form to a sustainability strategy[18].

At sub-national level, the first important step, in the middle of the 1990s, was the CONTARE project, aimed at defining a regional accounting system as a tool for regional administrations[19].

Afterwards, towards the end of the 1990s, constitutional bodies began to show strong interest in the matter, starting with the Italian Senate and CNEL (National Council for Economy and Labour). A number of bills on environmental accounting at national, regional and local levels were thus presented in Parliament during the previous and current legislature. Though not approved yet, these initiatives have prompted some local authorities to begin experimenting with the proposals discussed in Parliament, thus giving rise to what is often referred to as "public environmental accounting", "environmental accounting of local authorities" or "environmental accounting of Public Administrations" [20].

Since 2000 there has been an increase in such experiments at local level, also thanks to national and EU financial support. Of these, mention should be made of :

- the projects financed by the Ministry of the Environment within the framework of the Call for Tenders 2000 for the co-financing of programmes for sustainable

[18] More recently, this strategic indication has been confirmed with the Environmental Action Strategy for Sustainable Development in Italy (see CIPE 2002).

[19] Approved in 1996 as part of the 1994-1996 Three-year Environmental Protection Programme of the Ministry of the Environment. The objective was to create a tool to assist valuation of environmental policies by setting up a Decisional Support Model for Environmental Accounting and Control of Management (valuation) of environmental expenditure. Participants included the regional authorities of Tuscany (project leader), Piedmont, Liguria, Emilia Romagna and the autonomous provinces of Trento and Bolzano. The Ministry of the Environment acted as project coordinator, with technical support provided by Istat.
See http://www.rete.toscana.it/sett/pta/strumenti/contare/html/livello_intermedio/introduzione.html

[20] The first experimental project at local level was carried out by the provincial authority of Bologna ("Implementation of an environmental accounting system at provincial and inter-municipal level", http://www.provincia.bologna.it/ambiente/contabilita_ambientale.htm)

development and implementation of local Agendas 21[21];

- the CLEAR (*City and Local Environmental Accounting and Reporting*) project, financed by the EU in 2001 as part of its LIFE environmental programme, which resulted in the drawing up and approval of documents called "environmental balance sheets"[22] on the part of the local administrations involved in the project;
- the CONTAROMA project by Rome's municipal authority [23].

The environmental accounting experiments carried out voluntarily by Public Administrations have led to proposals for the use of environmental accounts. At the moment, this tool has yet to be codified into a standard form, given that the experiments themselves were rather heterogeneous and still not widespread. As regards contents, most of the experiments reported up to the present have focused on environmental expenditure carried out by local authorities, often with reference to only one or more sectors (ex. councillor's office to the environment) and not to the administration's financial statements as a whole. The most comprehensive experiences, such as the CLEAR project, take account not only of the data on local authorities' environmental expenditure but also of physical data regarding the territory governed.

The list of local authorities involved in such experiments is growing, in many cases with CLEAR being the project of choice[24], even if there is no lack of initiatives proposing other, original applications[25]. Appendix 5 takes account of the bill on environmental accounting that has sparked these experiments and of the results being produced.

A first important opportunity to study the link between the demand for and supply of environmental accounting at national level was a round table meeting jointly organised by Istat and the Ministry of the Environment in 2001. During the meeting, consideration was also given to the work carried out by Eurostat on the European strategy for environmental accounting. The special task force put together to formulate this strategy reported on environmental accounting demand and supply within the

[21] This refers to 12 projects carried out by the Municipalities of Rome, Cinisello Balsamo, Mantua, Lecco, Grosseto, Massa, the association of municipalities comprising Trecastagni, Nicolosi, Pedara and Viagrande, the Provinces of Lodi and Milan, the mountain Municipality of Valle del Santerno and the mountain Municipality of Volturno (see Ministry of the Environment, 2003).
[22] There are 18 local authorities involved: the Municipalities of Ferrara (group leader), Bergeggi, Cavriago, Grosseto, Modena, Pavia, Ravenna, Reggio Emilia, Rovigo, Salsomaggiore, Varese Ligure, Castelnovo ne' Monti and the Provinces of Bologna, Ferrara, Modena, Naples, Reggio Emilia and Turin. See http://www.clear-life.it/
[23] See http://www.comune.roma.it/ambiente/contaroma/home.html
[24] As in the case of the Municipality of Lucca (see http://www.comune.lucca.it/I/3B5FD076.htm)
[25] As in the case of initiatives underway in the Municipalities of Macerata and Pesaro.

framework of the European Statistical System, with some relevant observations. According to the task force, it is not easy to precisely identify the demand for environmental accounting. One reason is the rapid change of subjects that decision makers focus their interest on, whereas the development of tools takes time. In other cases, users often do not fully realise exactly what environmental accounting can offer, and thus they are unlikely to put forth a clear and detailed demand for data. It is more realistic to expect statistics to meet a broadly defined type of demand, by aiming at simply identifying the objectives to which users associate data. All of this requires that statistics try to identify the policy's longest-term prospects, translating them into specific demands for data and developing data aggregates for future demand. A look at the past shows that many concrete uses were defined once the data were made available (Eurostat, 2002d).

In the current debate, the reflection here proposed and synthetically taken up again in the conclusions (see chapter IV) offers an additional contribution towards linking supply and demand for information coming from official statistics integrated environmental and economic accounting.

As more thoroughly illustrated in Chapter III, the decisions taken at the various stages of development policies can be better informed via environmental accounting tools (where these are available with the necessary territorial breakdown). Such opportunities for use can be taken without a change to existing legislation (whether the bill on environmental accounting is approved or not), by integrating them in the processes of policy implementation via appropriate administrative and governmental acts (CIPE resolutions, Ministerial Decrees, etc.). Of course, consideration should also be given to the need to reinforce the assumption of responsibility by the various government levels e.g. with the introduction of tools such as those called for in the bill on environmental accounting. It should be noted, however, that the approach to the subject of integration between economic and environmental decisions adopted here is defined along the economic and environmental dimensions considered at once as well as along the statistical dimension, given the institutional framework. Therefore the elements of interest that can arise from the present report as concerns the debate on the possibility to introduce at legislative level the obligation to use environmental accounts[26] are to be seen essentially from a technical and scientific point of view.

[26] See Appendix 5.

III. Development policies and environmental accounting: a conceptual reference framework

III.1 Introduction

As discussed in the previous chapter, environmental accounting provides information, organised in accordance with concepts, definitions, classifications and national accounting schemes, on:

- the state of the natural patrimony with regard to quantity and quality (amount of stock of the various natural resources and their respective quality, for example, for different possible uses);
- the pressures exerted by anthropic activities on the natural patrimony in terms of its use and deterioration (extraction of natural resources, pollution and degradation);
- the measures (or "responses") undertaken by different economic and institutional sectors (households, enterprises, General Government) to prevent or reduce the negative effects of anthropogenic activities.

The purpose of this chapter is to identify how such information can contribute to the better design, implementation and monitoring of development policies. This objective is to be reached by the procedure outlined below.

Paragraph III.2 provides a more precise definition of the concept of development policy, highlighting the role of capital expenditure and summarising some key elements that help to distinguish among the various types of policies (final objective, sector, type of expenditure, level of government). Paragraph III.3 presents development policies as a sequence of various allocative decisions (allocation of resources among the territories, sectors of economic activity, beneficiaries of financing). Paragraph III.4 provides three examples of how environmental satellite accounts can be utilised in situations actually encountered in development policy activities. Afterwards, the same paragraph introduces a general reference framework for the use of environmental satellite accounts in relation to the various types of allocative decisions considered in paragraph III.3. Chapter IV then addresses possible priorities in terms of updating and fine-tuning the environmental accounting tools currently available in Italy.

III.2 Content and features of development policies

Generally speaking, development policies can refer to any and all government decisions aimed at either directly or indirectly helping to conserve and increase the stock of the public and private capital of a given population. This definition implicitly includes the idea that development (understood as an increase in the economic well-being of the population as a whole) cannot take place without an adequate allocation of resources to maintain and increase the production system's capacity to generate income. This capacity, in turn, is linked to the quality and quantity of capital goods (tangible and intangible) that can be utilised by economic agents.

In a nutshell, development policies determine or influence decisions about the allocation of income to either *current* expenditure (private consumptions and current expenditure on the part of the General Government) or *capital* expenditure (public and private investments). Whereas current expenditure generates "well-being" in the present, capital expenditure lays the groundwork for future prosperity. This definition of development policies comprises:

i) decisions regarding the amount, composition and selection of categories of beneficiaries, as well as the territorial distribution of public capital expenditure (expenditure policies for development);

ii) decisions regarding tax levies (identification of tax bases, tax rate structures, exemption system), insofar as such decisions impact on private choices regarding the maintenance and/or formation of capital *stock* (fiscal policies for development);

iii) decisions regarding market regulation, insofar as the promotion of market competition and liberalisation – especially for public utilities – influences enterprises in their decisions to invest resources in the conservation or growth of capital *stock* (regulation policies for development).

iv) decisions regarding activities to boost the Public Amministration's technical and administrative capacities, to the extent that they impact on the quantity and especially on the quality of public and private investment expenditures.

The rest of this paper focuses primarily on the potential use of environmental accounting tools for the design and evaluation of the first type of policies (expenditure policies). This does not exclude the fact that some information produced by

environmental accounting can also be relevant to fiscal, regulatory and *capacity building* policies for development, as is opportunely indicated in the rest of the chapter.

Of the various ways to categorise a specific public capital expenditure for development, official statistical sources distinguish between four classifications that are especially important for the purposes of this document. They include: a) the final objective of the development pursued; b) the expenditure sector, meaning the type of capital that the public expenditure sustains and the objective pursued; c) the destination of expenditures (creation of infrastructure, transfers to households or enterprises; d) the level of government responsible for the expenditure.

A) The final objective of development

Total public capital expenditure amounts to the sum of disbursements coming from different financial sources, each having a distinct final objective:

- ordinary resources;
- additional national resources;
- EU additional resources (structural funds);
- national co-financing of EU resources.

The first type of resource is allocated to carry out the State's ordinary functions. However, comma 5 of art. 119 of the Italian Constitution authorises another kind of State intervention, carried out via additional resources and special interventions, that specifically targets under-utilised areas with a view to eliminating structural imbalances. The use of EU resources and related national co-financing find their basis in arts. 158 and 159 of the treaty that set up the EU, which state that the Community must work to reduce both regional gaps in the level of development as well as the backwardness of less favoured regions, also through the use of structural funds.

The first distinction is of interest here, in the sense that environmental accounting can help to expand the concept of territorial imbalances, which is at the root of the distinction between ordinary and additional resources. Thus consideration can be given not only to differences in income levels, but also to differences in terms of the quantity and quality of the territories' respective natural resources and the way the environment and economic system interact in the different territories.

Information about the division of public capital expenditure among the various development objectives is provided in the so-called "Consolidated Financial Framework", drawn up by the Ministry of the Economy's Department for Development Policies, and published in the Department's annual report (see Table III.1). In the period 1999-2002, additional expenditure absorbed an amount totalling around 25 per cent of overall capital expenditure, reaching up to 50 percent in Italy's southern regions (hereinafter the "Mezzogiorno").

Table III.1 Average yearly capital expenditure on the part of the General Government in Italy and in the Mezzogiorno by source of financing, 1999-2002 (current values in billions of euros; percentages)

	Italy		Mezzogiorno		
	Average yearly expenditure (billions of euros)	Percentage of the total for Italy	Average yearly expenditure (billions of euros)	Percentage of the total for the Mezzogiorno	Percentage of the total for Italy
Ordinary resources	35.44	74.3%	9.34	49.2%	26.4%
Additional resources					
of which:					
• Community structural funds	3.02	6.3%	2.27	12.0%	75.2%
• national co-financing	2.94	6.2%	2.01	10.6%	68.4%
• fund for under-utilised areas	6.33	13.3%	5.38	28.3%	85.0%
Total capital expenditure	47.73	100.0%	18.99	100.0%	39.8%

Source: DPS 2004 Report, QFU "Quadro Finanziario Unico"– "Consolidated Financial Framework"

B) The expenditure sector

A second important feature regards the sector of use of the public capital resources as this determines the "form of capital[27]" (produced capital, human capital, etc.) that public expenditure takes. The distinction is important because, in general, there will be a difference among the contributions made by different forms of capital to the development of territories and the reduction of imbalances. Likewise, the consequences

[27] The concept of form of capital is discussed more thoroughly later on; see paragraph III.3 and notes 32, 33 and 34.

will generally be different in terms of any increase or decrease in the pressures placed by human activities on the environment.

There are various sectorial classifications of public capital expenditure, with different criteria by which to structure the basic information in hierarchical form. The Ministry of the Economy's Department for Development Policies has a "Regional Public Accounts" data bank that makes it possible, for example, to obtain information (Table III.2) on the division of capital expenditure among economic infrastructures, human capital, social infrastructures and residential building, which, as a rule of thumb, can be used as a possible division of capital expenditure among the various forms of capital[28]. In the period 1999-2002, around 80 percent of total capital expenditures were allocated to economic and social infrastructures and 11 percent to human capital. In the Mezzogiorno resources were allocated in a manner analogous to the rest of the country. As regards the environment, 9 percent of expenditures referred to the environmental sector (including works pertaining to the hydro-geological system, soil conservation, pollution abatement, protection of bio-diversity and natural landscapes, etc.) and to the integrated water cycle and to waste disposal.

[28] The information on expenditures taken from the RPA (Regional Public Accounts) data bank refers to 30 topic-based sectors taken from the classifications in the administrations' balance sheets in order to take account of the needs of both Community programming as well as more general analyses of public expenditure. See paragraph II.1.2 and, especially, Box M.

Table III.2 Average yearly capital expenditure on the part of the General Government in Italy and in the Mezzogiorno by macro-sector, 1999-2002 (current values in billions of euros; percentages)

	Italy		Mezzogiorno		
	Average yearly expenditure (billions of euros)	Percentage of the total for Italy	Average yearly expenditure (billions of euros)	Percentage of the total for the Mezzogiorno	Percentage of the total for Italy
Economic infrastructures(*)	26.41	54%	11.93	62%	45%
Human capital (**)	5.53	11%	1.86	10%	34%
Social infrastructures (***)	12.76	26%	3.89	20%	30%
Residential building (****)	3.96	8%	1.69	9%	43%
TOTAL	**48.67**	**100%**	**19.37**	**100%**	**40%**

Source: Ministry of the Economy, Department for Development Policies, Regional Public Accounts data bank

NOTES

(*) Economic infrastructures include those sectors pertaining to road systems, transportation, telecommunications, environment, waste, the integrated water cycle, energy, agriculture and fishing, industry and services, tourism, other public works and other expenditure in the economic field.

(**) Human capital includes those sectors pertaining to education, training, research and development, work and social security.

(***) Social infrastructures include those sectors pertaining to culture and recreational services, healthcare, interventions in the social field, assistance and charity, other interventions in the health sector, defence, justice, public security, general administration and unapportionable costs

(****) Includes the sector "residential and urbanistic buildings".

Note: The differences between capital expenditures reported in the Regional Public Accounts (MEF) and in the National Accounts (Istat) – used as a reference point for the Consolidated Financial Framework in Table III.1 – are due above all to the different method of valuating financial flows: Estimates in the national accounts are made on an accruals basis whilst those in the Regional Public Accounts are made on a cash basis. For more information reference should be made to the Methodological Notes to the DPS Report 2003 and the Methodological Guide on the website http://www.dps.mef.gov.it/cpt/ and http://www.dps.mef.gov.it/cpt-eng/cpt.asp.

C) Allocation of expenditures

A third significant distinction regards the destination of capital expenditure, which can be used to build infrastructures (tangible or intangible), or to make transfers either to enterprises (to support expansion of their production capacity) or to households (typically to aid the purchase, construction or restructuring of residential buildings).

The distinction is important in that the related repercussions on the environment will be different, depending on whether said expansion regards public capital (infrastructure) or private capital (in the case, for example, of transfers to enterprises). Once the decision has been taken to allocate a certain amount to transfers in favour of enterprises, it will then also be interesting to compare the economic and environmental performances for each type of enterprise.

In the period 1999-2002, 58 percent of capital expenditure was allocated (Table III.3) to gross fixed capital formation (50 percent in the Mezzogiorno), and 37 percent to transfers to enterprises (46 percent in the Mezzogiorno).

Table III.3 Average yearly capital expenditure by the General Government for the allocation of expenditure, 1999-2002 (in billions of euros; current values)

	Italy		Mezzogiorno	
	Billions of euros	Percentage of the total	Billions of euros	Percentage of the total
Gross fixed capital formation	28.34	58%	9.68	50%
Transfers				
Transfers to enterprises	17.99	37%	8.97	46%
Transfers to households	2.34	5%	0.71	4%
Total	**48.67**	**100%**	**19.37**	**100%**

Source: Ministry of the Economy, Department for Policy Development, Regional Public Accounts data base

Note: for information on the differences between capital expenditure as reported in the Regional Public Accounts (RPA) and that reported in the Istat National Accounts, see the note to Table III.2.

The majority of transfers went to enterprises, in the form of incentives to expand their respective production bases. Even if the incentive system is currently being reorganised and simplified in order to concentrate resources on a few instruments, according to a recent report by the Ministry of Production Activities[29] expenditure for transfers is presently distributed among approximately 67 national-level tools and more than 290 regional measures. Incentive tools can be classified into the following types:

[29] Report on interventions to support economic and production activities, Ministry of Production Activities, June 2004.

- *automatic* incentives are aimed at offsetting specific local disadvantages (greater cost of inputs in some areas of the country) and do not call for preliminary technical-, economic- or financial-type activities (various investment tax relief grants and employment tax relief grants);
- *public competition-based* incentives are aimed at offsetting difficulties in obtaining loans in the credit market, especially for small- and medium-sized firms, and call for a preliminary evaluation and selection of the initiatives (by announcement as per Law 488/92, honour loans, young entrepreneurship);
- *negociation-based* incentives are aimed either at promoting local entrepreneurship or at attracting investments by activating, via contractual methods, agreements in selected territories, and call for the definition of initiatives on the basis of a transaction (such as area agreements, territorial pacts and location agreements).

D) Level of government

A final significant distinction regards the level of government that takes decisions about public capital expenditure: the possible use of environmental accounting information will be different according to the territorial and/or sectorial field on which the different levels of government exercise their decisional activities.

Information on the composition of public capital expenditure for three distinct levels of government (Central State, Regions, Local governments) is provided by (Table III.4) the Regional Public Accounts' data bank managed by the Ministry of the Economy's Department for Policy Development. Average capital expenditure flows from the central state government to all areas of the country represent around 37 percent of the total; this percentages climbs to 45 percent if consideration is given to expenditures allocated to the Mezzogiorno.

Table III.4 Public capital expenditure on the part of the General Government by level of government, 1999-2002 (in billions of euros; current values)

	Italy		Mezzogiorno		
	Average yearly expenditure (billions of euros)	Percentage of total for Italy	Average yearly expenditure (billions of euros)	Percentage of total for the Mezzogiorno	Percentage of total for Italy
Central Government	18.13	37%	8.68	45%	48%
Regions	11.99	25%	4.70	24%	39%
Local authorities	18.55	38%	5.99	31%	32%
Total	**48.67**	**100%**	**19.37**	**100%**	**40%**

Source: Ministry of the Economy, Department for Development Policies, Regional Public Accounts data bank

Notes:

- Central Government: State; Savings & Loans Bank.; social security institutions; other central government authorities and the State Motorways Authority
- Regions: Regions; Local Health Authority; public hospitals
- Local authorities: Provinces; Municipalities; Mountain authorities; Chambers of Commerce; Universities and related agencies

For information on the differences between capital expenditure as reported in the Regional Public Accounts (RPA) and in the Istat National Accounts, see the note to Table III.2 .

A review of the classifications outlined above shows how every decision regarding public capital expenditure can be characterised in relation to:

- the final objective (direct expansion of the capital stock or reduction of differences in capital accumulation among territories);
- the sector (transportation, education, the environment, etc.);
- the (public or private) ownership of the capital targeted for expansion.

As illustrated below, environmental accounting can offer information that is helpful in taking the types of decisions outlined above. The considerations put forward in the remaining part of this chapter, and especially the examples presented in paragraph III.4, refer primarily to decisions taken at national and regional level which: a) impact directly on approximately two thirds of total capital expenditure; b) often have an indirect influence on the expenditures carried out by local authorities; c) correspond to the territorial scales typical of environmental accounting aggregates.

Against a backdrop of increasing government decentralisation, important decisions regarding the implementation of development policies are taken at provincial or municipal level. Analyses of the potential use of environmental accounting tools can be equally important as long as the decisions taken at local level form part of a policy in which other decisions are taken at higher territorial level.

