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An Experimental Monetary Water Account for Australia, 2003–04

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An Experimental Monetary Water Account for Australia, 2003–04

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and Peter Comisari

Centre of Environment and Energy Statistics

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INQUIRIES

The ABS welcomes comments on the research presented in this paper.
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AN EXPERIMENTAL MONETARY WATER ACCOUNT FOR AUSTRALIA, 2003–04

Rebecca Thomson, Michael Vardon and Peter Comisari
Centre of Environment and Energy Statistics

ABSTRACT

Physical water accounts have been produced by the Australian Bureau of Statistics (ABS) in the *Water Account, Australia* (ABS cat. no. 4610.0), for 1993–94 to 1996–97 and for 2000–01 and 2004–05. While data in the Water Account can theoretically be linked to economic data such as presented in the national accounts, there is little monetary data in the water account itself to facilitate such linking. Linking monetary and physical water accounting data could be useful for determining efficient water allocation, achieving cost recovery for water infrastructure assets and analysing trade-offs between alternative water and economic policies. This paper presents experimental monetary water accounts that allow some of the physical flows of water to be matched with monetary transactions. A feature of this research paper is the identification of data gaps and deficiencies to be addressed in order to support a more complete and rigorous monetary water account.

1. INTRODUCTION

In Australia, water is a limited resource unevenly spread across the nation and over time. Water is not only essential for basic human needs and the health of ecosystems, it is also an essential input to economic production processes. The current drought has highlighted the importance of water to certain industries and the need for efficient use of water. The drought is forecast to reduce growth in GDP by 0.5% in 2006–07 due to a decline in agricultural production (ABS, 2006b).

Monetary water accounts provide a range of information of analytical interest. For example, they support the generation of output and value added measures for water-related industries. In addition, assigning monetary values to water stocks and flows for various water users allows a direct comparison of these values with the corresponding physical stocks and flows. Monetary water accounts also allow commensurability with monetary measures of other natural resource stocks and flows, thereby supporting potentially powerful analytical frameworks such as the *System of Environmental and Economic Accounts 2003* (SEEA).

Agreements developed by the Coalition of Australian Governments (CoAG) in 1994 and 2004 aim to increase the productivity and efficiency of Australia's water use. One of the key elements of the 2004 National Water Initiative (NWI) was to introduce best practice water pricing and institutional arrangements to promote economically efficient and sustainable use of water resources, water infrastructure assets and government resources devoted to the management of water. The information provided by linking monetary and physical water accounts could be useful for determining efficient water allocation, achieving cost recovery for water infrastructure assets and analysing trade-offs between alternative water and economic policies (UN, 2006).

This paper presents experimental monetary water accounts, and a discussion of methods, data sources and possible future developments in this field of research. The scope of this paper is limited to 'distributed water' which, in this context, is defined as water that has been supplied from one economic unit to another for a fee, creating a measurable economic transaction. Distributed water includes urban mains water as well as water delivered to irrigators by rural water suppliers. Many economic entities use self-extracted water for their own use, such as farms for irrigation or hydro power plants to generate electricity. Estimates for the value of self-extracted water have not been included in this paper due to a lack of reliable data.

The ABS welcomes comments on this research paper. Comments should be directed to Rebecca Thomson, Centre of Environment and Energy Statistics, on Canberra (02) 6252 7595 or email rebecca.thomson@abs.gov.au.

2. FRAMEWORK FOR MONETARY WATER ACCOUNTS

An analytical framework being developed by the international statistical community for environmental accounting is the *System of Environmental and Economic Accounts 2003* (SEEA). The SEEA provides extensive guidance on the development of accounts for each of the types of natural capital including water, land, minerals and ecosystems. It includes stock accounts, which measure the amount of a natural resource available for use in the economy at a point in time (e.g. water stored in dams, or minerals in the ground), and flow accounts which measure the change in the resource (i.e. how much is used over a period of time). These accounts can be compiled in physical or monetary units, although so far work in this area has mainly concentrated on physical accounts (e.g. Megalitre (ML) of water, tonnes of minerals).

