

Submission from Australian Bureau of Statistics
to Productivity Commission inquiry
'Implementation of Ecologically Sustainable development by Commonwealth
Departments and Agencies'

The Australian Bureau of Statistics (ABS) recognises the ESD requirement for the integration of economic and environmental considerations and the consequential need for the integration of supporting information systems.

ABS 's legislative authority and role in providing information to support decision making is describe in appendix A. The role ABS has played to date in providing environment related information and compiling integrated environmental and economic statistics including our environmental accounts program is described in appendix B. The role to date has included:

- the collection of new information from households and business,
- the compilation of a range of information from both ABS and external sources into compendium type publications or as environmental accounts showing the stocks and flows of natural resources, valuing those stocks which provide an economic return and identifying the monetary flows within the economy related to environmental protection.

Our experience in compiling a range of data has been that there is a considerable amount of data available but there are a number of factors affecting its ability to be compiled into an integrated information set suitable for informing sustainable development. Access to data collected for purposes other than statistical ones are often difficult as they are not always maintained in such a way as to facilitate access by other potential users. Meta data is not always available and even information on the existence of the data is not readily available. Compatibility between related data sets is often poor as the underlying classifications, concepts and methodologies are not comparable. This can even be the case where different agencies or states have collected essentially the same data item.

There are several points in appendix A which are relevant to the use of data available in other agencies for statistical purposes. Among other things the ABS has legislative authority:

- to ensure co-ordination of the operations of official bodies in the collection, compilation and dissemination of statistics and related information, with particular regard to
 - (i) the avoidance of duplication in the collection by official bodies of information for statistical purposes;
 - (ii) the attainment of compatibility between, and the integration of, statistics compiled by official bodies; and
 - (iii) the maximum possible utilisation, for statistical purposes, of information, and means of collection of information, available to official bodies;
- to formulate, and ensure compliance with, standards for the carrying out by official bodies of operations for statistical purposes;

Activities supporting this role include working closely with Commonwealth, State and Territory administrative agencies, to providing statistics as a by-product of administrative systems.

There are other options for further ABS involvement in providing support for integrated information systems.

(a) The ABS could take a more active role in improving and utilising administrative data systems such as those held by water authorities according to ABS policy described in Appendix C. A substantial increase in this function by the ABS would require additional funding.

(b) Some other Commonwealth agencies are currently compiling statistics and data sets from a range of administrative sources. This activity could be transferred to the ABS along with the corresponding budget and skilled staff, where such activities were consistent with ABS's role. The advantages of doing so would be to improve the comparability of this statistical data with other relevant data sets, particularly with social and economic ones. As ABS's main function is the provision of data we have the appropriate expertise in the various aspects involved. In particular we have a proven record in the provision and maintenance of high quality standards. Furthermore the ABS, by law is independent of the political process. Consequently, statistics from these collections will at least be perceived as having high integrity. The whole community will have equal access.

Appendix A

Extract from Australian Bureau of Statistics Annual Report 1997-98 pp2-4

AUTHORITY AND LEGISLATION

The principal legislation determining the functions and responsibilities of the ABS are the Australian Bureau of Statistics Act 1975 and the Census and Statistics Act 1905. The functions of the ABS are defined in section 6 of the Australian Bureau of Statistics Act 1975 as follows:

‘(a) to constitute the central statistical authority for the Australian Government and, by arrangements with the Governments of the States, provide statistical services for those Governments;

(b) to collect, compile, analyse and disseminate statistics and related information;

(c) to ensure co-ordination of the operations of official bodies in the collection, compilation and dissemination of statistics and related information, with particular regard to

(i) the avoidance of duplication in the collection by official bodies of information for statistical purposes;

(ii) the attainment of compatibility between, and the integration of, statistics compiled by official bodies; and

(iii) the maximum possible utilisation, for statistical purposes, of information, and means of collection of information, available to official bodies;

(d) to formulate, and ensure compliance with, standards for the carrying

out by official bodies of operations for statistical purposes;
(e) to provide advice and assistance to official bodies in relation to statistics; and
(f) to provide liaison between Australia, on the one hand, and other countries and international organisations, on the other hand, in relation to statistical matters. The Australian Bureau of Statistics Act 1975 also established the Australian Statistics Advisory Council (ASAC). Subsection 18 (1) of the Act specifies that the functions of the Advisory Council are to advise the Minister and the Statistician in relation to:
'(a) the improvement, extension and co-ordination of statistical services provided for public purposes in Australia;
(b) annual and longer term priorities and programs of work that should be adopted in relation to major aspects of the provision of those statistical services; and
(c) any other matters relating generally to those statistical services.

All State and Territory governments are represented on ASAC, and the remaining Council members are drawn from a wide variety of organisations and interests. The Council provides valuable input into the directions and priorities of the ABS work program and is described in its annual report to Parliament. During 1997-98, six new members were appointed to ASAC, seven members retired or resigned and two members completed their membership terms. The Census and Statistics Act 1905 provides the Statistician with the authority to conduct statistical collections, including the Census of Population and Housing and, when necessary, to direct a person to provide statistical information. The Act requires the ABS to publish and disseminate compilations and analyses of statistical information and to maintain the confidentiality of information collected under the Act.

ROLE AND OPERATION

The mission of the ABS is to assist and encourage informed decision making, research and discussion within governments and the community by providing a high quality, objective and responsive national statistical service.

The ABS maintains close contact with its users through a variety of mechanisms, including advisory committees, user groups, outposted statistical officers, conferences and seminars, and day-to-day contact in the course of disseminating data. The Australian Statistician determines which statistics are to be collected, after full discussion with users, clients and ASAC, and makes the results widely available. The independent status of the Australian Statistician is specified in law, and the ABS has always received strong Parliamentary and community support. In order to provide official statistics, the ABS undertakes a large number of collections ranging from the five yearly Census of Population and Housing, to monthly and quarterly surveys that provide current economic indicators and less frequent collections from industry and households that provide detailed information on specific economic and social issues. The ABS also devotes considerable effort, in close cooperation with Commonwealth, State and Territory administrative agencies, to producing statistics as a

by-product of administrative systems. The ABS also tries to ensure that its statistical standards and concepts are applied as widely as possible.

In releasing statistics, the ABS follows long established principles that results should be made available as soon as practicable and should be equally available to all users. In recognition of the importance of free and ready access to statistics for the community generally, a large core set of statistics is made available through 528 public, technical and tertiary libraries across Australia. Complimentary copies of ABS publications are provided to members of parliament and to major news media organisations. The principal results from these publications are highlighted daily in the print and electronic media. Under the Statistics (Arrangements with States) Act 1956, Commonwealth and State statistical services have been integrated in all States since 1958 (in Tasmania since 1924). Although not covered by the Act, similar arrangements apply in both Territories. In Western Australia, South Australia, and Tasmania, the Regional Director administering the ABS Office is also the State Government Statistician. A government statistical coordination and consultative mechanism operates in most States and Territories. There is regular consultation with State and Territory governments on statistical priorities.

Appendix B

ABS Environment Statistics and Environmental Accounts program

A) ABS collections of environment data

1. The Australian Bureau of Statistics (ABS) has had a program of environment statistics since July 1991. One of the first initiatives of the new project was to identify existing ABS collections that would be useful for gathering environmental information. The early work focused on obtaining a place on the Monthly Population Survey (MPS) of households, and also to use existing annual business collections to gather data about environmental protection expenditure.

2. This paper briefly describes the use of these collection vehicles and also the use of other regular and ad hoc collections to obtain relevant environmental data. Some of these other collections include the Household Expenditure Survey, Survey of Motor Vehicle Use, Agricultural Census and Waste Industry Survey. Much of the data collected by ABS can be used in the analysis of environmental issues, however I will not elaborate in this paper. A couple of examples are the identification of population growth patterns by biogeographical regions to explore population pressures on different types of ecosystems; use of vehicle kilometres travelled in the calculation of greenhouse gas emissions; and cause of death data to identify the impact of the environment on the population, through natural disasters and environmental degradation, for example through loss of the ozone layer. In addition, other data systems compiled from a range of source data, for example input-output tables, overseas trade data, are used

in analysis of environmental issues.

2. Household Surveys

The ABS Monthly Population Survey (MPS) has as its main purpose the collection of data to compile unemployment statistics. However, the infrastructure is used to allow supplementary surveys each month. There is intense lobbying for these few valuable 'slots' as the sample size is quite large and the methodology provides high quality information. One of the earliest activities of the Environment Statistics Section was to identify user requirements for data from households related to environmental issues, and to obtain a regular place in the survey program.

4. Population Surveys have been conducted since 1960 to collect labour force and other characteristics of the population. The surveys have been undertaken on a monthly basis since 1978. The MPS is used principally to collect a wide range of statistics about the Australian civilian labour force (e.g. number of employed and unemployed persons, hours worked, occupation and industry, and duration of unemployment). It is a requirement that supplementary survey topics should not prejudice the timely and accurate collection of labour force data.

