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Key challenges in implementing the System of Environmental-Economic Accounting**Implementing the System of Environmental-Economic Accounting in Australia: estimates and issues****Note by the Australian Bureau of Statistics***Summary*

This paper focuses on practical efforts by the Australian Bureau of Statistics to implement the System of Environmental-Economic Accounting. It focuses on the environmental accounts including accounts related to various environmental stocks and flows in both physical and monetary terms. A number of functional accounts related to such areas as environmental taxes and environmental protection expenditures are also considered in this paper.

Besides discussing the achievements, the paper also addresses the issues that have been encountered in the implementation of this new statistical programme. The implementation issues include: building a more systematic and cohesive national environmental information base, implementation of a new programme within a tight budgetary climate, and educating and engaging data users to inform decisions on sustainable development.

I. Introduction

1. The Australian Bureau of Statistics (ABS) is a long-term supporter of integrated environmental-economic accounts ('environmental accounts') and has played a significant part in the successful efforts of the United Nations Committee of Experts on Environmental-economic Accounting (UNCEEAA), the London Group on environmental accounting and others in elevating the System of Environmental-Economic Accounting (SEEA) to the status of an international statistical standard. However, the ABS sees its primary role in the advancement of the SEEA in a much more practical light – that is, in the production of SEEA-style environmental accounts that allow Australian policymakers to make informed decisions in support of sustainable development.

2. The section II of this note focuses on practical efforts by the ABS to implement the SEEA within the Australian statistical landscape. It describes the range of environmental accounts produced by the ABS, which includes accounts related to various environmental stocks and flows in both physical and monetary terms. The ABS has also developed a number of SEEA 'functional' accounts related to such areas as environmental taxes and environmental protection expenditures. Issues inevitably arise in the implementation of any new statistical programme. The section III of this note, therefore, describes issues encountered by the ABS in implementing its environmental accounts programme. These implementation issues can be grouped under three broad headings: building a generally more systematic and cohesive national environmental information base; implementation of a new statistical programme within a tight budgetary climate; and educating and engaging data users on the power of SEEA-style data to inform decisions on sustainable development.

II. What environmental accounts has the Australian Bureau of Statistics produced?

3. The Australian continent comprises significant levels of natural resources and therefore early work on environmental accounts in Australia focused on the measurement of these environmental assets, especially on their economic value. While some environmental assets in the SEEA, such as the atmosphere, are outside the scope of the national accounts, many fall within the *System of National Accounts* (SNA) asset boundary. The ABS *Australian System of National Accounts* (cat. no. 5204.0) includes four categories of environmental assets within its balance sheet: land; significant subsoil assets¹ (mineral and energy resources); plantation timber; and native standing timber available for harvest. The estimation of these assets commenced in the early 1990s and is now an ongoing part of the Australian system of national accounts.

4. Also during the 1990s the ABS commenced a programme of environmental accounts development within its environmental statistics area. A dedicated environmental accounts programme provides continuing momentum for the development of these accounts within the ABS and other agencies. The remainder of this section provides a summary of various environmental accounts produced by the ABS.

¹ SNA's 'subsoil assets' fall within the SEEA category of 'mineral and energy resources'. This note generally uses the latter description, though where discussion is focused on the SNA the former term is used.

5. Table 1 summarises the range of SEEA-style environmental accounts produced by the ABS, information on both the stocks of natural resources, and flows (typically supply and use) of natural resources and relevant products and emissions. For each environmental domain it indicates broadly what types of accounts have been produced and the years for which data are available.

Table 1

Summary of SEEA-style stock and flow accounts produced by the Australian Bureau of Statistics

	<i>Frequency</i>	<i>Stock</i>		<i>Flow</i>	
		<i>Physical</i>	<i>Monetary</i>	<i>Physical</i>	<i>Monetary</i>
<i>Water</i>	Annual			2008-09 to 2010-11 2004-05 2000-01 1993-94 to 1996-97	2009-10 2008-09 2004-05 2003-04
<i>Energy</i>	Annual	1988-89 to 2011-12	1988-89 to 2011-12	2008-09 to 2010-11 2006-07 2004-05 1992-93 to 1997-98	2009-10 2004-05
<i>Minerals</i>	Annual	1988-89 to 2011-12	1988-89 to 2011-12		
<i>Timber</i>	Annual	1988-89 to 2011-12	1988-89 to 2011-12		
<i>Fish</i>	Occasional	1996-97		1996-97	
<i>Waste</i>	Ad hoc			2009-10	2009-10
<i>GHG emissions embedded in final demand</i>	Under development			2008-09 1992-93 to 1997-98	
<i>Land</i>	Annual ²	2010-11 and 2011-12	2011-12		

6. The balance sheet of the Australian system of national accounts contains monetary estimates of land, subsoil assets (mineral and energy resources) and timber resources.