In order to focus on the value added of environmental accounting tools for development policies, the following paragraph outlines the corresponding decisional processes. This makes it possible to pinpoint the environmental accounting information that is suited to use in the various stages of the decisional process.

III.3 Resource allocation decisions and the policy cycle

Every decision regarding expenditure has a juridical and administrative basis in norms and acts (EU directives and regulations, national laws and regulations, etc.) which regulate, from the point of view of procedures and financial statements, the programming, commitment and expenditure of resources. Given that these norms and acts are generally very diverse and tend to change over time, at first, it might seem difficult to identify common features by which to examine the potential use of environmental accounting tools.

This part of the chapter seeks to identify, above and beyond the various differences characterising provisions that regulate expenditure policies for development, some cornerstone features that are presumably present in every policy. By definition, such policies will have to determine *where* to spend (territorial breakdown of resources), *what component of the capital stock to* expand, what *type* of capital (public or private) is to be used to sustain growth, and – in cases where expenditure is aimed at increasing private capital –*which types of enterprises* are to sustain the investments.

As noted above, generally speaking, the objective of expenditure policies for development is to increase or preserve the public or private capital endowment with a view to improving the "well-being" of the population affected by such policies. For the purposes of this exercise, it is best to use a broad concept of capital[30], so as to include produced capital[31],, human capital, natural capital[32], knowledge capital and social capital.

[30] International organisms have adopted concepts, definitions and classifications regarding capital that constitute a standard for official statistics. In this document, reference is regularly made to such standards,

Some clarifications should be made. First, this definition implies that there is a functional link between capital endowment, in its various forms, and the well-being of the general population, to be understood in a broad sense and thus including not only per-capita income but also, for example, opportunities to use natural or cultural resources with no corresponding market transactions.

Secondly, it is presumed that if such policies did not exist, the resulting conditions would either lead to a decrease in capital endowment or impede an adequate rate of capital accumulation.

Finally, where development policies are aimed at reducing income gaps (as in the case of policies financed by "additional" resources), it is recognised that some territories suffer from a lack of capital, in its various forms, more than others and that this is at the basis of the disparities in income and in well-being among territories.

On the basis of the above, given that adequate levels of capital accumulation either do not exist or cannot be foreseen and considering the concomitant presence of imbalances in both income and well-being among the territories, the problem shared by development policies is how to allocate the scarce amount of financial resources available so as to determine or favour those forms of capital accumulation that most effectively reduce said imbalances.

Thus, if the key problem of development policies from this perspective regards decisions about the allocation of the available financial resources, this problem can be further broken down, for analytical purposes, into the following decisions (Figure III.1):

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especially as concerns those components of capital that are more directly linked to the ecological sustainability of development.

[31] Produced capital refers to what in the European accounts system (SEC 1995) is called 'non-financial produced asset' defined as '…the non-financial assets that have come into existence as outputs from production processes' (see SEC 1995, paragraph 7.14 and Table 7.1). It includes: fixed assets, inventories and valuables. Fixed assets comprises, for example, residential and non-residential buildings, software, etc. .

[32] Natural capital draws its definition from the SEEA2003 manual ("Integrated Environmental and Economic Accounts 2003"; see. United Nations *et al.*, curretly being published). According to the manual (see. SEEA2003, paragraph 1.23) natural capital includes three main components: natural resource stocks, land and ecosystems. All three components are crucial to the long-term sustainability of development in that they carry out three essential functions:

- they provide raw materials and resources for production and consumption processes (*resource functions*);
- they absorb unwanted by-products of production and consumption (*sink functions*);
- they provide the habitat for all living beings, including humankind (*service functions*).

Notably, crops and livestock fall under both the definintion of produced capital as well as that of natural capital.

choice of objectives:

- selection of territorial priorities (among Regions, among Provinces, etc.);
- selection of priorities among different forms of capital: for example, transport infrastructures or factories (produced capital) *versus* education (human capital) *versus* water quality (natural capital);
- selection of priorities within each form of capital (for example, in the category of natural capital: air quality *versus* water quality; in the category of public produced capital: roadways *versus* railways; within the category of human capital: education *versus* professional training);

choice of tools:

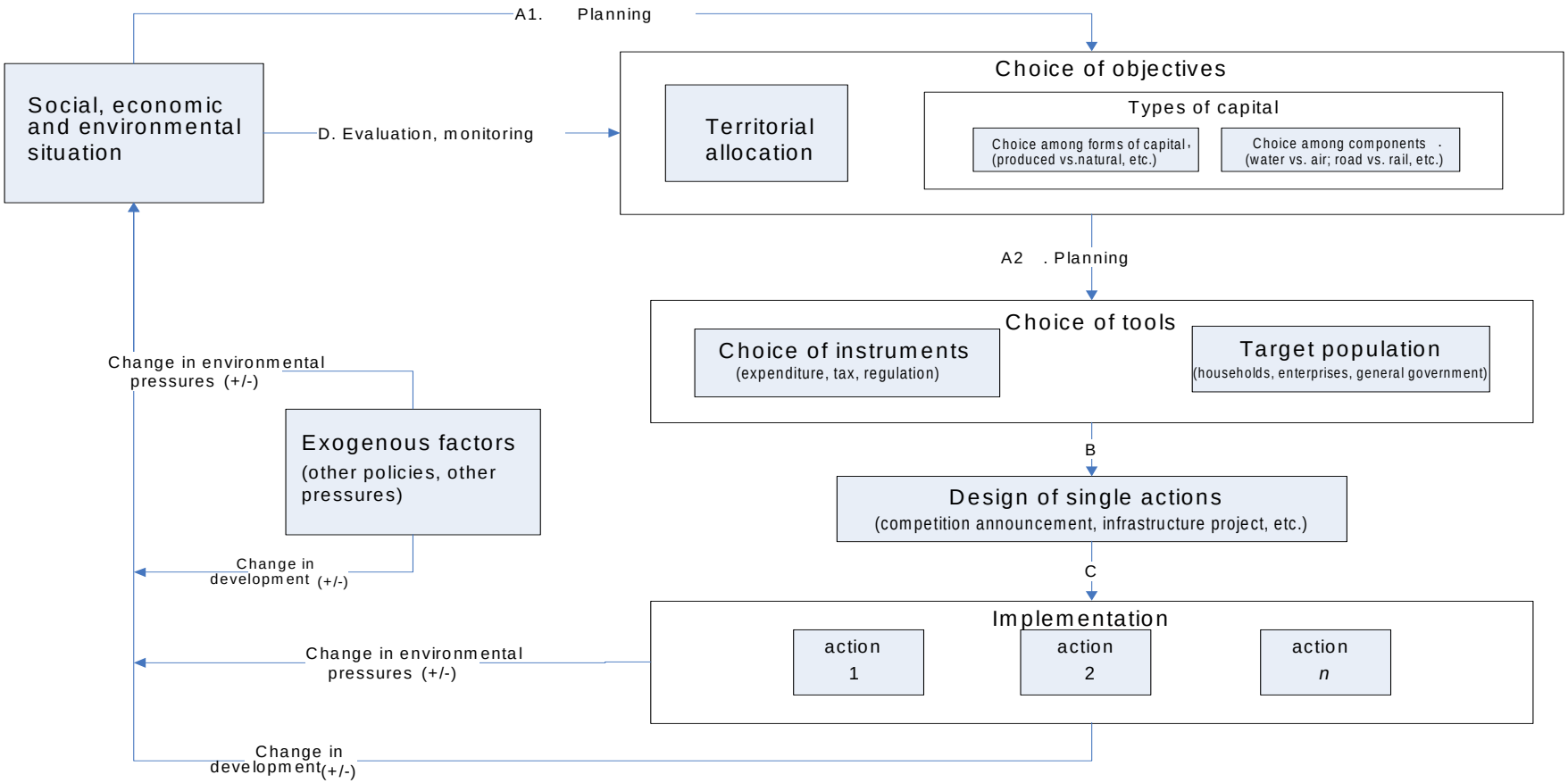
Once the objective has been fixed, it is then the policy maker's task to identify the means needed to reach it . This process can be broken down into two steps:

- choice of the mechanism to use:
    - expenditure instruments: the policy maker can allocate public capital resources to the development of the chosen form of capital in the territories earmarked as priorities, with preference being given to particular components of the selected form of capital;
    - tax instruments: the policy maker can structure the tax system in such a way as to encourage (or discourage) private investments in certain forms of capital (especially components of the forms of capital), and in certain territories;
    - regulation instruments: the policy maker can resort to market regulation to induce those changes in private behaviour needed to increase (or reduce) investments in certain forms of capital (especially components of the forms of capital), and in certain territories;
- identification of the target population, meaning either the beneficiaries (households, enterprises, general government) of the public work or the subjects whose behaviour is the object of desired change; and, within each type, choice of the subsets (for example, among enterprises, the selection of manufacturing industry).

In practice, these key facets of allocative decisions could be combined and arranged in different sequences and hierarchies. For example, in some cases, the decision pertaining to territorial breakdown will take place before that relating to the diverse forms of

capital and that regarding a choice between public and private investment (for example, the programming of CSF – Community Support Framework 2000-2006). In other cases, preliminary constraints might be set for the resources earmarked as incentives and the allocation of the resources among the different forms of capital (and, for each of these, among the diverse components comprising it) will follow. In some cases, the decision may not even be taken by the policy maker, but will depend on the "demand" of the beneficiaries. This is the case, for example, of certain "broad" incentives, in other words, those not designed to finance any particular type of initiative previously established by the policy maker).

Figure III.1 Resource allocation decisions and the policy cycle scheme



Source: MEF, DPS - Istat, National Accounts

As is true of every type of anthropogenic activity, development policies either generate or modify the pressures placed on the environment and on natural resources. In the medium- and long-term, the quality and quantity of natural capital are indispensable to producing income, and thus also to narrowing gaps in both income levels and well-being. Therefore, it is especially essential to ensure that the policy maker is fully informed about the environmental implications of the different resource allocation decisions in which development policies take shape.

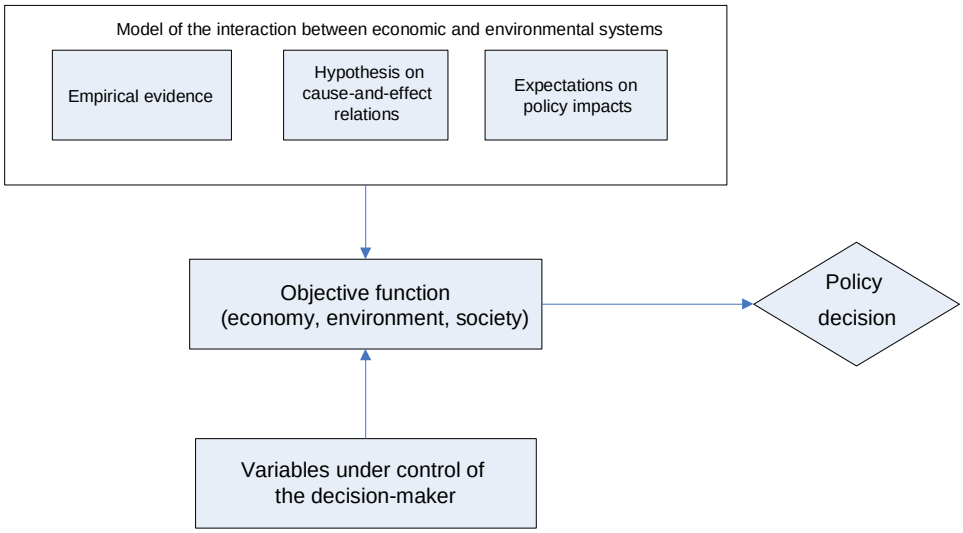
III.4 The possible use of environmental accounting tools

In every phase of the sequence presented in Figure III.1, the policy maker faces a problem that can be illustrated schematically and expressed as a "metaphor" of constrained optimization, characterised by an objective function (Figura III.2) that takes account of economic objectives (such as income) environmental objectives (such as the air and water quality) and social objectives (such as reducing the gaps in development), all having different weights.

The decision maker has to decide how to allocate the resources available in a way that maximises the policy's objective function, taking account of the way in which the economic system "reacts" to transfers and the way in which the environment "reacts" to pressures from the economic system.

In the face of a given policy intervention (such as the transfer of resources to enterprises), there will be a given reaction on the part of the economic system (change in production and thus in income), with certain consequences for the environment (increases or decreases in polluting emissions) and for society (changes in the distribution of economic well-being).

Figura III.2 Schematic illustration of the decisional process



Source: MEF, DPS - Istat, National Accounts

The "responses" from the economic and environmental systems to the policy-induced stresses will be the result of complex interactions involving a large number of variables. The decision will be taken on the basis of a stylised representation (or model) of how these complex systems work.

In a nutshell, this stylised model of the actual situation will be based on: a) empirical evidence on some variables characterising the behaviour of systems (such as per capita income, enterprises' investment activities, banks' lending activities); b) *a priori* hypothesis about some fundamental cause-and-effect relations among variables (for example, per capita income is low in certain territories because of the low level of investment on the part of enterprises due, in turn, to instances of credit rationing); c) expectations that are more or less formalised and quantitatively defined as to the relation between policy interventions, reactions of the economic system (and/or the environmental system) and final results in terms of objective variables (for example, resources for transfers to enterprises of X will produce an increase of Y in investments, which, in turn, will produce an increase of W in per capita income, and of Z in environmental pressures).

The better the information available to the decision maker, the higher the quality of the decisional process. This is true as regards the information used to a) reconstruct the framework of the relevant empirical evidence; b) confirm, modify or refute hypotheses concerning the cause-effect link; c) formulate reasonable expectations about the impacts of policy decisions.

Among the various types of statistical information, environmental accounting tools can improve the stylistic representation of the reality that the decision maker can use to take a decision:

- *directly*, by improving the framework of the evidence available on interactions between the economy and the environment;
- *indirectly*, by providing informative *input* for the creation/verification of hypotheses about cause-effect relations and for the estimation of what effects the policies will have on economic and environmental systems. It should be noted that, in these cases, it is necessary to create a model in which environmental accounting data form part of the necessary input.

The following boxes provide, by way of example, an application to actual cases in the decisional processes, as shown in Figures III.1 and III.2, in order to disclose the value added provided by environmental accounting data throughout the process. The examples regard the following types of development policies:

- the case of national programming of development (Box N);
- the case of regional programming of development (Box O);
- the case of incentives to enterprises (Box P).

By means of a sequence of questions that the policy maker is likely to ask in the various stages of the process, the boxes show, for example, that:

- in the decisions pertaining to **allocation of resources among territories ,** the information garnered from environmental accounts allows to take into account the differences in the respective environmental situations deemed capable of impacting on the gaps in development. In particular, there can be certain criteria by which to allocate greater financing to regions that have more degraded natural resources, are subject to relatively greater environmental pressures or are currently characterised by relatively low environmental protection expenditure levels.

- in the decisions pertaining to **allocation of resources among forms of capital,** the information garnered from environmental accounts can lead the policy maker to allocate resources to some forms of natural capital: a) in the case of a reduction in the quality or quantity of the resource; b) when the area's most important and/or dynamic economic sectors greatly depend on a few economic resources and/or have a strong impact on them. Indeed, in such cases, the degradation of the natural resources in question can, in the medium- to long-term, compromise the prospects for development of key economic sectors;
- indicators based on environmental accounting data can also contribute to a **better selection of the economic agents (production activities)** targeted by development policies, during both the programming stage and the implementation of the incentive policies (for example, in selecting the beneficiaries of the incentives). Specifically, trade-offs between a decrease in environmental pressures and possible effects on income, employment, etc. could be disclosed.

The boxes primarily illustrate those decisions pertaining to expenditure policies for development. However, it should be noted that some environmental accounting information can provide indications that are useful also for the design and valuation of tax policies: For example, the EPEA and RUMEA provide data on the composition (share of environmental taxes, market purchases, etc.) of enterprises' and households' total expenditure for environmental protection and for the use of natural resources. This information, together with data on pressures generated by various economic operators, can be useful to a review of current systems of charges and taxes.

Box N – The case of national programming of additional resources for development

FOREWORD/ INTRODUCTION

The programming at national level of additional capital interventions aimed at promoting development and economic and social rebalancing can be broken down into two main stages: the long-term programming of EU resources and the programming of national resources, with the latter being fixed annually by the Budegt Law and allocated, since 1999, to the fund for under-utilised areas (formerly the fund for depressed areas - FAS). Recent years have witnessed a progressive homogenisation and updating of the criteria used to programme national funds so as to bring them more into line with those used for the EU resources (according to CIPE - the Interdepartmental Committee for Economic Planning - resolution 139/1999), thereby laying the foundations for actual links and better co-ordination between the two policies.

The regional allocation of EU and national funds is defined on the basis of quantitative criteria that combine – with formulae and weights that might vary in some cases – indicators aimed at measuring the relative size of the different regions (in terms of percentage of the population and land area), and their relative position in terms of the various indicators of development (GDP per inhabitant, unemployment rate, infrastructural deficit, isolation/insularity). This is the very approach used in the creation of the formula for territorial distribution endorsed by CIPE resolution 139/1999.

In contrast, the criteria for decisions pertaining to the distribution of resources among "forms of capital", or among single components of the different forms of capital, are more difficult to identify. This is due to the flow of input from diverse institutional, technical and political visions of how variations in the different forms of capital stock contribute to increasing the related economic systems' ability to produce income, employment and development. An interesting case of breakdown, rationalisation and valuation of the underlying technical reasons for decisions pertaining to the "sectorial distribution" of resources is presented by the Programme of Development for the Mezzogiorno, which laid the cornerstone for the definition of the CSF 2000-2006, and especially by the *ex-ante* evaluation of said programme (especially as regards the distribution of the programme's resources among sectors). Utilising a macro-econometric model to estimate effects on the growth of variations of a subset of "breakthrough variables" together with a method to forecast the effects of the program on breakthrough variables (based on evaluations by experts in the sector), the *ex-ante* evaluation has identified possible ways to re-allocate resources among alternative priority uses (Axes), by which to increase the programme's capacity to reach its overall objective to boost income in the regions identified in Objective 1.

PROGRAMMING STAGE

CHOOSING THE TERRITORIES:

The policy maker faces the problem of deciding how to allocate resources among different regions so as to reduce the gaps in development, taking account of the different sizes of the territories and the different influence of factors that contribute to slowed development.

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		
What is the size of each region in terms of surface area and population?	Demographic and territorial statistics	Demographic and territorial statistics

Are there any significant differences among the regions in terms of growth, employment, or economic structure?	Regional economic accounts	Regional economic accounts
Are there any significant differences among the regions in terms of the supply of different forms of capital:		
Natural?	Environmental statistics (as regards some indicators)	Asset accounts of the natural resources: (provide a greater number of indicators)
Produced (public and/or private)?	Infrastructural statistics and economic accounts	Infrastructural statistics and economic accounts
Human?	Demographic statistics and statistics regarding education and the workforce	Demographic statistics and statistics regarding education and the workforce
Are there any significant differences among the regions in the availability and quality of the various natural resources?	Environmental statistics (only for some natural resources and as regards some indicators)	Asset accounts of the natural resources: (provide a greater number of indicators for a wider range of natural resources)
Over the past years, what percentage of public expenditure has been allocated to the regions?	RPA	RPA
What impact has environmental protection expenditure had on regions' total economic expenditure ?	RPA (only for the part of the General Government, with less breakdown per environmental sector and with a limited reclassification of the financial statements)[33]	EPEA
Are the territories with higher levels of extraction and pollutants the same ones that spend more on environmental protection and on the use and management of natural resources?	👎	RUMEA and EPEA combined with analyses of the asset accounts of natural resources and the NAMEA
What is the possible future scenario in the various regions in terms of variations in emissions of pollutants in the face of growth of certain economic sectors?	👎	NAMEA time series (examining, for example, the tonnes of pollutants produced by the various production activities with respect to a given increase in final demand, employment etc.)

[33] For more information see Box M and Appendix 4.

