

Jose Maria Casado Raigon, Marta Santamaria Belda<sup>1</sup>

**SYSTEMS AND EXPERIENCES ON NATIONAL INTEGRATED ACCOUNT  
AT THE DECISION OF ECOLOGICAL PROBLEMS**

Professor of Applied Economic of Cyrdoba University (Spain) Director of Cyrdoba European Documentation Center. Director «C6tedra Jean Monnet» of Economic

<sup>1</sup>Environmental Group Research of Alcalá de Henares University (Spain)

The international organizations have developed the offers with the purpose of processing the information about a condition of an environment and its influence on economic system. The estimation of a condition of an environment and their communication with economic system is offered.

*Key words: Environmental Accounts, indicators, genuine saving.*

Хосе Марія Райгон, Марта Сантамарія Бельда<sup>1</sup>

*Кордобський університет, Іспанія*

*<sup>1</sup>Енареський університет, Іспанія*

**СИСТЕМИ ТА ДОСВІД НАЦІОНАЛЬНОГО ІНТЕГРОВАНОГО ОБЛІКУ  
ПРИ ВИРШЕННІ ЕКОЛОГІЧНИХ ПРОБЛЕМ**

Міжнародні організації розробили оперативні пропозиції з метою обробити інформацію про стан навколишнього середовища та його вплив на економічну систему. Запропонована оцінка стану середовища та його зв'язки з економічною системою.

*Ключові слова: облік навколишнього середовища, стан економічної системи.*

In this article are studied several experiences of environmental accounting, developed in different countries and supranational institutions. Across the review of different experiences it is tried to reflect which is the state of the question and the progress that, from finals of the 20<sup>th</sup> century, has been experienced in this field. In spite of the effort realized by the authors of the article, it would turn out very difficult to gather from exhaustive form the evolution and current situation of all the countries in the field of the environmental accounting. Nevertheless, this work studies some of the most important experiences developed up to the moment.

We can to affirm that today we have got a frame of reference to European and world level that determines a favourable context for the change of logic in the traditional systems of national accounting. To possess this frame of reference turns out to be especially relevant for the complexity associated with the process of production of a system of environmental accounting. Close to the advances achieved in the integration of considerations concerning the sustainability of the current model of economic growth, also it is possible to find very important lacks in the different attempts of developing a system of environmental accounting.

The revision of the experiences presented focuses on the analysis of the environmental accounting origin and evolution inside the institutions and different countries, giving special attention to some aspect, as:

a) The methodological approach used, distinguishing five types of operative offers designed by different countries and supranational institutions.

b) The scope of the systems of environmental accounting. In this respect there are analysed the environmental aspects that are an object of attention on the part of every country. The type of environmental problems which they must face the above mentioned countries will determine of decisive form those environmental aspects that will be evaluated across its systems of accounting.

c) The most relevant difficulties in the development of the systems of environmental accounting, giving special attention to those aspects related to the shortage of information, the uncertainty associated with the methods of economic valuation of the environmental quality, etc.

d) The use of these systems for the design of sector politics, with the aim to reach a sustainable development.

This article begins, therefore, with an introduction in which there are exposed the principal deficiencies of the systems of National accounting and the first contributions fulfilled from an academic area to the field of the environmental accounting. In the same paragraph they will

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appear, of brief form, all five types of systems of withdrawal of economic – environmental information proposed up to the moment. In the second paragraph some of the controversial questions in the field of the environmental accounting will be analysed. In the following paragraphs it will be explained since the above-mentioned questions have treated the different countries. The countries qualify attending to the type of system that characterizes them, though the incorporation of a country in any of the categories does not involve that develops of exclusive form an only system, provided that it is possible the system coexistence, more or less, complementary.