² The Commonwealth of Australia contains 6 states and 2 territories. The land account for each state or territory is expected to be updated every 3 or 4 years, in line with updates to related land valuations. Note also that this entry relates specifically to land accounts with a spatial (physical) presentation. 'Land' also appears as a monetary item on the national balance sheet and these estimates exist for the period 1988-89 to 2011-12.

Monetary estimates of subsoil assets require estimation of physical stocks of various types of mineral and energy resources. All national balance sheet estimates are updated annually.

7. Among the various environmental flow accounts, Australia has focused primarily on water accounts and energy accounts. This reflects the importance of these resources and the corresponding policy demand for flow-related information.

8. The ABS water account (*Water Account, Australia 2010-11*, cat. no. 4610.0) presents information on the supply and use of water within the Australian economy. It has been produced in respect of 1993-94 to 1996-97, 2000-01, 2004-05 and 2008-09 to 2010-11 and there has been a general expansion in the range of data available with each new release. The ABS water account typically includes data on: supply of water by industry³ of supplier (in both physical (i.e. mega litres) and monetary terms); use of water by using industry and by households (in physical and monetary terms); water supply and use by state/territory; household expenditure on distributed water by state/territory; various aspects of bulk water, reuse water and distribution losses; value of irrigated agricultural production and related information on irrigated agricultural production (area, crop type, etc.); and a range of other items of information related to supply and use of water within the Australian economy.

9. The ABS has produced a number of energy accounts, with the most recent being: *Energy Account, Australia 2010-11* (cat. no. 4604.0). This publication contains data on physical (in peta joules) supply and use of energy products within the Australian economy—data on physical flows of energy products are derived from energy balances produced by the Australian Bureau of Resources and Energy Economics⁴ (BREE). The energy account publication for 1992-93 to 1997-98 also utilised extensive input-output analysis related to energy use and greenhouse gas emissions, with these analyses providing the basis for measuring energy use embedded in imports and for assigning total energy use to direct and indirect components. In so doing, the majority of energy use is attributed ultimately to exports and household consumption, which reflects the fact that industry uses energy to produce goods and services for the ultimate purpose of meeting demands of domestic and/or non-resident consumers. Similarly, the energy account for 1992-93 to 1997-98 used input-output analyses to attribute total greenhouse gas emissions to various types of products consumed in Australia.

10. In response to user demand, the use of input-output analysis to estimate greenhouse gas (GHG) emissions embedded in categories of final demand was recently repeated and experimental estimates in respect of 2008-09 were included in *Information Paper: Towards the Australian Environmental-Economic Accounts, 2013* (ABS cat. no. 4255.55.002).

11. A number of environmental accounts have been produced as a ‘one-off’ exercise, for example, *Mineral Account, Australia 1996* (ABS cat. no. 4608.0) and *Fish Account, Australia 1997* (ABS cat. no. 4607.0). These publications demonstrate ABS capacity to deliver; and they provide an opportunity to engage with the user community on needs and priorities, however, they have been produced just once to date because of priorities related principally to user demand.

12. In addition to the accounts shown in Table 1, the ABS has produced various environmental accounts of a functional nature. The SEEA describes functional accounts as relating to activities and/or goods and services with an environmental purpose. That is, the primary purpose of these activities is to reduce or eliminate pressures on the environment or

³ Industry information is presented according to the *Australian and New Zealand Standard Industrial Classification* (ANZSIC) ABS cat. no. 1292.0.

⁴ Australian Bureau of Resources and Energy Economics. *Australian Energy Statistics*. <http://www.bree.gov.au/publications/aes-2012.html>

to make more efficient use of natural resources—for example, expenditure on environment protection, and environmental taxes and subsidies. The importance of these activities from an environmental perspective is what leads us to separately identify these transactions and to present them in an analytically meaningful way.