5. Since the beginning of 1997 most of the data gathering for the MPS has been through telephone interviewing, with only the first interview with a new responding household being in person. The change from personal interview to telephone interview has required some changes to methods. In the past a number of questions in the environmental issues survey has been helped by the use of 'prompt card', that is a written list from which the respondent chooses one or more categories. An example is the list of items that are recycled, such as glass, plastic, paper, etc. With telephone interviewing, different approaches have to be adopted to replace 'prompt cards'.

12. Some data on environmental concerns of households was collected in 1986, in conjunction with a survey on use of national parks. Three collections from households have been completed and the fourth survey (scheduled for March 1998) is being developed. Over recent years, the environment project has been successful in preparing submissions to achieve the initial allocation of an annual 'slot' from 1998 onwards. There are regular reviews of these allocations and changing priorities and budgets means that no survey is really secure in its 'slot' allocation for the latter 2 years of the planning triennium.

13. Topics covered in May 1992 were: ranking of environmental concerns; items recycled and methods used; views on packaging; environmentally friendly products; involvement in environmental activities; sources of environmental information; and visits to national parks.

14. Topics in June 1994 were: repeat of ranking of environmental concerns; number, age and use of household appliances; sources, use and conservation

of water; and sources, use and conservation of energy.

15. Topics in 1996 survey (conducted in March and April) were: repeat of ranking of environmental concerns; ranking of environment amongst other social issues; items recycled and methods used; household hazardous waste disposal; transport and motor vehicle usage; and car maintenance.

16. Topics for March 1998 were: ranking of environmental concerns; ranking of environment amongst other social issues; views on packaging; use of environmentally friendly products; involvement in environmental activities; sources of environmental information; visits to national parks; and sources, use and conservation of water.

17. The sample used for the Surveys of Environmental Issues is a "half cluster". This means that approximately 18,500 dwellings are included in the sample, with the benefit being that the available interviewer time with each household is doubled.

18. The survey design requires that certain questions be asked by "personal interview". For most survey topics, "any responsible adult" (ARA) can be expected to be able to answer the questions. The situation covers questions such as what does the household recycle, how does the household dispose of hazardous household waste. For 'personal interview' questions, a further selection is necessary to identify a particular person in the household to answer those questions. The final number of "persons" selections was therefore about 18,500, and this selection is based on birthday. The individual, aged 18 years or older, whose birthday is next after the interview date, is selected.

21. ABS Catalogue 4602.0 Environmental Issues: People's Views and Practices is the output from this collection activity. Four editions have been released to date.

3. Business surveys for environmental protection expenditure

22. Questions about environmental protection expenditures have been asked in various ABS business collections since the 1990-91 financial year. Over that period the coverage has been extended from the original Mining and Manufacturing industries to a complete coverage based on the use of existing ABS collections, including Agricultural Finance Survey (AFS), Economic Activity Survey (EAS), Service Industries Surveys, Manufacturing Survey, Mining and Utilities Censuses.

23. The underlying framework for the questions was the OECD Pollution Abatement and Control model. This approach is being superseded by one developed by EUROSTAT, called SERIEE, which is based on the 'satellite account' concepts of the recent SNA revision. Environmental protection expenditure satellite accounts (SERIEE) are an activity based set of accounts spanning the whole economy. The accounts aim to quantify

environmental protection activity undertaken by: Specialised producers, whose main activity relates to environmental protection, such as waste management, sewage treatment and environmental consultancy services; Secondary output from non-specialised producers, those who produce environmental protection services as secondary to some other non-environmental activity, such as a transport company that transports some waste; and Ancillary output from a non-specialised producer, those who engage in environmental protection activities as part of the production of non-environmental goods or services. This includes most manufacturing, mining and agricultural businesses.

24. Better identification of the first two on an ongoing basis is an issue yet to be satisfactorily resolved. For specialised producers a higher rate of sampling in waste and sewage is the preferred option. The 1996-7 waste industry survey and an extended sample in the 1996-97 utilities survey of the water and sewerage industry will enable analysis of this matter for the first time. The waste industry survey may also assist with investigation of the secondary output issue where the transport industry is a significant player with respect to waste collection.

25. With the 1995-6 collection round, the questions were adapted or extended to cover the data requirements of SERIEE. A separate collection form was instituted as a supplement to the main form in each of the subject collections, except the AFS (because this is mainly administered by field interviewer, the environmental protection expenditure questions remained as part of the main form). The survey was titled Waste Management and Environment Protection Survey so that respondents would be clear that waste expenditures were to be included.

26. The strategy to be adopted for the 1996-97 collection is a repeat of the 1995-96 surveys with some modifications to take account of the different industries being covered. There are no alternative sources of environmental protection expenditure information available in Australia. The information has been sought annually for a number of reasons:

a) the collection has been evolving as the coverage is increased and further development undertaken eg new framework;

Data items

27. There are a number of groups of items sought on the various collections, with some variation depending on the industry being approached. For specialised producers, the data item requirements are very close to the standard set of data items collected for industry analysis. The following is the most complete set of data items for identifying ancillary output from a non-specialised producer, as used in mining and manufacturing collections

- Current expenditure on waste handling and other environmental protection

- a) Who provides the service
 - Payments to government
 - Payments to private contractors
 - Costs of work done on own account
- b) Environmental domain (according to SERIEE model)
 - Waste water/water pollution
 - Solid waste
 - Non-hazardous
 - Hazardous
 - Air
 - Soil and groundwater
 - Noise and vibration
 - Biodiversity and landscape
 - Other environmental protection

- Government subsidies and capital grants for environmental protection purposes.
- Receipts from environmental protection services carried out for another business
- Capital expenditure on waste handling and other environmental protection
 - a) Split between
 - end-of-line techniques
 - change-in-production-processes
 - b) Disaggregate total capital expenditure on environmental protection by
 - purchased
 - own account
 - c) by environmental domain (as for current expenditure).

Statistical output

28. ABS Catalogue 4603.0 Environmental Protection Expenditure, Australia is the output from this collection activity. Three editions (1990-91, 1991-92 and combined 1992-93 and 1993-94) have been released to date, with compilation work under way to produce the next publication covering 1994-95 and 1995-96. The publication also carries an analysis of expenditures by the public sector (using budget papers and ABS public finance data) and a limited analysis of household sector expenditures, based on ABS activity data with price information from external sources.

Survey design

29. The following table represents the situation for 1996-97 collections concerning sample sizes. Where sample surveys are possible, the designers are seeking to provide the best design to achieve estimates at 2 digit ANZSIC (the industry classification) level.

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Collection	Unit	Sample size
Agricultural Finance Survey	MU	2,500
Mining Census	MU	500
Utilities	MU	500
Manufacturing	MU	4,500
Economic Activity Survey (EAS)	MU	7,000
Construction Industry	MU	2,500

4. Other ABS Collections

31. In this section, other ABS censuses and surveys that have been used to collect information relevant to environmental issues, are briefly described.

Agricultural Census

32. Up until the 1996-97 season, the ABS has conducted an annual Agricultural Census. [Budget reductions mean that the annual census will likely be replaced by a 5 yearly census with an annual survey in the intervening years, commencing with the 1997-98 season.] Agricultural activity has a significant impact on the use of land and water and so the collection of information about production, use of natural resources, and management practices provides valuable information about the impact of this sector on the environment.

33. The 1996-7 ABS agricultural census was sent to approximately 150,000

farms. The census gathers information on area and production of broadacre and horticultural commodities, demographics of livestock, information for tracking land sales and acquisitions (in order to keep an up-to-date list of farms) and some data about farm inputs, for example fertilisers. In recent census, information about farm management practices, such as minimum tillage, environment related topics such as fencing to protect native vegetation, and emerging issues, such as agroforestry, were collected.

34. Each agricultural business is geo-referenced to a Statistical Local Area (SLA). SLAs in most rural areas are the same as a Local Government Area and, being based on administrative boundaries, are frequently not homogeneous in terms of land use, climate, topography or economics. "Small area" statistics from the agriculture census are published at the SLA. Many users of agricultural statistics have identified the need for output from the census to be published for flexible, user defined areas which are homogeneous in terms of the particular users application. It has long been recognised that 'geocoding' farms to latitude/longitude would enrich the agricultural statistics as an information source. In fact, the south-west part of Western Australia was 'geocoded' some 15 years ago (and although the coding has not been updated) and there is still considerable use of that information. ABS is conducting a trial of a method to geocode the whole farm register to facilitate better linkage between agricultural activity and other information, both environmental and social.

35. The following list shows some of the topics covered in recent agricultural censuses that have been 'sponsored' by the Environment Statistics program. It should be recognised that the topic title often includes quite a range of data items.

1. Use of insecticides, herbicides and fungicides;
2. Area of native vegetation protected from domesticated animals;
3. Area of degraded land, as perceived by the farmer;
4. Source of information about sustainable land use;
5. Tillage methods;
6. Organic farming, particularly has the producer been certified by an approved organisation;
7. River or creek frontage on the holding and the length protected from grazing animals;
8. Planting of trees, whether from seedling or seed, and main reasons eg to control irrigation salinity, act as windbreak;
9. Disposal of crop stubble;
10. Fallow land management techniques;
11. Cropping systems used, eg double cropped, crop rotation, spelled;
12. Decline of soil fertility, particularly what made the farmer aware and strategies adopted.
13. Source of Water (area irrigated using 7 specified sources)
14. Flood Irrigation (area flood irrigated, re-use of water)
15. Quantity of water used on irrigated crops.

