PRODUCING NATIONAL ESTIMATES OF ENVIRONMENTAL PROTECTION EXPENDITURE
The application of PAC and SERIEE in Australia

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Abstract:

This paper outlines the Australian Bureau of Statistics' (ABS) experience in producing environment protection expenditure statistics for Australia. The ABS began producing environment protection expenditure statistics for Australia in the 1990-91 financial year guided by the OECD's PAC framework. In 1995-96 the collection framework was changed from PAC to SERIEE, the framework developed by Eurostat to implement the UN System of Integrated Environmental and Economic Accounting (SEEA). This paper discusses the scope, coverage and methodological issues related to these frameworks in terms of Australia's experience. It also outlines the key problems encountered with collecting data on environment protection and likely future directions for this collection in Australia.

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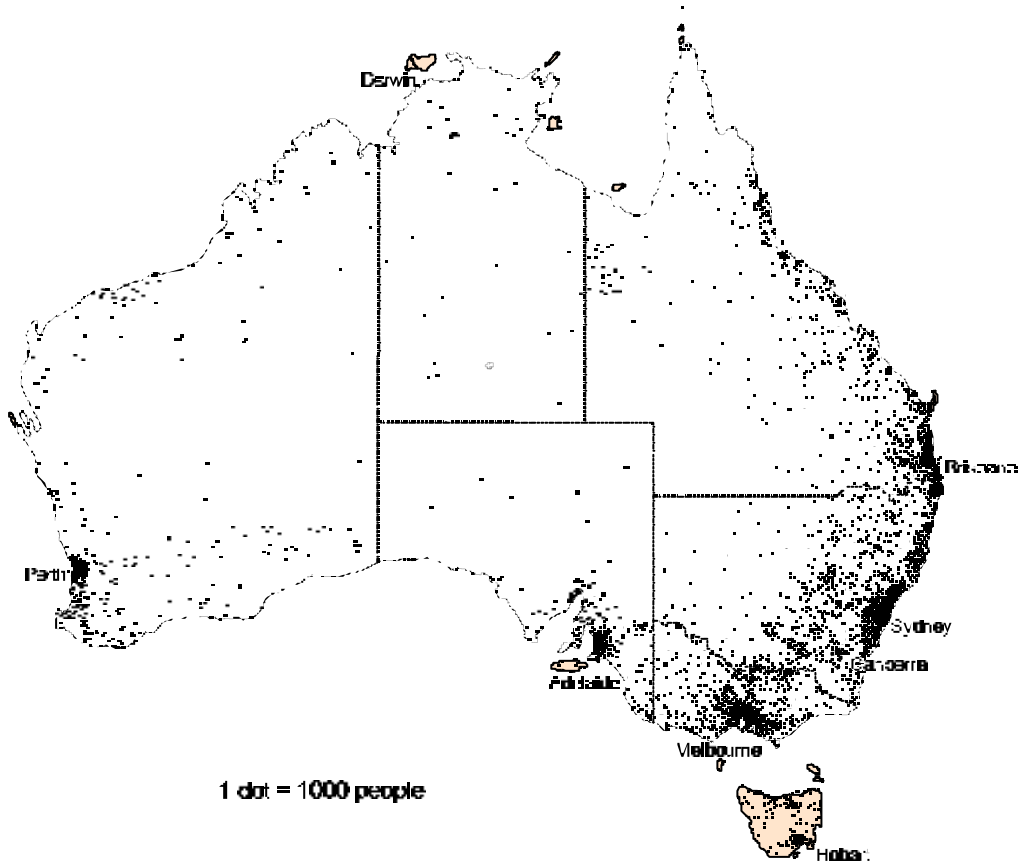
1. INTRODUCTION

1.1 Background and Australia's environmental issues

The Australian land mass is very old in geological terms. It is predominantly dry, and characterized by relatively infertile soils. These features have contributed to the vulnerability of the continent in relation to various forms of land use and, as a consequence, has resulted in serious and widespread land degradation. Australia's population has just reached 19 million, most of which is concentrated in two widely separated coastal regions. By far the largest of these, in terms of area and population, lies in the south-east and east. The smaller of the two regions is in the south-west of the continent. In both coastal regions the population is concentrated in urban centres, particularly the State and Territory capital cities. Half the area of the continent contains only 0.3% of the population, and the most densely populated 1% of the continent contains 84% of the population. This also places great stress on these areas, and on the areas that service them, such as water catchments and leisure areas. The distribution of Australia's population is shown in map 1.

Map 1. Population Distribution, Australia



Australia's biodiversity is considered exceptional because of its species richness and the high proportion of species and families unique to this continent. An estimated one

million species live in Australia, of which only about 15% have been formally described. However, Australia has a poor record of biodiversity decline, and has the worst record of any nation for conserving its mammal species. Eighty-five to ninety per cent of Australia's temperate woodland ecosystems have been replaced with a highly modified agricultural landscape. One of the highest concentrations of extinct and threatened birds of any habitat in Australia is that of the temperate woodlands ecosystem. Forested land is estimated to be around 20% (approximately 156 million hectares), with the overall reduction of forest cover from 1788 to 1980 estimated to be around 36%.

Pressures on the Australian environment come from a diverse range of economic activities. Whereas Australia's economic development was once led by the mining and pastoral industries (epitomized by the popular slogan that Australia was 'riding on the sheep's back'), today it is the Manufacturing and the Property and Business Services industries which contribute the most to Australia's GDP. In 1997-98, for example, Manufacturing contributed 13.2% of GDP and employed 12.8% of the workforce, while Property and Business Services contributed 10.8% of GDP and employed 10.8% of the workforce. While the Agriculture, Forestry and Fishing industries and the Mining industries continue to be significant (contributing 3.4% and 4.8% of GDP respectively in 1997-98), the 1980s and 1990s have seen a decline in the relative contribution to GDP from goods-producing industries and a rise in the contributions from service industries (ABS 2000, p.371-2).

Fossil fuels provide around 94% of Australia's energy needs and much of Australia's economic activity is energy intensive in nature. The large distance between settled areas also contribute to relatively high levels of energy use per capita due to transport of people and freight. The transport and storage industries contribute 6.3% of GDP.

Australia has three levels of government - one national government, 8 State or Territory governments, and around 600 local governments. Each level of government has its own bureaucracy to help develop and implement policies and programs. Efforts to prevent manage or repair damage to the environment therefore requires co-operation and co-ordination between many government agencies, as well as between the public and private sectors.

1.2 History of environment protection expenditure collections in Australia

Australia began collecting statistics on Environmental Protection Expenditure (EPE) in 1990-91 in response to both domestic and international demands for more comprehensive economic information on the environment than was then available. These demands came from a number of quarters. Among the key users of EPE data are government agencies at federal, State and local levels. Government decision-makers can make use of EPE data to help evaluate such issues as: the implementation of eco-efficiency measures by various industry sectors; the extent to which the public sector is financing the private sector to protect the environment, or vice versa; changes over time in the uptake of cleaner production technologies or practices; and the size and nature of the environmental management industry in this country.

Businesses and business organizations have also made use of EPE data to monitor such issues as the impact of government environmental regulations on industry, the contributions of their members to national efforts to protect the environment, and the nature of demand for environmental goods and services. National estimates of EPE also provide information for meeting the requirements of international organizations such as the OECD and APEC for information on member countries' environmental protection activities.

With these needs in mind, the ABS developed its environment statistics program with the long term aim of to providing high level decision-makers with information that allows for the assessment and development of policies, legislation, market forces and related economic instruments, in a way that improves both economic and environmental outcomes.