### **THE INTEGRATION OF ENVIRONMENTAL CONSIDERATIONS IN THE NATIONAL ACCOUNTING**

The environmental wide accounting the information gathered by the system of national bills so that the analyst has an authentic image of the existing relation between the economic system and the natural way. The offers realized from the field of the environmental accounting put its attention fundamentally on three aspects:

- 1) The measurement, both of the revenues generated by the natural resources and of the depreciation of the natural capital;
- 2) The calculation of the damage associated with the pollution spilt on the natural way;
- 3) The measurement of the expense that the society incurs to avoid the environmental impacts.

From the beginning of the decade of the seventies, the works in the field of the environmental accounting have been come developing to two levels: the academician and the institutional one. Inside the academic area, a group of investigators, being based on the principles of the economic theory, they have realized a series of offers to incorporate the environmental considerations in the measurement of indicators of well-being and sustainability. Among these studies stands out Solow's work (1986) in which wide the concept of national clear product to incorporate the depreciation of the not renewable resources. On his part Hartwick (1990) incorporates in the measurement of the net production, the depreciation of the renewable resources and the costs of reduction of the pollution (If the reader is interested in this line of work, he can consult some recent publications in this field: Heal and Kristum (1998), Weitzman (1999), Aronsson, Johansson and Lufgren (1999), Dasgupta and Mäler (2000), Asheim (2000).

In the institutional area, diverse supranational organizations and even some countries, they have elaborated a series of methodological operative offers to develop systems of economic – environmental information among which it is necessary to distinguish:

- a) The systems of indicators. Inside this group the system of indicators emphasizes pressure- state -response proposed by the Organization for the Cooperation and the Economic Development (OCED) and the system of indicators of sustainability supported by United Nations;
- b) The purification of the indicators of the national accounting, among which there figures the indicator of genuine saving of the World Bank the purification of the indicator of production of goods and services, in line with the works developed in Costa Rica, Indonesia, Japan, United States;
- c) The accounts of natural resources, which gather information about the condition and evolution of the same ones. This alternative is in agreement with the offer realized by Norway and France;
- d) The satellite accounts, which are a complement to the information gathered in the current system of national accounts. Inside this type of accounts they arise proposed as the counterfoil NAMEA of Holland (counterfoil input – product extended) and the expense accounts in environmental protection;
- e) The integrated system of economic and environmental accounting, also known by its initials in English, SEEA, this supported by United Nations and it is the frame that their join the majority of the previous offers. Later there will be exposed some of these offers, describing brief the theoretical foundations, the methodology, the degree of development of the same ones to national level and its usefulness in the design of politics.

### WHAT ELEMENTS SEPARATE A FEW SYSTEMS OF ACCOUNTING FROM OTHERS?

The production of a system of environmental accounting associate ride a high, given complexity the difficulty to reach an approach it sufficiently synthetic. A system of environmental accounting must possess the aptitude to report brings over of the condition of the environment and its links with the economic system. This task can turn out to be especially difficult given the diversity of existing relations between the economic sphere and the environment. These systems of information must possess a useful format for the capture of decisions in the area of the political public ones. Therefore, on the development of a system of environmental accounting contributions of character will have to converge so much academic as institutionally, in order to harmonize the rigor with the potential utilization of the information. Depending on the aptitude to cover these two requirements, the different systems of environmental information can be grouped, conventional, in five categories:

a) The most elementary systems of organization of the environmental information are the systems of *indicators*. Given the simplicity of this alternative, it is possible to approach multitude of related aspects with the environmental problematic. In despite of this advantage, the image that they contribute of the reality it turns out so simplified that demonstrate unable to inform processes of public decision;

b) The *added or synthetic indicator* try, with major or minor success, to report it brings over of the degree of sustainability of an economy. Therefore, they can serve to report it brings over of certain trends or to be alert to the public opinion about specific problems;

c) On its part, *the accounts of natural resources* offer information more complete on the condition of the resources, its evolution and its relevancy in the economic sphere. They serve, therefore, to determine the physical shortage of the resource, to corroborate if the same ones are object of excessive levels of extraction or to detect those resources which protection should be a priority;