SELECTION OF FORMS OF CAPITAL: The policy maker is faced with deciding how to allocate the resources among the different forms of capital (natural, human and produced capital) in such a way as to maximise the objective function, and taking account of the facts available regarding the different contribution from different forms of capital to development.		
QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		
What are the production sectors that contribute the most to income and employment in the under-utilised areas?	Regional economic accounts	Regional economic accounts
In recent years what stock of capital has shown signs of the greatest decrease in terms of quantity and/or quality:		
Natural?	Environmental statistics at regional level (as regards some indicators)	Asset accounts of the natural resources: (provide a greater number of indicators)
Produced (public and/or private)?	Infrastructural statistics and economic accounts	Infrastructural statistics and economic accounts
Human?	Demographic statistics and statistics regarding education and the workforce	Demographic statistics and statistics regarding education and the workforce
Are the most important productive sectors (in terms of share of value added and/or of employees) and most dynamic (in terms of growth rate of value added and of employment) the same ones that contribute more to generating environmental pressures?	👎	NAMEA
To what extent does the extraction of natural resources satisfy the needs of the most important production sectors?	👎	NAMEA
Over the past years, has economic growth led to a growing or diminishing need for material?	👎	Material flow accounts (MFA)
SUMMARY: the information that can be garnered from environmental accounting can lead the policy maker to allocate some forms of natural capital: a) in the presence of a quantitative and/or qualitative decrease of the resource; b) when the area's leading and/or most dynamic economic sectors are highly dependent on a few natural resources and/or have a strong impact on them. Indeed, in such cases, the degradation of the resources in question can, in the medium- to long-term, jeopardise the growth prospects of key economic sectors.		

Legend: 👎 the documentation available in the official statistics (excluding environmental accounting) does not allow for even a partial answer to this question.

Box O – The case of regional programming of additional resources for development

FOREWORD/ INTRODUCTION

The two main systems of programming additional capital resources for the regions are Institutional Programme Agreements, with the related Framework Programme Agreements (FPA), and the Regional Operative Programmes (ROP), co-financed by EU structural funds. In - fact, the systems are partially integrated, as the FPAs often call for some financing from Community resources.

Both the ROPs and the FPAs are organised on the basis of "priority axes" corresponding to the large-scale sectors of intervention used as references for decisions about the investments in the Mezzogiorno (natural, cultural and human resources, development at local and city level, networks and service junctions). Axis I – Natural Resources regards the promotion and enhancement of natural and environmental resources. The purpose of this axis is to increase the correct and efficient use of natural resources, finding ways to directly impact on environmental quality (purification, water adduction, waste management, hydro-geological setup, etc.).

Each sector of intervention requires the stipulation of one or more Framework Programme Agreements, by which the regions and the competent central administration agree to a work programme, a timetable, a financial plan that is in line with the availability of ordinary and additional resources (EU and national), and the procedures by which to monitor the related investments.

With reference to the generalised model proposed as a tool to analyse the decisional process of development policies, it should be noted that in both the case of Framework Agreement Programmes and that of Community Operative Programmes, the regional policy maker has to decide how to divide available resources among the various forms of capital: The resources of Axis 1 are allocated to improving the supply of natural capital; the cultural resources of Axis 2 are allocated to improving the supply of public produced capital; the resources of Axis 3 are allocated to improving the supply of human capital and so forth. After having completed this initial distribution, the policy maker must then allocate resources to the various objectives within each form of capital (for example, within the natural capital: the quality of air, the quality of water, soil protection, energy resources, etc..).

The policy maker must also consider the fact that all of the interventions, independently of the axis, will have positive and negatives impacts on the quantity, quality and composition of natural capital.

Finally, consideration is given to regional decisions regarding division among "forms of capital" and among productive sectors (at the moment the form of intervention is selected), presuming that such decisions, especially in relatively smaller regions with concentrated areas of productive activities, can also be easily viewed in terms of territorial distribution.

PROGRAMMING STAGE

CHOICE OF FORMS OF CAPITAL:
The policy maker is faced with deciding how to allocate the resources among the different "priority axes" (and thus among different forms of capital) and among different objectives within the axes (that is, between "measures" and lines of intervention).

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		
What is the demographic situation of the region in terms of number of inhabitants, age pyramid (by sex), working-age population, employed population, etc?	Social-demographic statistics	Social-demographic statistics

What are the characteristics of the regional economic system and what is its output?	Regional economic accounts	Regional economic accounts
Does the regional economic system require a high level of material resources (energy, water, etc.)?	👎	Economy-wide material flow accounts (MFA)
To what extent does the extraction of the various natural resources help to meet the requirements of the region's key economic sectors?	👎	NAMEA
Over the past years, what capital stock has shown signs of greater decrease in terms of quantity and/or quality:		
Natural?	Environmental statistics at regional level (as regards some indicators)	Asset accounts of the natural resources: (provide a greater number of indicators)
Produced (public and/or private)?	Infrastructural statistics and economic accounts	Infrastructural statistics and economic accounts
Human?	Demographic statistics and statistics regarding education and the workforce	Demographic statistics and statistics regarding education and the workforce
What is the availability and state of quality of the region's various natural resources (water, forests, subsoil resources, etc.)?	Environmental statistics (only for some natural resources and as regards some indicators)	Asset accounts of the natural resources: (provide a greater number of indicators for a wider range of natural resources)
To what extent does environmental protection expenditure impact on total economic expenditure and in what sectors of environmental intervention is such expenditure concentrated?	RPA (only for the part of the General Government, with less breakdown by environmental sector and limited reclassification of the financial statements)[34]	EPEA
To what extent does expenditure for the use and management of natural resources impact on total economic expenditure and on what natural resources is such expenditure concentrated ?	RPA (only for the part of the General Government, with less breakdown by environmental sector and limited reclassification of the financial statements)[35]	RUMEA

[34] For more information see Box M and Appendix 4.
[35] For more information see Box M and Appendix 4.

CHOICE OF TOOLS

The policy maker has to choose the beneficiary (production activity/economic agents) and the way (mechanism) by which to allocate the resources available. Taking account of the facts available on how different economic sectors interact with the environment, the policy maker will thus have to:

- determine the allocations to be made to the different economic agents (for example, households *versus* enterprises; certain types of enterprises)
- choose from among the different mechanisms by which to transfer resources

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		
How many tonnes of pollutants are produced by household consumption and how many are produced by productive activities? Among the region's production activities, which ones contribute most to the emission of certain pollutants?	👎	NAMEA
What is the relationship between the economic performance and the environmental performance of the region's various production activities? (for example, in terms of the emissions/value added ratio, emissions/employment ratio, etc.)	👎	NAMEA
Considering the trend in pressures on the quality of the environment, as shown in the asset accounts of natural resources and in the NAMEA type accounts, are the territories with higher levels of pollution and degradation the same ones that spend more on environmental protection ?	👎	EPEA combined with analyses of the asset accounts of natural resources and of the NAMEA
Considering the trend in pressures on the stock of natural resources, as shown in the asset accounts of natural resources and in the NAMEA type accounts, are the territories with greater levels of extraction of natural resources the same ones that spend more on the use and management of natural resources?	👎	RUMEA combined with analyses of the asset accounts of natural resources and of the NAMEA
Considering the pressures produced by the different production activities, as shown in the NAMEA type accounts, are the more polluting activities the same ones that spend more on environmental protection?	👎	NAMEA and EPEA combined
What is the economic importance of the environmental protection industry (for example, in terms of turnover, compensation of employees, number of employees, investments, etc.)?	👎	EPEA

Legend: 👎 the documentation available in official statistics (excluding environmental accounting) does not allow for even a partial answer to this question.

Box P – The decisional process and environmental accounting: the case of incentives to enterprises

FOREWORD/ INTRODUCTION

The term "incentive" refers to a wide range of instruments used to transfer resources to enterprises which, in the period 1999-2002, absorbed an amount totalling 29 percent of overall capital expenditure in the extended public sector.

With reference to the generalised model proposed as a tool to analyse the decisional process of development policies, it should be noted that in the case of incentives, the policy maker takes decisions directly linked to only one form of capital, produced capital, the quantity and composition of which will depend on the decisions pertaining to transfers to enterprises.

Nevertheless, decisions regarding transfers to enterprises will obviously impact on the quantity, quality and composition of natural capital, given that different production activities generate different forms and intensities of environmental pressures. Thus, repercussions on the quantity and quality of natural capital will vary depending on which enterprises are chosen to receive the transfers.

Assuming that environmental quality has a place in the policy maker's objective (even if it does not have the same weight as economic or social objectives), the problem consists in deciding how to allocate the available resources among enterprises, taking account of a certain "model" of the effects that transfers have on the choices made by enterprises, and of the effects of the beneficiaries' production activities on the environment.

A recent survey carried out by the Environmental Authorities' Network regarding ninety-nine incentive systems (designed to either directly or indirectly benefit the environment and co-financed with EU structural funds via the current 2000-2006 programming cycle) shows that the degree of specificity in terms of sector, size and environmental topics of the incentives is rather limited: around 80 percent of the resources available were tendered via aid systems not particularly focused on specific environmental topics, sectors or size of enterprises (see the Environmental Authorities' National Network and the Community Structural Funds Programming Authorities' National Network, 2004).

The rest of this section seeks to illustrate how information contained in the environmental accounts could contribute to honing incentive instruments for enterprises.

PROGRAMMING STAGE

CHOICE OF TERRITORIES:
The policy maker has to decide how to allocate resources among the territories in such a way as to maximise the reduction of gaps in development, also taking account of repercussions on the environment (and thus on the long-term sustainability of economic development) produced by the options of resource allocation.

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can be asked at this stage are of the following types:		
Are there significant differences in terms of growth, employment and economic structure among the various territories?	Regional economic accounts	Regional economic accounts

Are there significant differences among the territories in terms of the availability and quality of the various natural resources?	Environmental statistics (only for some natural resources and as regards some indicators)	Asset accounts of the natural resources (with respect to environmental statistics these provide more indicators for a wider range of natural resources)
Over the past years what percentage of public expenditure has been allocated to the various territories?	RPA	RPA
In the various territories, to what extent has environmental protection expenditure (total/by General Government/by enterprises) impacted on total economic expenditure?	RPA (only for the part of the General Government, with less breakdown by environmental sector and limited reclassification of the financial statements)[36]	EPEA
Considering the trend in pressures on the quality of the environment, as shown in the asset accounts of natural resources and in NAMEA-type accounts, are the territories with more pollution and degradation the same ones that spend more on environmental protection?		EPEA combined with the analyses of the asset accounts of natural resources and of the NAMEA
Considering the trend in pressures on the stock of natural resources, as shown in asset accounts of natural resources and in NAMEA- type accounts, are the territories that extract more natural resources the same ones that spend more on the use and management of natural resources?		RUMEA combined with the analyses of the asset accounts of natural resources and of the NAMEA

CHOICE OF INSTRUMENTS

The policy maker has to select the beneficiary (production activity/economic agent) and way (mechanism) to allocate the resources available. Thus, the policy maker will have to choose:

- from among different production sectors, in such a way as to maximise the effects on the objective function
- from among different mechanisms by which to transfer resources (for example grants, loans, tax relief grants, etc.)

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can be asked at this stage are of the following types:		

[36] For more information see Box M and Appendix 4.

What is the economic performance (in terms of value added, number of employed, etc.) of the various production activities?	Regional economic accounts	Regional economic accounts
What are the production activities that exert more pressure on the natural environment (ex. in terms of natural resource requirements and/or emissions of pollutants) ?	👎	NAMEA (see Figure III.3)
What is the relationship between the economic performance and the environmental performance of the various production activities?	👎	NAMEA (for example via calculation of the ratio between emissions and value added, the ratio between emissions and number of employee, etc.) (see Figure III.3)
How much do enterprises operating in different production activities spend on environmental protection and on the use and management of natural resources? W hat environmental sectors of intervention are selected?	👎	EPEA/RUMEA (see Figure III.4)

IMPLEMENTATION STAGE

The policy maker has to choose the beneficiaries of the incentives by utilising, for example, average parameters

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		
What is the average emission of the various pollutants produced by the production activity?	👎	NAMEA
What is the average requirement for natural resources on the part of the various production activities?	👎	NAMEA
What is the average expenditure by enterprises on environmental protection/on the use and management of natural resources. What environmental sectors of intervention are selected?	👎	EPEA/RUMEA

MONITORING AND EVALUATION STAGE

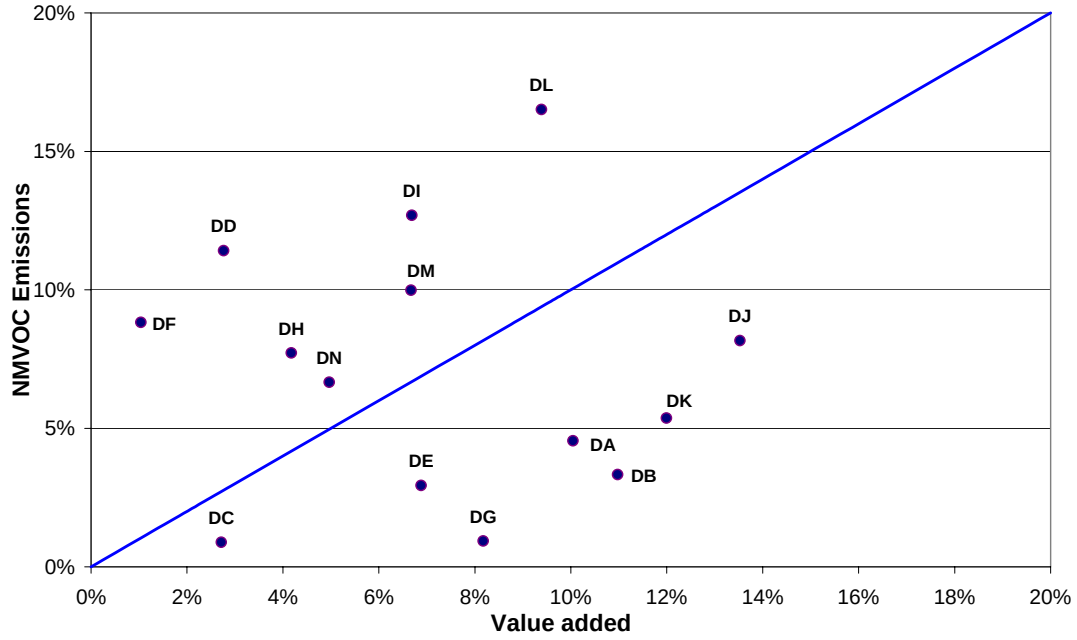
The policy maker has to identify the parameters to be used for appraisal and evaluation activities

QUESTIONS	AVAILABLE STATISTICS	
	"WITHOUT" ENVIRONMENTAL ACCOUNTS	"WITH" ENVIRONMENTAL ACCOUNTS
Some of the questions that can arise at this stage are:		

Following introduction of the incentives, how has the environmental pressure exerted by the different production activities changed (for example, in terms of requirements of natural resources and/or emissions of pollutants)?	👎	NAMEA
Following introduction of the incentives, how has expenditure on the part of enterprises changed as regards environmental protection and the use and management of natural resources for the various environmental sectors?	👎	EPEA/RUMEA

Legend: 👎 the documentation available in official statistics (excluding environmental accounting) is not sufficient to even partially answer this question.

Figure III.3 NMVOC emissions and value added of the manufacturing sector, by economic activity; percentage contribution to the total for the sector – Italy, 2001

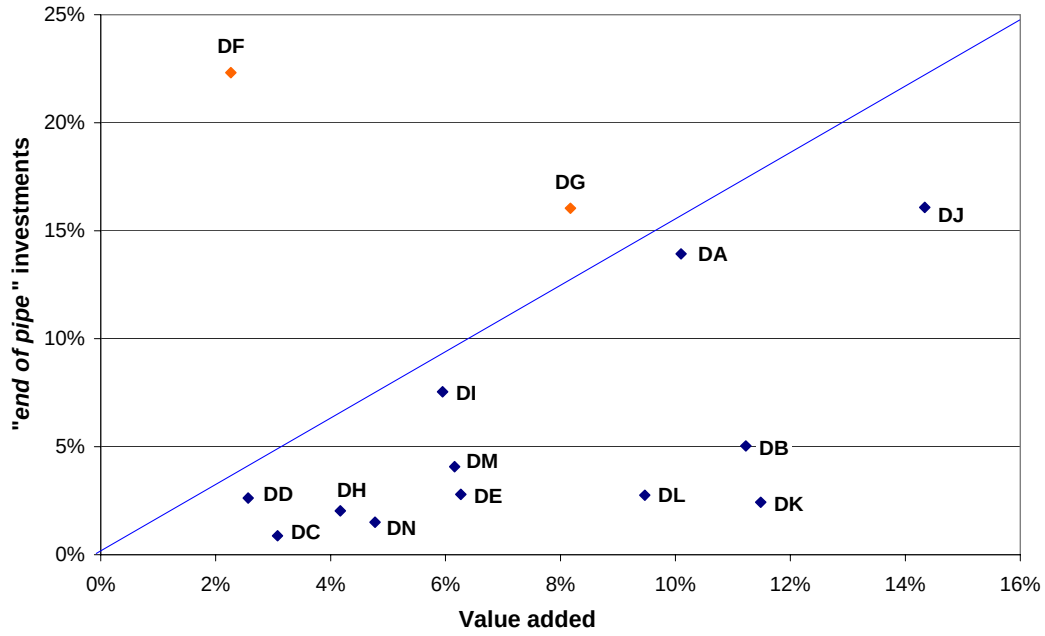


Source: Istat, NAMEA 2001

*LEGEND: **DA**. Manufacture of food products, beverages and tobacco; **DB**. Manufacture of textiles and textile products; **DC**. Manufacture of leather and leather products; **DD**. Manufacture of wood and wood products; **DE**. Manufacture of pulp, paper and paper products; publishing and printing ; **DF**. Manufacture of coke, refined petroleum products and nuclear fuel; **DG**. Manufacture of chemicals , chemical products and man-made fibres; **DH**. Manufacture of rubber and plastic products; **DI**. Manufacture of other non-metallic mineral products; **DJ**. Manufacture of basic metals and fabricated metal products; **DK**. Manufacture of machinery and equipment n.e.c.; **DL**. Manufacture of electrical and optical equipment; **DM**. Manufacture of transport equipment; **DN**. Manufacturing n.e.c.*

Note: The Figure illustrates, for the manufacturing sector, the percentage contribution of each economic activity to the sector's total NMVOC emissions and total value added. In line with the NAMEA-type "environmental profiles" (see Box J paragraph II.1), the figure provides a clear overview of the economic activities whose contribution to the national economy is greater/smaller than their contribution to environmental pressure. In particular, economic activities above the diagonal made a greater contribution to NMVOC emissions than they did to value added. An analogous figure could be drawn using other economic variables, such as production or employment, and other types of environmental pressure, such as waste production.

Figure III.4 End of pipe investments for environmental protection and value added in the manufacturing sector, by economic activity; percentage contribution to the total for the sector – Italy, 1997



Source: Istat, EPEA 1997

LEGEND: ***DA**. Manufacture of food products, beverages and tobacco; **DB**. Manufacture of textiles and textile products; **DC**. Manufacture of leather and leather products; **DD**. Manufacture of wood and wood products; **DE**. Manufacture of pulp, paper and paper products; publishing and printing ; **DF**. Manufacture of coke, refined petroleum products and nuclear fuel; **DG**. Manufacture of chemicals , chemical products and man-made fibres; **DH**. Manufacture of rubber and plastic products; **DI**. Manufacture of other non-metallic mineral products; **DJ**. Manufacture of basic metals and fabricated metal products; **DK**. Manufacture of machinery and equipment n.e.c.; **DL**. Manufacture of electrical and optical equipment; **DM**. Manufacture of transport equipment; **DN**. Manufacturing n.e.c.*

Note: The above figure illustrates, for the manufacturing sector, the percentage weight of each economic activity out of the total for the sector in terms of value added and end of pipe investments in environmental protection. It provides a clear overview of those manufacturing activities whose contribution to the sector's total environmental investment is greater/smaller than their contribution in terms of value added. Specifically, economic activities located below the diagonal contribute less to the sector's total "response" to environmental pressures (created by the very same sector) than they do to the sector's value added. Against a backdrop of low-level diffusion of environment friendly technology, this type of information could be useful in identifying policy objectives aimed at inducing these economic activities to boost environmental investments. In different situations it might be preferable to focus the analysis on other variables (for example, current expenditure for environmental protection, total environmental expenditure, etc.). In general, the data garnered from the EPEA make it possible to carry out analyses that, in addition to considering other economic variables (such as production or employment generated by environmental protection activities), also allow for a more detailed breakdown, such as by enterprise size or by environmental sector of intervention (wastewater management, waste management, etc.).

The examples above reveal how there are cases in which environmental accounting is able to provide information not otherwise available from other sources (for example

NAMEA-type data regarding environmental pressures broken down by sector of economic activity, which can be useful in numerous occasions in the case of incentive policies for enterprises). In other cases, the information that environmental accounting can provide is more complete and/or more detailed compared with other sources, thereby offering greater support in terms of knowledge. For example, this is true as regards EPEA and RUMEA aggregates with respect to RPA data, or data from the assets accounts of natural resources compared with other environmental data not organised in a single, equally coherent framework and thus not able to provide equally complete information.