13. Table 2 summarises the various functional environmental accounts produced by the ABS. Although various functional environmental accounts have been produced by the ABS, the most extensive work undertaken by the ABS in this area is contained in *Environment Protection Expenditure, Australia 1995-96 and 1996-97 (cat. no. 4603.0)*. This publication reports on types of environmental protection expenditure undertaken by Australian businesses, governments and households.

Table 2

Summary of System of environmental-economic accounting-style ‘functional’ accounts produced by the Australian Bureau of Statistics

	<i>Most recent estimate</i>
<i>Environmental taxes</i>	2011-12 ⁵
<i>Water access entitlements and trading</i>	2004-05 ⁶
<i>Soil degradation</i>	1996-97 ⁷
<i>Biodiversity</i>	1996-97 ⁸
<i>Waste</i>	2009-10 ⁹
<i>Environmental research and development expenditure</i>	2008-09 ¹⁰
<i>Air</i>	2010-11 ¹¹
<i>Environmental protection expenditure</i>	1996-97 ¹²

⁵ ABS cat. no. 4629.0.55.001.

⁶ ABS cat. no. 4610.0.55.003.

⁷ Estimates modelled using data from the National Land and Water Resources Audit (2002) *Australians and natural resource management 2002*, Canberra.

⁸ ABS cat. no. 4603.0.

⁹ ABS cat. no.4602.0.55.005.

¹⁰ ABS cat. no. 8112.0.

¹¹ Unpublished data from the ABS Economic Activity Survey.

¹² The most comprehensive ABS information on environmental protection expenditures is contained in the 1996-97 edition of ABS cat. no. 4603.0. Although more recent data are available on this topic, these are limited in scope.

III. Key issues in the implementation of the system of environmental-economic accounting

14. Key issues encountered by the ABS in implementing its environmental accounts programme are described below and have been grouped into three categories: building a more systematic and cohesive national environmental information base; the tight budgetary climate experienced throughout much of the implementation of this programme; and educating and engaging data users on the power of SEEA-style data to support evidence-based decision making across environmental and socio-economic domains.

15. As Australia faces various environmental issues across a range of domains, many organisations currently collect environmental information, often with a particular scientific, regulatory or administrative purpose in mind. This results in highly fragmented sets of data which suffer from a range of problems including:

- (a) Inconsistent definitions and standards;
- (b) Independence from any framework facilitating data linkage and interconnectivity;
- (c) Inconsistent frequency and timing of produced data;
- (d) Poor spatial representation;
- (e) Low levels of visibility, discoverability and accessibility;
- (f) Lack of time series and therefore lack of stability over time; and
- (g) Poor capacity to support modelling and forecasting.

16. Accordingly, there is significant frustration when trying to articulate the state of the environment, or in trying to address particular environmental issues spanning jurisdictions and regions. It also becomes extremely difficult to understand, model or forecast the impact of a policy intervention collectively across the environment, economy and society.

17. In Australia, the quality and extent of biophysical information on environmental issues is quite variable at present. Comprehensive and good quality information exists for some aspects, such as temperature and rainfall. However, in other areas, particularly those relating to ecosystems, the scientific information base is patchy, lacks cohesion and 'national' data sets are typically unavailable. As a result, the Australian government has identified a high priority need for additional investments in biophysical information, and has commissioned its Bureau of Meteorology (BoM) and the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) to develop a National Plan for Environmental Information (NPEI) as an initial step towards improved monitoring of the state of Australia's land, ocean, air and water resources.