Household Expenditure Survey

36. The ABS Household Expenditure Survey (HES) collects detailed information about expenditure, income and household characteristics, about every 5 years. The last survey was conducted for 1993-94 financial year and involved 8,400 households resident in private dwellings. Information was collected during a personal interview and from diaries in which survey participants recorded all their expenditures over a two week period. Interviews and diary filling were equally spread over the financial year.

37. The Environment Section's interest in the HES relates to the identification of expenditure by households on environmental protection as part of the environmental accounts program. The following list contains some additional items proposed for the next HES collection (1998-99). Our expectation is that we will not have many of these included because the commodity list is already large and coding is a significant effort. However, this discussion is included to show the range of collections that should be considered for obtaining environmental data. The list of part of the submission is: Carburation adjustment services; Exhaust pipe adjustment services; Charges for sewerage net works; Waste water charges; Installation of waste water systems; Charges for collecting septic tank sludge; Water tanks; Trash bags, bins, wheeled rubbish containers, compost bins; Noise protective windows; Donations for environment protection groups; Publications about environmentally sound behaviour.

Waste Industry Survey

38. The ABS conducts a rotating series of Service Industry collections. Over the years the development activities associated with these industry collections, for example detailed form pilot testing, have been used to explore environmental protection expenditures. For the 1996-97 financial year, the Waste Industry (ANZSIC Class 9634) is the subject of a detailed collection for the first time. The Environment Section is particularly interested in this industry because of its relevance to the SERIEE based environmental protection estimates, and also because of the opportunity to collect some physical data about waste for use in the waste account. As well as conducting the collection in Class 9634 (the 'industry component'), the ABS is running a parallel collection of Local Government activity in waste collection and disposal (the 'non-industry component').

39. As at June 1997, there were 1,660 businesses on the Business Register with ANZSIC 9634 and 728 local government units. Given that the waste survey has not been conducted previously, the preferred option was to conduct a census of all units. However, given limited processing resources, it was decided to take a 40% sample of businesses with ANZSIC 9634 and employment < 5, a 50% sample of Local Government units identified as aboriginal councils, and to completely enumerate all other units. In practice, this means that the sample size is 913 units for the industry component (a fraction of 55%) and 709 units for the local government survey (a fraction of 97%).

40. The range of data items in this survey include: employment; income (eg from activities associated with waste management, interest); expenses (eg wages and salaries, workers compensation, contract expenses, purchases); assets and liabilities; capital expenditure; and quantities of wastes and recyclables. The income questions are split into income from collection and transport of waste, collection and transport of recyclables, treatment/processing and/or disposal of waste, treatment/processing and/or sale of recyclables, and waste management consulting services. The collection and transport of waste items are further split into solid (domestic and municipal waste, commercial industrial construction and demolition, other); liquid; sludge; and other. The quantities data items include waste received and disposed of at landfills (split into solid, liquid and sludge); quantity received at waste liquid treatment plants; and quantity received at other facilities. A further split between hazardous and non-hazardous wastes is also obtained. The quantities of recyclables sold is obtained for paper and cardboard, glass, mulch and compost, oils, concrete, plastics, aluminium, ferrous metals, other metals and other items.

B) ABS activities on compiling Environment and Sustainability Data

1. ABS work concerning indicators has included a number of activities, such as the preparation of compendia and thematic publications of sets of indicators, data collections that provide the raw data for indicators, involvement in wider government processes such as State of the Environment reporting and the UN Commission for Sustainable Development indicator exercise, and, more recently, consideration of indicators in the context of sustainable development, the issues surrounding measures of well-being and the development of information systems that link environmental and economic accounts. A few of these activities will be covered in this section.

Compendia and thematic publications

2. Over the past six years, ABS activity has been to draw together a range of information concerning environmental issues and to present that information using various presentational frameworks. The publications provide a range of indicators about the topics covered, as well as a directory to more detailed ABS and non-ABS data. Four publications fall into this category of work and they are briefly described here.

(a) Australia's Environment: Issues and Facts (ABS Cat No 4140.0, released in June 1992). This was the ABS's first environment publication and was released at the time of the Rio Earth Summit in 1992. The UN Framework for the Development of Environment Statistics (FDES) was the basis for the presentation. Broadly, the framework is a matrix with the rows showing the environmental media, such as atmosphere, flora, fauna, water, human

settlements; and the columns classify the interactions between society and the environment in the sequence of 'action, impact and reaction'. A final information column covers inventories, stocks and background conditions to add context to the other categories.

(b) *Australians and the Environment* (ABS Cat No 4601.0, released June 1996). This compendium publication was intended to be the subsequent edition of the book described in (a) above. The title reflects a changed approach to focus more closely on the relationship between Australia's environment, its economy and society. The book followed the premise of sustainable development - that environment, economy and society are interdependent. The presentation framework was based on Statistics Canada's Population Environment Process (PEP) model. This model shows how the economy and population interacts with the stock of natural assets and natural processes. Specifically, it explores the resources and services that flow from the environment to the economy and population, and the impacts by the economy and population on the environment that result in changes to natural assets and processes.

(c) *Australian Agriculture and the Environment* (ABS Cat No 4606.0, released September 1996). This thematic publication also followed the PEP framework and presents information for a range of indicators, some of which overlap with the NCPISA project (mentioned earlier) and the OECD set of agri-environmental indicators.

(d) *Australian Transport and the Environment* (ABS Cat No 4605.0 released June 1997). Transport systems play a major role in the economic life of industrialised countries and in the daily lives of their citizens, as well as having a significant detrimental effect on the environment. This thematic publication uses the OECD 'Pressure - State - Response' framework to present a range of information about the transport issue.

Indicators linked to environmental accounts

3. In 1995 the ABS commenced a project to develop environmental and resource statistics in an integrated set of accounts. These will be comparable with, and relatable to, the national economic accounts. The development will achieve a number of objectives including the provision of an information base for the analysis of a range of policy issues, the contribution of industry sectors to environmental problems and the likely effects of environmental policy measures. One of the parts of the project is to explore issues associated with the derivation of indicators related to sustainability concepts (eg sector contributions to pollution).

4. The ABS view is that a range of indicators could be derived from the information system assembled for the stocks and flows tables of the various resource accounts.

Possible Indicators of Sustainable Development Publication

5. The ABS has decided to halt further work on the development of

thematic and compendia publications. These books are resource intensive to research and produce, and ABS wants to commit resources, at this time, to the environmental accounts project and to a more strategic approach to indicator work. The State of the Environment Reporting process will provide a range of environmental indicators that describe the state/condition of environmental media, the major pressures/activities that lead to the observed condition, and societal responses. There are a number of sectoral processes (described earlier) to produce indicators relevant to sustainable development in those sectors. It is imperative that efforts not be duplicated.

6. As part of the process to determine the ABS role with respect to sustainable development indicator work, a discussion paper is being drafted, and ABS has also part-sponsored a national conference (see next section). The discussion paper will review a wide range of organisational frameworks for indicators of sustainable development; provide background about the definition of sustainable development, selection criteria for indicators, and limitations of indicators; and propose a first set of indicators. After considerable consultation, the intention is for the ABS to assemble the data and produce a publication on a regular basis. The work in the United Kingdom has been a significant influence on ABS deliberations.

7. The proposed set of indicators are organised in a framework which reflects the goals of sustainable development, initially sourced from Agenda 21 objectives, namely economic prosperity, social well being and intra and inter generational equity, optimal use of non-renewable and renewable resources, and that human activities minimise damage to the earth's carrying capacity, human health and biodiversity. The following table provides a possible set of goals, key issues and some examples of indicators.

Table 4: Example of Goals, Issues and Indicators for Sustainable Development

Sustainability Goal	Key Issues	Key Indicators
Economic Prosperity	Economic growth	Gross Domestic Product
A healthy economy should be promoted and maintained to foster a good quality of life, while at the same time protecting the environment.	Employment and Inflation	Gross Domestic Product per capita.
	International Trade	Employment
	Environmental Protection	Employment by sectors
	Expenditure	Long term unemployed
		Inflation
		CPI
	These issues enable an appraisal of the health and growth of the economy, an	Debt, savings, investment
		National debt as a % of GDP

indication of the	Savings
contribution by	International Trade
different sectors,	Value of Imports. and
and the important	exports
social component of	Overseas aid as a % of
employment.	GDP
	Environmental Protection
	Expenditure
-----+-----+-----	
Minimise Damage to	Environmental
Environmental	Quality
Carrying Capacity	Air Quality
	Freshwater and River
Damage to the	Systems
earth's carrying	Marine and Estuarine
capacity should be	Waters
minimised in order	Waste
to maintain or	Climate Change
enhance the life	Ozone Depletion
support services and	Agricultural
productivity of the	Productivity
earth.	Population
	Water
	These issues enable
monitoring and	Water quality
appraisal of	Contaminants in Fish.
environmental	Volume of Untreated
quality, the	Sewerage
maintenance and	Freshwater and River
amenity of the	Systems
earth's life support	Total phosphorus
functions, and the	Number & diversity of
effect of human	macroinvertebrates
population growth	No. of Catchment
and corresponding	Management Groups
levels of economic	Waste
activity	Space consumed by
particularly in	landfill sites
terms of land use	Household waste - per
and waste on the	capita
sustainability of	Industrial waste per
the earth's carrying	unit GDP
capacity.	Climate Change
	CO₂, CH₄
	(subscript: 4) and N
	(subscript: 2)O
	emissions
	Deforestation Rate
	Ozone Depletion