d) The *satellite accounts* can serve to complete the lacks of information as for atmospheric emission, expenses in environmental protection, which is not covered by the accounts of the natural resources. The satellite account is combined the information expressed so much in physical like economic units, since they happen for example in case of the counterfoils input-output extended;

e) The systems of *environmental integrated accounting* have the objective of approaching great part of the environmental aspects and its links with the economic system. In this system there is prosecuted the utilization of monetary units, though to achieve it, it should follow to him a sequential process in first which the variables appear in physical units and later to advance in the field of the economic valuation. On having had all the information expressed in monetary units, it is possible to calculate added indicators that serve to evaluate the environmental behaviour of a country. This system is outlined as the alternative more complete of them up to the moment realized.

To value the challenges associated with the development of a system of environmental accounting, we start from the learning around the experience of other countries and pioneering institutions. Some countries as France appeared ambitious objectives at the moment of designing a system of environmental accounting (Weber, 1993). After years of work, they came to the conclusion from that was necessary to divide its approaches in more manageable units (Hecht, 2000, p.14). The sequential process proposed by United Nations (UN, 1993) might reduce the uncertainties associated with the possible over-measuring of the system *a priori*.

In general, is observed that a long period of time passes from the moment in which the first reflections appear on the design until that the offices of statistics reach the stage of systematical production of information. In fact, the majority of the countries begins his gaits in the field of the environmental accounting developing some study I pilot on a small scale directed by some independent investigator.

In more advanced phases, the official agencies of statistics are gaining competences on the development of the official systems of environmental accounting. In spite of the satellite accounts and the integrated system of environmental accounting are similar, both approaches their present important differences regarding economic valuation of the environmental quality. Precisely, the relative *success of some systems of information in physic units* based fundamentally

on the facility of its construction. Nevertheless, on having done without the valuation of the environmental quality, these systems turn out to be incomplete since they omit information it brings over of the well-being that the population enjoys. Inside the systems of physical accounting the German system stands out for the complete approach in that there is included an analysis of the cycle of life of the products and information concerning of the commercial interchanges with third countries.

The socio-economic context of every country and the different environmental problematic which there faces each of them, they constitute two elements key at the moment of determining the type of natural and environmental resources that will be an object of attention on the part of the authorities entrusted to develop the system of accounting of the above mentioned country. In case of the countries in process of development, the efforts tend to evaluate the level of exploitation of its base of natural resources. This is normal provided that they are economies more dependent on a natural patrimony, in general exploited in excess. In the developed countries and in those countries where the rates of industrialization and urbanization have gone off in the last years the efforts centre on analysing the process of degradation of the environmental quality (atmospheric emission, generation of residues) the consumption of energetic resources and the expense in environment. Nevertheless, there exist still such aspects as the biological diversity, which, for the present time, have not been an object of attention, possibly for the complexity associated with the same ones and the scanty role that they play in the economic sphere.

Recently, some countries have begun to exploit new horizons in the field of the environmental accounting. One of the most novel aspects is the integration of the information of the systems of accounting in the general models of the economy, since it happens in case of Sweden and Germany (Hecht, 2002). These models of general balance allow obtaining a measurement of the value that would reach the production of an economic system of having been respectful with the environment.

This task requires the huge effort of modelling the environmental economy, but thank to it, it would result feasible to reject the valuation's methods of the quality. To this aim, it would be enough to set some standards of quality and to analyse the structural changes, that it should have produced in the economy, in order to realize the aforementioned objectives (O' Connor, 2000). This alternative could make a success in the achievement of a concrete result, which must be especially interesting for the design of an environmental managements politics, being at the same time capable of properly calculate in which way, the introduction of a restriction could affect to the hole economy of a nation. Despite the fact that, through the general models of balance, it is not possible to make accurate measurements on the welfare, that immediately after, the population would derive from the standards of environmental quality.