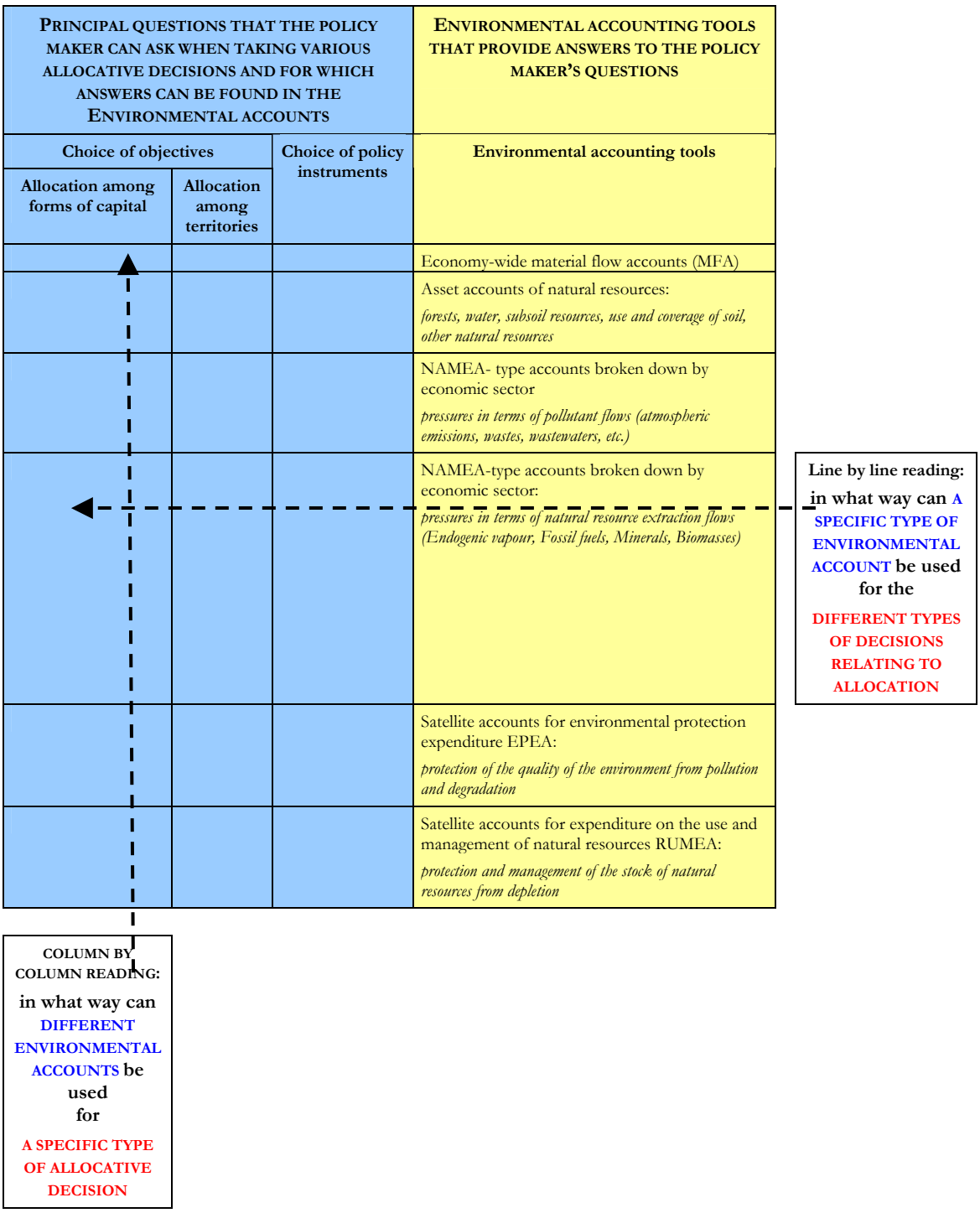
Importantly, the best way to answer policy makers' questions with the information from environmental accounting is to present time series of the latter so that it is possible to see the trends of the various phenomena over a period of time. As mentioned, sometimes it is necessary to use models to analyse such information, combining data from environmental accounts with other types of data.

In order to provide a general reference framework, which also acts as a kind of guide for the most important possible uses of environmental accounts for development policies, Table III.5 presents some particularly significant questions that environmental accounts can help answer by exploiting all of the special features that make them stand out from other information tools. With reference to the sequence of resource allocation decisions described in Figure III.1, attention is focused on selecting objectives (allocation among forms of capital and territories) and policy instruments. Some reflections on the use of environmental accounts during the implementation, monitoring and valuation of the policies, are provided at the end of this paragraph and in the above example of incentives to enterprises (Box P). Moreover, the specific contribution of this tool, centred on the systematic link between economic information and environmental information, is especially strategic in the earlier stages of the process, that is, those in which decisions on how to allocate reousrces are taken.

In Table III.5 the questions are gathered and organised as in Figure III.5. A line by line reading shows questions that a policy maker might ask, depending on the different types of allocative decisions to be taken, and for which there is a specific environmental accounting tool best suited to answering all of the questions (last column). A column by column reading indicates the questions that a policy maker might ask for a specific type

of allocative decision and for which there are answers in the different environmental accounting instruments.

Figure III.5 Which environmental accounts for which information needs: main reading keys



Source: MEF, DPS - Istat, National Accounts

Table III.5 Decisional process and environmental accounting: the policy maker's main "questions" and the environmental accounts' "answers"

Choice of objectives		Choice of policy tools	Environmental accounting tools
Breakdown of different forms of capital	**Territorial breakdown**		
Does the economic system have a very large need for natural resources? In particular, does the economic system have a large need for imported natural resources, thereby producing localised environmental pressures elsewhere?	Which territories have economic systems with the greatest material resource requirements? In particular, which territories have economic systems with the highest requirement for imported natural resources, thereby producing localised environmental pressures elsewhere?		Economy-wide material flow accounts (MFA)
What is the availability and quality of the various natural resources? What is the level of anthropogenic pressures on various natural resources?	Are there significant differences among territories in terms of the availability of various natural resources and their quality? Do these differences depend on a different level, in the various territories, of anthropogenic pressures on the various natural resources?		Asset accounts of the natural resources: *forests, water, subsoil assets, land use and land cover, other natural resources*
To what extent are the various polluting emissions attributable to the economy's key economic sectors?	In which territories and to what extent are the various polluting emissions attributable to the local economy's key economic sectors? In the various territories, how many tonnes of pollutants are produced by household consumption and how many are produced by production activities? Among production activities, which ones contribute most to the emission of certain pollutants in the various territories? Are there significant differences among the various territories in terms of the relation between the economic performance and the environmental performance of various production activities (for example, in terms of emissions to value added, emissions to number of employed, etc.)? What is the future scenario in the various territories in terms of increases or decreases in polluting emissions in the face of a certain level of growth of certain economic sectors (for example, how many tonnes of pollutants are produced by the different production activities in response to a certain increase in final demand, in employment, etc. of specific economic sectors)?	How many tonnes of pollutants are produced by household consumptions and how many by production activities? Which production activities contribute most to the emission of certain pollutants? What is the relationship between the economic performance and the environmental performance of various production activities (for example, between emissions and value added and between emissions and number of employee, etc.)? What is the possible future scenario in terms of a variation in emissions of pollutants in the face of a given level of growth in certain economic sectors (for example, how many tonnes of pollutants are produced by the different production activities in response to a certain increase in final demand, in employment, etc. in certain economic sectors)?	NAMEA-type accounts broken down by economic sector: *pressures in terms of flows of polluting substances (atmospheric emissions, wastes, wastewater, etc.)*
To what extent is the extraction of the various natural resources carried out to satisfy the needs of the economy's key economic sectors?	In which territories and to what extent does the extraction of various natural resources serve to satisfy key economic sectors' requirements? How many tonnes of natural resources are extracted in the various territories in order to satisfy final household consumption? How many are extracted to satisfy the intermediate consumption of production activities? In the various territories, which production activities have the greatest natural resource requirements?	How many tonnes of natural resources are extracted to satisfy final household consumptions and how many to satisfy the intermediate consumption of production activities? Which production activities have the greatest natural resource requirements?	NAMEA-type accounts broken down by economic sector: *pressures in terms of extraction of natural resource flows (endogenous vapour, fossil fuels, minerals, biomasses)*

Choice of objectives		Choice of policy tools	Environmental accounting tools
Breakdown of different forms of capital	**Territorial breakdown**		
	Are there significant differences among the various territories in the relation between the economic performance and the environmental performance of the various production activities (for example, in terms of natural resource requirements to value added, natural resource requirements to the number of employed, etc.)? What is the future scenario in the various territories in terms of variations in natural resource requirements in the face of a given level of growth of certain economic sectors (for example how many tonnes of natural resources are needed to satisfy the intermediate consumption of production activities for a given increase in final demand, employment, etc. in certain economic sectors)?	What is the relation between the economic performance and the environmental performance of the various production activities (for example, in terms of the relation between the need for natural resources and value added and that between natural resources and number of employed, etc.)? What is the future scenario in terms of variations in the need for natural resources in the face of a given level of growth in certain economic sectors (for example, how many tonnes of natural resources are needed to satisfy the intermediate consumption of the various production activities for a given increase in final demand, in employment, etc in certain economic sectors)?	
To what extent does environmental protection expenditure impact on the economy's total expenditure? In which sectors of economic intervention is the expenditure concentrated? How much do enterprises, households and the General Government spend on environmental protection and how much does such expenditure impact on the total expenditure of each of these types of operators? In which sectors of environmental intervention is expenditure by the various operators concentrated?	In the various territories, to what extent does environmental protection expenditure impact on the economy's total expenditure? In the various territories, in which sectors of economic intervention is the expenditure concentrated ? In the various territories, how much do enterprises, households and the General Government spend on environmental protection and how much does such expenditure impact on the total expenditure of each of these types of operators? In the various territories, in which sectors of environmental intervention is expenditure by the various operated concentrated? Considering the trend in pressures on the quality of the environment, as shown in the accounts of the natural patrimony and NAMEA-type accounts, are the territories with the greatest pollution and degradation the same ones that spend more on environmental protection?	How much do the different enterprises involved in production activities spend on environmental protection? Which environmental sectors of intervention are chosen? Considering the pressures generated by the different production activities, as shown in the NAMEA-type accounts, are the activities that pollute the most the same ones that spend more on environmental protection? As regards the greater pressures generated by different production activities and by households, as shown in the NAMEA-type accounts, is the financial burden for environmental protection borne mostly by the same enterprises and households or, in contrast, by the government? How much do environmental taxes impact on the total financial burden for environmental protection borne by enterprises and households? How much do environmental charges impact on the total financial burden for environmental protection borne by enterprises and households? What is the economic importance of the environmental protection industry (for example in terms of turnover, compensation of employees, number of employees, investments, etc.)?	Environmental protection expenditure satellite accounts EPEA: *protection of the quality of the environment from pollution and degradation*
To what extent does expenditure for the use and management of natural resources impact on the economy's total expenditure? On what natural resources is expenditure concentrated?	In the various territories, to what extent does expenditure for the use and management of natural resources impact on the economy's total expenditure? On what natural resources do the various territories concentrate expenditure?	How much do different producers and manufacturers spend on the use and management of natural resources and which natural resources are earmarked? Considering the pressures generated by the different production activities, as shown in the NAMEA-type	Expenditure for the use and management of natural resources satellite accounts RUMEA: *protection and management of the stock of natural resources from*

Choice of objectives		Choice of policy tools	Environmental accounting tools
Breakdown of different forms of capital	**Territorial breakdown**		
How much do enterprises, households and the General Government spend on the use and management of natural resources and how much does this expenditure impact on the total expenditure of each of these types of operators?	In the various territories, how much do enterprises, households and the General Government spend on the use and management of natural resources and how much does this expenditure impact on the total expenditure of each of these types of operators?	accounts, are the activities that have the greatest natural resource requirement the same ones that spend more on the use and management of natural resources?	*depletion*
On what natural resources is expenditure by the various types of operators concentrated?	In the various territories, on what natural resources is expenditure by the various types of operators concentrated?	Considering the pressures generated by the different production activities and by households, as shown in the NAMEA-type accounts, is most of the financial burden for the use and management of financial resources borne by the same enterprises and households or, in contrast, by the government?	
	Considering the trend in pressures on the stock of natural resources, as shown in the natural patrimony accounts and in the NAMEA-type accounts, are the territories with the greatest extraction of natural resources the same ones that spend more on the use and management of natural resources?	How much do environmental taxes impact on the total financial burden for the use and management of natural resources borne by enterprises and households? How much do environmental charges impact on the total financial burden for the use and management of natural resources borne by enterprises and households? What is the economic importance of the industry of the use and management of natural resources (for example in terms of turnover, compensation of employees, number of employees, investments, etc.)?	

A line by line reading of the box presented in Table III.5 clearly shows that:

- there are environmental accounting tools able to provide useful support for some decisions, but not for others. This is the case of material flow accounts and asset accounts of natural resources. Given that, whatever the territorial scale of analysis, such accounts produce aggregate information at economy-wide level, they are not particularly useful as regards the choice of policy instruments [37];
- there are environmental accounting tools that can provide useful support to all types of reource allocation decisions, different as they may be, by favouring the reading of certain information suited to the case in point. This is the case of the NAMEA, EPEA and RUMEA accounts as the information comes directly from the economic accounts (by sectors of economic activity and institutional sectors) and thus they can be read at various levels and for various objectives. For example, if taking a decision about distribution among different forms of capital, the policy maker might first read through the NAMEA-type data in order to verify if the economic sectors that pollute more are the same ones that "drive" the economy, as such information influences decisions about what weights to assign the economic and environmental factors in the objective function. A more thorough and analytical reading might be carried out in the stage of territorial distribution and/or choice of tools, during which it is important to systematically compare the economic and environmental performance of all sectors of the economy in all territories.

A column by column reading can reveal some information organised in accordance with the various types of decisions involved:

Choice of objectives – resource allocation among different forms of capital

As regards the distribution of resources among different forms of capital, the environmental accounts can be used to focus attention on a selected number of especially important pieces of information.

The first important piece of information is provided by some indicators taken from the material flow accounts, which, if compared with principal macro-economic indicators (such as GDP) in a time series, show whether or not economic growth is strongly dependent on the consumption of natural resources and, specifically, to what extent

[37] In this document meaning selection of the mechanism and identification of the policy's target population.

such growth depends on natural resources imported from abroad. These indicators offer direction to the policy maker that, for example, can decide to increase or decrease the protection of indigenous natural resources or take decisions regarding the reconversion of production systems, technologies, etc. depending on the economy's dependence on the use of the domestic and/or foreign natural resources.

This type of help can be further qualified via an initial, partial reading of NAMEA-type data, limited, as stated above, to verifying if the economic sectors deemed more dangerous to the environment (more polluting and/or having a greater need for natural resources) are also those that "drive" the economy (i.e. they are more important in terms of relative contribution to the territory's value added, number of employee, etc.). Depending on the case at hand, the policy maker can opt either for choices that further develop the economy's "driving sectors" without the need for technology changes, or for choices aimed at developing other sectors and/or at introducing technological innovations.

The asset accounts of natural resources and the EPEA and RUMEA accounts provide a framework of the state of the environment of a given territory and of the intensity of the responses to environmental pressures on the part of public and private operators, respectively. This information, especially when examined in time series, can advise the policy maker as to where to concentrate efforts in the territory, favouring the allocation of resources to territories having more degraded environments (quality) or to those having the greatest depletion of natural resources (quantity). It can also serve to justify the policy maker's choice of sector (wastes, quality of air, forests, fauna reserves, etc.) and to avoid an overlapping of efforts, by demonstrating that the selected sector receives less attention on the part of both public and private operators via a valuation of trends in environmental protection expenditure on the part of households, enterprises and public authorities.

Choice of objectives – resource allocation among territories

During the territorial distribution of resources, there can be a greater and more analytical use of environmental accounts.

On the one hand, this stage can utilise the same information used in the phase of allocation among forms of capital, even if the information is now broken down by

territory in order to compare the different local realities (for example in the case of material flow accounts and asset accounts of natural resources).

On the other hand, especially as regards NAMEA, EPEA and RUMEA, this need for territorial comparison makes the following necessary:

- utilisation of a more complete set of environmental accounting data compared with that used during the allocation of resources among the different forms of capital. An example could be the use of a complete set of NAMEA-type data in order to systematically analyse the economic and environmental performances of the various regions' different economic sectors, in order to better direct sectorial policies and general economic development;
- joint analysis of information coming from the different environmental accounts. An example could be the verification of whether or not those territories with greater levels of pollution and degradation, based on the trend in environmental pressures as reported in the NAMEA-type accounts and asset accounts of natural resources, are also the ones that report a greater response on the part of public and/or private operators based on environmental protection expenditure accounts.

Choice of tools

The potential contribution from environmental accounting seems to change depending on whether the decision concerns the selection of the mechanism with which one intends to modify the behaviour of operators (command and control, fiscal measures and price policies, and transfers of resources) or the identification of the target population, meaning those subjects whose behaviour is the object of change (households, enterprises, GG; and, within the enterprises, the different sectors). This contribution seems smaller in the first case, as it is probable that other factors (equitable distribution, general economic equilibrium and so forth) come into play. In contrast, the contribution coming from environmental accounting information seems particularly significant in the latter case, i.e. the selection of the target population.

This is especially true for the NAMEA, EPEA and RUMEA and is related to the fact that such accounts provide a sectorial breakdown of economic activity and/or institutional sector, thereby allowing for immediate links and comparisons with the national and regional economic accounts. This possibility to draw direct links, as previously illustrated in the example regarding incentive policies to enterprises (Box P),

makes it possible, for example, to forecast an increase in environmental pressures (in terms of use of natural resources and emission of pollutants) due to support given to the development of certain production sectors (NAMEA). During the design of tools to support enterprises, in order to direct the aid, account can also be taken of the financial efforts already put forth by enterprises in terms of environmental protection expenditure (SERIEE).

The contribution from environmental accounting appears quite different if considered during the phase of *programming* (that is, in relation to the different types of allocative decisions considered above) and during the *implementation* of policies, or in the phase of *monitoring* and e*valuation* (*ex ante*, *in itinere* and *ex post*). In the first case, the environmental accounts, whatever the territorial scale of reference, provide "context" data, that can be used exactly as such:

- in the *programming* stage by guiding the policy maker's allocative decisions, as illustrated in the above examples and in Table III.5;
- in the *implementation* stage by providing, for example, benchmarks by which to establish criteria for the allocation of resources to the different economic subjects in the various territories, in order to select interventions that ensure greater environmental support (see use of data provided by NAMEA, by EPEA and by RUMEA in the example regarding incentives to enterprises provided in Box P).

On the other hand, to evaluate a programme's impacts, it is necessary to separate the effects attributed to financed interventions from other effects having different origins, typically via the different techniques used in literature for the construction and analysis of hypothetical "counter-factual" situations. The construction of such evaluation schemes is unquestionably made easier when the monitoring systems adopt the same standards (definitions, classifications, frameworks, etc.) as the official statistics. Specifically, when the objective is to evaluate the programme's environmental effects, it might prove useful to classify environmental protection interventions according to standard SERIEE classifications, or to define indicators that measure the environmental pressures of interventions according to the NAMEA framework. This way, it is possible to compare enterprises benefiting from the intervention with the average of enterprises used as the comparison group. Notably, moving in this direction means introducing a way of handling environmental accounting standards that is wholly analogous to the established method of handling national accounting standards (for example when classifying interventions according to the NACE classification of economic activities).

IV. Conclusions

This chapter presents some conclusions that can be drawn from the first part of the MEF-Istat research regarding:

a) the definition of potential uses of environmental accounting for development policies;

b) a preliminary identificationof the strategic priorities, related to possible uses, for further development of the environmental accounting aggregates.

IV.1 Potential utilisation of environmental accounting aggregates

By means of the conceptual framework outlined in chapter III, it is possible to identify a series of ways in which the information gathered from environmental accounting can contribute significantly to the design, implementation, monitoring and evaluation of development policies, both directly and as input to produce further information[38].

Each environmental account can provide information not otherwise available, as well as information that is more complete and more broken down as compared with other sources. Some modules – for example the material flow accounts and asset accounts of natural resources – can be useful for some types of resource allocation decisions but not for others. Other modules - for example, the NAMEA, EPEA and RUMEA - can be useful in different ways for all types of resource allocation decisions by providing information that meets the specific needs of the case in point.