		Ozone Depleting	
		Substances emitted	
		Agricultural	
		Productivity	
		Pesticide Usage	
		Organic Matter Content	
		in soils	
		Distribution and Extent	
		of Soil Salinity	
		Soil Erosion	
		Population	
		Population density	
		Fertility Rate	
		Net Migration Rate	
		Urban Population Growth	

Fulfilment of Basic	Income Equity	Income Equity	
Human needs, social	Employment Equity	% Families living below	
well-being,	Food Supply	the poverty line	
community	Community	Average annual	
participation and	Participation	wages/salaries	
Intergenerational	Education Equity	Employment Equity	
and	Provision of Public	Labour Force	
Intra-generational	Goods	Participation Rate	
Equity.	Community Safety	Unemployment Rate	
	Food Supply		
The importance of	The issues listed	Diet - Nutrient intake	
human and social	here enable an	Community Participation	
capital is	analysis of how well	% of adult population	
emphasised as an	basic human needs	who contributed time to	
integral component	are being met in	community	
of sustainable	terms of food,	Educational Equity	
development. It	shelter, health and	Literacy Rate	
follows that the	education and a	Secondary School - Year	
fulfilment of basic	measure of the	12 Retention Rate	
human needs and	social well-being of	Provision of Public	
social well being	our society. Some of	Goods	
are important. The	the issues also	Government Expenditure	
theme of inter and	assist an	on Health, Education,	
intra generational	understanding of	Employment Programs,	
equity is a	whether the needs of	Housing	
fundamental	all groups in our	Community Safety	
principle of	current generation	Incidence of Violent	
sustainable	are being met, and	Crime.	
development and aims	ensuring appropriate	Incidence of property	
to ensure that	measures are in	related crime	
current human	place for the		
activities do not	fulfilment of the		

disadvantage or hinder the ability of future generations to meet their needs nor do they disadvantage or deny groups or societies in our current generation the ability to meet their needs.

Optimal Use of Non-renewable Resources
 Energy Use Land Use Energy Use Depletion of Fossil Fuels
 Contribution of energy Non-renewable resources should be used optimally to ensure the sustainability of non-renewable resource supply for future generations. The impacts of the use of non-renewable resource use, particularly that of fossil fuels should be minimised.

The issues listed here enable an % share of energy consumption from renewable resources of the Vehicle km travelled otherwise of the use Market share of unleaded petrol of non-renewable resources. In Land Use Conversion of agricultural land to residential development Land Cover Change Mineral Resources Depletion of mineral stock Recycling of minerals

Optimal Use of Renewable Resources
 Forests Fisheries Forest Cover Water Timber production Fisheries
 Renewable resources need to be used so that human use of renewable resources is not greater than the natural regenerative capacity of these resources.

Water Fish stocks above minimum biological acceptable level Water Consumption by sector % of available water, by drainage basin

Minimise Risk to Mortality Mortality

Human Health	Water Quality	Infant Mortality
Pollution Abatement	Life Expectancy	
It is important that	Activities	Water Quality
the impacts of human	Life Style Factors	Bathing Water Quality
activities on the	Sewerage Contamination	
environment do not	The above issues	Life Style Factors
adversely affect	allow an assessment	% population who are
human health.	of the impact on	smokers
	human health of	Average daily
	environmental	consumption of alcohol
		Use of illicit drugs
		Participation in
		exercise activities
		Average daily nutrient
		intake
		Proportion of infants
		immunised
-----+-----+-----		
Minimise Damage to	Habitats and	Habitats and ecosystems
Biodiversity	Ecosystems	Habitat Fragmentation
Plants and Animals	Designated Protected	
Maintenance of	Areas	
biological diversity	To conserve the wide	Representativeness of
is important because	variety of species	ecosystems in protected
it provides critical	and habitats and	areas
processes that make	ensure that	Plants and Animals
life possible; it is	commercially	Number of native
important for	exploited species	plant/animal species
ethical, aesthetic	are managed	-endangered or
and cultural	sustainably.	vulnerable
reasons, and it is		Distribution and
important for		Abundance of major
economic reasons.		environmental pest
		plants and feral animals
-----+-----+-----		

Conference 'Measuring National Progress'

8. In July 1997, the ABS co-sponsored a conference "Measuring national progress: Is life in Australia getting better, or worse?". The conference considered indicators of national performance, and what they reveal about the quality and sustainability of life in Australia. The point of departure for much of the debate was the adequacy of Gross Domestic Product (GDP) as a measure of national well-being. A number of composite indicators that adjust GDP to take account of a wide range of issues have been proposed. "Green GDP", the Genuine Progress Indicator (GPI) and the Index of

Sustainable Economic Welfare (ISEW) are examples.

9. The presentations to the conference covered a range of topics, including:

- a discussion of the strengths and weaknesses of the GPI
- the concept of citizenship, and the development of benchmark/indicator systems
- accountability at local and global scales
- measures of economic activity
- indicators of income inequality, and income poverty
- indicators associated with the work-place - paid employment, hours of work
- indicators of well-being for children
- population health and well-being, and the definition of health that incorporates the concepts of physical, mental, social and spiritual well-being
- measuring social capital
- quality of life and standard of living
- indicators about the state of the environment, with focus on biological diversity
- the compilation of an Australian ISEW.

10. At the conference, the ABS presentation put forward the view that the preferred approach is to develop a set of indicators, linked by an underpinning statistical framework. It agreed that GDP was not sufficient for analysing national progress and that this had never been the intention, although there is considerable focus on GDP results in that context. Also, the ABS view is that any other composite indicator may be effective in capturing headlines, but will have difficulties with interpretation and compilation. The ABS conclusion is that the 1993 System of National Accounts, with its support for satellite accounts and social accounting matrices, provides the most suitable framework. The ABS has an inclination towards the work of the Statistics Netherlands on SAMs.

Concluding Remarks

11. The ABS is at the launching point of a new direction concerning indicators. The organisation has a vast range of social and economic data, and other agencies in Australia have large databases of environmental information. A process is under way, guided by state of the environment reporting requirements, to identify the indicators needed in the environment regime. Then, there will follow the considerable work to assemble that data. The ABS data series already have an established conceptual base in terms of definitions and classifications, and in some cases the same conceptual base which allows integration.

12. An exercise, modelled on the UK processes and framework (described above), could be pursued to bring into the public arena a wide range of

indicators specifically related to the goals of sustainable development. This effort would draw on existing information within the current frameworks. The resource requirements, whilst still significant in terms of the size of the ABS Environment Statistics Unit, would be able half of those required to undertake a compendium publication of the size previously produced (about 400 pages).

13. Pursuit of the initiative mooted at the "national progress" conference would be longer term and involve research into the construction of SAM's, and investigation of the latest Netherlands work called SESAME - System of Economic and Social Accounting Matrices and Extensions. SESAME is described as a statistical information system in matrix format, from which a set of core economic, environmental and social macro-indicators are derived. This exercise would be more resource intensive and require a collaborative effort across many areas of the ABS.

C. ABS work on Environmental Accounts

1. The Australian Bureau of Statistics (ABS) began work on tasks related to environmental accounts soon after the establishment of its program of environment statistics in 1991. The initial work was undertaken within ABS budget resources. In the 1995 Federal Government budget, further resources for the environmental accounts project were made available. Although it was recognised that the project would be a long term one, the proposal for additional funds covered only a first phase of four years. The following extract from Treasury Portfolio Budget Statement, provides a description of the project.

"Environmental and Natural Resource Accounting

In line with international developments, the ABS will develop environmental and resource statistics in an integrated set of accounts. These will be consistent with, and relatable to, the national economic accounts. The development will achieve a number of objectives including the provision of an information base for the analysis of a range of policy issues, the wider implications of economic growth, contribution of industry sectors to environmental problems and likely effects of environmental policy measures.

The accounts will be developed in the following stages:

- continue survey work to construct accounts on environment protection expenditures by sector;
- develop resource accounts in physical units showing stocks and flows and covering both economic and 'environmental' natural assets;

- derive aggregate indicators related to sustainability concepts (eg sector contributions to pollution).

The development will assist in assessing environmental costs as well as economic growth and income. It will complement State of Environment reporting. Each step in the program will produce results which will be widely useful. The resulting statistics will be published and therefore open to public evaluation."

2. In Australia, the demand for environmental accounts was expressed in the National Strategy for Ecologically Sustainable Development (ESD), a Council of Australian Governments endorsed approach to sustainable development. This strategy, signed by governments in December 1992, is in addition to UNCED Agenda 21 objectives. Objective 14.2 of the strategy includes: "To enhance the quality, accessibility and relevance of ESD-related data governments will:

- continue work on conceptual issues underlying the long-term development of satellite or supplementary accounts to the Australian National Accounts
- review the national and sector balance sheets to the Australian National Accounts".