There are a number of potential benefits to measuring economic activity related to protecting the environment. These include:

- providing an indication of the response of various sectors to environment protection regulations and policies;
- providing information for the environment satellite accounts proposed as part of the revised System of National Accounts;
- provide some indication of the extent and nature of demand on the suppliers of goods and services for environment protection, and
- providing a measure for benchmarking Australia's activities on environment protection both over time and in comparison with other OECD countries.

Early editions of the ABS publication on EPE in Australia were guided by the OECD's pollution abatement and control (PAC) framework. In the mid 1990s, the ABS moved towards the collection of more comprehensive information relating to environment protection expenditures, consistent with the principles and objectives of the United Nations System for Integrated Environmental and Economic Accounting (SEEA). In implementing the environment protection expenditure account of SEEA, the ABS was guided by the framework developed by Eurostat in 1994, called the European System for the Collection of Economic Information on the Environment (SERIEE). The reasons for a change in the collection framework and the implications of this change are discussed in Part 2.

Information about environment protection expenditures has been published since 1990-91 in a publication called *Environment Protection Expenditure, Australia (ABS Catalogue Number 4603.0). The most recent edition of this publication,* released in July 1999, *is for the financial years 1995-96 and 1996-97.* Since there has been a pause in the collection of these statistics since 1996-97 (for reasons explained later), there will not be another edition of this publication until mid 2001.

2. EPE COLLECTION FRAMEWORKS

When the ABS began collecting statistics related to environment protection in the early 1990s, international thinking about how to approach and organize environmental accounts was in its infancy. In the early 1990s the OECD Pollution Abatement and Control (PAC) Framework provided the only well developed guidelines on how to measure economic activity related to environment protection. Australia adopted this model as the basis for the first collections of these statistics.

2.1 The OECD Pollution Abatement & Control Framework

In the early 1990s, the OECD's PAC framework defined pollution abatement and control as *".. purposeful activities aimed at the prevention, reduction and elimination of pollution or nuisances that could have a harmful effect on the environment*" (OECD, 1993). This framework provided guidance on identifying:

- who is carrying out such pollution abatement activities, and
- who is financing pollution abatement activities

Accordingly, the PAC framework called for the collection of statistics on the flow of capital and current expenditures incurred by public and private sectors directly aimed at pollution abatement and control. Current expenditures include:

- provision of environmental services for own use (including costs of wages, salaries, rents, energy, maintenance expenditure and intermediate inputs); and
- environmental services and specific goods bought in from the market.

Capital (or investment) expenditures include purchases and own-account production, and additions of new durable goods to the stock of fixed assets for pollution abatement and control purposes. In line with National Accounting standards, household expenditure on durable goods is not considered investment expenditure but is counted as a current expenditure.

The PAC guidelines note that data on capital expenditure for pollution abatement and control can be divided into two components:

- expenditures for end-of-line techniques (to treat pollutants after generation in production processes by the use of separately identifiable abatement facilities); and
- expenditures for change-in-production or integrated techniques (processes to reduce or eliminate the generation of pollutants by employing a range of techniques).

The framework also identifies monetary flows between the private and public sectors. These inter-sectoral flows occur in the form of government subsidies to the private sector for undertaking pollution abatement and control activities, and fees and charges in the form of purely financial transfers (such as rates, environmental licensee fees and fines) from the private to the public sector.

According to the OECD, the identification of these intersectoral flows assists in identifying two important variables: the level of abatement activity executed by each sector (called 'the abater principle') and the financial burden or costs borne by each sector (regardless of which sector the actual pollution abatement occurs in), called 'the financer principle' (OECD, 1993). It is possible for the differences between the value of the two estimates to be substantial, indicating significant levels of transfer payments and subsidization.

The framework for these two bases of compilation is set out in Table 2.

Table 2. The OECD Pollution Abatement and Control Framework

PUBLIC SECTOR	PRIVATE SECTOR
investment expenditure	investment expenditure
+	+
current expenditure	current expenditure
-	-
PAC by-products	PAC by-products
=	=
PAC, Abater Principle	PAC, Abater Principle
+	-
subsidies to the private sector	subsidies from the public sector
-	+
fees / charges from the private sector	fees / charges to the public sector
=	=
PAC, Financer Principle	PAC, Financer Principle

Note: PAC by-products are waste products sold to other producers.

Much of the data collected by the ABS from the private sector between 1990-91 and 1994-95 reflects the terms and definitions as specified by this framework. The early publications presented statistics on capital and current expenditure on environment protection activities by industry (including manufacturing, mining, agriculture, utilities and other service industries) and by the public sector. Subsidies and transfers were identified where possible, and State information presented where available.

However, the early publications of environment protection expenditure also presented some estimates of some non-PAC expenditures including expenditure on:

- environmental research and development
- activities related to conservation (such as national parks) and
- activities related to sustainable land management (landcare and environmental impact assessment).

This allowed a broader coverage of the costs of environment protection to industry and government of interest to policy makers and other users of these statistics.

2.2 The UN System of Integrated Environmental & Economic Accounting (SEEA)

Since the early 1990s, there has been considerable work done in the international arena on the development of comprehensive and consistent approaches to national environmental accounting. Following the Rio Earth Summit in 1992, the United Nations developed and published the System of Integrated Environment & Economic Accounting (SEEA) (1993). SEEA proposed a variety of accounts to measure the interactions between the environment and the economy within individual countries. One of these accounts relates to environmental protection expenditure.

In 1994 the European Statistical agency, Eurostat published a manual on implementing the environment protection expenditure account of SEEA. This manual was called the European System for the Collection of Economic Information on the Environment, (known by a French acronym, SERIEE). The ABS began using SERIEE to guide the collection of environment protection expenditure for the 1995-96 collection onwards.

SERIEE defines environment protection as *"all actions and activities that are aimed at the prevention, reduction and elimination of pollution as well as any other degradation of the environment"*. This definition is broader than the OECD PAC definition because it covers all environment protection expenditures, not just those activities relating to pollution abatement and control. Expenditures on the following activities are included:

- protection of biological diversity and landscape;
- protection of soils and groundwater;
- protection of water resources; as well as
- traditional environmental protection activities such as management of waste and wastewater, and protection of ambient air and climate.

This fairly broad definition of what constitutes environment protection is conceptually narrowed in SERIEE by the application of an '*end purpose* criterion', that is, environmental protection must be the main objective or reason behind any action or activity before expenditure linked to these activities is included in the environment protection accounts. Actions and activities which have a favorable impact on the environment but which serve other goals do not come under environment protection.

To further define the types of activities included within the scope of environment protection, the ABS was guided by the *Single European Standard Classification of Environmental Protection Activities* (CEPA). CEPA classifies activities on the basis of the following:

- type of environmental pollution;
- type of environmental media affected; and
- type of activity performed (prevention, reduction, measurement, control).

Appendix 1 provides a detailed description of this classification system.

Like the PAC framework, SERIEE calls for information on national EPE to include measures of who is using or benefiting from environment protection goods and services and who is financing or paying for those goods and services. This requires information

to be collected on taxes and subsides to map the flows of resources between public, private and household sectors and to avoid double counting.

In addition, SERIEE also provides guidance on collecting statistics to analyze who is producing or supplying environment protection goods and services in an economy. Producers or suppliers of environment protection goods and services are divided into specialized and non-specialized producers. Specialized producers are those businesses which provide these goods and services as their primary activity, while non-specialized producers supply EP goods or services as secondary to their main business activity. Information on these producers can be very useful to policy-makers wishing to measure and promote the economic performance of the environmental management industry.

3. DATA COVERAGE

The Environment Protection Expenditure publication to date has presented estimates of relevant expenditures for all major institutional sectors including the corporate sector - both public and private; the three levels of general government - Commonwealth, State and local; and the household sector.