Other countries, as France (Weber, 1993) and Australia (Young, 1992), tried to integrate the spatial dimension in the framework of the environmental accounts. In the case of Australia, this was realised from the employment of geographical information's systems.

## **INDICATORS SYSTEM OF ECONOMICAL ENVIROMENTAL INFORMATION**

### **1. Indicator system pressure-states oecd's response**

The indicators system or environmental information proposed by the OECD collects the information around three main axes (OECD, 1998, p. 109):

The indicators of *pressure* describe the environmental «charge» arisen from the different human activities on its environment. They could be useful to determine the degree of fulfilment of the different environmental standards set by the regulation.

The indicators of *state* describe the conditions that result a consequence of the pressures carried out by the human being.

The indicators of *response* reveal the actions that the society adopts in order to restrain the degraation process of the environment.

Since 1991, the OECD publishes periodically three seires of indicators: *the central serie*, *the serie of sectorial indicators* and *the serie of «key» indicators*. *The central serie* compiles data relative to the climatic change, the reduction of ozone layer, quality of the air, management and proliferation of wastes, biodiversity, water quality, exploitation of natural hydric resources, forestry and fishery. *The serie of sectorial indicators* collects information among the rate of

integration of the environmental aspects in different domains (agricultural, energetic, transport and domestic consumption). Finally, *the serie of «Key» indicators* take those indicators from the central serie that report on these especially more prominent aspects of the environmental concerns.

The OECD uses these publications as a basis of information in order to carry out a periodically *checking on the environmental behaviour of its members*. From the system of indicators, the analyst will be capable to establish comparisons at the international level, but he could not obtain an integrated outlook of the environmental behaviour, which takes place inside an economical system. To this objection, it should be added the fact that the system leads into conceptions extremely simplistic of the current processes, existing in the reality. The European Environmental Agency employs the framework of the OECD's indicators, trying at the same time to supply this deficiency, incorporate to them two new different points: on the one hand, information on the forces, which generate the pressures and on the other hand, information on the impacts induced by the pressures, taking in concern the fact that the state of the environment is also influenced by the natural processes.

## **2. Indicators system sustainability of the uno**

United Nations proposed in 1995 a system of *134 different indicators*, gathered around for groups: social (40 indicators), economics (26 indicators), institutional (10 indicators) and environmental (58 indicators). In each one of these groups, the indicators are organised under the scheme of a main item, introduced before: *pressure-state-response*.

From 1996 to 1999, twenty-two countries (Austria, Barbados, Belgium, Bolivia, Brasil, China, Costa Rica, Czechoslovakian, Finland, France, Germany, Ghana, Maldives, México, Morocco, Pakistan, Philippines, South Africa, Tunis, United Kingdom and Venezuela) have been taking part in a pilot project of this system of indicators. Although, the result was satisfactory, the participants on the pilot project emphasized that the framework *pressure-state-response* was not the most suitable and appropriated to the economical, social and institutional sphere of every single country. At the same time, they added that the checklist of indicators was too much extensive to execute it completely. As a result of these conclusions, it took place a review process, essentially focused on two different sides: to incorporate other kind of indicators which report on a serie of priorities aspects and to design a briefer list of indicators, which could constitute the basis for the development of the different systems of indicators at the national level (United Nations, 2001).

In this system of information's treatment appeared the same deficiency and weakness, which resulted inside the system proposed by the OECD. From this system, it was not possible to have a hole and completed vision of the sustainability of a economy, owing, mainly, to the quantity of indicators involved.

## **AGGREGATED INDICATORS**

It tries to adjust the current macromagnitudes with concerns relating to the natural resources *depreciation*, the *degradation* of the environmental quality and the *expenses on environment*. In this field, it can be distinguish the supporters of correcting the *flow variables* (such as the production), from this supporters of taking out estimations of the *capital stock's variation*, making use of variables, as the relative to the economic saving. Among the upholders of the first group, it can be found the United Nations against the World Bank, which pleads for the second alternative, how we are going to comment on the following paragraphs.