3. This paper reports on the ABS environmental accounts project with the focus on achievements to date, and future plans. Not all of the ABS work in physical resource accounts can be reviewed here, so just a couple are mentioned. Before getting to the detail, the next section explores some background relevant to the Australian situation.

2. Background

4. The current situation (at August 1997) is that quarterly and annual national accounts are published by the ABS based on the principles in the 1968 edition of the UN's System of National Accounts (SNA). With the 1993 System of National Accounts (SNA93) now the agreed source for the specification of national accounting, the ABS is progressing a work program to implement changes to the "core" set of accounts. The changes are described in the ABS publication, Discussion Paper: Introduction of Revised Statistical Standards in ABS Macro-economic Statistics (Cat No 5245.0, released in December 1994).

5. SNA93 addresses some links to the environment and provides the outline of a framework (see SNA93, Chapter 21 - Satellite analysis and accounts) to build such links. This is further elaborated in the companion handbook to SNA93 describing the system of environmental economic accounts (SEEA), titled Integrated Environmental and Economic Accounting. The following subsections provide a brief overview of components of the ABS environmental accounts project.

National balance sheet

6. A balance sheet (SNA93, paragraph 13.1) is "a statement, drawn up at a particular point in time, of the values of assets owned and of the financial claims - liabilities - against the owner of those assets".

Balance sheets are an integral part of the overall system of national accounts and can be drawn up for institutional units or sectors or for the total economy. The balance sheet provides an indicator of economic status - ie the financial and non-financial resources at the disposal of the economy.

7. SNA93 recommends that the core accounts should include, in the balance sheets, the market value (or proxies) of natural assets such as forests, water, fisheries, land and subsoil assets. Consistent with the rest of the core accounts, balance sheets only relate to assets within the economy and exclude non-monetary values of natural assets such as environmental and aesthetic values (eg biodiversity, clean air). Balance sheets utilise the stock part of the physical accounts to which monetary values are assigned. On this topic, the ABS has published Australian National Accounts: National Balance Sheet (Cat No 5241.0) which includes subsoil assets, land and forests, and standing timber, for the years 1989-90 to 1994-95.

Physical accounts

8. Natural resource accounting (SNA93, paragraph 21.130) "focuses on physical asset balances - ie, opening and closing stocks and changes therein - of materials, energy and natural resources. Where applicable (for selected pollutants) it may also include changes in environmental quality of natural assets in terms of environmental (quality) indices". Generally, the indicators used to construct these environmental quality indices are not readily amenable to being expressed in monetary terms.

9. Physical accounts (stocks and flows expressed in physical units) allow the tracking of material and energy flows through the economy and their eventual release as wastes or emissions. They include accounts for a range of natural resources (minerals, energy sources, water, forests, fish) and may include accounts for land cover and land use, for wastes and emissions, and for biodiversity. Physical accounts typically embody considerable sectoral and industry detail and often are explicitly linked to the input-output (I-O) accounts.

10. An early step by the ABS in this part of the environmental accounts project was the development of energy 'balances' (or accounts) showing stocks of energy resources and flows of energy products, in physical units. To present the status of energy resources and changes over time, the stock account consists of five components: Opening Stock, Closing Stock, Net Change, Production and Adjustment. The flow accounts show conversion of primary energy products to electricity and other secondary forms, together with end use by industry and estimates of emissions. The publication Energy

Accounts for Australia (ABS Cat No 4604.0) was released in November 1996.

11. The process followed by the ABS for developing the physical resource accounts is:

- Develop a scoping paper for the particular account. The scoping paper is a specification of the work to be done and covers matters such as the structure of the tables; description of all data items and classifications; data sources and technical expert contacts; linkage to the Input-Output system; spatial and temporal disaggregation of the tables; further research possibilities and issues still to be resolved.
- The scoping paper is presented to the ABS's Environment Statistics Advisory Group (ESAG) for discussion and revisions are made as needed. At this point, there is further and more extensive contact with technical experts to refine the specification.
- After revision the paper is circulated widely to people and organisations interested in the environmental accounts project.
- Whilst the consultation process is under way, ABS commences the data gathering phase to identify what information is available, any issues with the data such as quality and comparability because the data is usually from a non-ABS source, and to begin compilation of the tables of the account. This phase is expected to require significant resources for each account.
- In due course the results of each account compilation will be published by the ABS as a catalogued report with the first edition possibly bearing the title of "experimental". All the publications of the environmental account family will be recognisable as a related set of publications.

Environment Protection Expenditure

12. ABS data collection work is described in the paper for the 1997 ECE/Eurostat Work Session on Methodological Issues of Environment Statistics titled "Data Collection using ABS surveys: How to get environmental information using existing collections". Briefly, the ABS will be following the SERIEE framework (from 1995-96) after having used the OECD Pollution Abatement and Control (PAC) framework for its earlier work. Data is available from 1990-91 on an annual basis, with an increasing industry scope over the years.

13. In the following sections some more detail is given on two of the physical accounts. As scoping papers have not been finalised for the wastes, and the biodiversity and land-use/cover accounts, I have not included any information. Also, many of the accounts have a similar structure to their stock and flow accounts, with only the detailed

classifications being different. Therefore, I have provided only some of the details about the minerals and water accounts. The fish and forest accounts are also at the data compilation stage.

14. In addition, the reader should appreciate that our starting point was to identify and describe the 'ideal' requirement for each account. It is recognised that the data gathering phase will lead to compromises in what can be finally included, because of limitations to do with the availability of data or data quality.

15. The paper concludes with an outline of our plans for the final years of the first phase of the project.

3. Mineral Account

16. The Mineral Account will contain tables showing:

- stocks, by category of geological/economic assurance, and mineral; and
- flow of minerals through the sectors of the economy.

The data collected will be compiled into two main sets of tables referred to as the minerals stocks table and the minerals flow table.

Minerals Stock Tables

17. These tables are based on the Non-financial Asset Account described by SEEA. The stock table consists of five components which will show the status of mineral resources and changes over time:

Opening Stocks Row 1
Depletion Row 4
Adjustments Row 10 - 12
Other Changes Row 14 - 18
Closing Stocks Row 19.

18. The estimates of mineral resources depend upon the system of classification used. The ABS is proposing to use the McKelvey Box classification, an example of one of the categories in this classification is 'economic demonstrated resources (EDR)'. One exception is that uranium is classified by the OECD Nuclear Energy Agency and the International Atomic Energy Agency under the terminology 'reasonably assured resources' (RAR) and 'estimated additional resources' (EAR).

19. The ABS has produced tables based on a range of selected minerals. There are over 30 in the list, including bauxite, coal, copper, diamonds, gold, iron ore, mineral sands, petroleum crude oil, tin, uranium and zinc. Initially it was proposed to compile tables for EDR at the national level only, however, the user consultation phase identified a requirement for State level data. Also, for certain minerals, users sought information in addition to EDR, namely sub-economic demonstrated and inferred resources for a range of minerals, and hypothetical resources for petroleum and gas.

Minerals Flow Tables

20. Compiling data by commodity produced and consuming industry enables presentation within an Input Output framework. The Input Output framework can be augmented to show flows from the natural environment to economic activities and flows of residuals, from the production process, back into the environment.

21. Minerals flow tables provide information on production, conversion and consumption for the reference period. To derive this table it will be necessary to include data on imports and exports, to calculate total stocks, changes in stock levels and to specify end-use or consumption for each mineral. The flow tables require completed input-output matrices. In Australia, these are now available up to 1993-94, with subsequent years still being compiled. A preliminary flow table has been compiled for the 1992-93 financial year and work is proceeding on the 1993-94 table.

4. Water Account

22. Availability, quality and use of water is a significant issue in Australia. Each State and Territory government undertakes water resource monitoring and assessment. The objective of the water account project is to provide a mechanism to provide a consolidated information system linking the physical data to economic and other natural resource data sets. This would provide a macroeconomic view of water usage and availability.

Water Stock Tables

23. The stock tables describe, in physical terms, changes in water resources over a particular period of time. It is proposed that the stock tables include water assets in all significant storages such as rivers, lakes, dams and groundwater aquifers. The physical data will show the interrelationship between the environment and economic use of water.

24. The intended scope of the stock tables is a matter for some debate. SEEA broadly defines the scope as "water available for economic use". According to SEEA, natural water resources should be included in the account only as a supplement, if data is available. To adequately demonstrate the interrelationship between the environment and economy, the stock tables will attempt to include measures of water available for economic use after the needs of nature have been met, where these have been identified by water authorities.

25. The following elaboration of water assets and water balance tables should be read in the context of an 'ideal' situation. Discussions with experts in the field about the availability of relevant information has suggested that the proposed approach may not be viable. If a complete water region coverage is not possible, ABS will investigate a case study approach because there may be sufficient information for a limited number of regions.