3.1 Industry

For the first few editions of *Environment Protection Expenditure* coverage of all industries was not possible. PAC data for 1990-91 was collected from the mining industry, the manufacturing industry and the public sector. Non-PAC environmental expenditures were also collected for both the private and public sectors, In 1992-93 data collection activities were extended to also include the retail, wholesale, construction, agricultural and household sectors. These industries were surveyed each year until 1996-97, when there was a break in the collection cycle.

Once the SERIEE framework was adopted in 1995-96, industries were divided into specialized producers of environment protection goods and services, and 'other' producers. The 'other producers' category includes both non-specialized producers of EP and businesses which consume but do not produce EP goods and services. A majority of the businesses surveyed come under the 'other' category, that is they are businesses which use (purchase) environment protection goods and services and which, if they produce any of these goods or services, do so only as a minor part of their normal business activities.

Coverage of industry expenditures is comprehensive, and includes: manufacturing, mining, utilities (electricity, gas and water), agriculture, construction and service industries. Coverage for this group of industries is limited to businesses that appear on the ABS Business register i.e. businesses with 1 or more employees. This also includes non-profit institutions serving households (NPISHs), which are not separately identified and presented.

3.2 Environment protection industries

Information collected from the environment protection industries (or 'specialized producers') is limited to the following:

- the waste management industry;
- the waste water management industry and, lastly,
- all general government activities relating to environment protection.

Other environment protection industries are not comprehensively collected at present because they can not be readily identified in the Standard Industry Classification. As such, these figures are expected to be an underestimate for this industry group.

The waste management industry was comprehensively surveyed in the 1996-97 financial year and the methodology is detailed in a paper presented at the *ECE/Eurostat Working Session on Methodological Issues in Environmental Statistics* in 1998. Coverage included businesses (the corporate sector) '*mainly engaged in collecting or disposing of refuse (except through the sewerage system)*'. This group was relatively easy to identify as it relates to a specific group 9634 in the *Australian and New Zealand Standard Industry Classification* (ANZSIC). The waste management component of Local Government Authorities was also surveyed. State and Commonwealth government bodies were found to have little or no direct involvement in the waste industry other than legislative and regulatory responsibilities.

Coverage of the wastewater management industry included fully corporatized bodies, corporatized public sector trading enterprises, State general government water and sewerage authorities, and local government sewerage operators.

3.3 General Government

From the outset an attempt was made to capture relevant expenditures and receipts for all levels of government in Australia. In early editions of the publication, it was not possible to separately identify relevant transactions for local government, except in broad terms, and coverage of environment protection expenditures by other levels of government (State and federal) was mainly limited to transactions related to sanitation and waste disposal services.

With the adoption of the SERIEE framework, general government transactions were broadened to cover activities and programs related to biodiversity and landscape protection, soil and groundwater protection, and other related activities as specified in CEPA. In accordance with the guidelines in the SERIEE manual, expenditure on environment protection activities by all levels of government were also recorded under the banner of 'environment protection industries'. As such, all these activities of general government were treated as discrete economic units whose primary purpose was environment protection. For example an industry department with a program or division related to environment protection was defined as a specialized producer.

3.4 Households

Full coverage of the Australian economy is made complete by estimates of expenditure on environment protection activities by the household sector. In practice, estimates for the household sector are only partial at this stage, relating primarily to sewage and household garbage collection rates and fees paid by households. A range of other environment protection activities which may be being undertaken by households are not currently collected.

4. DATA COLLECTION STRATEGIES

The Environment and Energy Statistics Section (EESS) uses a number of sources and strategies to compile national estimates of environment protection expenditure. These include the following:

- utilizing the results of existing ABS surveys (such as *the Waste Management Industry survey* and the *Water and Sewerage Survey*, and the *Household Expenditure Survey*);
- developing specific EPE questions and 'piggybacking' them to existing ABS industry surveys (e.g. agriculture, manufacturing & mining surveys);
- utilizing non-ABS sources of information such as annual reports and Budget Paper estimates (for general government transactions), and other ad hoc sources (for household expenditures); and
- developing a tailor-made survey as in the case of local government.

Many of these data compilation and collection strategies have been outlined previously (see recent ECE/Eurostat papers - *1996-97 Waste Management Industry Survey* (ABS 1998) and *Data Collection Using ABS Surveys: How to get Environmental Information using Existing Collections* (ABS 1997)). As such, these methodologies will not be repeated except in summary.

4.1 Utilizing the Results of Existing Surveys

The main existing ABS surveys relevant to EPE are the Waste Management Industry survey, the Waste Water and Sewage Industry survey and the Household Expenditure survey.

Methodological issues relating to the 1996-97 *Waste Management Industry Survey* were the subject of a paper delivered by the ABS at an ECE-Eurostat Conference in 1998. Copies of this paper can be made available on request. Data from the Waste Industry Survey fed back into the Environment Protection Expenditure Account (EPEA) and enabled reliable and comprehensive estimates to be reported for the production of goods and services by the Waste Management Industry - by both the private sector and local government. Gross capital formation for this industry was also reported.

For the 1995-96 and 1996-97 financial years, specialized production by the wastewater management industry was sourced from a combination of the ABS *Water and Sewerage Survey*, and supplementary information derived from:

1) preliminary estimates of the local government *Environment and Natural Resource Use and Management survey*, and
2) published estimates of water and wastewater operators by industry groups and annual reports.

Supplementary data sources were needed due to the fact that the ABS *Water and Sewerage Survey* was not designed to provide detailed estimates of the sewerage industry, split by institutional sector and level of government. The small sample size was thus supplemented by 1) local government estimates and 2) published industry estimates, where these units did not appear in the ABS *Water and Sewerage Survey*. Weights were adjusted accordingly and aggregates for the whole wastewater management industry were estimated. In this instance, no institutional sector splits were derived due to the fact that the data quality did not lend itself to further disaggregation.

Estimates of wastewater management expenditure represent activity-based expenditures by water and sewerage operators to the extent that it was possible. This strategy was adopted due to the fact that, in Australia, many operators engage in both water supply and sewerage operations yet the industry class distinction is often arbitrary and does not truly reflect the activities undertaken. Where the sewerage component of a business or unit classified to a Water Supplier ANZSIC (3701) could be identified or estimated this expenditure was included in the wastewater management estimates. Where a unit was classified to the Sewerage ANZSIC (3702), all transactions of this unit were included under wastewater management. Future environment protection expenditure surveys will address this rather ad-hoc approach to collecting estimates for this environment protection 'industry'.

Data from the Household Expenditure Survey is also used to help estimate the contribution of the household sector to environment protection expenditure in Australia. Households incur expenditures to prevent or manage environmental pollution and degradation in a number of forms, such as:

- payment of fees and charges for sewage and garbage disposal services,
- purchase of pollution control devices such as catalytic converters or unleaded fuel for cars,
- purchase and maintenance of insulation and other energy efficiency technologies, and
- purchase and maintenance of devices to reduce water consumption.

Questions to obtain estimates on these types of items are periodically included in the ABS Household Expenditure survey.

4.2 Drawing on Other ABS industry collections

From the outset, a cost effective way of collecting estimates of environment protection expenditure by industry has been to add questions to existing ABS industry collections, such as the surveys of the Mining, Manufacturing, Agriculture, and Service industries. In the early 1990s this involved the addition of only a handful of questions that were

imbedded in these industry survey forms. As the need for information on environment protection grew, it became necessary to develop a separate survey form for most industries. This was dispatched as a supplement to the industry surveys. The only exception was the agricultural finance survey, where environment protection questions remained embedded in the industry survey form because this survey is administered by field interviewers.