### **1. Genuine economic saving from the world bank**

The national production can be set aside for the consumption, as well as the economic saving/investment. The capital stock will be no-one, inside these economies which have got levels of consumption, similars to these ones of the net national product (NNP). The *unsustainability criterion* will be given from those levels of consumption, which would be higher than the production levels, that is to say, which would provide negative savings. In this case, the consumptions surplus will be taking place, at the expenses of the capital exploitation.

Taking into account these concepts, the World Bank (WB) employs the indicator of the *net economic saving*, as an approach to the variations in the capital stock. In 1997, (World Bank, 1997) proposed the elaboration of a new indicator for the national economic saving, that it was known as the genuine saving. This indicator was published among a extensive whole of

World Bank development's indicators. With the calculation process of the genuine saving, there will be introduced a whole range of new ideas, according to the saving estimation's method, used in a conventional way. The WB extended the concept of capital to aggregate to it the environmental perspective and the human one, admitting *the existing replaceability between the natural capital and the produced capital*. The incomes gained from the natural resources could be invested another time in other forms of capital, that it could ensure an investment's flow in the future. In this way, the capital stock would remain constant, therefore the exhaustion of the natural resources deposits will be compensated by an increase of the produced capital.

In the genuine saving's calculation, the World Bank added *three adjustments* to the net conventional saving's calculation:

- a) Firstly, the *expenditures on education* would be aggregated to the net saving's value;
- b) In the second place, the *natural capital's depreciation* would be deducted. For this purpose, the variation of stock relative to the natural resources's exploitation was incorporated to it (such as the renewable ones- forestry, as the no-renewable ones- mineral and fossil fuels);
- c) Finally, the *environmental quality's degradation* would be also deducted. As an approximated value to the depreciation's value, it was estimated the concrete amount that the population could be willing to pay for reducing the impact of the CO<sub>2</sub> emission on the human health.

Some natural resources have been excluded from the genuine saving's calculation, by the difficulty to get reliable and accurate measurements, as it concretely happens to, in the case of fisheries or land's degradation.

This indicator has been published since 1999 among the *Development's Indicators* of this institution. A country, where the genuine saving would be usually negative, will be far from reaching the sustainable development. However, even though it would be more probably, it is not possible to affirm, beyond all reasonable doubt, that a country with a positive genuine saving should have assured a sustainable development (Hamilton & Lutz, 1996).

For instance, the *table 1* shows the result of the genuine saving, among three large groups of countries (as a percentage on the GIP). Through it, we can easily observe how the countries with low incomes provide levels of natural resources's depreciation meaningfully higher than these ones, which belong to countries with high ranges of incomes, especially in all which is referred to the energetic resources. The genuine saving's difference between the countries with low ranges of incomes and these ones who have a medium range of income (10,2 points), is due to the difference that exists in the conventional net saving between these both groups (9,2 points). In the case of the forestry and mineral resources is remarkable that the countries with high ranges of incomes don't provide any depreciation rates, (or in other words, a depreciation's rate neared to the «zero» value).

## CONCLUSIONS

Since the nineties decade, a great amount of countries began to develop environmental accounts system, generally following the rules set by the different supranational institutions. The *institutional support* has played a main role in this field, especially respect to the United Nations, the OECD, the World Bank and Eurostat.

At the national sphere, the *first attempts* on verification the statistic data of the National Accounts took place at a *small scale*, thanks to pilot scheme owned by investigators, which in the concrete case of the less-developed countries, had the financial support given by the different international organisations and the cooperation agencies from some foreign nations. *In the most advanced phases, the official cooperation agencies of statistic* were those, who gained a leading role, grace to the fact that they owned the development of the environmental accounts system. The majority of the developed nations have actually the availability of a more or less achieved of systematic data collection's system on the environment situation and its relationship with the whole economical system.