As concerns decisions about the allocation of resources among different forms of capital (produced capital *versus* natural capital), irrespective of the need to allocate resources among the territories, the environmental accounts can be used profitably via a careful, well-considered analysis of some indicators, starting from an economy-wide perspective and then identifying the trade-offs between economic sectors and natural resources or environmental problems. For example, a first step towards deciding to what extent the growth of the economic system should be directly favoured and to what extent the natural environment should be directly protected can be aided by a MFA-type indicator, by which it is possible to evaluate to what extent economic growth is dependent on the consumption of natural resources and what is the availability of such resources. The decision at hand can thus be more solidly based by considering a NAMEA-type indicator which, for example, reveals if a pollution problem is prevalently

[38] For example, via analyses based on the use of models.

due to a certain key economic sector or indicates, technology being equal, the expected effects of growth in employment and value added of a specific sector on a given environmental domain. Finally, an evaluation of what resource to favour over another can be deepened by using more specific indicators regarding the state of the environment available in the asset accounts of natural resources. On the other hand, information from the EPEA and RUMEA can be used for decisions regarding the extent and course of a possible intervention in the light of the effort put forward by the economic system to protect or manage the natural environment.

A greater and more analytical use of environmental accounts is possible for a problem concerning the territorial allocation of resources. First and foremost, such accounts provide a territorial breakdown of the same information used during the allocation among forms of capital. Moreover, in relation to the possible use of NAMEA-type data, an examination of the environmental and economic performances of the different regions of the country can be insightful. The same is true in relation to the possible use of EPEA and RUMEA aggregates in a evaluation to determine if the territories that are more polluted or subject to greater environmental pressures (according to the indicators of the asset accounts of natural resources and of the NAMEA) are the same ones where the response from the economic system is greater.

Finally, as concerns the choice of policy instruments, the potential contribution from environmental accounts – especially the NAMEA, EPEA and RUMEA – is particularly significant as regards the selection of target subjects[39]. This is because the accounts are organised so as to provide a breakdown by sector of economic activity and/or by institutional sector. Consequently, the information can be immediately linked to and compared with information provided in the national and regional economic accounts. As previously shown in the example pertaining to incentive policies for enterprises (Box P), this possibility to draw links makes it possible, for example, to forecast the increase in environmental pressures (in terms of use of natural resources and polluting emissions) that can occur in response to the development of certain manufacturing sectors (NAMEA). Additionally, while designing instruments in support of enterprises, in order to better targetincentives, account can also be taken of the financial efforts already put forth by the various econmic activities in the form of environmental protection expenditure (SERIEE).

[39] This contribution does not seem relevant for the choice of the mechanism to be used.

IV.2 Priorities for further development of the environmental accounts

The environmental accounts regularly produced by Istat are those assigned the highest priority by European strategy for environmental accounting; they are also the ones that are most regularly produced at international level. The considerations that can emerge from this research on priorities are to be seen within a general reference framework defined by the European Statistical System. The further development of Istat environmental accounts, both at national level and as concerns possible extension to local level, is connected to the wealth of handouts and operational guides available[40]. Priorities aimed at maximising the benefits of additional efforts are linked, on the one hand, to the contribution that certain advancements can give in terms of information support to the definition, implementation and monitoring of development policies and, on the other, to criteria of technical and financial feasibility[41].

Importance for development policies

As regards the first type of criteria, an exercise can be made in order to pinpoint some initial priorities, based on the above considerations about the different possible uses of environmental accounting data. This is done by matching the four types of accounts (material flows, asset accounts of natural resources, NAMEA and EPEA/RUMEA) with the three main types of decisions (choice of territories, choice of forms of capital, choice of instruments) and the two territorial levels of information (national, regional), thereby obtaining a total of 24 cases (4×3×2) that constitute an initial, not necessarilty exhaustive, list of possible ways environmental accounting can contribute to the processes of design and evaluation of development policies. Each of these combinations can be assigned a value (Table IV.1) in terms of the potential use and importance of environmental accounts for development policies, even if this requires summarising and organising the results of the analyses reported in greater detail in paragraph III.4.

[40] see Appendix 2.

[41] In practice, in addition to environmental accounts broken down by territorial level, consideration must be given to specific natural resources or to categories of environmental pressures or economic parameters on which to focus interest.

Table IV.1 Elements to evaluate the potential use and relevance of environmental accounting tools for territorial development policies

Account	Decision	Territorial scale of information	Potential use and relevance
MFA	Territorial distribution	National	Low (a)
Asset accounts	Territorial distribution	National	Low (a)
NAMEA	Territorial distribution	National	Low (a)
EPEA/RUMEA	Territorial distribution	National	Low (a)
MFA	Forms of capital	National	Average (b)
Asset accounts	Forms of capital	National	High
NAMEA	Forms of capital	National	High
EPEA/RUMEA	Forms of capital	National	Average (b)
MFA	Instruments	National	Low
Asset accounts	Instruments	National	Low
NAMEA	Instruments	National	High
EPEA/RUMEA	Instruments	National	Average (b)
MFA	Territorial distribution	Regional	High
Asset accounts	Territorial distribution	Regional	High
NAMEA	Territorial distribution	Regional	High
EPEA/RUMEA	Territorial distribution	Regional	High
MFA	Forms of capital	Regional	High
Asset accounts	Forms of capital	Regional	High
NAMEA	Forms of capital	Regional	High
EPEA/RUMEA	Forms of capital	Regional	High
MFA	Instruments	Regional	Low
Asset accounts	Instruments	Regional	Low
NAMEA	Instruments	Regional	High
EPEA/RUMEA	Instruments	Regional	High

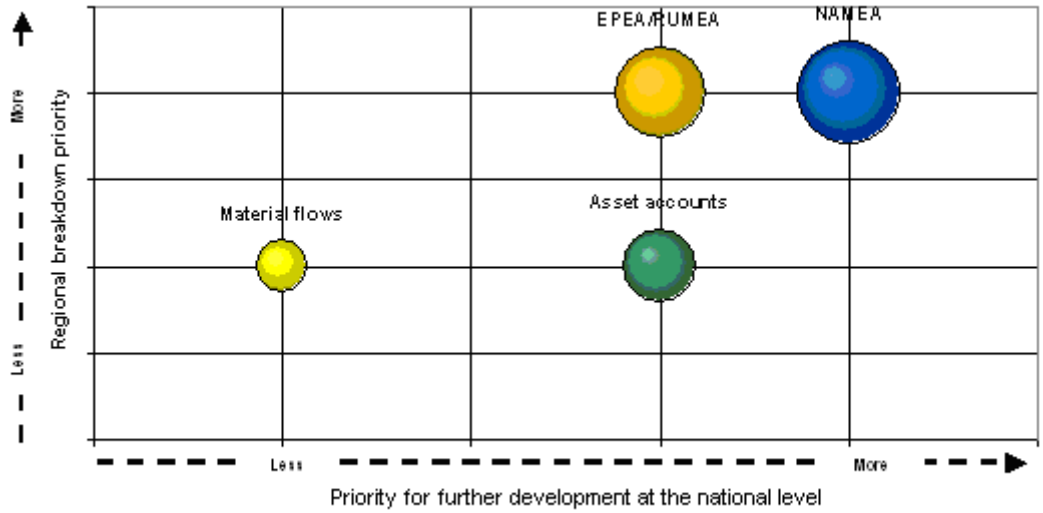
Notes:
(a): In contrast, the potential use of information on a national scale for decisions regarding territorial distribution is deemed low as opposed to non-existent given the possibility to make regional estimates by using environmental accounting data at national level along with other indicators broken down by region.
(b): Generally speaking, to assign a high level to the potential use and relevance of environmental accounting instruments at national level would correspond to a common understanding given that said instruments are specifically designed to direct national and supranational policies and strategies with a view to environmental sustainability. This perspective only partially coincides with that of territorial development policies, which are the focus of this work (see paragraphs III.2 and III.3). Consequently, judgements as to the relevance of environmental accounting tools can be adapted in relation to a series of facts, including the growing administrative decentralisation taking place in Italy. By virtue of this decentralisation, it is reasonable to expect that an increasing number of decisions will be taken at regional level, as regards both the allocation of resources among different forms of capital as well as the choice of instruments. Consequently, in some cases, environmental accounting tools are herein attributed greater importance at regional as opposed to national level, considering that, from the point of view of the policy maker operating at territorial level, the information provided on a national scale could have limited value for territorial levels for which certain resource allocation decisions are taken.

The judgements in Table IV.1 can be aggregated by type of account, thus allowing some preliminary conclusions about priorities for development policies to be drawn. Specifically, given the two-fold need to widen the field of statistical information available on a national scale and to produce a breakdown on a regional scale in order to allow for the use of the accounts under examination, analyses of the potential use and relevance of the accounts can be usefully carried out also by taking separate account of these two dimensions.

Figure IV.1 illustrates the relative positions of the four types of environmental accounts as regards their potential use and relevance, both at national level (along the horizontal axis) and at regional level (along the vertical axis), and in general (distance from the origin of the axes). In the last case, the overall evaluation is also emphasised in the graph by the larger or smaller size of the coloured bubbles.

This initial analysis indicates that the NAMEA could offer the most benefits to development polices, considering both the statistical information at national level as well as the development of statistics at the level of the individual regions. The EPEA and RUMEA accounts rank next, as analogous benefits can be obtained from the breakdown by region, while such benefits are somewhat less significant as regards their further development on a national scale. The following position goes to asset accounts, for which one can expect limited uses for the choice of instruments. Finally, the material flow accounts come last, as they appear to provide little use in identifying qualitative and quantitative variations in the individual components of natural capital.

Figure IV.1 Comparative qualitative evaluation of the potential use and relevance of the different environmental accounting tools



Sources: MEF, DPS - Istat, National Accounts

It is important to point out a series of *caveat* that must be considered in order to correctly interpret the results of such an analysis of priorities and to correctly circumscribe its validity:

- the indications provided concern the ranking of instruments, but not necessarily the ranking of priorities in terms of the increase of information for a *given* environmental accounting *tool* (expansion of the information to national level *versus* a regional breakdown): for example, the position of asset accounts in Figure IV.1 should not be interpreted as meaning that for such accounts the development of national data takes priority over their regionalisation, but rather that the benefits of such development are superior with respect to the case of material flow accounts, similar with respect to EPEA, and inferior with respect to NAMEA;
- for simplicity's sake, the analysis is carried out supposing that only one instrument is used at a time. A more complex analysis would require the joint use of more than one instrument (for example, the joint use of asset accounts and the EPEA, both broken down by region, in order to valuate the adequacy of environmental protection expenditure in a certain region in relation to the state of preservation – or degradation– of the regional natural resources);

- for simplicity's sake, all types of decisions are deemed equally important, whereas, in general, for some policy makers, certain decisions could be more urgent or important than others;
- judgements as to the usefulness of different environmental accounting tools regard the use of accounts in general and could differ considerably in specific situations. For example, the characteristics of a particular region from the point of view of the endowment of natural capital (for example, dependence on other territories for natural resource supplies) could be such that the asset accounts of natural resources prove more useful than other environmental accounts such as the NAMEA or the EPEA;
- the degree of priority assigned to the accounts is valuated exclusively with reference to their potential use for development policies and within the conceptual framework proposed in this work. Such a scheme, proving useful and necessary for the purposes of the analysis carried out, necessitates, among other things, a simplified approach to the various questions, which, in reality, are rather complex. The first recommendations made at this stage can require closer examination. In particular, for the future, a more in-depth study of the material flow accounts would be useful, also in light of the results of the debate begun in the OECD as to the interpretation and use of the indicators derived from this type of environmental account[42].

Feasibility

On the basis of the evaluation of the potential use and relevance of environmental accounts, some elements regarding their feasibility – as concerns both the expansion of data production at national level as well as their breakdown at regional level – allow for the definition of a line of reasoning on the priorities. The time period to be considered is more or less long, depending on whether or not feasibility studies with positive results have already been carried out or, at any rate, whether or not there are other difficulties in terms of application.

From a short-term perspective, the current situation reveals a good level of feasibility as concerns the regional breakdown of aggregates on atmospheric emissions and the direct extraction of material from the natural environment, which are regularly produced with

[42] This refers to the initiative launched as part of the implementation of the recommendations of the OECD's Council in 2004 regarding material flows and the productivity of resources (see OECD, 2004), in particular to follow up on related requests put forward by the heads of State and of Government of the G8 countries.

reference to the national economy (NAMEA). Moreover, the evaluations pertaining to the potential use and relevance of information indicate a particularly high level of interest in the NAMEA aggregates, given that one must assume there is a certain variability amog regions in the technology adopted by the different economic sectors and in the behaviours of final consumers, factors on which the quantities of emissions and extractions depend.

A good level of feasibility is also associated with the production of regional aggregates on environmental expenditure (EPEA and RUMEA accounts, with the experience acquired in the case of EPEA being more solid also with respect to the NAMEA). On the other side, despite the lower level of potential use and relevance compared with the NAMEA, there is unquestionable interest in development in this direction because expenditure behaviours on the part of local governments as well as enterprises operating at the territorial level vary from region to region.

Within the framework of asset accounts some parts of the forest accounts seem feasible at regional level, especially some physical aggregates relative to the size of stocks in terms of volume of timber and in terms of forest area. In general, the endowment of natural resources in terms of quality and quantity differs among regions and thus, in line of principle, the development of such accounts deserves high priority. Nevertheless, in terms of feasibility, the development of this type of account in the immediate future is limited to the production of the aforementioned aggregates.

It is also important to look at flows between the various regions that are significant from an economic-environmental profile, in other words, the imports and exports of natural resources (as input in the economy) as well as pollutants generated at regional level. The need for such information would be met in the material flow accounts, even if their compilation at regional level does not seem feasible in the immediate future.

In short, the initial priorities that can be set by combining the observations on feasibility just presented with the previous ones pertaining to the relevancy for development policies are: the rapid regional breakdown of the NAMEA and EPEA/RUMEA aggregates, the development of some asset accounts where this is possible at regional level, and, in a medium- to long-term, the production of material flow accounts at regional level.

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APPENDIX 1 The international context of environmental accounting of official statistics

The SEEA2003 manual

The *Integrated Environmental and Economic Accounting 2003* (SEEA2003) handbook[43], which presents the main approaches to environmental accounting developed internationally at world level, is a useful tool that aids understanding of both the outlines and contents of environmental accounting as well as the current situation.

It is useful to note that the handbook's contents are organised into three large categories of accounts, each marked by the contribution it is able to make to measuring specific economic and environmental aspects of sustainable development[44].

The first category includes *Physical and hybrid flow accounts*.

SEEA physical flow accounts typically describe (by means of accounting structures generally of the *supply and use* or *input-output* type, suitably adapted by the SNA) the use by the economic system of natural resources and of the *inputs* coming from the ecosystem, as well as the production of wastes by the economy itself.

The SEEA hybrid accounts, a typical example of which is the NAMEA[45], provide a side-by-side presentation of an economic module, including national accounts in monetary units, and an environmental module, drawn up using the same principles as those used in economic accounting and primarily expressed in physical units (the term hybrid derives from the use of the two different units of measure, monetary and physical).

This category of account primarily makes it possible to evaluate the economic system's dependence on certain environmental inputs and the extent of the pressures placed on the environment by the economic system.

The second category includes *Environmental economic accounts* and, in particular, satellite accounts regarding environmental protection expenditure (EPEA)[46] and the use and management of natural resources (RUMEA)[47].

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[43] The handbook, jointly produced by the United Nations, the European Commission, the International Monetary Fund, the OECD and the World Bank, is available on the website: http://unstats.un.org/unsd/envAccounting/seea.htm
The SEEA2003 is the result of a long process of revision of an earlier manual, published by the United Nations in a preliminary version in 1993; see United Nations (1993a).
[44] see SEEA paragraphs 2.13-2.16.
[45] *National Accounting Matrix including Environmental Accounts* (see paragraph II.1.2).
[46] *Environmental Protection Expenditure Account* (see paragraph II.1.2).
[47] *Resource Use and Management Expenditure Account* (see paragraph II.1.2).

The specific feature of these accounts is that they make it possible to visualise flows otherwise "hidden" in the national accounts. Economic transactions linked to environmental protection activities and to the use of natural resources by various institutional sectors (enterprises, households, general government, non-profit institutions serving households) are singled out.

The third category of accounts includes *Asset accounts of natural resources in physical and monetary terms*. For each component of natural capital – natural resources, lands and eco-systems – the asset accounts typically report the opening stock and closing stock for a given accounting period and the related changes in flows taking place during the period under consideration. Due to their features, asset accounts especially lend themselves to evaluations concerning the sustainable use of resources.

Table A1.1 provides a comparison between the categories of accounts identified in the SEEA2003 and the main types of environmental accounts adopted in the European Statistical System (ESS). The table underlines, among other things, the transversal nature of the European Statistical System's integrated environmental and economic accounting of natural resources with respect to the main types of accounts considered.

Table A1.1 Classification of environmental accounts in the SEEA2003 and in the European Statistical System

in the SEEA2003	in the ESS	
Flow accounts in physical terms and hybrid accounts	Economy-wide material flows accounts and balances	
	NAMEA-type flow accounts	Integrated environmental and economic accounting of natural resources
Environmental economic accounts	Environmental economic accounts	
Asset accounts of natural resources in physical and monetary terms	Asset accounts of natural resources	

In addition to the three categories of accounts described, the SEEA 2003 also addresses the topic of the techniques of monetary valuation used to measure environmental degradation and the topic of the "environmental adjustment" of national accounts and national accounts aggregates.

Taking account both of the uncertainties surrounding the subject and the importance of giving due consideration to such uncertainties whilst defining the guidelines to be proposed, the handbook is to be regarded more as a reference framework based on the best applications thus far tried out in various countries rather than as a rigorously structured "system" of accounts.

The process of standardisation in the European Union

The European Union has played a crucial role in terms of actions and activities, by means of its own statistical office (Eurostat), in accordance with the approach introduced towards the end of 1994 by the guidelines contained in a Communication of the European Community to the European Council and Parliament regarding environmental accounting[48].

The efforts put forward by Eurostat have primarily regarded:

- *standardisation of the contents* of the environmental accounting systems of member states (what information to produce and at which level of breakdown);
- *standardisation of the methodologies*, via definition of the:
    - *methodological reference framework* (concepts, definitions, classifications and accounting frameworks) and
    - *techniques of implementation* (operational approaches for the application of environmental accounting tools).

Contents have been standardised through the progressive definition, jointly carried out with member states, of a *set* of *standard tables* for the different environmental accounts (for example *standard* tables of forests accounts, *standard* tables of subsoil asset accounts, *standard* tables of economic accounts, etc.): that is, a *set* of accounting tables that forms the "core" of each environmental account and that thus takes priority in being implemented in all member countries.

As regards methodologies, Eurostat, also via a joint effort with member countries, has overseen the production of handbooks for many of the environmental accounts being developed and, in some cases, has also overseen the preparation of operational guidelines for the compilation of accounts (compilation guides). With respect to their methodological counterparts, these guides provide operational directions for the actual implementation of environmental accounts depending on the basic data available.

[48] see Commission of European Communities (1994). The different activities to be started in Eurostat and to be promoted at European level in application of the directions provided in the European Commission's Communication were defined by a Task Force (December 1994), in which, in addition to Eurostat, the national statitstical institutes of Germany, Italy and Netherlands took part.

A summary outline of the handbooks, compilation guides and *standard tables* available for the various environmental accounts currently being developed at EU level is provided in Appendix 2.

The effectiveness of the European Union's actions, aimed not only at the *standardisation*, but also and especially by means of the *compilation guides* at the *operationalisation* of environmental accounts, is apparent at various levels:

- the general structures of some European environmental accounts and the related handbooks have by now been adopted at world level, also due to the fact that they have been included and accepted in the SEEA2003 (this is the case of the NAMEA, the material flow accounts and the SERIEE);
- at EU level the *standard tables* are regularly filled in by a significant number of countries, representing in this way the broadest and most compact example of a homogeneous system of environmental accounting at international level;
- the enlargement of the EU leads one to think that Europe will continue to be the largest area of standardisation of environmental accounting systems.

APPENDIX 2 Handbooks, compilation guides and standard tables of environmental accounts of the European statistical system

The following table summarises the state of advancement of the various areas of activity in the field of environmental accounting, with reference to two parameters: first, the availability of a handbook or compilation guide, and, secondly, the availability of standard tables. The latter are drawn up *ad hoc* to transmit environmental accounting data from EU member countries to Eurostat. Generally, such tables are simplified versions of either the tables presented in handbooks or of a subset of tables included in the handbooks, selected to encourage data collection on the part of member countries. The fact that, in some cases, standard tables for data transmissions have not been prepared despite the existence of available handbooks does not mean that standardised accounting tables have not been drawn up. There are environmental accounts for which standard tables are available, even in the absence of real and actual handbooks. In such cases, the tables are furnished with detailed notes on how they are to be compiled. In cases where neither handbooks nor standard tables are available, there are methodologies which, though not yet established internationally, are applied in a documented manner in some countries. One exception is the RUMEA satellite account, which, though lacking such experience at international level, is the subject of an Istat pilot project underway in Italy.