The supplementary survey was titled *Waste Management and Environment Protection Survey* so that respondents were clear that waste expenditures were to be included. The results were collected and processed by the relevant industry collection area and weighted unit record files were provided to the Environment Section to be prepared for publication.

In the 1995-96 collection round, EPE questions on non-environment industry surveys were adapted or extended to better cover the data requirements of SERIEE. Specifically, questions were asked to identify the value of total production of environment protection goods and services both for sale to others (secondary output) and for internal use (ancillary output). The new version also allowed for the distinction between the consumption of market environment protection goods and services (payments to contractors/agencies), and own account expenditure for the purpose of environment protection.

The advantages to the 'piggyback' approach to collecting environment protection estimates from industry has been that it provides a cost effective way of collecting this data from all industries. This method also saved having to duplicate the survey dispatch and processing expertise held by the industry survey areas of ABS. However, the ABS is currently considering making the EPE survey into an independent collection. The reasons for this change are discussed in part 6.

4.3 Utilizing non-ABS sources of information

While it has been possible to collect EPE estimates for industry by piggybacking onto existing industry surveys, this has not proved to be possible for obtaining estimates of general government EPE.
General government is a major contributor to EPE, particularly as a producer (or supplier) of environment protection goods and services. Commonwealth and State governments primarily serve a policy and regulatory role, with environment departments and agencies being the major stakeholders. Other relevant departments include government bodies relating to agriculture and primary industries and other land management agencies.

Previously, the bulk of Commonwealth and State government expenditures have been sourced from unpublished ABS Public Finance statistics. This group of expenditures was termed 'sanitation and protection of the environment' and enabled estimates - at each level of government - to be made for:

1) household garbage;
2) other sanitation;
3) sewerage;
4) urban stormwater drainage; and

5) protection of the environment not elsewhere classified.

Appendix 2 contains a detailed description of these activities.

In recent years, this classification system (Government Purpose Classification) has been revised, and since 1995-96 the above splits have not been available. As such, all Commonwealth and State government estimates have had to be collected from Parliamentary budget paper and departmental annual reports. Currently, no organized system is in place for the Commonwealth and State government bodies to deliver these estimates to the ABS and these estimates are extracted manually by EESS staff.

4.4 Data Collection via a Purpose-Built Survey

In addition to affecting the available data for federal and State governments, the revision to the Government Purpose Classification resulted in no comprehensive data being available on environment-related transactions by the more than 600 Local Government Authorities operating in Australia.

It was at this point in time that the ABS was approached by the Australian Centre for Regional and Local Government Studies (ACRLGS) to become involved in their Local Government Environmental Accounting project. One of the objectives of the Environmental Accounting project was to influence local government accounting systems such that councils were able to identify environmental transactions. The ABS took this opportunity to develop a survey form that would meet EESS reporting requirements for both an EPE account and a Natural Resource Use and Management account for local government.

This local government survey was pilot tested over several years with the active involvement of councils that participated on a voluntary basis. In 1998-99 the ABS conducted this survey as an official (compulsory) collection for the first time, sampling 50% of the local government councils and 87% of the Australian population. The sample was more statistically robust than the pilot surreys and was representative of all States. Councils were sent a survey questionnaire, a guide on how to fill in the form and 2 articles on environmental accounting, as well as assistance in the form of a telephone dial in service and email inquiry access.

5. STATISTICAL OUTPUTS

The combined output from all the various data sources has been published in *Environment Protection Expenditure, Australia (ABS Catalogue number 4603.0).* Early editions of this publication were called *Costs of Environment Protection, Australia* but the name was changed in 1992-93 to reflect the broader scope of the publication.

Given Australia's decision in the mid 1990s to change from using the OECD to the SERIEE framework to guide the collection and presentation of EPE statistics, efforts have been made to ensure some consistency in the published data. The collection of

information since 1995-96 still provides the data required to complete the OECD PAC questionnaire each year, as well as domestic users needs for information on pollution abatement and control measures. Data on flows between the public and private sectors (designed to show who is financing EPE activities) is also provided by both frameworks. The adoption by the OECD PAC framework of categories of environmental protection activity similar to those in the CEPA has also diminished the differences between the two frameworks in terms of statistical outputs.

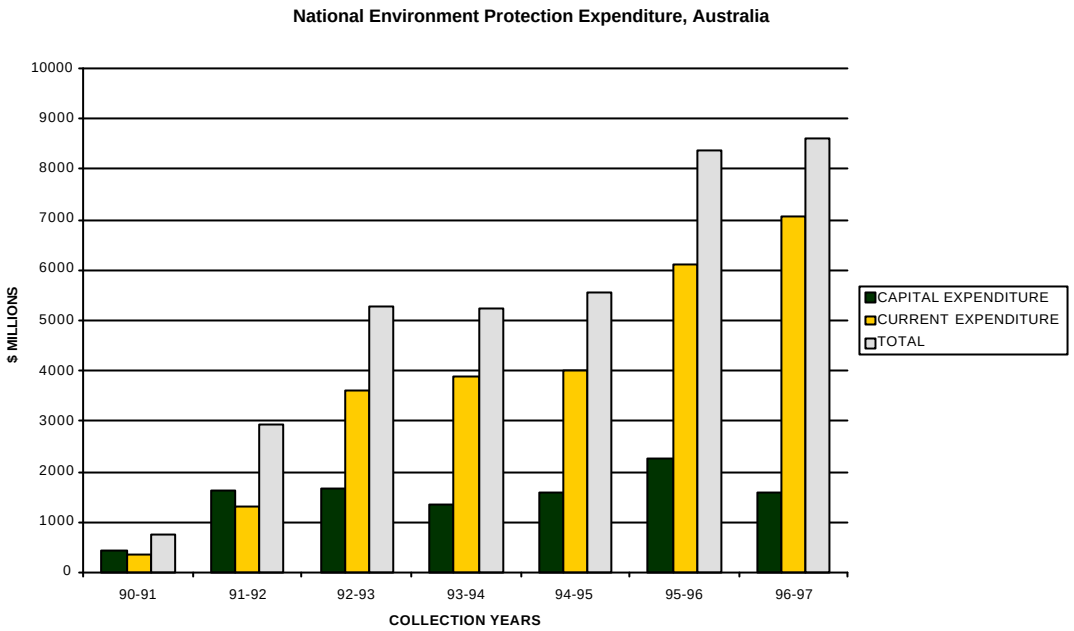
It is not intended here to detail the statistical outputs from the EPE collection in detail - copies of the publication will be available at the workshop for people to see if they are interested in the actual data. Rather the emphasis of this section is on outlining the types of data which have been published, and how this has changed depending on the environmental accounting framework used by the ABS to guide this work over the past 10 years.

5.1 Types of Date Published

A range of information and indicators have been obtained from collecting EPE data on a comprehensive basis. Since the early 1990s, the ABS has provided national estimates of environment protection expenditure in Australia. Initially these estimates were only partial but they soon became comprehensive as all relevant sectors, including industries, governments and households were included in the estimates.

Figure 1 provides an overview of total environment protection expenditures in Australia from 1990-91 to 1996-97, when the last collection was run. The precise estimates supporting this figure are not all directly comparable because of the changes in methodology over these years. For example, the comparatively low estimates for 1990-91 reflect the fact that not all industries were collected. The marked increase in reported expenditures for 1995-96 is likely to reflect improvements in the measurement of relevant expenditures more than actual increases in these expenditures over earlier years. Nevertheless, the estimates are nonetheless indicative of an overall trend toward increased national expenditure on protecting the environment.