Water Stock Assets Table

26. The reason for not developing a conventional annual stock table for water based on existing stocks is that water is a resource that is being constantly renewed. Comments received from water resource experts on the structure of an annual stock table indicated that the stock approach was regarded as unsuitable for characterising the performance of a system with long response times. A clear distinction is required between the capacity of a system and its potential yield. The potential yield of the system is dependent upon long term climatic variability, and not solely upon the system capacity. The influence of climatic variability on water resources is fundamental to the whole issue of environmental sustainability.

27. An alternative to the conventional stock table is to have a stock measure based on the average annual surface and groundwater resources, calculated over a number of years. The stock measure would include the volume of water allocated for economic and environmental use and the volume of unallocated resources. It is expected that average annual water resources will give an indication of the long term availability of water. Average annual groundwater resources are defined as the average volume of water extracted from the groundwater system each year on a sustained basis. Average annual surface water resources are defined as the average volume of water that could be diverted from a basin each year on a sustained basis.

28. Table 3 indicates the proposed row categories for the Water Stock Assets Table, including an opening stock based on the average annual surface and groundwater resources at the start of the accounting period and other volume changes that have occurred during the accounting period. In most years the closing stock will be equal to the opening stock.

Table 3. Row definitions for the Water Stock Assets Table.

Category	Components	Details
A. Opening Stock	A.1 +Average annual surface water resources	Water assets available in Australia for economic and environmental use, based on long term averages of the resources
	A.2 +Average annual groundwater resources	available, estimated at the start of the accounting period. If possible including a component breakdown into allocated resources (for economic and environmental use) and unallocated resources. The definitions used by different States may vary.

B. Other Volume Changes	B.1. +/-Hydrological forecasts altered	The reassessment of the available resource by hydrologists, eg reassessment of allocations to various uses.
	B.2. +/-Methodological changes	For example new estimation techniques and methods derived for measuring water.
	B.3. +/-Other volume changes not elsewhere classified	Includes other volume changes throughout the accounting period which has altered the availability of water resources (eg: the construction of new dams which may alter the allocation of water for economic use)
C. Closing Stocks	Sum of 'Opening Stocks' plus/minus 'Other Volume Changes'	Measurement made at the end of the accounting period (on 30 June).

Australian Annual Water Balance

29. An Australian Annual Water Balance is proposed to detail the annual inputs, consumption and output of water over the accounting period. The components to be measured include: inflows (precipitation, natural inflow from adjacent basins); net anthropogenic changes and net changes in storage which could result in losses/inflows into the regional water balance; and outflows (evapotranspiration and basin outflow).

30. The net anthropogenic changes parameter considers the volume of water diverted by major and minor diversions from surface and groundwater resources for economic use, and the subsequent return flow discharge of excess water after it has been used for various economic purposes. Diversions include water resources that are diverted on a sustained basis from a stream or aquifer to supply water for rural, urban and industrial usage.

31. Economic use of water can also occur in-stream for activities such as hydro-electricity generation, recreation and navigation. The volume of water required for most in-stream uses cannot be accounted for, with the

exception of hydro-electricity generation. Inter-basin transfers of water are also measured in net anthropogenic changes and will be included where such transfers originate or are destined for a region outside the measurement area. Changes in the storage of lakes and dams measures the amount of storage at the start and end of the accounting period in order to determine the difference in the amount in storage. It is recognised that estimates of changes in the volume of water stored in dams will be more accurate than estimates of some natural storages such as lakes.

Table 4. Row definitions for the Australian Annual Water Balance

Category	Components	Details
A. Inflows	A.1. + Precipitation	Areal precipitation for the measurement area.
	A.2. + Natural inflows into the measurement region	Volume of water naturally flowing into the measurement region from other river basins
B. Net Anthropogenic Changes	B.1. +/-Net Economic Changes	Volume of water diverted for economic use from surface water and groundwater sources. If possible detail as: surface water (hydro-electricity, irrigation, rural, domestic, industrial) and groundwater (irrigation, domestic, rural, industrial).
	ii + Return flow discharges	Includes point and non point discharges and if possible include the following breakdown; hydro-electricity, irrigation, rural, domestic, industrial. Includes discharges into lakes, rivers, dams, aquifers, estuaries and the ocean.
	B.2. +/-Water transfers	Includes surface water and groundwater transfers into and from the measurement

		region, for example	
		interbasin transfers and	
		artificial groundwater	
		recharge.	

C. Net Changes in Storage	C.1 +/- Changes in the volume of water in storage	Increase or decrease in volume of water in storage from the previous year. Water in storage includes dams and lakes.	
	C.2 +/- Net groundwater recharge	Balance between infiltration from surface water systems and groundwater discharge	
	C.3 +/- Other volume changes	Other volume changes not included elsewhere	

D. Outflows	D.1 - Evapotranspiration	Areal evapotranspiration for the measurement area	
	D.2 + Basin outflow	Mean annual runoff from basins in the measurement area	

32. Spatial disaggregation is important due to the variable hydrological conditions across Australia. The use of States as a region is not a logical basis for classification of water resources. It provides some ease with the definition of State government jurisdiction or other such political boundaries, however, drainage divisions, water regions, river basins and groundwater provinces all cross State boundaries. Australia has been divided into 245 river basins, 77 water regions, 12 drainage divisions. It is proposed to collect data at either the river basin or the water region level and then aggregate results up to the drainage division level. Water regions are groups of river basins that have some commonality geographically and socially for the purposes of water planning.

33. The occurrence and availability of groundwater resources are determined by geologic characteristics and the classification of groundwater systems is not related to overlying catchments. There are 61 groundwater provinces which are major areas within which there is a broad uniformity of hydrogeological and geologic conditions. At this stage groundwater resources will be considered in the framework of water regions and drainage division.

Water Flow Table

34. Water flow table will be based on Input Output tables which, once suitably augmented, provide a useful framework to study the interaction between the environment and economic activity. The analysis will calculate the total volume of water (direct and indirect) consumed by industry in the production of a commodity for delivery to final demand. The flow table will indicate the direct requirements of water (Megalitres) as intermediate consumption by industry and as final demand by households and government, as return flow discharges, and as exports. For example, water is required in the direct production of paper in a paper mill, an example of water used indirectly for the production of paper is water used for irrigating woodlots from which timber is harvested to produce paper.

Table 5. Direct Use of Water Table

-----+-----	
	Megalitres
-----+-----	
Distribution of Supply to:	
-----+-----	
1. Intermediate Consumption	
(superscript: 1)	
-----+-----	
1 Agriculture; hunting and trapping	
-----+-----	
2 Forestry and fishing	
-----+-----	
3 Mining	
-----+-----	
9 Wood and wood products	
-----+-----	
10 Paper, printing and publishing	
-----+-----	

20 Electricity, gas and water			
-----+			
TOTAL INTERMEDIATE CONSUMPTION			
-----+			
2. Final Demand for Water			
-----+			
1 Household ^(superscript: 2)			
-----+			
2 Government			
-----+			
3 Return flow discharge (superscript: 3)			
-----+			
4 Exports			
-----+			
TOTAL FINAL DEMAND FOR WATER			
-----+			
Total Distribution of Supply (superscript: 4)			
-----+			
Source of Supply ^(superscript: 5)			
-----+			
1 Groundwater major diversions			
-----+			
2 Groundwater minor diversions			

3	Surface water major diversions		
4	Surface water minor diversions		
5	Imports ^(superscript: 6)		
	Total Source of Supply		
	(superscript: 7)		

1. Intermediate consumption is based on 35 industry groups and only those relevant to the Water Account will be reported.
2. Also referred to as private consumption.
3. Equivalent to B1 (ii) in the Australian Annual Water Balance Table.
4. Total volume of water supplied for use in intermediate consumption and final demand for water.
5. Total source of the supply from groundwater and surface water withdrawn through diversions or self extraction, equivalent to B1 (i) in the Australian Annual Water Balance Table (excludes imports).
6. Imports of bottled water and other freshwater into Australia, likely to be insignificant but will be counted.
7. The total distribution of supply and total source of supply are equal.

35. Table 5 shows the structure to be used in the water flow table, with just a few examples of the industry classification. The major components of the vertical axis are intermediate consumption, final demand for water and source of supply. Intermediate consumption consists of the goods and services (in quantity terms, the volume of water) which are consumed in the process of production. Final demand categories represent the volume of water to final users. Final users include households, government, return flow discharges and exports. Return flow to the environment is equivalent to B.1(ii)- return flow discharge in the Australian Annual Water Balance Table (refer Table 2) and includes point and non point discharges from hydro-electricity, irrigation, rural, domestic, industrial sources into lakes, rivers, dams, groundwater aquifers, estuaries and the ocean. Exports include economic exports of water as bottled water and as fresh water supplied to ships and planes.

5. Conclusion

36. The ABS intends to implement, eventually, most aspects of SEEA. In the short to medium term, it is envisaged that the ABS will:

- Continue to develop and present data on environmental protection expenditures with the aim of covering all sectors and implementing the satellite account concepts based on SERIEE.
- Continue to develop national balance sheets with the aim of covering all the types of produced and non-produced assets described in the SNA. The disaggregation of 'other volume changes', to take account of depletion and degradation, is required in order to link physical accounts to the SNA.
- Continue to develop physical accounts including both natural resources and emissions. The aim will be to progressively expand the types of resources and emissions covered, depending on relevance to policy requirements and data availability.
- Keep a watch on international developments in environmental accounting, particularly valuation methods. Also contribute to the development of environmental accounting standards so that concepts and definitions developed are suitable for Australia's unique set of environment-economic interactions.