When we analyse the different systems of environmental accounts, it could be appreciated that the matter, subject of the main analysis, differs from the developed nations and the non-developed ones, mainly owing to the huge typology of environmental concerns, which should be faced by each one. *The whole of the non-developed countries* possesses a wealthy basis

on environmental resources, but in contrast, generally, over-exploited. Therefore, these countries *pay more attention to the natural resource's depreciation, than to the environmental quality's degradation*. On the other hand, *the environmental degradation performs a prominent role in the environmental accounts systems among the most developed countries*.

Trying to integrate the environmental variable inside the national accounts system, there are basically two different positions, relative to the units, which must be employed. On the one hand, there are the followers of building the system around a main item: information organised on several *physical units*. On the second hand, the supporters of the second group, consider that the *monetary valuation*, it turns into an essential question, to show the existing interactions between the economy and the environment. But what it is really beyond all doubt, it is that both of these points of view can be integrated and complementary, as it currently happens with the integrated accounts system, promoted for the United Nations. Anyway, it seems to be unquestionable, even though the relations could be reckoned in physical units, it is that this fact hinders the accuracy, in order to incorporate new information. In the concrete case of «NAMEA» matrix, whose relative successfully outcome was partially due to the facility of performing an accounts system into physical units, is feasible to check the environmental behaviour of every single area, which are integrated inside the «economical tissue»; but in contrast, it results impossible to compare the environmental impact's magnitude, relative to each area, with its own contribution to the economy.

The integrated accounts system appears to be as the most complete alternative, because this system integrates the most part of the set proposals at the moment. Through the integrated accounts system is also possible to have available at the same time of an aggregated indicator and of whole information's system to «diagnose» the situation and to manage all the resources, which are constantly in conflict. Some countries are advancing in the information's integration, turning this informative process into different reckonable models of general balance to, in this way, evaluate the forthcoming effects of some environmental protection's measures as, for example, the establishment of a tax, thank to it, it could be finally possible to mitigate the pollutant wastes.

#### BIBLIOGRAPHIC INDEX

Adger W.N., Whitby M. National Resource Accounting in the Land-Use Sector: Theory and practice // *European Review of Agricultural Economics*. – 1993. – 20. – P. 77-97.

Anielski M. Resource Accounting: Indicators of the Sustainability of Alberta's Forest Resources // Paper presented to the international Society of Ecological Economics Conference. – Stockholm, 1992.

Aronsson T, Johansson P.O., Lofgren K.G. On the Proper Treatment of Defensive Expenditure in «Green» NNP Measures. // In Boman M. (ed). *Topics in Environmental Economics. Economy and Environment*, 1999. – 17. – P. 53-61.

Asheim, A. Y Nyborg, K. On the Interpretation and Applicability of a Green National Product // *The review of Income and Wealth*. – N.-Y., 1995. – 41, № 1. – P. 57-71.

Asheim G.B. Green national accounting: why and how? // *Environment and development Economics. Special Issue: Advances in Green Accounting*, 5, Parts 1 & 2 (February and May 2000). – 2000. – P. 177-194.

Australian Bureau of Statistics // *Development of Mineral Accounts in Australia. Subregional Training Workshop on Environmental Statistics*, May 2000, Bangkok. – 2000.

Bakken L.R. y Bleken M.A. The nitrogen-cycle caused by man in Norway // Discussion paper № 32. (Paper presented at the “8<sup>th</sup> Nitrogen Workshop, Gent, Belgium, 3-8 September 1994). *Agriculture University of Norway*. – 1994.

Bartelmus P. et al. Integrated environmental and economic accounting: a case study for Papua New Guinea // In E. Lutz (ed.) *Toward improved accounting for the environment. An UN Stat-World Bank Symposium*, IBRD. World Bank, New York, USA. – 1993.