Figure 1. National Environment Protection Expenditure, Australia



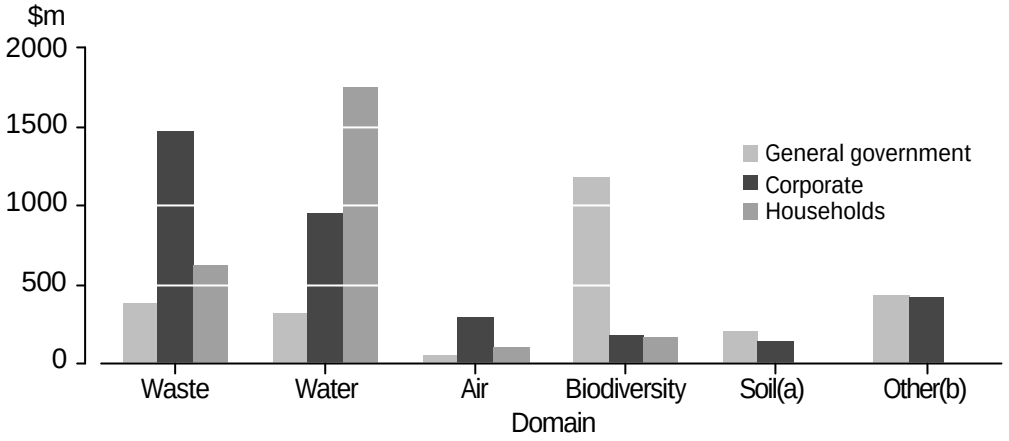
When taken as a percentage of Gross Domestic Product (GDP), these estimates indicate that EPE has risen slightly over this period from an estimated 1.3% of GDP in 1991-92 to 1.6% of GDP in 1996-97.

By using CEPA to guide collection of EPE data, it is possible to analyze which activities contribute the most to national EPE estimates. For example in 1996-97, the majority of Australia's national expenditure to protect the environment was on waste water management and water protection ($3.0b) and waste management activities ($2.5b). Together these represented around 63% of total national EPE. Expenditure to protect biodiversity and landscape contributed a further 18% to total expenditure ($1.5b), with protection of ambient air and climate, and soil and groundwater representing only about 6% and 4%, respectively. The remainder (less than 10%) was expenditure for research and development, noise and vibration abatement and expenditures on other environment protection activities not able to be separately identified and allocated to a specific domain.

Estimates of expenditure by domain can also be cross referenced to institutional sector to provide a picture of which sectors are undertaking what environment protection activities (see Figure 2).

Figure 2. Environment Protection Expenditure, By Sector and Domain - 1996-97

14.17 ENVIRONMENT PROTECTION EXPENDITURE, By domain 1996--97



(a) Low household expenditure in Soil and Goundwater Protection and Other Environment Protectic
(b) Includes noise and vibration abatement and research and development.

Source: Environment Protection Expenditure, Australia (4603.0).

Examples of results obtained from the 1996-97 EPE survey include the following:

- General government spent approximately 30% ($2.6b) of national expenditure for environment protection in 1996-97. The largest expenditure was for activities aimed at the protection of biodiversity and landscape ($1.2b).
- General government provided around 43% of total environment protection services and products produced. Over half of this production was for services and products provided either free or at minimal cost to the community (non-market).
- Expenditure on environment protection by Australian households was approximately $2.6b in 1996-97. Most of this was spent on wastewater services such as sewerage rates and charges, septic systems and urban stormwater drainage ($1.7b). This represented 58% of total national expenditure on wastewater management and water protection.
- The corporate sector accounted for 40% of total national expenditure to protect the environment ($3.4b in 1996-97). About 42% of total expenditure by the corporate sector were for waste management activities ($1.5b).
- Within the corporate sector, service industries spent the most on waste management activities ($948m).
- Manufacturing industries spent the most on wastewater services and water protection ($271m), with a large proportion of this being capital investment ($128m). Manufacturing also invested heavily in equipment and activities to protect ambient air and climate ($203m).
- Expenditures on protection of soil and groundwater by the corporate sector were largely undertaken by agricultural industries. Agriculture spent $102m in 1996-97 on measures to protect soil and groundwater (29% of all expenditures on these measures).
- Most environment protection expenditure by the mining industries was for wastewater management and water protection ($90m in 1996-97) and protection of biodiversity and landscape ($99m).

- Overall, the corporate sector provided environment protection services to the value of $4.6b in 1996-97 (approximately 56% of total environment protection services

and products produced). The majority of this was the provision of waste management and wastewater management services by these industries ($3.3b in 1996-97).

5.2 Estimates of Use, Production and Financing of Environment Protection Goods and Services

As mentioned in Part 2.2, one of the strengths of the EPE account proposed by SEEA (and elaborated in SERIEE) is that it enables analysis of three main issues:

- who in an economy is using EP goods and services
- who is financing EP goods and services, and
- who is producing EP goods and services.

Australia published information specifically to address these three distinct questions for the first time in the 1995-96 and 1996-97 publication. The summary tables from this publication are shown below, not for the purpose of providing data, but to illustrate the format and the possible analysis which these tables support.

Table 1 shows who is using, or consuming, environment protection services and products. These uses include:

- final consumption of products and services by households to mitigate the impacts their activities have on the environment. This often takes the form of fees and charges for environment protection services provided by government or business;
- intermediate consumption of products and services by industries to mitigate the impacts of their production on the environment. This can take the form of payments to government agencies or private contractors, or own account expenditure for internal use of environment protection services; and
- final consumption by general government in their capacity as a collective consumer of environment protection services on behalf of the community.

By definition, the unit investing in environment protection activities (capital expenditure to protect the environment) is also regarded as the user of that investment (the first three columns). Information on connected and adapted products was not collected, and neither was the distinction made between non-specialized and non-characteristic producers. Non-specialized producers are those producers supply environment protection goods and services as a secondary activity to their main business. Non-characteristic producers are those producers in the economy, which do not produce any environment protection goods and services. Instead of distinguishing these producers, their EPE transactions were combined into an 'other producers' category.

Table 1. National Environment Protection Expenditure, By User of Products and Services - 1996-97

Components	Environment protection industries(a)		Other producers	Consumers(b)				Total
	General government	Other	Total industries	Common-wealth	State	Local	Households	
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Final consumption of environment protection services and products								
Market	. .	. .	. .	. .	. .	. .	2 637 700	2 637 700
Non-market	. .	. .	. .	597 564	1 241 508	330 625	n.a.	2 169 697
Total	. .	. .	. .	597 564	1 241 508	330 625	2 637 700	4 807 397
Intermediate consumption of environment protection services								
Market	(c)	(c)	1 483 689	. .	. .	. .	. .	1 483 689
For internal use	(c)	(c)	747 379	. .	. .	. .	. .	747 379
Total	(c)	(c)	2 231 068	. .	. .	. .	. .	2 231 068
Total consumption of services and products	. .	. .	2 231 068	597 564	1 241 508	330 625	2 637 700	7 038 465
Gross capital formation for environment protection activities	382 269	414 153	786 621	. .	. .	. .	. .	1 583 043
Subsidies on production	(c)	(c)	12 065	. .	. .	. .	—	12 065
National expenditure for environment protection								
Current	. .	. .	2 243 133	597 564	1 241 508	330 625	2 637 700	7 050 530
Capital	382 269	414 153	786 621	. .	. .	. .	. .	1 583 043
Total	**382 269**	**414 153**	**3 029 754**	**597 564**	**1 241 508**	**330 625**	**2 637 700**	**8 633 573**

(a) Primarily waste management and waste water management.
(b) General government as collective consumers; households as actual consumers.
(c) Transaction may exist but is not recorded here due to SERIEE's accounting conventions.