ENVIRONMENTAL ACCOUNTS		MAIN PRODUCTS	AVAILABILITY OF HANDBOOKS OR COMPILATION GUIDES	AVAILABILITY OF STANDARD TABLES
Economy-wide material flow accounts		• indicators of use of materials • material flow accounts	• Eurostat (2000), Economy-wide material flow accounts and derived indicators. A methodological guide	
NAMEA-type accounts broken down by economic sector	Flow accounts for pollutants	• atmospheric emission accounts	• Eurostat (publication underway), NAMEA for air emissions. Compilation guide	• Eurostat, NAMEA-air standard tables • (a NAMEA-type standard table on energy use is currently being defined) • (a NAMEA-type standard table on environmental taxes is currently being defined)
		• waste accounts		
		• wastewater accounts		
	Flow accounts for natural resources	• fossil fuels direct intake accounts • mineral direct intake accounts • biomass direct intake accounts (with possible breakdown by type of resource) • water direct intake accounts	*(Eurostat: methodological and practical directions are provided in the handbook for material flow accounts)*	*(Eurostat: methodological and practical directions are provided in the compilation notes for standard tables regarding the different natural resources)*

ENVIRONMENTAL ACCOUNTS		MAIN PRODUCTS	AVAILABILITY OF HANDBOOKS OR COMPILATION GUIDES	AVAILABILITY OF STANDARD TABLES
Environmental economic accounts (SERIEE)	Environmental protection expenditure satellite account (EPEA)	• Economy-wide satellite accounts (all institutional sectors)	• Eurostat (1994), SERIEE – 1994 Version, Theme Environment, Series Methods • Eurostat (2002), SERIEE Environmental Protection Expenditure Accounts – Compilation Guide	
		• Statistics by institutional sector: - Expenditure by the GG	• (Eurostat is preparing a compilation guide for the production of data on public expenditure for environmental protection)	• OECD/Eurostat, Environmental protection expenditure and revenues – Questionnaire
		- Expenditure by enterprises	• Eurostat (2005), Environmental Expenditure Statistics: Industry Data Collection Handbook	• EU Regulation no. 3056/2002 on the structural business statistics • OECD/Eurostat, Environmental protection expenditure and revenues – Questionnaire
		- Expenditure by households		• OECD/Eurostat, Environmental protection expenditure and revenues – Questionnaire
	Satellite account of expenditures for the use and management of natural resources (RUMEA)	• Economy-wide satellite accounts (all institutional sectors)	• *(Eurostat: methodological and practical directions are provided in the SERIEE handbook 1994 and in the EPEA compilation guide 2002)*	
		• Statistics by institutional sector: - Expenditure by the GG	• *(OECD/Eurostat: methodological and practical directions are provided in the 1999 handbook for eco-industries)*	
		- Expenditure by enterprises	• *(OECD/Eurostat: methodological and practical directions are provided in the 1999 handbook for eco-industries)*	
		- Expenditure by households		
	Environmental taxes	• Statistics on environmental taxes, that can be integrated into EPEA and RUMEA satellite accounts	• Eurostat (2001), Environmental taxes — A statistical guide	• (a standard table is currently being defined within the NAMEA)
	"Eco-industries" (economic activities that produce environmental protection goods and services)	• Statistics on "eco-industries"	• OECD/Eurostat (1999), The Environmental Goods & Services Industry. Manual for data collection and analysis	

ENVIRONMENTAL ACCOUNTS		MAIN PRODUCTS	AVAILABILITY OF HANDBOOKS OR COMPILATION GUIDES	AVAILABILITY OF STANDARD TABLES
Integrated environmental and economic accounts for natural resources	Asset accounts NAMEA-type flow accounts SERIEE-type economic accounts	• Forest accounts	• Eurostat (2002), The European Framework for Integrated Environmental and Economic Accounting for Forests – IEEAF • (Eurostat: methodological and practical directions are provided in the notes to the compilation of standard tables)	• Eurostat, IEEAF – Integrated Environmental and Economic Accounting for Forests – standard tables
		• Water accounts	• (Eurostat: methodological and practical directions are provided in the notes to the compilation of standard tables)	• Eurostat, Water accounts standard tables
		• Sub-soil asset accounts	• (Eurostat: methodological and practical directions are provided in the notes to the compilation of standard tables)	• Eurostat, Subsoil asset accounts for oil and gas – standard tables
		• Accounts of land use and cover	• (Eurostat: methodological and practical directions are provided in the notes to the compilation of standard tables)	• Eurostat, Land accounting – Draft set of tables
		• Accounts of other natural resources (ex. fish resources, other livestock resources, etc.)		

APPENDIX 3 Environmental accounts: current situation in the European Union and in Italy. Possible developments

The table below provides an overview of how environmental accounting is currently being applied both in Europe and in Italy. Based on the current situation, the table also indicates the most feasible areas of development in Italy as regards the production of data at regional level and those areas requiring longer-term development (essentially due to a lack of basic data).

CURRENT SITUATION AND POSSIBLE DEVELOPMENTS / ENVIRONMENTAL ACCOUNTS	CURRENT SITUATION		POSSIBLE DEVELOPMENTS IN ITALY	
	in Europe	in Italy	based on the positive results of feasibility studies already carried out	based on feasibility studies to be carried out, or on the overcoming of other application difficulties
Economy-wide material flow accounts	The existing applications are standardised and comparable, thanks to the methodological guidelines published by Eurostat. In addition to time series and to the accounts drawn up by the individual countries, the principal indicators are available for all 15 member states, calculated by country by the European Environmental Agency's Topic Centre on the Management of Resources and Wastes. The most widely diffused indicators regard direct input of the material utilised (Domestic Material Input – DMI, and Domestic Material Consumption– DMC).	Italy is an international leader in this area. The applications carried out include, in addition to the time series of indicators of direct flows of material used, those of indicators including material moved but not used and indirect flows connected to foreign trade (Total Material Requirement – TMR, Total Material Consumption – TMC), as well as an overall balance sheet of all economic input and output.	Creation at regional level of the domestic extraction (DE) aggregate, with a breakdown by type of material (biomass, fossil fuels, construction minerals, other minerals) and by the activities that directly carry out the extraction.	Creation at regional level of a complete set of indicators and of material flow accounts. Creation at national level of an Input-Output table of physical flows. Creation at regional level of the DMI aggregate, calculated by summing up regional imports (from abroad and from other regions) and domestic extraction (DE)

CURRENT SITUATION AND POSSIBLE DEVELOPMENTS / ENVIRONMENTAL ACCOUNTS	CURRENT SITUATION		POSSIBLE DEVELOPMENTS IN ITALY	
	in Europe	in Italy	based on the positive results of feasibility studies already carried out	based on feasibility studies to be carried out, or on the overcoming of other application difficulties
NAMEA-type accounts broken down by economic sector	Since the second half of the 1990s, the 15 founding member states and some new EU member states have drawn up NAMEA tables, which link economic indicators taken from national accounts and physical indicators of environmental pressures with the related activities (economic activities and final household consumptions). Compared with the information provided for other environmental pressures, that regarding atmospheric emissions is the most advanced due to the number of countries that produce this type of data, to the fact that some countries now regularly produce said data and to the level of standardisation that is being reached at European level. Some countries have also carried out successful pilot projects regarding the possibility of extending the accounts of the environmental module to water extractions and discharge, to polluting emissions in water and to wastes. The near future is expected to see the inclusion of a table on environmental taxes broken down by type of tax and economic activity as well as the inclusion of a table on energy uses per economic activity and households in the standard NAMEA tables. Some countries also produce complete NAMEA matrixes in which the economic part (NAM) includes some national accounts, with the number depending on how detailed the general structure is.	In line with other European countries, in Italy, the development of the NAMEA began, as regards the environmental module, with the description of emissions of some atmospheric pollutants and of resources' intake. The following are available for the years 1990-2001: • tables that link some especially important economic aggregates (production, value added, intermediate consumption, household final consumption by function, employment) to the emission of ten atmospheric pollutants and to the intake of four natural resources, based on a breakdown per economic activity and household consumptions coherent with classifications proposed at European level. • tables on the atmospheric emissions of enterprises, by economic activity, and of households • a table linking the total of emissions calculated in accordance with the NAMEA method and the total calculated in accordance with the method adopted in international agreements (UNFCCC and UN-ECE CLRTAP); • Istat has prepared complete NAMEA-type matrixes for Italy for 1990, 1991 and 1992. Work has begun on the creation of a table on taxes with a breakdown by type and by economic activity and a table on energy uses broken down by economic activity and by household consumption. Work has also begun on the creation of a NAMEA-type table at regional level.	Creation of complete NAMEA-type general structures on a national scale using the tables of resources and uses. Creation for all regions of NAMEA-type tables for atmospheric emissions and for direct extractions of materials from the natural environment (DE).	Creation of complete NAMEA frameworks on a regional scale

CURRENT SITUATION AND POSSIBLE DEVELOPMENTS / ENVIRONMENTAL ACCOUNTS		CURRENT SITUATION		POSSIBLE DEVELOPMENTS IN ITALY	
		in Europe	in Italy	based on the positive results of feasibility studies already carried out	based on feasibility studies to be carried out, or on the overcoming of other application difficulties
Environmental economic accounts (SERIEE)	Environmental protection expenditure satellite account (EPEA)	<u>Base statistics on expenditure by institutional sector</u> For some years now all 15 founding member states and some new states have collected data on environmental protection expenditures according to European standards. The statistics produced are still not homogeneous as regards the years of reference and the level of completeness of the field of observation: • expenditure by enterprises, data collected on the basis of EU regulations on structural business statistics • expenditure by the GGs, based on the data produced *ad hoc* for the purposes of the EPEA and on national accounts data by COFOG function • household expenditure, data are not collected on a regular basis <u>Economy-wide satellite account</u> Few countries are able to draw up the account in its entirety and to produce it on a regular basis. Some countries draw up the account only referring to some environmental sectors.	<u>Statistics on expenditure by institutional sector</u> For some years now, environmental protection expenditure data have been processed in accordance with European standards, especially as regards enterprises and the GGs. The statistics produced for the various years are not uniform from the point of view of the breakdown and of the completeness of the field of observation: • expenditure by enterprises; the collection of data for the years 1997-2003 on a national scale, with variable breakdowns in relation to changes in EU regulations • expenditure by the GGs; regular collection of data broken down by environmental sector of intervention with reference to State governments, 1995-2002; collection has begun for some regional governments. ESA95 data are available for the COFOG function, 1990-2003 series, not broken down by environmental sector and presented separately for the central government and local government • household expenditures, two pilot surveys carried out <u>Economy-wide satellite account</u> The economy-wide account with reference to the wastewater management and waste management sectors has been created for 1997. Production in a time series has begun on a regular basis.	<u>Statistics on expenditure by institutional sector</u> • expenditure by enterprises; data on a regional scale • expenditure by the GGs; data broken down by environmental sector for all regional governments; data for the other local administrations with reference to some environmental sectors • household expenditures; data on national and regional scale <u>Economy-wide satellite account</u> Production of regional estimates for some selected aggregates.	<u>Statistics on expenditure by institutional sector</u> • expenditure by the GGs, production of data on national and regional scale, broken down by environmental sector, referring to all general governments <u>Economy-wide satellite account</u> Production of the complete account regarding all environmental sectors on national and regional scale.

CURRENT SITUATION AND POSSIBLE DEVELOPMENTS / ENVIRONMENTAL ACCOUNTS		CURRENT SITUATION		POSSIBLE DEVELOPMENTS IN ITALY	
		in Europe	in Italy	based on the positive results of feasibility studies already carried out	based on feasibility studies to be carried out, or on the overcoming of other application difficulties
Environmental economic accounts (SERIEE)	Satellite account of expenditures for the use and management of natural resources (RUMEA)	<u>Statistics on expenditure by institutional sector</u> At the moment there is no standardised process of data collection. Some countries autonomously produce information on expenditures for the use and management of some resources (prevalently water, energy, forests). <u>Economy-wide satellite account</u> Unlike the EPEA, a standard methodology (definitions, classifications, accounting tables) has yet to be developed.	<u>Statistics on expenditure by institutional sector</u> At the moment there is no *ad hoc* collection of data on these expenditures, for any institutional sector <u>Economy-wide satellite account</u> Production in a time series of the water resources account has begun, especially as regards the sector relating to the collection, adduction and distribution of water. Pilot projects are underway for the forest resource (especially as regards the sylviculturist sector) and subsoil assets (extractive branch).	<u>Statistics on expenditure by institutional sector</u> • expenditures by the GGs; data broken down for some natural resources for the Central government, the regional governments, and other local governments <u>Economy-wide satellite account</u> Production of regional estimates for some chosen aggregates.	<u>Statistics on expenditure by institutional sector</u> • expenditure by enterprises; data on a national and regional scale *(lack of definitions and classifications to use as references for possible surveys)*; • expenditures by the GGs, data on a national and regional scale broken down for all natural resources, referring to all public administrations • expenditures by households, data on a national and regional scale (lack of definitions and classifications to use as references for possible surveys) <u>Economy-wide satellite account</u> Production of a complete account relating to all natural resources on a national and regional scale
Integrated environmental and economic accounts of natural resources Integrated	Forest accounts	<u>Production and use of timber</u> A standardised methodology exists. The accounts are produced on a regular basis in Nordic countries, where this resource is especially important. <u>Other functions and activities (carbon storage, recreation, biodiversity, protection)</u> The development of accounts for these functions is still in the pilot stage, except for the carbon storage function. The future is expected to see a greater availability of basic statistics following international initiatives and agreements (such as Kyoto)	<u>Production and use of timber</u> Aggregates expressed in physical units relative to direct extractions of timber and other products from forests are regularly processed during the compilation of material flow accounts at economy-wide level and of the NAMEA ("intake" module)	<u>Production and use of timber</u> Monetary aggregates relating to the use and management of forest resources on a national scale, and of some physical aggregates relating to the consistency of the stocks in terms of volume of timber at national and regional level. <u>Other functions and activities (carbon storage, recreation, biodiversity, protection)</u> Physical aggregates relating to the consistency of stocks in terms of forest area.	<u>Production and use of timber</u> Creation of economic accounts for the NACE 02 division (forestry) on a national scale and of physical asset accounts in terms of volume of timber on a national and regional scale. <u>Other functions and activities (carbon storage, recreation, biodiversity, protection)</u> Creation of physical asset accounts in terms of forest area, as well as the storage of carbonl, on a national and regional scale.

CURRENT SITUATION AND POSSIBLE DEVELOPMENTS / ENVIRONMENTAL ACCOUNTS		CURRENT SITUATION		POSSIBLE DEVELOPMENTS IN ITALY	
		in Europe	in Italy	based on the positive results of feasibility studies already carried out	based on feasibility studies to be carried out, or on the overcoming of other application difficulties
environmental and economic accounts of natural resources	Water accounts	<u>Accounts of monetary transactions connected to the supply and demand of water resources</u> A standardised methodology exists. <u>Physical flow accounts of exchanges within the economy and with the natural environment</u> A standardised methodology exists. The physical qualitative aspects are held to be among future priority developments.	<u>Accounts of monetary transactions connected to the supply and demand of water resources</u> A feasibility study is underway regarding water distribution services (NACE 41 division) and the collection and treatment of wastewater (included in the NACE 90 division). <u>Physical flow accounts of exchanges within the economy and those with the natural environment</u> A feasibility study is underway regarding the use of distributed water (by type of use: civil, industrial…) and of services regarding the collection and treatment of wastewater at national and regional level.		<u>Monetary transactions connected to the supply and demand of water resources</u> Development of supply use tables and monetary accounts of water distribution services (NACE 41 division) and collection and treatment of wastewater (included in the NACE 90 division). <u>Physical flow accounts of exchanges within the economy and with the natural environment</u>. Development of accounts at national and regional level. *(difficulties due to the scarce availability of basic data).*
	Accounts for subsoil assets	There is a standardised methodology both for economic accounts and for asset accounts in physical terms.	A feasibility study is underway regarding the estimate of some aggregates of economic accounts including the rent for drilling for crude petroleum and natural gas (NACE 11.1 group), and the creation of asset accounts expressed in physical terms for such resources. Aggregates expressed in physical units relating to direct extractions of energy and non energy minerals from the subsoil are regularly processed during the compilation of economy-wide material flow accounts and of the NAMEA ("intake" module).		Creation of economic accounts for drilling for crude petroleum and natural gas (NACE 11.1 group) and of asset accounts in physical terms of such resources. Development of accounts relating to other subsoil assets.
	Accounts for land use and cover	There are important methodological and applicative references, as well as sets of pan-European data, developed mostly by the European Environmental Agency. Eurostat deems this type of account to be among future priority developments	Evaluation of the possibility of utilising the sets of European data for the creation of accounts is underway. Estimates of the surface area covered by buildings are available as an intermediate product of material flow accounts.		Production of some aggregates and estimates at national and regional level on the basis of European data, possibly integrated with *ad hoc* studies . Production of real accounts of the use and coverage of soil on national and regional scale.
	Accounts for other natural resources (ex. fish resources, other livestock resources, etc.)	The methodologies still have to be harmonised. Eurostat deemed this type of account to be among future priority developments	Aggregates expressed in physical units relating to fished fish resources are regularly processed during the compilation of economy-wide material flow accounts and of the NAMEA ("extraction" module).		Creation of accounts regarding the use of fish products.

APPENDIX 4 General Government environmental expenditure: methods of reclassification by function of the public budget accounts adopted in the National Statistics System

Introduction

Given that it is impossible to identify some financial outlays linked to specific activities carried out by the General Government (GG) on the basis of the functional classifications normally used in public finance documents, in some cases it is necessary to carry out a reclassification.

Environmental protection is one such case. Generally, the functional classifications used in the financial statements of the various GGs – with the sole exception of Central Government (discussed further on) – do not include groupings that make it possible to identify environmental protection expenditures, according to the definitions adopted for this particular function within the context of official statistics. Sometimes there are items that regard part of the phenomenon (in other words, a subset of interventions that fall within the field of environmental protection); other times environmental protection expenditures are classified in items that also include expenditures for other purposes.

In the National Statistics System (Sistan) there are different processes by which to produce data regarding either public expenditure by function or just the environmental protection function. Said processes are implemented via *functional reclassifications* of the budget accounts and comprise:

- production of data on "environmental protection" expenditures in order to draw up the environmental protection expenditure satellite account (EPEA, part of the European system, SERIEE), within the framework of environmental accounting for Istat purposes;
- production of data on "environmental protection" expenditures in order to calculate expenditure by the General Government per function, within the framework of Istat national accounts (ESA95);
- production of data on expenditures for the "environment" at regional level, in order to draw up the Ministry of Economy and Finance's Regional Public Accounts.

This appendix provides more in-depth analyses of the methodological reflections first addressed in II.1.2 with reference to the data produced for the purposes of the EPEA and data relating to the Regional Public Accounts, by also providing considerations on the data produced for the purposes of the ESA95, currently the only ones mandatory for countries in the European Union as per Community regulations regarding National Accounts. A comparison of these three processes as regards the methods used and the

type of results produced makes it possible to identify some improvements in terms of accuracy of the estimates (and thus of the usability of the information) that can be implemented through the environmental accounting approach.

DATA REGARDING PUBLIC EXPENDITURE FOR THE ENVIRONMENT PRODUCED BY SISTAN WITH METHODS OF FUNCTIONAL RECLASSIFICATION

Satellite accounts of the European system SERIEE

The first formulation and standardisation of the concept of environmental expenditure within the framework of official statistics was the work of the European system for the collection of economic information on the environment, SERIEE (*Système Européen de Rassemblement de l'Information Economique sur l'Environnement*)[49].

This system distinguishes between expenditures for "environmental protection", which are reported in the EPEA (*Environmental Protection Expenditure Account*), and expenditures for the "use and management of natural resources", which are reported in a separate satellite account, RUMEA (*Resource Use and Management Expenditure Account*).

"Environmental protection" is defined as including "all activities and actions whose main objective is the prevention, reduction or elimination of pollution as well as any other form of environmental degradation", as, for example, activities relating to wastewater management (treatment, sewerage), waste management (collection, transport, disposal), the prevention or abatement of atmospheric pollution (modification of production processes, installation of pollution abatement systems), etc.. In cases where they are carried out for the purpose of environmental protection, this definition also comprises instrumental activities such those of monitoring and control, research and experimental development, administration and regulation, training, information and communication. On the other hand, this definition excludes activities that, though impacting favourably on the environment, have other primary objectives, such as hygiene and health. Activities and actions aimed at preventing or reducing the depletion of natural resources (energy savings, rationalisation of the use of water resources, the saving of raw materials through the use and production of recycled materials, etc.) are also excluded and are, instead, classified under the use and management of natural resources.