BEA (Bureau of Economic Analysis) // *Accounting for Mineral Resources: Issues and BEA's Initial Estimates Survey of Current Business*. – 1994.

Born A. Measuring Canada's natural wealth: why we need both physical and monetary account // In Uno and Bartelmus. *Environment accounting in theory and practice*. Kluwer Academic Publisher. – 1998.

Bryant, C. y Cook, P. (1992) *Environmental Issues and the National Accounts* // *Economic Trends*. – № 469.

- Bureau of Economic Analysis // Accounting for Mineral Resources: Issued and BEA's Initial Estimates. Survey of Current Business. – 1994.
- CEC (Commission of the European Communities) // Directions for the European Union on Environmental Indicators and Green National Accounting (COM (94) 670 final). Commission of the European Communities. DG XI, DG XII & Eurostat. – 1994.
- Clough P. Natural Resource Accounting for New Zealand's Indigenous Forests: Report to the Ministry of Environment. – New Zealand Institute of Economic Research (Inc.), interim draft, 1991.
- Cruz W y Repetto, R. // Accounts Overdue. Natural Resource Depreciation in Costa Rica. – World resource Institute, 1991.
- Daly H. y Cobb, J.B. Jr. For the Common Good // Beacon Press, Boston, 1991.
- Dasgupta P.S. & Mäler K.G. Net national product, wealth and social wellbeing // Environment and Development Economics, 2000. – 5. – P. 69-93.
- De Haan M. & Keuning, S. The NAMEA as validation instrument for environmental macroeconomics. – Fondazioni Eni Enrico Mattei, Nota di lavoro 90. – 2000.
- De los Angeles, M.S., Peskin, H. M. Philippines: environmental accounting as instrument of policy // In Uno K., Bartelmus P. (eds.) Environmental Accounting in Theory and Practice. – Kluwer, Dordrecht, 1998. – P. 95-111.
- El Serafy, S. et al. Environmental Accounting for Sustainable Development. – Washington, D.C. UNEP & World Bank, 1989.
- EUROSTAT // SERIE E. The European system for the collection for the Economic Information on the Environment. – Luxembourg: Office for Official Publication of the European Communities, 1994.
- EUROSTAT // SERIE E. Environmental protection expenditure accounts Compilation guide. – Luxembourg: Office for Official Publication of the European Communities, 2002.
- Hamilton K. y Lutz E. Green National Accounts: Policy Uses and Empirical Experiences. World Bank, Environment Department. – Washington D.C. Department paper 39, 1996.
- Hamilton K. Genuine Savings as a Sustainability Indicator. World Bank, – Washington, D.C., 2000.
- Harris H. Recent developments in Environmental Accounting. Economic Assessment and Strategy Division. Economic Trends., 2000. – № 563.
- Hartwick J. Natural Resources, National Accounting and Economic Depreciation". Journal of Public Economics. – 1990. – 43 (3). – P. 291-304.
- Heal, G & Kristum, B. National Income and the Environment // Handbook Environmental Economics, May 1998, revised May 2001.
- Hecht J.E. Lessons learned from environmental accounting: findings from nine case studies. UICN. – 2000.
- Huetting, R. et al. Methodology for the calculation of sustainable national income". // In Markandya, A and Costanza, C (eds), Environmental accounting: a review of the current debate, United Nations Environment Program (UNEP) Environment And Economics Unit (EEU). Environmental Economics Series Paper №. 8. Harvard Institute for International Development, USA, 1992.
- Hultkrantz L. National Account of Timber and Forest Environmental Resources in Sweden Environmental and Resource Economics, 1992. – 2. – P. 283-305.
- IGENI (Informatic, Geographic and Statistic National Mexico's Institute) // Economic and Environmental Accounting System of Mexico, from 1993 to 1996. – Mexico F.D., 1999.
- IDRC (International Development Research Centre) // A National Account System for the Environment in Costa Rica, 1998.
- JRI (Japan Research Institute) Report on an Estimation of Integrated Environmental and Economic Accounting (in Japanese) Economic Planning Agency Research Contract. – Tokyo, 1997.
- Lutz E. Towards improved accounting for the environment. World Bank. – Washington, D.C., 1993.
- Nordhaus W. & Tobin J. Is growth obsolete? // Studies in Income and Wealth, 38. – 1972.
- Nordhaus W. y Kokelenberg, E.C. Nature's numbers: expanding the national economic accounts to include the environment. – Washington D.C., National Academy Press, 1999.
- O'Connor M. Towards a typology of Environmentally-Adjusted National Sustainability Indicators: Key concepts and Policy Application // Fondazione Eni Enrico Mattei, Nota di Lavoro 95. – 2000.
- Oda K. et al. Japan: the System of integrated Environmental and Economic Accounting (SEEA) – trial estimates and remaining issues // In: Uno, K. and Bartelmus, P. (Eds) Environmental Accounting in Theory and Practice. Kluwer, Dordrecht, 35-61. – 1998.
- OECD Towards Sustainable Development Environmental Indicators. – Paris, 1998.
- Office for National Statistics // The Pilot United Kingdom Environmental Account, Economic Trends, August. – 1996. – № 514.
- Office for National Statistics // UK Environmental Accounts 1998. The Stationery Office. – 1998.
- Office for National Statistics // United Kingdom National Accounts (The Blue Book). The Stationery Office. – 1999, 2000.