The units that consume environment protection products and services, or invest for environment protection, may not necessarily bear the full cost of the activity from their own resources. Table 2 presents the actual financing of national expenditure on environment protection by institutional sector, taking into account subsidies, grants and other transfers where these have been identified. There may be transfers between institutional sectors that have not been able to be identified and extracted.

Table 2. Financing of National Expenditure for Environment Protection, By Source and User

	Environment protection industries(a)		Other producers	Consumers(b)				
Financing units	General government $'000	Other $'000	Total industries $'000	Common-wealth $'000	State $'000	Local $'000	Households $'000	Total $'000
General government								
Commonwealth	11 408	—	n.a.	580 317	89 853	813	n.a.	682 391
State	126 959	—	n.a.	17 247	1 151 655	19 924	n.a.	1 315 785
Local	240 931	—	n.a.	—	—	309 888	n.a.	550 819
Total	379 298	—	17 648	597 564	1 241 508	330 625	n.a.	2 566 643
Corporations								
Environment protection industries	n.a.	414 153	—	n.a.	n.a.	n.a.	n.a.	414 153
Other producers	n.a.	. .	3 012 106	n.a.	n.a.	n.a.	n.a.	3 012 106
Total	2 971	414 153	3 012 106	n.a.	n.a.	n.a.	n.a.	3 429 230
Households	. .	. .	. .	n.a.	n.a.	n.a.	2 637 700	2 637 700
National expenditure	382 269	414 153	3 029 754	597 564	1 241 508	330 625	2 637 700	8 633 573

(a) Primarily waste management and waste water management.
(b) General government as collective consumer; households as actual consumers.
Note: Sums will not necessarily equal totals as some splits not available.

Table 3 summarizes the production of environment protection services for Australia. It describes who is providing the environment protection service and what type of output they are producing (market, non-market, or for internal use). The environment protection industries consisted primarily of waste management services and wastewater management services (sewage treatment plant operators). Table 4 also shows the inputs in the form of current uses received and consumed in the production of the environmental output, as well as investment by government and industry for environment protection activities. It should be noted that some of the inputs might include resources utilized for non-environmental protection activities. These amounts have not specifically been identified and deducted.

Although non-environmental output was collected, the decision was made to exclude this information from this edition. The lack of transparency in this table as originally described in SERIEE was seen as a particular problem in presenting information that was clear and understandable to most readers. For this reason, all tables were kept as simple as possible so as not to alienate users.

Table 3. Production of Environment Protection Services, Summary - 1996-97

Transactions	Environment protection industries(a) General government $'000	Environment protection industries(a) Other $'000	Other producers For sale(b) $'000	Other producers For internal use $'000	Total $'000
Output					
Environment protection					
Non-market	1 961 621	..	..	..	1 961 621
Market	1 662 497	3 329 162	550 305	..	5 541 964
For internal use	(c)	(c)	(c)	747 379	747 379
Total	*3 624 118*	*3 329 162*	*550 305*	*747 379*	*8 250 964*
Inputs					
Current uses					
Intermediate consumption	2 292 876	2 621 521	(c)	(d)822 439	5 736 836
Compensation of employees	918 886	635 521	(c)	n.a.	1 554 407
Consumption of fixed capital	184 368	301 209	(c)	(e)	485 577
Other taxes on production	21 342	297 523	(c)	35 597	354 463
Less other subsidies	9 851	538	(c)	10 174	20 564
Environment protection income					
Market output	1 662 497	3 329 162	550 305	..	5 541 964
Current transfers	127 837	n.a.	n.a.	n.a.	127 837
Total	*1 790 334*	*3 329 162*	*550 305*	*..*	*5 669 801*
Capital transactions					
Gross fixed capital formation	382 206	426 577	(c)	681 432	1 490 215
Other capital uses	63	- 12 424	(c)	n.a.	- 12 361
Total	*382 269*	*414 153*	*(c)*	*681 432*	*1 477 854*
Investment grants	15 710	—	(c)	5 581	21 291

(a) Primarily waste management and waste water management.
(b) Not collected for Agriculture.
(c) Transaction may exist but is not recorded here due to SERIEE's accounting conventions.
(d) Includes compensation of employees.
(e) Not collected.
Note: Output does not include non-environmental protection output.

The ABS is yet to receive detailed feedback from stakeholders on how useful or not they have found this information to be. A comprehensive user consultation is being conducted at present to find this out. Changes to the presentation or more detailed explanation of the analytical potential of these tables may be needed to maximize their value to stakeholders, particularly policy-makers in government departments.

6. PROBLEMS ENCOUNTERED

The ABS has encountered a number of conceptual and practical difficulties with the collection and presentation of EPE statistics.

When EPE data was first being collected the main difficulties encountered were practical - how to ensure respondents understood the questions asked of them, and provided appropriate and accurate responses. These problems gradually diminished over time, as EESS became more experienced with preparing survey forms, based on pilot tests, and as respondents became more familiar with being asked the type of questions that appear on an EPE survey form.

With the decision in the mid 1990s to adopt the UN SEEA (and SERIEE) as the basis for compiling and EPE account for Australia, a whole new set of conceptual and practical issues arose. These issues are due in part to the conceptual complexity of the SERIEE framework by comparison with the OECD PAC framework. As such Australia has not fully implemented SERIEE. Rather than full implementation, ABS has used SERIEE to guide the collection and presentation of EPE statistics, while simplifying the framework as necessary in response to data constraints and the need for users to be able to understand and make use of the data.

Some conceptual and practical difficulties have remained regardless of the framework being used. An example is the collection of comprehensive information on taxes and subsidies - data that is crucial to both the OECD PAC and the SERIEE frameworks for identifying who is financing EPE. Another example is the issue of how to clearly distinguish between capital expenditures related to end-of-line investments from change-in-production investments. Having respondents recognize clearly what information is required, and accepting that a survey on EPE is relevant to them, has also remained an ongoing issue, although this has been gradually diminishing over time as businesses become more familiar with the terminology and concepts underlying national measures of EPE.

6.1 Conceptual Issues

6.1.1 Making EPE data accessible to users

Perhaps the most fundamental problem the ABS faced in compiling the EPE account for Australia was the presentation of relatively complex ideas and terminology in a format that was reasonably user-friendly. As a consequence of using a framework consistent with the System of National Accounts (SNA), as well as an elaborate accounting framework to avoid double-counting (inherent in SERIEE), the resulting output was potentially complicated and difficult to interpret. Add to that the breakdown of information into 7 different domains, by industry, by level of government, and the volume of information generated was considerable.

EESS addressed this by simplifying, where possible, the presentation of the tables and the terminology used therein to produce a product that would be less likely to alienate traditional users while at the same time producing more sophisticated information for users. Ultimately, the extent to which the SERIEE framework was used as an analytical tool was diminished in this particular exercise due to information gaps and a lack of established links with physical data.

One of the main strengths of SERIEE lies in its ability to provide a bridge between physical and economic data. Indeed, SERIEE (1994) acknowledges that these linkages are "indispensable for a variety of uses of the system". Providing both physical mad monetary data would therefore be ideal. This was not a priority for this first attempt at compiling the EPEA based on SERIEE. The emphasis in this product is on valuing the net cost of environmental protection measures borne by producers, and the value of the activities linked to environmental protection so as to determine the market for these goods and services.

6.1.2 Making EPE data relevant to policy-makers

Ideally, SERIEE's strategic relevance as a research framework should be assessed against its relative importance to national policy formulation and evaluation and/or the probability that it will become more useful to these processes over time. The potential to influence government policy making and macro-economic strategy is probably dependant on the detail of SERIEE being complete and the linkages being made, which has not been possible to date due to gaps in data and information.