37. The program of work for the four year period of the first phase of the environmental accounts project is included below. ABS would anticipate, in this first phase of the project, developing scoping papers for the series of resource accounts; compilation of a number of those accounts to the stage of a public release of information; compilation and release of extended national balance sheets; and the compilation and release of environmental protection expenditure account, on an annual basis using the SERIEE framework. The first phase of the project would culminate in the release of a report on the development of environmental accounts.

1995-96 (completed)

- Discussion paper for distribution to stakeholders
- Environment protection expenditure - develop 1995-6 collections in SERIEE framework
- Physical accounts - complete compilation of Energy accounts for Australia (simplified account)
- Physical accounts (commence scoping document for minerals, forests)

1996-97 (completed)

- Environmental Protection Expenditure, 1992-93 and 1993-94 (OECD PAC basis)
- Physical accounts (circulate scoping document for comment on the following accounts: minerals, forests, water, fish)
- Physical accounts - commence compilation of accounts for minerals,

forests, water, fish

- Balance sheets, 1989-90 to 1994-95 (covering forests, subsoil assets, land, livestock)

1997-98 (completed)

- Environmental Protection Expenditure, 1994-95 and 1995-96 (OECD PAC basis)
- Physical accounts - commence compilation of data for energy account based on input-output framework
- Physical accounts - release experimental accounts for minerals (ABS Cat No 4608.0)
- Balance sheet

1998-99

- Environmental Protection Expenditure, 1995-96 (in SERIEE format)
- Physical accounts - release experimental accounts for fish (ABS Cat No 4607.0)
- Physical accounts - release experimental accounts for water, forests
- Physical accounts - commence compilation of accounts for wastes
- Balance sheet
- Report summarising progress on the environmental accounts project

Appendix C

Extract from ABS Policy Manual, Administrative By-Product Statistics

Introduction

1 In August 1982 the ABS issued a paper entitled "Administrative By-Product Statistics: An ABS View of the Roles of the Administering Authority and of the ABS". Experience with that policy since 1982 and feedback from administering authorities and State statistical co-ordination bodies has led to some further development of the ABS views on roles. Many of these new perspectives were reflected in comments made and positions taken in the reviews of nine fields of social and labour statistics that were undertaken by Social and Labour Division in 1990.

2 The purpose of this paper is to record these contemporary views so as to provide further guidance to ABS officers determining ABS roles in administrative by-product collections. Hopefully it will also lead to a better understanding by administering authorities and State co-ordinating

bodies of the ABS position.

The 1982 ABS Administrative By-Product Policy

3 The ABS policy on administrative by-product statistics circulated in 1982 recognised that one important source of official statistics was the documents and records generated by a government administrative process such as a birth record or a record of court appearance. If certain information recorded in these documents could be coded (ie converted to numbers according to statistical classifications) and data captured (ie the codes fed into a computer), subsequent editing and compilation could provide statistics of general interest and application beyond that of the administering authority.

4 The position advocated in the policy paper was that:

"as from some future date to be negotiated case by case, these three activities (ie coding, data capture and editing) should be undertaken by the administering authority, as part of its administrative data handling process. This would avoid the ABS handling the administrative unit record, or copies of it."

5 The ABS was then to obtain coded and edited data in computer readable form from the administering agency.

6 The 1982 policy proposed the following roles for ABS in respect of administrative by-product statistics:

- a prime responsibility for the relevance and reliability of the statistics it publishes which are produced as a by-product of an administrative process;
- b consultation assistance to administering authorities on formulating or revising definitions and classifications, quality control measures, coding procedures, training and the transfer of data to computer readable form;
- c periodic evaluation of all stages of data gathering, coding and entry into computer-readable form;

- d consultation with users to ensure that highest priority statistics needs are met within practical and cost constraints;
- e design and operations of computer systems to compile and tabulate statistics from the administrative data supplied to ABS;
- f production of special tabulations to meet particular statistical needs, including the needs of the administering agency;
- g active participation in and assistance with consultations between users and suppliers of data in the administrative by-product area.

Contemporary Comments/Views

7 ABS still sees the administrative records of Government agencies as, potentially, an important source of information that can be used to satisfy the statistical needs of users.

A Partnership

8 When seeking to use administrative records as the basis for compilation of official statistics, ABS will be looking to establish a partnership between itself, the administering agency and other relevant parties.

9 For continuing administrative by-product collections ABS still has its sights set on achieving the roles and responsibilities set out in the 1982 paper, where that has not already been achieved. How fast the relationship moves toward that seen as desirable by ABS is a matter to be negotiated case by case but the ABS does want to see a timetable agreed upon.

10 For proposed new, or enhanced, administrative by-product collections the ABS will seek to negotiate the roles, functions, and financial contributions of each party, case by case. In the light of those negotiations ABS, and no doubt the administering agency, will decide whether it is willing or able to proceed.

11 In reaching its decisions on the nature of the partnership and whether

or not to proceed to use administrative records to compile official statistics ABS will take into account:

- a the value of the statistics to significant users and the community;
- b the costs to be borne by ABS;
- c ABS judgements about the relative priorities of alternative uses of the resources available to the ABS;
- d the extent of the commitment of the administering agency to the compilation of the statistics;
- e the comparative advantages of ABS and the administering agency in undertaking the functions.

The value of the statistics

12 The statistics published by the ABS are the end result of a process which starts with a demand for information. In assessing the strength and importance of that demand, account is taken of such factors as the importance of the uses to which the information will be put, the extent of support from major Commonwealth and State government users, the contribution the statistics will make to informed decision making, research and discussion, and the breadth of support from within government and the community.

13 Also relevant to assessing the value of the statistics is the quality, including timeliness and coverage, of the statistics that can be produced.

14 For existing collections the extent of user interest in the statistics, reflected in revenue raised and requests for unpublished data, is also taken into account. However it must be recognised that poor timeliness and presentation of the statistics might have affected performance in these areas.

The ABS costs

15 ABS recognises that the production of statistics from administrative sources usually imposes costs on the administering agency. The level of these costs is relevant to any discussion of roles and functions and no doubt to the agency's own decision whether to be involved in the collection. However, often administering agencies are also major users of the statistics as they need them for policy, planning, monitoring and evaluation purposes or to satisfy an obligation to report on the program they are administering. ABS expects the contribution of administering agencies to at least reflect the value of the statistics to themselves.

16 The costs to be borne by ABS will be a function of the role that is expected of ABS, the number of administrative records in the collection, and the quality of the information within the administrative system and provided to ABS.

17 ABS may seek to reduce its costs (for example by seeking some user funding or reducing the number of records to be processed by sampling) if costs are seen not to reflect the value of the statistics or to achieve a more acceptable cost/benefit ratio. On the other hand ABS may be willing to increase its costs if the value of the statistics is high and others are not willing to contribute. ABS may also be willing to take on some functions which are seen as the responsibility of the administering agency for a period of time (for example to ensure a statistical series continues) if the administering agency is willing to fund this work and is positioning itself to take on these functions.

18 Although usually not an issue with administrative by-product collections, ABS will also take account of any additional load imposed by the statistical demand on the clients of the administrative process.

Judgements on relative priorities

19 Demands on ABS resources consistently exceed those available. In each case where a new or enhanced administrative collection is proposed, and from time to time for each continuing collection, ABS will need to make a judgement whether the costs of the administrative statistics are commensurate with the benefits that will flow from them being available. Opportunity costs also need to be assessed, as choosing to spend ABS resources, particularly skilled resources on a collection will usually mean that other statistical demands will not be met.

Extent of commitment of administering agency

20 Experience has shown that little can be achieved without the clear commitment and support of the administering agency to the production of quality statistics in a timely fashion. In negotiating the development of an administrative by-product collection or roles and responsibilities ABS will be looking for strong assurances of support and demonstrated commitment to the production of quality statistics.

21 If the administering agency is not interested in the statistics then it may not agree to undertake functions such as coding, data capture and editing, even though these may best be done as part of the day-to-day operation of its administration. ABS will then be faced with the question of whether it should undertake these functions by negotiating to receive copies of the source documents.

22 If the copies of the source documents are in paper form, requiring ABS to manually code the information and then to undertake a data capture process then the data would have to have considerable value for ABS to become involved.

23 If the administering agency (or agencies) has a strong interest in the statistics but does not have a management information system which readily provides the information required, then ABS may offer advice and assistance to improve the system. A joint funding arrangement may be negotiated between ABS and the agency (or a consortium of such agencies) one long term aim being to provide ABS with aggregate statistics in computer readable form.

ABS comparative advantages

24 In general terms, ABS's comparative advantages lie in those tasks that require statistical knowledge at a professional level. The following are a few examples:

- a the specification of the data items (and their classifications) to be obtained from the collection;
- b advice on setting up quality control procedures (including data editing) and any sampling procedures;
- c the development and use of computer assisted coding systems;

- d the publication of statistics which are reliable, objective and apolitical;
- e the presentation (and consequent enhancement) of administrative by-product data in association with data from other sources;
- f the training of agency staff in statistical procedures.