- Peskin H.M. National Accounting and the Environment. Artikel 50. – 1972.
- Repetto R. et al. Wasting assets: natural resources in the national income accounts // World Resources Institute. – 1989.
- Sadoff C.W. The Effects of Thailand's Logging Ban: Overview and Preliminary Results". Thailand Development Research Institute. – 1992.
- SNZ (Statistics New Zealand) // Natural resource accounts for New Zealand. Overview document. – 2002.
- Solow R. On the intergenerational Allocation of Natural Resources // Scandinavian Journal of Economics, 1986. – 88 (1). – P. 141-149.
- Sorensen K Environmental Accounts In Norway // Paper Prepared for the 26<sup>th</sup> General Conference of the International Association for Research in Income and Wealth Cracow, Poland, 27 August to 2 September 2000. – 2000.
- Statistics Canada // National Accounts and the Environment. Papers and Proceedings from a Conference. – Ottawa, Canada. June 17-20, 1997.
- Statistics Sweden // Nordic Natural Resource and Environmental Accounting, 1995.
- United Nations // Integrated Environmental and Economic Accounting. Series F. – N.-Y. – 1993. – № 61.
- United Nations // Indicators of Sustainable development: guidelines and methodologies. – N.-Y., 2001.
- United Nations // System of Environmental and Economic Accounting. Draft for the Statistical Commission. – N.-Y., 2002.
- United Nations Economic and Social Commission for Asia and the Pacific // Environmental Accounting for India: Some Case Studies. Bangkok, Thailand, 1994-96. – Bangkok, 1996.
- Uno K. Economic Growth and Environmental Change in Japan: Net National Welfare and Beyond // In Archibugi F. Y., Nijkamp P. (eds). Economy and Ecology: Towards Sustainable Development. – London: Kluwer Academic Publishers, 1989.
- Vernon B. Producing national estimates of environmental protection expenditure. The application of CAP and SERIE E in Australia // Paper presented to the Subregional Training Workshop on Environmental Statistics, May 2000, Bangkok. – Bangkok, 2000.
- Weitzman M. L. A Contribution to the Theory of Welfare Comparisons, National Bureau of Economic Research. // Working Paper 6988. – 1999.
- World Bank // Expanding the measure of wealth. World Bank. – Washington, D.C., 1997.
- Young M.D. Natural Resource Accounting: Some Australian Experiences and Observations // Working Paper 92/1, CSIRO, Canberra (also published in Lutz, 1993. – 1992.

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