This information gap is particularly important in relation to environment-related taxes and subsidies, which are the main tools available to economists in a position to adjust or fine tune environment-related policies. The calculation of environment-related financial burden requires comprehensive data on environment-related taxes, subsidies, investment grants etc. Unfortunately, this is one area in which the available information is sparse and of poor quality, and steps need to be made to rectify this data gap if EPE reporting is to influence policy at this level.

Until then, EESS will work to determine the appropriate level at which to collect and present data to suit the majority of users, including industry groups, Environment Protection Authorities, environment and primary industry departments, and other policy-makers. If the report is intended to reach a wider audience, the language, terminology and concepts of EPE need to be presented in a clearer and more understandable style. In addition, value-adding to produce a more analytical document must be balanced with the need for timely statistics.

6.1.3 Coping with the interlinkages between environmental issues

Another conceptual issue encountered by the ABS has been that the aggregation of EPE data into domains (i.e. SERIEE sub-accounts) can be problematic to the extent that the placement of transactions into these discrete groupings may have the effect of actually obscuring some dimensions of the relationship between economic activity and environmental degradation. This is because the scope and nature of ecological impacts do not sit neatly in a single nuisance/degradation category.

For example, rising sea temperatures linked to global warming have been identified as a major threat to the world's tropical reef systems, including the Great Barrier Reef. Expenditure on actions taken to limit or restrict greenhouse gas emissions, however, are not linked by name to protection of biodiversity and landscape and are classified in the protection of ambient air and climate sub-account instead. Thus the names or labels of the SERIEE domain sub-accounts may imply a separation of impacts and issues that in ecological terms are ambiguous, and may not be easily interpreted or linked to supporting information.

The conceptual split between EPE and expenditure on Natural Resource Management (NRM) was also problematic. There did appear to be a large 'grey' area between EPE and NRM, as much expenditure on NRM was deemed to have significant positive environmental outcomes, although the primary motivation may not be established as

defensive (or rehabilitative) expenditure to protect the environment. Examples include such activities identified as 'catchment management planning' and 'rangeland management' - activities identified as being for the ecologically sustainable *use* and conservation of these resources. This problem is magnified by the fact that the difference between these activities being in or out of scope can make quite a substantial difference to domain expenditures such as soil and groundwater protection and biodiversity and landscape protection, particularly by the government sector.

In addition, this distinction between EPE and expenditure for activities towards the sustainable use and management of resources was not made for the agriculture industry. As outlined previously, these expenditures formed the bulk of reported expenditure by this industry and, given the relevance of soil and land degradation issues in Australia, it was deemed inappropriate to exclude such expenditures. This was in spite of the fact that such expenditures do not fit neatly under the definition of environment protection, as farmers could generally not separate land management expenditure between that which was primarily for environment protection, and that which was for sustainable management for economic benefits.

6.1.4 Measuring the EP component of capital investment

Finally, the concept of 'extra cost' for integrated facilities proved too difficult to operationalise. Industry survey questionnaires made a distinction between 'end-of-line' products and techniques and 'change in production/integrated technology/cleaner production processes'. However, no attempt was made to estimate extra cost for the latter. Future collections will look at addressing this issue.

6.2 Operational Issues

6.2.1 Environment protection industries

As well as these conceptual issues, many operational problems related to data availability, data quality and collection methodologies were faced. One of these has been the problems associated with identifying and capturing the environment protection industry. There is considerable demand from policy-makers throughout Australia for information on the turnover, exports, employment and profitability of the 'environment industry', and information on this industry is necessary to fully compile the EPE account. However in practical terms this information is difficult to collect.

A key cause of this difficulty is the lack of a distinct industry classification for businesses supplying environmental goods and services. Although the industry classification (ANZSIC) used by the ABS has the advantage of being compatible with other collection frameworks (a feature which could be important when considering the linkages between EPE and supporting information), it does not identify 'environment' industries as a particular grouping in its own right.

Activities within the environment protection industry are characterized by the following:

- waste transport (ANZSIC = road & rail transport),
- environment services (ANZSIC = business services),

- environment research and development businesses (ANZSIC = universities, business services),
- waste management industry (ANZSIC = waste management services);
- waste water management industry (ANZSIC = sewerage operators) and
- Environment related agencies (usually in the 96xx class, such as zoological parks board).

Due to current survey methodology, there is only a small chance of collecting these industries, and when they are collected they tend to become an outlier in the data.

The exceptions, of course, are the wastewater industry which is currently collected in the annual *Water and Sewerage Survey*, and the waste management industry which is periodically run as a full survey. For this reason, only these two industries have been included under the title of environment protection industries in the figures relating to the corporate sector.

The OECD and Eurostat have recently published a manual for data collection and analysis of the Environmental Goods and Services Industry (1999). This manual gives practical guidance on how to develop a comprehensive collection of statistics on the environmental goods and services industry in a manner that is likely to be consistent internationally. The ABS is intending to use this manual to guide the development of a new collection of statistics on this 'industry', possibly in the next 1 to 2 years.

6.2.2 Industry surveys

There have been a number of operational difficulties with the industry surveys. These surveys have been run as a supplement to existing industry collections. Due to pressures to minimize respondent load and budgetary constraints, it has not always been possible to collect data to the level of detail necessary to meet some of the conceptual requirements of the EPE account.

For example, it has sometimes been necessary to model estimates rather than being able to rely on survey data. In some instances, methods used to calculate domain splits for each of the data items (used to derive secondary production, environment protection income, payments to contractors, own account expenditure, taxes, fees and fines etc) were fairly coarse. Total current and capital expenditure for each domain was asked, and these ratios were apportioned across each of the data items. In some cases, tick box questions (relating to expenditure ranges) were asked and estimates made based on these.

Another concern was the relatively high proportion of nil responses reported by both the service industries group, and also the agriculture industry. To date there has not been the opportunity to investigate the extent to which these nil responses reflect true reporting by respondents (i.e. that they actually have no EPE, not even waste expenditures) or whether they reflect other issues, such as respondents not having the necessary data to hand, or not understanding the questions asked. EESS intends to further investigate these results to confirm whether or not these are in fact true nil responses, or non-sampling errors of some sort.

6.2.3 Water and sewerage survey

The ABS *Water and Sewerage Survey* has, in the past, been designed to provide aggregate financial estimates for the water and sewerage sector combined. As such, estimates for the sewerage industry as a specialized producer of environment protection goods and services using this survey vehicle alone were insufficient and additional sources were sought.

Regarding the sewage treatment operations of the water supply industry, EESS provided these units with the *Waste Management and Environmental Protection Survey* questionnaire (provided to all other non-environment industries). It was intended that expenditure relating to the sewerage operations of these units would be recorded here and hence, EESS would have a more complete picture of the wastewater management industry in Australia. Unfortunately, results and discussions with the subject matter area revealed that water operators were not accurately recording their sewerage operations on the supplementary form. This resulted in EESS having to abandon the use of the supplementary questionnaire and using the main survey data items to derive sewerage estimates.

6.2.4 General government

In the absence of any survey data on EP related expenditures by federal and State governments, data on these levels of government has to be collected on an ad hoc basis using non-ABS data sources. Collation and compilation of Commonwealth and State EPE estimates is made difficult by the varied manner in which budget papers and departmental annual reports are presented. There are large variations in the level of detail reported, as well as in the categories used to organize budgetary information. Much of the estimation is based on a judgement of the amount of activity within a portfolio statement. This is then proportioned over detailed expenditure information from the financial accounts.