25 In negotiating roles the ABS will aim to undertake only those tasks requiring special statistical knowledge and expertise, leading to the most efficient use of its skills and resources.

26 The comparative advantages of the administering agency generally centre on:

- a the capacity to integrate, at low marginal cost, the statistical processing activities, the administering activity and agency's management information systems;
- b an understanding of those management information systems (usually computer based) within its organisation which have the potential to generate the required statistics;
- c an ability to modify these systems and their records to produce statistics;
- d an appreciation of the quality and possible shortcomings of the information recorded on the source documents.

Statistical Quality

27 The term quality, when applied to statistics, can refer to one or more of several attributes of the data. Accuracy is obviously the most important element of quality. Statistics are more or less accurate to the extent that they properly reflect the quantitative characteristics of the phenomenon being measured. Collecting data via a survey rather than a census will introduce sampling error. Non sampling errors will arise from the design

and conduct of the collection ie faulty concepts and definitions, poor questionnaire design, ambiguous questions, undercoverage, processing errors.

28 However, quality can be affected by factors which go beyond sampling and non-sampling error. Timeliness can affect quality. The statistics may be accurate but, because they are out of date, they may no longer reflect the current values of the characteristics being measured.

29 User perception of quality may also be affected by the degree to which the data remain relevant to the problem being examined. It can also be influenced by the degree of accessibility to the data.

30 Because complete accuracy or total relevance can rarely be attained, discussions on statistical quality are usually about acceptable levels of quality. Acceptability is judged in terms of the uses to which the data will be put and the alternative sources available.

31 In negotiations on administrative by-product statistics ABS will generally aim for higher rather than lower quality levels (eg more accuracy , timeliness and accessibility rather than less). There are two main reasons for this. First, ABS often has a wide range of users to satisfy with differing views on what is "acceptable". Second, ABS has a reputation in the community for publishing reliable statistics and it is important to ABS standing and to community trust in ABS that that reputation be maintained.

32 The wider ABS obligations to the community may sometimes clash with the more specific but less stringent needs of particular agencies in the partnership arrangement. The different objectives of the partners will need to be discussed and resolved.

33 The quality of administrative by-product statistics produced is very much dependent on the quality of the information provided by the administering authority, including the thoroughness of the input editing undertaken and full coverage. Close and continuing co-operation between ABS and the administering authorities is essential to high quality statistics, with both parties accepting that quality maintenance is a responsibility of both sides. In reaching agreement on levels of acceptable quality ABS will be concerned with two issues ie quality control and quality monitoring.

Quality Control

34 Quality control refers to procedures built into the data collection and processing systems to regularly check and adjust data quality. The onus for maintaining adequate quality control procedures must rest primarily with the agency responsible for administering the particular program/process as they are integral to the administrative process.

35 However, because ABS has an obligation to the users it is servicing it too has an interest in data quality. If necessary, it will take the initiative in seeking an arrangement with the source agency to ensure that the quality of the data reaches an agreed standard. It may also refuse to publish data if the quality is inadequate.

36 In general, the ABS contribution towards maintaining data quality will take the form of advice and assistance in setting up quality control procedures in the administering agency. These procedures may address several of the factors outlined above (eg coverage, accuracy, timeliness), which affect quality. The precise arrangements need to be negotiated case by case.

Quality Monitoring

37 Quality monitoring refers to the periodic checking of those procedures in place to control levels of data quality. ABS does not see itself becoming involved in the editing of unit records. In negotiating an arrangement on collection and processing of administrative by-product statistics ABS will, as a general rule, seek to include a quality monitoring task to be carried out jointly by ABS and the administering agency.

38 How often the quality monitoring task is carried out will depend on the nature of the collection and the availability of resources - it may be annually but may well be every two to three years.

Processing Administrative Information

39 This paper has been addressing the issue of how ABS will obtain statistics which are a by-product of administrative processes. However, these processes may also generate information which is of an administrative rather than statistical nature. For example, hospital discharge records will carry personal details on patients and the treatment they receive, in

addition to the data needed for statistical purposes.

40 In negotiating an arrangement with ABS to extract statistics, an agency may be in a situation where it cannot efficiently process its own administrative information. It might then ask ABS to process the information on its behalf.

41 As a general rule ABS will not enter such arrangements even if payment is offered. While it may have an advantage in computer processing skills compared to the agency, processing of data for the agency's administrative purposes is not an ABS function. ABS is not in the "business" of data processing on behalf of clients. To the extent that ABS might currently be involved in such work, this must be regarded as a short-term transitional arrangement.

42 However, in reaching its own statistical goals, ABS may be willing to help agencies towards a better processing arrangement for their own information needs (eg through the temporary outpost of an ABS officer). This might form part of the package which ABS negotiates with the agency.

Administrative By-product Statistics Collected and Compiled by Other Agencies

43 At the Commonwealth and State level agencies other than ABS have been given responsibility for compiling statistics from particular administrative processes. Examples at the Commonwealth level are correction statistics compiled by the Australian Institute of Criminology; injury statistics by Worksafe Australia; and hospital and welfare services statistics by the Australian Institute of Health and Welfare. ABS looks to these agencies to negotiate arrangements with the administering agencies for compiling and publishing these statistics.

44 ABS has responsibility under the Australian Bureau of Statistics Act to co-ordinate Commonwealth statistics and to develop national statistical classifications and standards. With the agreement of State Governments it takes on similar roles with respect to State statistics. With those responsibilities in mind ABS is prepared to assist agencies which have primary responsibility to compile and publish administrative by-product statistics. It will provide consultation assistance on formulating or revising definitions and classification, quality control measures, coding procedures and training. In addition ABS may be prepared to publish the statistics to ensure their wide availability.

Maintaining a Statistical Database

45 Where the demand on the ABS for the statistics is complex and wide ranging, ABS may wish to negotiate an agreement with the source agency whereby it establishes and maintains a "primary" statistical database. This is one which contains both unit records (appropriate data items having already been coded by the agency) and the aggregate tabulations needed by major users. An example of an ABS primary database is the DEMOSS database for vitals statistics.

46 However, where ABS decides to obtain unit records, it will insist that all personal identifiers be removed before the information is received. ABS has no interest in the identity of individuals. The object in obtaining unit records is to enable ABS to compile aggregate tables to satisfy complex user requests which have not been covered by the "standard" aggregate tabulations provided by the administering agency.

47 Where it is clear that the demand for statistical tables is less complex ABS may decide to negotiate only a "secondary" database consisting of statistical aggregates provided by the administering agencies. School statistics from the National Schools Collection is one example.

48 While the complexity of user demand and costs will influence the ABS choice on the nature of the database it maintains, an additional factor may be the need by users to have equal access to data. Because of its statutory independence from the political process and its policy neutral role ABS is sometimes well placed to take on the role of 'honest broker' and maintain statistical data bases to provide all parties with equal access to information.

Confidentiality and Privacy

49 Under the confidentiality provisions of the Census and Statistics Act, no information can be released by ABS which is likely to enable the identification of an individual. The only exception is ABS is authorised to return information to the source from which it was obtained. Information obtained by ABS as part of an administrative by-product collection comes under these confidentiality provisions. Identifiable information can be returned to the source agency but to no other agency or individual.

50 The Commonwealth Privacy Act provides for the protection of privacy

through Information Privacy Principles. ABS has a long history of operating in ways consistent with the provisions of the Privacy Act and it will continue to do so. This applies equally to ABS activities relating to Commonwealth and State administrative by-product collections, even though the latter may not be subject to the provisions of the Privacy Act.

Dissemination

51 Whenever ABS compiles and analyses statistical information it is required to publish and disseminate the results, or an abstract of those results. ABS dissemination policies for administrative by-product statistics in no way differ from the general policies applying to the other statistics it collects.

52 However, circumstances may arise where both ABS and another agency have a responsibility to disseminate statistics. A question of duplication may then arise.

53 Often a closer examination of the market may indicate that the duplication is more apparent than real. For example, the administering agency may have a narrower policy oriented market whereas ABS wishes to make the information widely available.

54 If duplication will nevertheless occur (and this is more likely in the area of publication) then agreement will need to be reached on which agency accepts prime responsibility. While this will be influenced by the roles/functions and comparative advantages of each party, because of its obligation "to publish and disseminate" ABS will usually want to accept publication responsibility. However, if another agency has a clear comparative advantage (eg in data analysis) then ABS may be happy to let the agency take the primary role and ABS merely publish an abstract of the results, either on their own, or in one of the ABS omnibus publications.

Payment for Statistics by ABS

55 A number of agencies who are the source of administrative by-product data, are now applying "user pays" guidelines in their operations. They may therefore request ABS to pay for statistical information provided or for the costs incurred by them in extracting administrative by-product statistics from their information systems.

56 ABS may be willing to meet the costs incurred in the extraction of statistics. These are a matter for negotiation and are relevant to any decision the ABS may make on the costs and benefits of a particular collection and the extent of its involvement.

57 However, ABS will not pay for the statistical or administrative data.