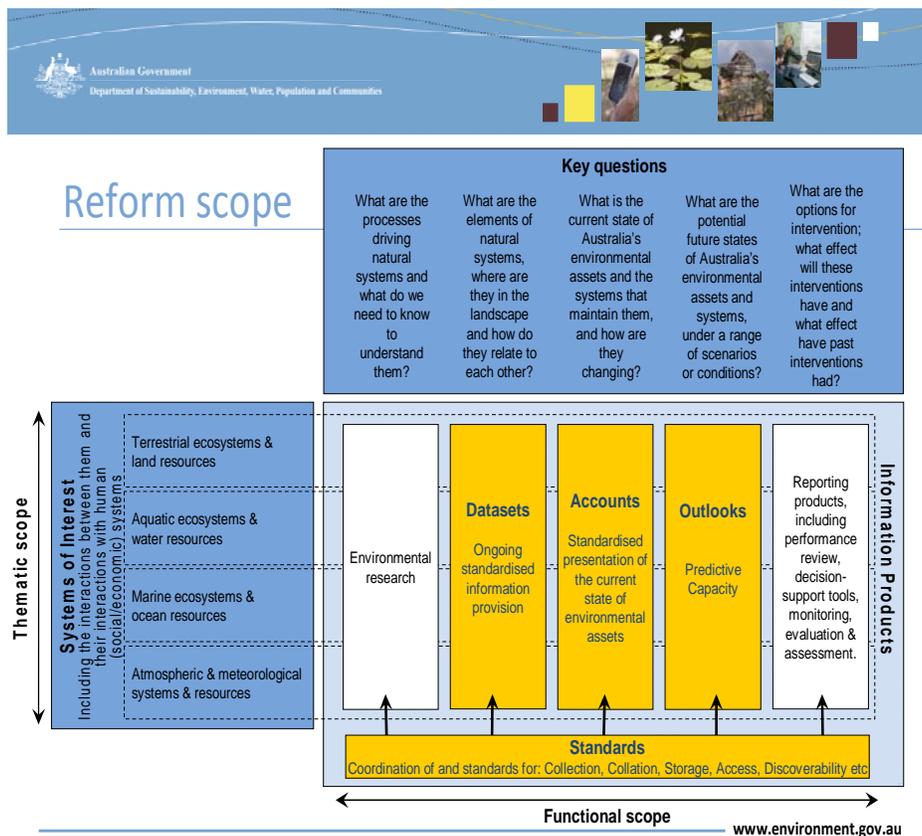
18. Within the NPEI implementation plan, SEWPaC is responsible for policy development and programme design, and the BoM is responsible for product development and operational delivery. In addition, the ABS has a legislated¹³ role as the central statistical authority for the Australian government, and by arrangement with the state and territory governments. A central responsibility of this role is to ensure statistical coordination across levels of government to avoid duplication while maximising the utilization, compatibility and integration of statistics compiled by official bodies. The ABS is working closely with SEWPaC and BoM as part of the NPEI process.

¹³ Australian Bureau of Statistics Act 1975

19. The main objectives of the NPEI are to reform and improve the state of Australia's environmental information so that governments can 'identify, predict and manage change in environmental condition'. The NPEI supports the coordination of the collection, analysis and delivery of standardised environmental information for use in evidence-based decision-making. Diagram 1 provides an early assessment of the scope of reform envisaged for the NPEI.

Diagram 1

Reform scope of Australia's National Plan for Environmental Information¹⁴



20. Among the various reforms, one objective of the NPEI is the development of environmental accounts, which is itself an important driver for environmental information reform. Considerable attention therefore attaches to the elements underpinning the establishment of national environmental accounts i.e. standard use of terminology, concepts, definitions, classifications, accounting rules etc. The NPEI also aims to deliver co-ordinated and standardised data collection, storage, access and discoverability. The NPEI is not designed specifically to deliver SESA-style accounts, but the NPEI goal of greater standardisation of environmental data is a key building block for such accounts.

21. In common with many other national statistical agencies, the ABS faces the challenge of allocating limited resources across a wide statistical programme crossing the environment, the economy and society. The ABS environmental accounts programme has

¹⁴ Sebastian Lang. 2010. Presentation to ABS Environmental Accounts Workshop, 23 September 2010, Canberra.

been able to expand only by making strategic choices on where to focus effort and by adopting an innovative approach to programme delivery.