A particular issue is accurately discerning between sustainable development and environment protection expenditure. The potential for inconsistent reporting between years needs to be carefully avoided by transparent extraction procedures, including detailing sources and methods and any assumptions that have been made, or data quality issues that are apparent, for future account keeping. As well, the same State or department does not necessarily report information in a consistent manner between years. The major benefit of this process is the potential to link the available data directly to policy.

7. FUTURE DIRECTIONS

The EESS is currently undergoing a review of its EPE collection. The 1998-99 collection was cancelled to enable EESS, industry survey areas, forms design and methodology stakeholders to determine the best way to achieve quality results in the future. As part of this review, consultations are being held with users of this data from both government and corporate sectors around Australia. This user consultation will

help to clearly identify and understand the needs of our target audience. A key step is a continuing dialogue with users of the report (e.g. EPA's) or developing new relationships with other clients, where they are relevant to the strategic aims of the EPE account.

The environment protection expenditure account is likely to be more useful and reach a wider audience if it is more closely linked to environmental policies and outcomes. If the report is intended to reach a wider audience, the language, terminology and concepts of EPE need to be presented in a clearer and more understandable style. One possibility may be to publish two reports, in order to tailor the information presented for specialist and non-specialist audiences. This option could involve the release of a preliminary EPE publication that presents the data in its simplest form, followed by the release at a later date of a more thorough analysis (this is an approach that appears to have worked well for other ABS subject areas).

This two-stage approach to the release of information would also allow for the compilation of supporting physical data. The feasibility of collecting this information via ABS surveys would need to be investigated in terms of the additional demands on respondents and the ABS in terms of time and resources. However, where the ABS already has such physical data, for example in the case of waste, the linkages should be made with the financial data.

Given operational limits to the capacity of the ABS to fund collection of data, there may be an opportunity to model some aspects of the EPE account, particularly where experience has shown a high non-sample error. This could save time and resources in the long term, once reasonable models have been developed. Modeling would also provide the opportunity to selectively publish forward estimates.

A more thorough analysis of EPE in Australia would also require more work to be done on the information gaps relating to environmental taxes, subsidies and levies. Steps that can be taken in the near future include consultation with; the Commonwealth Government's Treasury Department and the Department of Finance and Administration; Environment Protection Authorities (EPA's) and other relevant State Government agencies and departments; and local government, to seek broad agreement on the definition of environmental taxes and subsidies. A medium term strategic goal in this context, is to include definitions of environmental taxes and subsidies as part of the development of environmental accounting standards.

In terms of opportunities to improve data collection for the general government sector, the development of environmental accounting standards would improve this situation dramatically and the ABS may have an important role in this respect. For example, the local government EPE project has two related goals; the collection of EPE statistics where ABS government finance statistics have become deficient; and the implementation of an environmental accounting standard. This exercise has proved very successful and the quality and comprehensiveness of the data are good.

A full collection of national EPE statistics will again occur for the 1999-2000 financial year. Questionnaires relating to the non-environment industries have recently been completely revised and the new format pilot tested. The new forms approach

expenditure from a 'type of waste/emission/degradation' being treated perspective. In this manner, data items will be more meaningful to industries and they will not be expected to be familiar with the underlying definitions relating to various categories of CEPA.

It is also likely in the next 12-18 months that a new collection will be developed to obtain a comprehensive view of the environment management industry in Australia. Consultations with relevant Commonwealth and State government departments are currently underway, and methodologies for identifying and surveying this 'industry' are being investigated. There is considerable demand for this information both within Australia and from international organizations such as the OECD and APEC.

In summary, the coverage and quality of the data collected will continue to improve, as forms design and question wording are fine-tuned and better ways of extracting data are developed. Broader issues still to be addressed include the strategic aims of the EPEA and the target audience. It is envisaged that this information will be more widely accepted with the development of time-series; with clearer links to regulations and policy; as well as provision of related physical data.

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Appendix 1 – Classification of Environment Protection Activities

1 Protection of ambient air and climate
- 1.1 Prevention of pollution through in-process modifications
  - 1.1.1 For the protection of ambient air
  - 1.1.2 For the protection of climate and ozone layer
- 1.2 Treatment of exhaust gases and ventilation air
  - 1.2.1 For the protection of ambient air
  - 1.2.2 For the protection of climate and ozone layer
- 1.3 Measurement, control laboratories and the like
- 1.4 Other activities

2 Waste water management
- 2.1 Prevention of water pollution through in-process modifications
- 2.2 Sewerage networks
- 2.3 Waste water treatment
- 2.4 Treatment of cooling water
- 2.5 Measurement, control laboratories and the like
- 2.6 Other activities

3 Waste management
- 3.1 Prevention of waste production through in-process modifications
- 3.2 Collection and transport of waste
- 3.3 Treatment and disposal of hazardous waste
  - 3.3.1 Thermal treatment
  - 3.3.2 landfill
  - 3.3.3 Other treatment and disposal
- 3.4 Treatment and disposal of non-hazardous waste
  - 3.4.1 Incineration
  - 3.4.2 landfill
  - 3.4.3 Other treatment and disposal
- 3.5 Measurement, control laboratories and the like
- 3.6 Other activities

4 Protection of soil and groundwater
- 4.1 Prevention of pollutant infiltration
- 4.2 Decontamination of soils
- 4.3 Measurement, control laboratories and the like
- 4.4 Other activities

5 Noise and vibration account
- 5.1 Noise and vibration from road and rail traffic
  - 5.1.1 Preventative in-process modifications at the source
  - 5.1.2 Construction of anti-noise vibration facilities
- 5.2 Air traffic noise
  - 5.2.1 Preventative in-process modifications at the source
  - 5.2.2 Construction of anti-noise vibration facilities
- 5.3 Industrial process noise and vibration
- 5.4 Measurement, control, laboratories and the like
- 5.5 Other activities

Classification of Environment Protection Activities continued

6 Protection of biodiversity and landscape
6.1 Protection of species
6.2 Protection of landscapes and habitats, of which
6.2.1 Protection of forests
6.3 Rehabilitation of species, populations and landscapes
6.4 Restoration and cleaning of water bodies
6.5 Measurement, control, laboratories and the like

7 Protection against radiation (excluding nuclear power stations and military installations)
7.1 Protection of ambient media
7.2 Measurement, control laboratories and the like
7.3 Other activities

8 Research and development
8.1 Protection of ambient air and climate
8.1.1 For the protection of ambient air
8.1.2 For the protection of atmosphere and climate
8.2 Protection of ambient water
8.3 Waste
8.4 Protection of soil and groundwater
8.5 Abatement of noise and vibration
8.6 Protection of species and habitats
8.7 Protection against radiation
8.8 Other research on the environment

9 Other environmental protection activities
9.1 General administration of the environment
9.2 Education, training and information
9.3 Activities leading to indivisible expenditure
9.4 Activities not elsewhere specified

Appendix 2 – Government Purpose Classification

GPC(a) code	Former GPC(a) code	Activity	Description
273	731	Household garbage	Administration, regulation and support of household garbage, collection and disposal services.
	723	other sanitation	Administration, regulation and support of sanitary services other than household garbage such as the disposal of industrial waste and radioactive waste and cleaning of streets and gutters.
	733	Sewerage	Administration, regulation and support of sewerage collection, treatment and disposal operations. Includes assistance for development, expansion and operation of effluent drainage systems and deep main town systems.
	734	Urban stormwater drainage	Regulation, support and operation of urban stormwater drainage services such as the linking or lining of creeks and provision of open or deep draining systems.
	739	Protection of the environment n.e.c.	Administration, regulation and support of specific activities which the other detailed level project codes do not cover. These activities include the development and operation of monitoring equipment for measuring air and noise quality. This category should be treated as a non-specific category.

(a) Government Purpose Classification.