[49] *SERIEE – 1994 Version*, Eurostat (1994).

Everything pertaining to qualitative aspects of the environment, that is, to phenomena of pollution (atmospheric emissions, wastewaters, wastes, soil pollution, etc.) and of degradation (loss of biodiversity, soil erosion, salinisation, etc.) falls into the field of environmental protection and the related expenditures are registered in the EPEA. On the other hand, everything pertaining to the quantitative availability of natural resources (water, energy resources, wild flora and fauna, etc.) and thus, their exploitation and those measures aimed at avoiding and reducing their depletion, falls into the field of the use and management of natural resources and the related expenditures are registered in the RUMEA.

Currently, everything concerning conceptual and theoretical aspects and application methodologies for the EPEA have been codified and standardised at international level, so that, for example, there is a classification of environmental protection expenditures adopted by leading international organisms: the CEPA (*Classification of Environmental Protection Activities and expenditures*)[50]. The same level of definition and standardisation has not been reached for aspects of the RUMEA, even if European handbooks relating to the SERIEE[51] and the OCSE/Eurostat handbooks on the environmental industry [52] provide various conceptual and methodological elements thereby allowing for the definition of at least broad categories of expenditure for the management and safeguarding of the principal types of natural resources. Thus, considering the availability of both the CEPA classification and the instructions for the use and management of natural resources, on the whole, the scope of analyses of the SERIEE system (EPEA + RUMEA) breaks down – in terms of aggregates – into the sectors of environmental intervention listed in Table A4.1.

[50] As is true of the other conceptual and methodological aspects of the EPEA, the CEPA has been adopted in the United Nations' SEEA2003 handbook of environmental accounting (*Integrated Environmental and Economic Accounting 2003 - Handbook of National Accounting*, currently being published) and has been formally adopted by the United Nations, the European Union, the International Monetary Fund, the OECD and the World Bank.

[51] *SERIEE – 1994 Version*, Eurostat (1994); *SERIEE Environmental Protection Expenditure Accounts Compilation Guide*, Eurostat (2002).

[52] *The Environmental Goods & Services Industry. Manual for data collection and analysis*, OECD/Eurostat (1999).

Table A4.1 The scope of SERIEE analyses: the CEPA classification of the EPEA and the main categories of natural resources of the RUMEA

"Classes"(*) of the CEPA1994 (EPEA)	
1	Protection of ambient air and climate
2	Wastewater management
3	Waste management
4	Protection of soil and groundwater
5	Noise and vibration abatement
6	Protection of biodiversity and landscapes
7	Protection against radiation
8	R& D for environmental protection
9	Other environmental protection activities
Categories of natural resources (RUMEA)	
I	Inland water
II	Forests
III	Wild flora and fauna
IV	Non renewable primary energy sources (fossil fuels)
V	Non energy raw materials

(*) Every class breaks down into more items identified by a 2 or 3 digit code

From an economic point of view, the EPEA and the RUMEA, both being satellite accounts, are based on the same system of concepts, definitions, classifications and general structures of the National Accounts. Thus, the aggregates of satellite accounts can be directly compared with the corresponding aggregates of the National Accounts of which they form part (for example, GDP, expenditure for final consumption, investment), allowing for the evaluation of the relative importance of expenditure for the environment with respect to the total of resources or uses of the economy. Moreover, adoption of the same conceptual and theoretical system of the National Accounts ensures the complete and coherent registration of transactions for environmental protection carried out by all of the economy's institutional sectors, thereby avoiding duplications.

The more advanced phase of standardisation of the EPEA with respect to the RUMEA explains why, in most cases, the information produced within the framework of official statistics is currently concentrated on "environmental protection" expenditures and thus on the EPEA.

As regards public expenditure in particular, Istat currently produces a time series of data relating to Central government [53] and has begun production of a time series for some regional governments[54]. From the perspective of *function*, such data pertain to "environmental protection" and are classified on the basis of the CEPA considered at its maximum level of detail. From an *economic* perspective, the data are produced in a manner coherent with the EPEA aggregates (and thus with those of the ESA95) and regard both current expenditures as well as capital expenditures.

The reclassification by function is carried out via an *ad hoc* methodology created by Istat and based on the budget analysis technique[55]. This methodology involves analysing the elementary expenditure units of the final accounts of the different GGs (expenditure items), in order to obtain accurate estimates of environmental protection expenditure with a useful level of breakdown (for example, a breakdown by environmental sector of intervention). Considering all of the *qualitative* information reported in the budget account for each expenditure item (description of the expenditure item, law cited in the description of the expenditure item, placement of the item in the budget account structure, classification criteria of the item) and, where necessary, the supplemental, specifically gathered and more detailed information, it can be determined if the activities carried out with the financial resources of the item relate (in whole or in part) to environmental protection. Should that prove to be the case, they are classified on the basis of the CEPA. The reclassification is essentially carried out by means of an analytical approach whereby every elementary unit of expenditure is examined. Reclassifications are not carried with methods based on transcoding or "bridge schemes", by which homogeneous groups of expenditure items (identified based on classification criteria used in accordance with public finance rules) are more or less completely attributed to the environmental function.

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[53] see Istat (2005a): *La spesa per la protezione dell'ambiente delle Amministrazioni dello Stato – anni 1995-2002*, http://www.istat.it/conti/ambientali/

[54] see, for example, Regione Lazio (2005): *Rapporto sullo stato dell'ambiente della Regione Lazio*, Rome.

[55] see Istat (2003g), *Contabilità ambientale e risposte del sistema socio-economico: dagli schemi alle realizzazioni*, Annali di Statistica, Anno 132, Serie XI, Vol. 1, Roma; Istat (currently being published), *Linee guida per il calcolo della spesa delle Amministrazioni pubbliche per la protezione dell'ambiente – Tecniche e strumenti per la riclassificazione dei rendiconti pubblici*, Istat, Methods and Norms, Rome.

Expenditure on the part of the General Government by function within the framework of the ESA95

Data relating to public expenditure for environmental protection are produced within the framework of the new European National Accounts System ESA95, on the basis of EU regulation 2223/96[56]. In accordance with this regulation, the national accounting system is required to produce data on "GG expenditure by function" broken down in accordance with the international COFOG classification (*Classification Of Functions of Government)*[57], which regards all GG functions[58]. Within said classification, "environmental protection" is one of the various GG functions and corresponds to the "05. Environmental protection" category. The contents and breakdown of this item are based explicitly on the classification adopted for the EPEA within the SERIEE: "The breakdown of environmental protection is based on the classification of environmental protection activities (CEPA) within the European system for the collection of economic information on the environment (SERIEE) of the EU's statistical institute (Eurostat)" (United Nations, 1999).

The breakdown of the "05. Environmental protection" function in Figure A4.2 clearly shows that, though in line with that of the EPEA, the concept of environmental protection in the COFOG is less detailed than in the CEPA classification. In any case, it should be remembered that the definition and breakdown of the COFOG's 05 function is based on the CEPA 1994 and not on the more recent CEPA 2000. The modification introduced with the new CEPA version partly reduces coherency between the COFOG's 05. function and the CEPA.

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[56] EU regulation no. 2223/96 of the Council, 25 June 1996, regarding the European system of national and regional accounts in the EU.

[57] *United Nations* (1999), *Classification Of the Functions Of Government*, http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=4&Lg=1

[58] In the COFOG the maximum level of aggregation is identified in the following GG functions ("divisions"):

01. General public services
02. Defense
03. Public order and safety
04. Economic affairs
05. Environmental protection
06. Housing and community amenities
07. Health
08. Recreation, culture and religion
09. Education
10. Social protection

For some years now, at national level and following reform of the national budget, the COFOG has been adopted in the Central Government Budget Account for the classification of expenditure items by "function-objective"[59]. Nevertheless, from this perspective, the national budget is still an isolated case and therefore it is not possible to benefit from a generalised reclassification of accounts by COFOG function carried out at the source to produce national accounting data relating to expenditure by function of *all* General Government administrations.

Table A4.2 The COFOG environmental function adopted in the ESA95

"Groups" of the COFOG "05 Environmental protection" function	
05.1	Waste management
05.2	Wastewater management
05.3	Pollution abatement
05.4	Protection of biodiversity and landscape
05.5	R&D Environmental protection
05.6	Environmental protection n.e.c.

The data produced by Istat within the framework of the ESA95 refer to all of the GGs and to the sub sectors "central governments", "local governments" and "social security agencies". The data are in line with the consolidated accounts of the GGs produced by Istat via methods to calculate the deficit and public debt. The flows are calculated net of transactions between the different sub sectors of the GGs. This means that only those transactions carried out with subjects not included in the institutional sector of the GGs are included, whilst transactions, and especially transfers, between the different GGs are not included[60].

The method to reclassify functions in the government budgets is based on a complex approach that includes recourse to different techniques for the various entities of the General Government, but which is primarily based on the use of "bridge schemes":

- for central government administrations, the estimates are produced by taking account of the reclassifications of functions of the budget accounts with reference to the COFOG classification carried out at the source. At any rate, detailed analyses

[59] Law no. 94 of 1997 which reforms the national budget has introduced, amongst other things, the classification of State expenditures by "objective-functions", defined on the basis of the COFOG.
[60] see Istat (2004a), *Spesa delle Amministrazioni pubbliche per funzione. Serie SEC95 - anni 1990-2002*, and Istat (2004b), *Spesa delle Amministrazioni pubbliche per funzione. Serie SEC95 – anni 2000-2003*, www.istat.it/conti/nazionali/

and checks are carried out in order to correct a series of incorrect classifications that arise;

- in most cases, especially for local authorities, "automatic" transcoding operations are carried out for financial statement data for a changeover from the original classification by functions to the COFOG by means of "bridge" systems. In the case of government budget functions that cannot be wholly attributed to a single COFOG function but need to be split up between two or more functions, the attribution is carried out *pro quota* in cases in which official, reliable data that make it possible to calculate breakdown parameters are available. Otherwise, this is carried out in accordance with prevailing criteria;
- in other cases, where no initial element of use is available, *ad hoc* in-depth studies are carried out via careful analyses of the budgetary documents.

Environmental expenditure in the Public Sector in the Regional Public Accounts

The "Regional Public Accounts" Project was begun in 1994 in order to provide a tool able to measure expenditure flows in the territory [61].

Progressively developed so as to be increasingly in line with the national accounts system, as regards definition of the field of observation and definition of the economic aggregates measured, some of the project's main objectives are:

- to detect financial flows that all GGs incur in the individual regional territories, with the maximum institutional and territorial breakdown that the accounting documentation permits;
- to reconstruct the consolidated accounts of total expenditure (current and capital) of the Public Sector in Italy's twenty regions.

The field of observation is the Public Sector[62]. The expenditures of the various levels of central and local entities of the public sector are traced back to the reference

[61] Ministry of Economy and Finance, http://www.dps.tesoro.it/cpt-eng/cpt.asp and, *Guida metodologica per la costruzione di conti consolidati della finanza pubblica a livello regionale*, http://www.dps.mef.gov.it/cpt/cpt_guidametodologica.asp

[62] The definition of Public Sector is in line with the requirements of the European Union for the verification of the principle of additionality in the use of Structural Funds. It comprises, in addition to General Government, a non-general-government sector consisting of central and local entities that: (1) belong to the public sector on a formal basis, in that some public bodies exercise direct or indirect control over their management and/or provide financing to these entities; (2) operate in the public services segment; (3) have in the past or may in the future be eligible to obtain Structural Funds.

classification of functions primarily by utilising "automatic" transcoding schemes ("bridge-schemes"), with limited "analytical" reclassification of the base sources. In the case of financial statements of regional governments within the RPA project, recourse is made to analyses carried out by regional systems present in the territory, which, having at their disposal more detailed information, carry out a more precise reclassification.

From an economic point of view, the Regional Public Accounts, though focusing attention on capital expenditure (investments and transfers), present a breakdown by economic category of the total of flows generated by authorities in the larger public sector.

The expenditure flows disclosed are regrouped with respect to various classification criteria, including a functional type criterion for "sectors" that includes a series of items relating to the environment (Table A4.3).

Table A4.3 The environment in the functional classification adopted in the "Regional Public Accounts" Project

RPA "Sectors" relating to the environment	
A	Waste disposal
B	Sewerage and water treatment
C	Environment
D	Water
E	Energy

Environment expenditures refer to:

- a broad sector which, theoretically, can include both expenditure for "environmental protection" (as defined for the purposes of the EPEA and of the ESA95) and expenditure for the "use and management of natural resources " (as defined within the SERIEE-RUMEA context). Nevertheless, given the methods of reclassification adopted, the item "Environment" primarily includes environmental protection expenditure (even if, as discussed more fully later on, on the basis of the techniques actually utilised, other types of expenditure are also included);
- two sectors that fall into the field of "environmental protection" (waste disposal and sewerage and wastewater treatment);
- two sector that fall into the field of the "use and management of natural resources" (water and energy).

The methods of reclassifying functions adopted within the context of the sistan in order to calculate public expenditure on the environment

Criteria to compare the different methods

The different methods of functional reclassifications used in the different processes of statistical information production described above can be compared from three different perspectives:

- the **theoretical-conceptual** perspective, that is, on the basis of the definitions and classifications used as references for the environment;
- the **cornerstones of the reclassification methodology**, that is, by comparing "analytical" methods that carry out classifications on a unit by unit basis with "automatic" methods that are based on the use of "bridge" matrixes via which the transcoding of entire groupings of units of analysis is carried out;
- the **application**, that is, by the way in which the methodology of reclassification is concretely applied (repeatability of the results, times, coverage, etc.).

The different definitions and classifications utilised

The different definitions and classifications utilised with reference to the environment are compared synoptically in Table A4.4.

Above and beyond the greater level of analysis of the SERIEE system (generally a typical characteristic of satellite accounts, if compared with the central system of national accounts), a comparison of the different definitions and classifications utilised shows – amongst other things:

- **general coverage**: besides the field of environmental protection, the SERIEE and RPA also cover, albeit with different levels of detail, the field of the use and management of natural resources. In contrast, this field is not classified as such by the COFOG within the context of the ESA95;
- **"environmental protection"**: the definition and classification of environmental protection are substantially coherent between the ESA95 (COFOG) and the SERIEE-EPEA, despite the greater detail of the CEPA with respect to the 05. function of the COFOG. The concept of environmental protection adopted within the context of the Regional Public Accounts is, theoretically, coherent with that of the SERIEE and of the ESA95, but does not include either R&D activities for environmental protection or those relating to administration, education, training and

information (classes 8 and 9 of the CEPA, groups 05.5 and 05.6 of the COFOG), unless they are already included at the outset in the functions of the financial statements that are traced to the environmental sectors of the Regional Public Accounts. In fact, on the basis of the bridge systems, the broad sector "Environment" (sector C of Table A4.3) can be defined with the following contents:

Protection of the environment as in the EPEA and in the COFOG –
Wastewater management (singled out in sector B of Table A4.3) –
Waste management (singled out in sector A of Table A4.3) –
R&D for environmental protection –
Other environmental protection activities =
"Environment"

- **"use and management of natural resources"**: this aspect is covered exclusively by the SERIEE and by the RPAs. The latter explicitly take account of only two sectors (energy and water). In reality, given the bridge systems utilised, the other components tend to be implicitly included, in that they are included in some of the functions of the financial statements that are traced to the environmental sectors of the RPAs. Such functions are generally reclassified in correspondence to the broadly inclusive sector "Environment" (between parenthesis in the synoptic framework of Table A4.4 in that such sector is prevalently used for "environmental protection" functions, see previous point).

In reality, there are other elements that distinguish the various approaches, above and beyond that arising from the different definitions of reference. They derive from:

- the *type of method* of reclassification applied;
- the *way* in which the method of reclassification is actually applied.

Table A4.4 Summary framework of the definitions and classifications utilised in the Sistan in relation to the environmental protection function carried out by public administrations

Scope of interest	For expenditures by the GGs in accordance with the ESA95		For environmental expenditures in accordance with the SERIEE		For environmental expenditures by the general government in accordance with the RPAs	
ENVIRONMENTAL PROTECTION	**Scopes of the environmental protection function (COFOG , 05 function)**		**environmental protection activities (EPEA-CEPA account)**		**sectors of environmental expenditure**	
	05.1	Waste management	3	Waste management	A	Waste disposal
	05.2	Wastewater management	2	Wastewater management	B	Sewerage and wastewater treatment
	05.3	Pollution abatement	1	Protection of ambient air and climate	C	Environment
			4	Protection of soil and groundwater		
			5	Noise and vibration abatement		
			7	Protection against radiation		
	05.4	Protection of biodiversity and landscape	6	Protection of biodiversity and landscapes		
	05.5	R&D for environmental protection	8	R&D for environmental protection		
	05.6	Environmental protection n.e.c.	9	Other environmental protection activities		
USE AND MANAGEMENT OF NATURAL RESOURCES			**natural resources of interest (RUMEA account)**		**sectors of environmental expenditure**	
			I	Inland water	D	Water
			II	Forests	(C)	(Environment)
			III	Wild flora and fauna	(C)	(Environment)
			IV	Non renewable primary energy sources (fossil fuels)	E	Energy
			V	Non-energy raw materials	(C)	(Environment)

LEGEND:

	Environmental protection in accordance with EPEA (SERIEE) and the ESA95 (COFOG)
	Use and management of natural resources in accordance with RUMEA (SERIEE)
	Not applicable

"Analytical" methods versus "automatic" methods

The production of aggregates relating to public expenditure on the environment within the Sistan is characterised by the use of different methods of reclassifying government budgets:

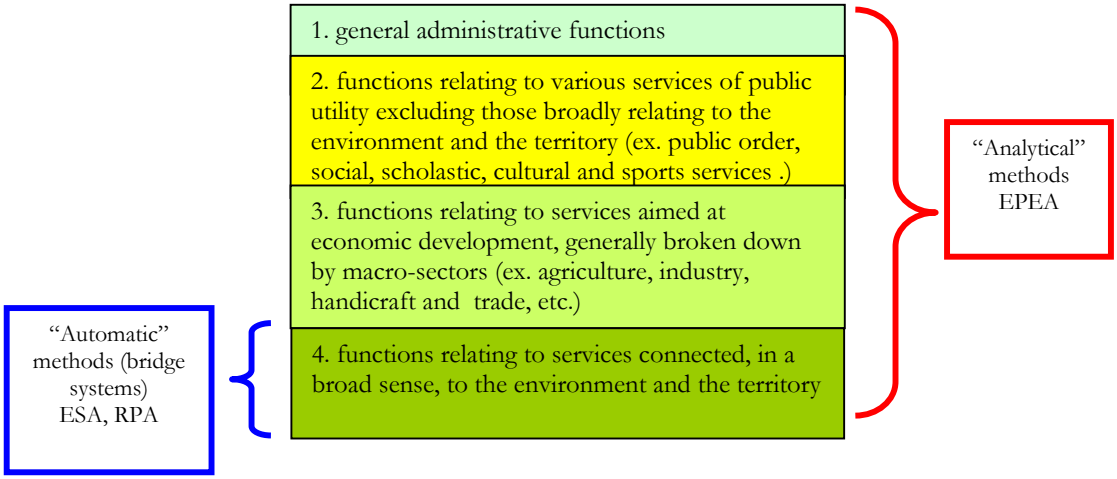
- "analytical" methods are adopted for the purposes of the EPEA satellite account: the analysis and reclassification are carried out on a "case by case" basis for each of the elementary units of expenditure. Where necessary, these methods also call for the breakdown of units of analysis that are not homogeneous (in that they contain only in part environmental protection expenditures and/or because they are classified in correspondence with more than one CEPA class);
- "automatic" methods are adopted for the purposes of the ESA95 and of the RPAs: the reclassification is carried out by homogeneous groups of expenditures, identified on the basis of the functional classification utilised *ab origine* in the budget accounts, via the use of "bridge" systems. Normally, different systems are used for the different levels of the GG.

The choice between analytical and automatic methods necessitates a trade off between:

1) the **accuracy** of the estimates produced via analytical methods, with the drawback that the amount of work required makes it difficult to apply this method to all GGs;
2) the **completeness** of the field of observation reached more easily via automatic methods, with the consequence that estimates can be produced quickly but less accurately. In some cases they are even distorted.