22. In developing SEEA-style accounts, a statistical agency is faced with two broad strategic possibilities: (1) to produce the full range of accounts but to (necessarily) do so in a relatively superficial way; or (2) to focus on accounts for areas of greatest policy importance and to produce these in a way that meets the broader needs of decision makers. The ABS has essentially taken the second approach and has produced quality environmental accounts in respect of, for example, water, energy and environmental assets. Nevertheless, the ABS has also maintained a research and development programme, covering issues such as water access and entitlements, fish accounts, environmental taxes and environmental protection expenditure accounts. Typically, these types of accounts are released as part of an official ABS information paper and although the estimates may be experimental and/or limited in scope, they provide users with examples of what can be produced and create an opportunity for dialogue with users on the usefulness of the data. As such, they provide a 'marker' for possible future developments, should external funding be identified.

23. Data collection is expensive for both data providers and for statistical agencies and the ABS environmental accounts programme has necessarily grown with only a minimal expansion of data collection by the ABS. For example, the recently-released ABS waste account used only existing data sources (from various government agencies and from industry associations) which have then been organised into an accounting presentation. Similarly, the ABS energy account is primarily sourced from energy balances produced by BREE with adjustments applied to represent the 2006 ANZSIC classification and to convert the accounts from a territory to residence basis. By modifying the existing BREE collection instead of starting a new collection, a number of benefits have arisen (in addition to cost benefits). In particular, the modifications have required an ongoing collaboration between the ABS and BREE which has improved both the energy accounts and energy balances (for example, by delivering greater coherence) and has therefore been of significant mutual benefit. A further example of collaboration applies to land accounts, where agreement has been reached between the ABS and relevant agencies in various Australian states. One such agreement allows the ABS to generate estimates of land values for each Natural Resource Management region within the state of Victoria using administrative data gathered by the Victorian Valuer General¹⁵.

24. ABS environmental accounts relate directly to elements of the existing suite of ABS economic and social statistics. This is a key feature of environmental accounts and underpins much of their power in supporting integrated analyses. Nevertheless, this feature poses threats as well as opportunities for the statistical agency. In particular, attention needs to be paid with regards to coherence between environmental accounts and economic and social statistics. However an opportunity also exists to pool resources and expertise between various collection areas in order to deliver improved systems and efficiency and to deliver more robust data series. For example, in developing hybrid (combined monetary and physical) estimates of use of energy products within the ABS energy account, it was clear that these estimates needed to be consistent not only between physical and monetary measures, but also with monetary estimates within the ABS input-output tables. This requirement was the imperative for an ongoing collaboration that has resulted in the implementation of improved sources and methods in both the ABS input-output tables and the energy account. The collaboration and pooling of resources between these two programmes has avoided a potential duplication of efforts as well as avoiding a possible

¹⁵ Valuer-General Victoria is the state's independent authority on property valuations.

lack of coherence. The environmental accounts programme has to some extent leveraged off the larger resource base of the economics statistics programme, but both programmes have unambiguously benefited from this collaboration.

25. Further productivity gains may arise from how national statistical offices conduct the timing of various environmental accounts. The ABS recently decided to produce both its water account and energy account on an annual basis. This brings these accounts into line with balance sheet estimates of environmental assets, which have been updated annually since the 1990s. Producing environmental accounts on an irregular or infrequent basis is less efficient. While this is in some respects cheaper than an annual programme, there are considerable start-up costs when running a data collection that has been dormant for some time. In particular, the loss of key staff and skills when the programme effectively shuts down cannot be readily replaced when it recommences—this loss is especially acute for environmental accounts production because the integrated nature of the accounts requires staff with a unique combination of statistical, economic and biophysical knowledge. An annual production cycle also improves the quality of the product, one key reason being greater feedback from users. From the data users' perspective, the annual production of environmental accounts provides the confidence to build these data into ongoing decision making processes, which is a key factor in the uptake of environmental accounts.

26. Collaboration among various national and international statistical agencies can support the cost-effective uptake of environmental accounts. This collaboration can take a number of forms, such as the exchange of ideas and materials at international meetings and workshops; the use of electronic forums and other resources; the joint development of standards and guides; temporary appointments of skilled staff from partner agencies; and targeted international aid. The ABS has used all of these in building its environmental accounts programme. The lessons learned from the experiences of other individuals and organisations can be invaluable in advancing our own programme. For example, the ABS developed its *Energy Account, Australia* prior to the finalisation of the SEEA Central Framework and prior to the development of a SEEA module specific to energy. In the absence of any official international guidelines on the production of energy accounts, a report of the Dutch experience¹⁶ in developing these accounts became a valuable resource for the ABS to clarify key concepts underpinning energy accounts and to identify appropriate publication outputs.