The different level of accuracy of the quantification of environmental expenditure that can be reached with the two types of methods is linked to the way in which the government budget is broken down in terms of functions. To that end, whatever the functional classification adopted, by law, in the budget account, in very general terms, four broad families of functions of a public administration can be identified. An example is provided in Figure A4.1, which constitutes a generalisation of the functional breakdown of a budget account. This is particularly instrumental in highlighting those functions directly connected to environmental expenditures in accordance with the concepts and definitions established within the context of official statistics.

Figure A4.1 Functions of public budget accounts taken into consideration in the different methods of functional reclassification of the financial statements ("automatic" methods *versus* "analytical" methods)



Source: MEF, DPS - Istat, National Accounts

Specifically, the fourth family of functions includes:

- functions explicitly relating to "**environmental protection**", that is, referring to one or more sectors of intervention in the field of environmental protection (EPEA – CEPA): ex. waste disposal services (Municipalities and Provinces); nature protection (Regions and Provinces);
- functions explicitly relating to the" **use and management of natural resources**", that is, referring to one or more sectors of intervention in the field of the use and management of natural resources (RUMEA): ex. energy (Ministries and Regions);
- functions that are explicitly "**environmental - mixed types**", that is, referring either to one or more sectors of interventions in the field of environmental protection (EPEA – CEPA), or to one or more sectors of intervention in the field of the use and management of natural resources (RUMEA): ex. integrated water services (Municipalities); forests (Regions);
- functions that are explicitly "**environmental and non environmental**", that is, referring to one or more sectors of intervention in the field of environmental protection (EPEA – CEPA) and/or to one or more sectors of intervention in the field of the use and management of natural resources (RUMEA), and, at the same time, to sectors of intervention that lie outside that of environmental protection and

that of the use and management of natural resources: ex. soil protection (Mountain authorities); industry and energy sources (Regions);

- functions that are "**broadly environmental**", that is, they broadly refer to the management of the territory and of the environment and "as such" do not refer unquestionably and exclusively to environmental protection (EPEA – CEPA) and/or to the use and management of natural resources (RUMEA): ex. services that protect and enhance the environment (Provinces); Management of the territory and of the environment (Municipalities);
- functions that are explicitly "**non environmental**", that is, they do not refer either to one or more sectors of intervention in the field of environmental protection (EPEA – CEPA), or to one or more sectors of intervention in the field of the use and management of natural resources (RUMEA): ex. civil protection (Provinces and Mountain authorities); development of the mountain economy (Mountain authorities).

As illustrated graphically in Figure A4.1, by definition, "automatic" methods operate using a subset of the financial outlays posted in the budget account: those classified *ab origine* in correspondence to functions relating to services broadly linked to the environment and the territory (type 4). The "analytical" methods consider the whole budget account, thereby including environmental expenditures classified *ab origine* in correspondence also to functions not relating to services broadly linked to the environment and the territory (types 1-3). For example: incentives to enterprises for environmental investments, generally classified in correspondence to the function relating to services aimed at economic development (type 3); personnel expenditures and other kinds of administrative type running expenses that can be attributed to the environmental protection activities carried out by the authority (type 1).

Automatic reclassification systems thereby introduce various elements of distortion or approximation, i.e., they:

a. **do not catch environmental expenditures** that are classified in correspondence to functions 1 to 3 (underestimate of environmental expenditures and consequent overestimation of non-environmental expenditures). Specifically, the following are not "caught":

a.1 environmental expenditures classified amongst functions of economic development (type 3), which can also involve large amounts (ex. incentives to industrial or agricultural enterprises for environmental interventions);

a.2 environmental expenditures for activities relating to R&D, environmental training and communication, monitoring and control, administration and regulation classified in correspondence to functions 1 and 2;

a.3 running expenses (costs relating to personnel, social security, the acquisition of goods and services, depreciation) linked to the authority's environmental activities and classified as a type 1 function;

b. **catch non-environmental expenditures** that are classified in correspondence to the last three types of functions listed for the fourth type (overestimate of environmental expenses and consequent underestimate of non-environmental expenses);

c. **in some cases they erroneously attribute to single environmental functions** (ex. wastewater management, waste management, etc.) some expenditures classified in correspondence to functions not sufficiently broken down, as is the case of the first three types listed for the fourth typology, with a consequent general underestimate or overestimate of environmental expenses relating to specific functions (underestimate or overestimate of some environmental expenditures and consequent underestimate or overestimate of some non-environmental expenditures).

Ways of applying reclassification methods

During the functional reclassification of financial statements, whatever the method used, it is possible that:

- decisions are taken *ad hoc* to handle possible elements of distortion inherent in the method of reclassification adopted, depending on the different restrictions in the reference framework;
- elements of subjectivity are introduced during the process of reclassification, with the consequent risk of distorted results;

Thus, the question of how to manage distortions arising from the outset and that regarding the need for standardisation arise respectively in the two cases.

To this regard, a synoptic framework of what happens in the three different contexts is provided in Table A4.5.

As shown in the table, even if the decisions taken *ad hoc* introduce elements of distortions and/or approximation, they are based on methods generally conceived in such a way as to systematically keep the error under control.

In contrast, situations influenced by the subjectivity of the experts actually carrying out the reclassifications are characterised by the introduction of errors that are difficult to control. In general, due to their formulation, automatic methods provide the maximum protection against this type of risk. In analytical methods, this risk is greater because the approach involves a qualitative analysis of the information available. Within the context of environmental accounting carried out by Istat, in order to provide the maximum protection against this type of risk, the way of proceeding is standardised via a decision tree to analyse expenditure items (the decision tree substantially guides the analysis by establishing a hierarchical order by which to examine the information available) and a series of very detailed check lists.

Table A4.5 Ways of applying the three different methods of functional reclassification of the financial statements used in the Sistan to calculate public expenditure for the environment

ASPECTS TO BE MANAGED	EPEA (SERIEE)	ESA95	RPA
Distortion	**Restrictions**: ✋ definition of environmental protection (excluding expenditures for the use and management of natural resources) ✋ CEPA classification at level of class **Ways of proceeding**: (in the absence of detailed information allowing for accurate estimates) • introduction of conventional criteria of reclassification corresponding to the "expressions" included in the descriptions of the expenditure items (and/or in other types of descriptive information) • use of estimate coefficients based on reclassified financial statement data, to "break up" non-homogenous expenditure items not otherwise broken down (items that contain only in part environmental protection expenditures; items that contain environmental protection expenditures to be broken down amongst the CEPA classes)	**Restrictions:** ✋ definition of environmental protection (excluding expenditures for the use and management of natural resources) ✋ COFOG classification at level of division **Ways of proceeding:** • the functions present *ab origine* in the financial statements to be broken down amongst the different COFOG divisions are attributed to a single division with a "majority" criterion based on the information available • "break ups" are carried out only in cases where there are reliable, official parameters that can be updated	**Restrictions:** the definition of "environment" which is at the basis of RPA environmental sectors and the related breakdown in sectors do not seem binding, also in relation to the presence of the broad sector "environment" often utilised as a catch-all **Ways of proceeding:** • in general the functional attributions are carried out respecting the original classification adopted at the base sources • in particular, the functions present *ab origine* in the financial statements that would be broken up amongst different environmental sectors are, in some cases, diffused in a single aggregate (ex. the integrated water service that would be broken up between the sewerage and treatment sector and the water resource sector, is generally presented under the aggregate item "integrated water cycle") • "break ups" are not carried out
Standardisation	Standardisation is ensured via the use of some operative instruments such as: • a decisional tree to analyse the expenditure items in the financial statements • a series of check lists relating to the CEPA and to various topics of intervention in the environmental field	Standardisation is ensured by the use of automatic methods (bridge systems)	Standardisation is ensured via the use of automatic methods (bridge systems) in cases in which the reclassification is carried out directly by the project's central system at the DPS In some cases the functional reclassification is carried out by the regional systems of the RPA project, set up at the individual regional administrations.

Istat's environmental accounting approach

Istat is currently working to reconcile and combine as much as possible the two main methods of production, EPEA and ESA95, so as to reap the benefits of more accurate estimates (by avoiding or mitigating the various types of distortion) and of more complete coverage of the field of observation.

The approach adopted is *multimodal* and requires:

- an **analytical reclassification of the entire budget account** for those administrations having various competencies in the environmental sector (that cannot be "caught" via the explicitly environmental functions) and that, for environmental purposes, transfer considerable resources to other public and private bodies in the field of community, national and regional policies: essentially **Central government and regions**;
- a **mixed type of reclassification**, **in part automatic and in part not, primarily centred on the functions relating to services broadly connected to the environment and to the territory** for the territorial authorities that carry out some specific environmental functions. An automatic reclassification is to be carried out for items sufficiently homogeneous to not entail errors of attribution; a "break up" with statistical methods is to be carried out for non-homogenous items to be attributed in part to the environment and in part not and/or to different environmental sectors; detailed analyses must be carried out for broad environmental items: essentially **Provinces, Municipalities, Mountain authorities**;
- a **reclassification at authority-wide level** of administrations that can be defined as having a single function (especially authorities that do not carry out environmental protection activities, such as social security agencies);
- quantifications based on **the application of *ad hoc* methods of estimation** for public authorities that exclusively carry out very specific functions in the environmental field. An example of this is the APAT, which carries out research and development activities and monitoring and control activities both in the field of environmental protection (EPEA) and in the field of the use and management of natural resources (RUMEA) for the different sectors of intervention contemplated in the two satellite accounts. By avoiding burdensome reclassification processes, it is possible to hypothesize the adoption of a technique that breaks down the expenditures in accordance with the authority's activity between EPEA and RUMEA and, thus, amongst the various sectors of intervention.

APPENDIX 5 The legislative initiative for the framework law on environmental accounting for Central government, Regions and Local Authorities and the related experimentation at local level

The framework law

Several bills regarding environmental accounting have been presented in Parliament since 1998.

During the previous legislature, the Senate approved a bill that failed to complete its mandatory rounds in the Chamber of Deputies before the end of the legislature. In the current legislature, the text previously approved by the Senate has been re-proposed and flanked with additional bills having very similar content [63]and regarding environmental accounting (Bill no.s. C441, S188, S900, S958, S2385[64]). All of these bills have essentially the same structure and contents, with limited exceptions. The text generally used as a reference is Bill S188, which takes the name of its proposer, "Giovanelli", and picks up on the text approved by the previous legislature.

The purpose of said bill lies "*in the integration of Central government's, the regions', the provinces' and the municipalities' financial and budgetary planning documents and acts with information and objectives regarding the environmental sustainability of development in order to define an adequate information basis for the policy makers*" (Art. 1). This objective is reached via the processing of suitable "*documents regarding the environmental sustainability of development*" that must be approved by the Central government, regional and local authorities "*at the same time as those documents pertaining to economic and financial programming and the budget accounts*" (Art. 2).

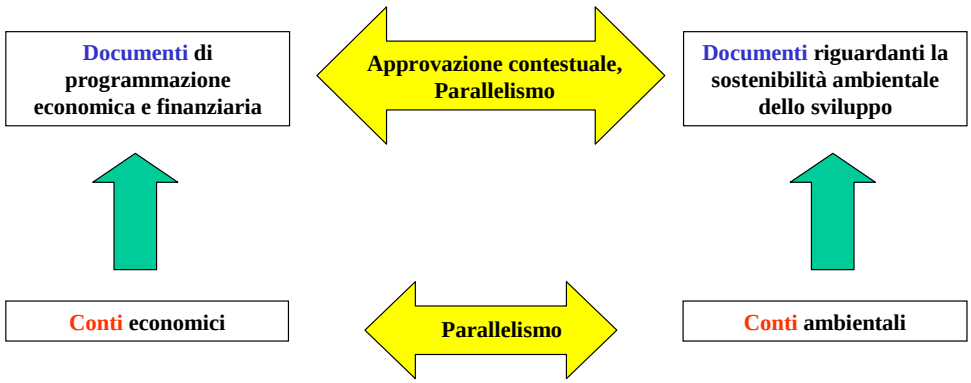
"*In order to process documents regarding the environmental sustainability of development, [...] the Central government, the regions, the provinces and the municipalities [...] adopt a systems of environmental accounts*" (Art. 3). The "environmental accounts" thus act as an information tool that helps to define the information framework and the objectives regarding the environmental sustainability of development, to be reported in suitable documents designed to support the policy makers, defined by Art. 2. From a technical point of view, the "environmental accounts" include – as came out in a parliamentary debate, above and apart from some technical imperfections concerning the accounts contained in the different articles – tools derived from a system of integrated environmental and

[63]As regards bills presented to the Senate, a discussion of a consolidated text is expected to take place in the Territorial, Environmental and Environmental Assets Commission.

[64] Chamber of Deputies: Bill no. C441, bill regarding environmental accounting carried out by Central government, regional and local authorities, June 2001; Senate: Bill no. S188, bill regarding environmental accounting carried out by Central government, regional and local authorities, June 2001; Bill no. S900, bill regarding environmental accounting, November 2001; Bill no. S958, regulations pertaining to environmental accounting in the General Government, May 2002; Bill no. S2385, Bill regarding environmental accounting for local authorities and delegating the Government for the definition of the features of environmental accounting documents, July 2003.

economic accounting such as that described in paragraph II.1.2, together with other types of statistical information relevant for sustainability.

Figure A5.1 Underlying structure of Bill S188 (and other analogous bills) for the environmental accounting carried out by public authorities



Source: MEF, DPS - Istat, National Accounts

What emerges in the above figure is the need to introduce the mandatory use of a programming instrument in the environmental field that can be read in parallel with and is approved at the same time as established economic and financial programming instruments. Also as regards information tools, there is the intention to introduce a new product – the "environmental accounts" – ensuring the readability in parallel with economic and financial accounts, in other words, to the principal information tool at the base of the economic and financial programming documents. Essentially, the underlying formulation calls for:

- the assumption of responsibility for documents regarding the environmental sustainability of development, in the same manner as that assumed for economic and financial programming documents.
- the introduction of a double parallelism between instruments regarding the economy and instruments regarding the environment.

As concerns definition of the layout and contents of the tools to be introduced, the bill delegates this responsibility to the government.

As regards the "System of environmental accounts" in particular, the bills provides some general guidelines:

- from the point of view of contents, the environmental accounts include information that describes:
  - in physical terms, interactions between the economy and the environment especially as regards the environmental pressures coming from various human activities (forms of pollution and degradation, extraction of natural resources);
  - in physical terms, the state of the environment as far as quantity is concerned (consistency of the stock of natural resources) and as far as quality is concerned (state of the various environmental *media*);
  - in monetary terms, the responses undertaken by humans to tackle (prevent, reduce, repair) environmental problems (environmental protection expenditures);
- from the point of view of the quality of data, the information to be included in the environmental accounts is to be found in the national statistics system (Sistan), so as to base the system on official and reliable information.

It should also be noted that the environmental accounts system will have to be defined and drawn up gradually, in accordance with the progress of the subject-matter at international level. A specific annex to art. 3 takes account of the current situation and identifies specific environmental accounting tools of official statistics, such as the NAMEA and the SERIEE, to be used as the first reference in the processing of environmental accounts at the various institutional levels.

What clearly emerges is the intention to equip public administrations with an environmental accounts system that is coherent with that of official statistics. Equally clear is the fact that environmental accounts will be diversified for the different levels of government.

Experimentation carried out by the local authorities: the main contents of environmental accounts and their use accordng to the current approa ch

The past years have witnessed some experimental applications of the environmental accounting bill at local level [65]. An analysis of these experiences, limited as they may be, makes it possible to identify a general trend in the approach followed.

Two types of accounts are mainly considered:

[65] see paragraph II.2.

- the so-called "physical accounts", that describe the environmental situation of the territory governed by the authority by means of a selected set of physical indicators, mostly of "pressure" and of "state";
- the so-called "monetary accounts", that report the expenses incurred by the authority to safeguard the environment, meaning those "responses" undertaken by the authority to combat the environmental problems in the territory;

As shown in Figure A5.2, in accordance with a "macro" approach, some aspects are considered with reference to the entire territory and to all economic operators that act on it (indicators of pressure and of state included in the physical accounts). Likewise, in accordance with a "micro" approach, other aspects are examined exclusively with reference to the authority that governs the territory (environmental expenditures of the authority recorded in the monetary accounts).

Figure A5.2 The environmental accounts of local authorities: the framework that is becoming the established form in Italy

macro-type approach	micro-type point of view (from the authority's perspective)
• ***"Pressures" exerted by all economic operators (physical data)***	• "Pressures" generated by the local authority (physical data)
• ***"State" of the environment (physical data)***	
• "Responses" on the part of all economic operators (environmental expenses)	• ***"Responses" on the part of the local authority (environmental expenditures)***

Environmental accounts of local authorities

Source: MEF, DPS - Istat, National Accounts

The experiments carried out by local authorities seem to show that, with respect to a structure such as that of official statistics, characterised by a "macro" point of view, and a company-type structure, dominated by a "micro" point of view, what emerges is an approach that is midway between the two. According to the stated objectives, this structure helps in the definition and evaluation of the public authority's environmental policies.

Some important technical and statistical questions arise about the contents of both the "physical accounts" and the "monetary accounts", as well as the utilisation of such accounts.

From a technical perspective, the main question regards the heterogeneity of the approaches and the relation with standards – where they exist – defined at national and international level, especially those of environmental accounting of official statistics.

To this regard, the EPEA satellite account and the related CEPA classification are the reference standard for the quantification of environmental expenditure[66]. However, at times, the experimental applications currently available refer to this standard in a merely nominal manner. Most of time they introduce alternative classifications and, in cases where the CEPA is applied, they do so in a not wholly correct manner[67]. The natural need on the part of local administrations to tailor and adapt the standard to their own information needs is, in effect, mistaken for the inadequacy or even inapplicability of the standard itself.

This phenomenon reveals an inadequate metabolisation of the official statistics' general frameworks. The correct approach would require to make all the necessary adaptations while, at the same time, ensuring the possibility to compare the products with the relevant official data at European, national and regional level. From the point of view of the public administrations, it is crucial to ensure the comparability of the information in space and in time, in relation to two fundamental objectives:

- to know the reality of the territory governed compared with the reality of the various reference contexts (ex. regional, national, etc.), in order to establish if the trends in one's own territory are positive or negative ;
- to communicate to the public in an effective and transparent manner, because if the citizen is not able to make comparisons, he or she is not able to form a correct opinion.

Another important question from a technical perspective regards the conformity of the "physical accounts" and of the "monetary accounts " with respect to the stated objective of such instruments, that is, to lend support to the definition of the local authorities' policies, to the monitoring and evaluation of the same and to

[66] see paragraph II.1.2.

[67] For example, there is a tendency to classifiy on the basis of the CEPA also expenditure for the use and management of natural resources, such as those connected to the distribution of water, or expenditure that fall neither in the domain of the EPEA nor in that of the use and management of natural resources.

communication and transparency. The question is: which physical indicators correlated to a certain environmental policy implemented by the authority and referring to the territory it governs need to be considered together with the data on expenditure incurred by the authority to implement the policy?

On this subject, a system organised on the basis of the two components currently taken into consideration in most cases does not make it possible to clearly verify the success or failure of the local authority's policies. In actual fact, the changes described by the physical indicators relative to the territorial context can be determined not only by the action of the authority, but also or only by the effect of other factors (ex. policies implemented by higher or lower levels of government; other policies of the same authority; actions voluntarily undertaken by enterprises that operate in the territory; economic situation, etc.).

A first step towards overcoming this aspect can be taken by enriching the system with environmental performance indicators that can be directly ascribed to the authority's policies and verify how much these impact with respect to complex phenomena reported in the territory. This is done by equipping the "physical accounts" with indicators of the direct output of interventions carried out with the expenditures reported in the "economic accounts" that are defined in a way that allows them to be compared with corresponding physical indicators referring to the whole territorial context[68].

With regard to the use of "physical accounts" and "monetary accounts" the question is: which processes and/or decisional bodies are supported by the environmental accounting of local authorities and in what way? Unquestionably, the concrete use of the tool to support the decisional processes also depends on its contents and breakdown. Thus, the answer to this question could be provided over time, also with the overcoming of difficulties such as those highlighted above. At present, also for the previous technical considerations, the pilot exercises conducted thus far show that there is not enough experience to construct a solid base with a view to a standard practice of use in the institutions. At the moment, more emphasis is being given to the

[68] Starting from such an enrichment, the next question regards adoption of the best methods of analysis in order to utilse the information considered for the valuations to be carried out. A formulation such as the one suggested here was adopted in the CONTARE project, designed to to set up a regional environmental accounting system (see paragraph II.2). In this project, for the methods to analyse information included in the system si fa riferimento, amongst other things, to the methodologies developed within the valuation of EU structural funds.

environmental accounting of local authorities as a means to communicate the authority's policies and strategies to the public, even with some limitations such as the difficulty to carry out apt comparisons.

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