27. The securing of parcels of external funding has been an important element in the development of the ABS environmental accounts programme. For example, the National Water Commission provided part of the funding for the 2004–05 edition of *Water Account, Australia* which enabled this edition to realise significant improvements over previous editions—improvements that have been maintained into subsequent editions. In a tight financial climate, the ability of a statistical agency to secure external funding is likely to be critical to the success of its environmental accounts programme. However, external funding will not be secured unless the accounts can be demonstrated to be useful. Conversely, there is little point in producing environmental accounts if the information they contain is not used. Even where a statistical agency produces quality environmental accounts that are frequently updated, the risk remains that these data may not be fully utilised by key decision-makers in government, industry and/or in the community. It may be that data users do not understand the nature and potential of environmental accounts and if this is the case, data providers have a role to play in educating the user.

¹⁶ Schenau, S. 2008. *What are energy flow accounts? Experience from the Dutch energy accounts*. Paper circulated to London Group members January 2008.

28. Where data users are not convinced of the utility of environmental accounts, there will be a strong temptation for users to simply use indicator sets in assessing sustainable development. While indicator sets are relatively cheap to implement and provide a degree of flexibility, they do not have the power of SEEA-style accounts—a power stemming from their systematic and comprehensive nature, which in turn is underpinned by a robust theoretical foundation. Sustainable development indicator sets are also frequently hostage to practical considerations of data availability and to stakeholder acceptance. The ABS has therefore made a commitment to educating the statistical user on the nature and power of environmental accounts.

29. As part of the recent expansion of its environmental accounts programme, the ABS undertook a campaign to demonstrate to its data user community the capacity of environmental accounts information in informing various policy questions. A key element of this campaign is a publication outlining the entire ABS environmental accounts programme and linking these data to various Australian environmental policies across all environmental themes¹⁷. It is thus a practical demonstration of the power of these data to inform a wide range of environmental and socio-economic decisions. In conjunction with the release of this publication a major conference was held in Melbourne, Australia, on 14-15 May 2012, involving key data providers, policy makers, journalists and academics. This conference reinforced and extended the message contained in the publication and was notable for securing the active engagement of heads of key Australian policy agencies.

30. The ABS was heavily involved in the process of elevating the SEEA to the status of an international statistical standard. In doing so, the ABS brought a number of key Australian policy agencies into the update process – the objective being to bring a data users’ perspective to the forum but also to increase the ‘buy-in’ of Australian agencies to the SEEA franchise. For example, the London Group on environmental accounting has hosted Australian representatives from the ABS, the BoM and the Victorian Department of Sustainability and Environment, while recent meetings of the United Nations’ group of experts on land and ecosystem accounting also included Australian representatives from the Wentworth Group of concerned scientists and the Australian National University. This strategy has been successful and has led to key Australian agencies contributing their expertise to the SEEA development process and retaining a positive perspective on the utility of SEEA-style accounts.

IV. Conclusion

31. The ABS has produced a wide range of environmental accounts over the past twenty years or so, but its highest priority is to first develop information for those areas of greatest interest to Australian policymakers. In most cases, a significant amount of data already existed for these areas and could be modified to generate environmental accounts. Accordingly, the ABS has been able to expand its environmental accounts programme while simultaneously undertaking minimal new data collection.

32. The development of national environmental accounts benefits enormously from effective coordination and engagement with data providers, data producers (including regulatory authorities) and users of environmental information. This collaboration is critical to achieving a greater standardisation of environmental information which in turn provides the foundation for cost-effective delivery of environmental accounts—a crucial consideration in the contemporary world of official statisticians.

¹⁷ *Completing the picture. Environmental accounting in practice.* ABS cat. no. 4628.0.55.001.

33. A potential obstacle to the uptake of environmental accounts is a failure of data users to understand the power of fully integrated environmental-economic information in informing issues of a multi-disciplinary nature, such as issues related to climate change mitigation and adaptation. Where this obstacle exists, it can be a costly exercise to develop the guides, seminars and training modules required to educate the data user. Nevertheless, this is the role of the data provider and in the Australian experience is an important part of a successful implementation of environmental accounts.

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