The development of monetary environmental accounts is limited since market values for natural resources are not always available, and where they are available, are not always appropriate to valuing the resource. In particular, market prices are derived through a mechanism that itself ignores most environmental externalities. However monetary environmental accounts allow us to assess the impact of economic development on the different types of natural resources using a common basis of measurement. Potentially they could be used to assess the effects on the economy of environmental degradation and depletion of natural resources. SEEA shows how these individual environmental accounts can provide the basis of a natural capital balance sheet integrable with the national balance sheet for economic assets as described in the 1993 edition of the *System of National Accounts* (1993 SNA). The development of a monetary water account is therefore an important step in developing a comprehensive set of accounts to support a SEEA-style measurement of the contribution of natural resources to economic growth, and the effects that economic and human development have on our environment.

Within the broader context of SEEA, the draft Integrated *Environmental and Economic Accounting for Water Resources* (SEEAW) released in May 2006 provides a consistent framework for compiling monetary water accounts. Full monetary water accounts provide information on:

- the supply of distributed water in the economy by the Water Supply, Sewerage and Drainage Services industry;
- expenditure on water and sewerage services by industries, households and governments;
- value added to the economy for the major industries related to water;
- the value of water extracted for own use (self-extracted water);

- water and waste water protection and management expenditure (expenditures made by the economy for the protection and management of water resources); and
- asset accounts, which can be compiled for the value of water and sewerage infrastructure assets, and the value of the stock of water itself.

It is not possible to implement all the above components of monetary water accounts for Australia at present because much of the required data are either unavailable or are of poor quality. Consequently, this paper concentrates on the supply of distributed water and waste water and sewerage services by the Water Supply, Sewerage and Drainage Services industry, expenditure on water and waste water and sewerage services by industries and households, and the value of water and sewerage infrastructure assets.

The approach used in this paper to compile the monetary water account is based on a supply–use system. This system is widely used by statistical agencies to compile national accounts and various satellite accounts, and serves as a means to promote consistency of data drawn from different sources. A feature of this system is that measures of supply and use for each product are independently calculated, and discrepancies between supply and use can then be resolved using a systematic process of data confrontation.

The supply table records the total supply of water products in the economy, and the use table shows the use of those products by sectors of the economy. Total use is broken into intermediate consumption and final consumption. The use of water-related products by industry (and government) is considered intermediate consumption, as water is used as an input into the production processes for other goods and services. The use of water-related products by households is termed final consumption as households are, in this instance, the final users of the outputs of production. Use tables generally also show capital expenditure, changes in inventories and exports. These items are not relevant for this exercise as expenditure on water products is rarely capitalised and water is not directly exported from Australia (although water is incorporated into products such as meat, wool etc. that are exported from the country). In Australia, changes in water inventories occur but these are difficult to calculate at present and have been excluded from this exercise.

Monetary supply–use tables can be presented in conjunction with the corresponding physical tables as hybrid accounts. Hybrid accounts link the monetary and physical information related to water supply and use, and can also be used to link the emission of pollutants in return flows to the environment.

3. METHODOLOGY

The first step in constructing monetary water accounts is to identify the water-related products that will be used to compile estimates of supply and use. Four products were selected for this exercise:

- Urban distributed water;
- Rural distributed water;
- Bulk water (both urban and rural); and
- Waste water and sewerage services.

Urban distributed water is treated water supplied to urban areas via a mains water system. Rural distributed water is water supplied via mains, open channels or natural waterways, for irrigation and other rural uses. Bulk water (or wholesale water) is water supplied from one water authority to another before it is supplied to end use customers. The bulk water component must be separately identified in order to balance the estimates of supply and use. Waste water and sewerage services represent the activity of collecting and treating waste water and sewerage produced by households and businesses, including trade waste water.

The reference period for the monetary accounts presented here is 2003–04. This period was chosen as it is the most recent year for which the required data were available.

Supply side

Monetary estimates for the supply of urban distributed water, rural distributed water, and waste water and sewerage services were compiled for each state. There is no single data source providing all the information required, so data from a variety of sources were used, including the ABS Economic Activity Survey (EAS), State governments, industry associations and company reports.

State government reports used include:

- the 2003–04 New South Wales *Water Supply and Sewerage Performance Monitoring Report*;
- the Victorian *Water Review*;
- the Queensland *Annual Water Statistics*; and
- the Tasmanian *Local Government Water and Waste water Business Cost Recovery Compliance Review*.

Industry association reports used include:

- *WSAA Facts*, produced by the Water Services Association of Australia; and
- *Australian Irrigation Water Provider Benchmarking Data*, prepared by the Australian National Committee on Irrigation and Drainage (ANCID).

For water supply organisations not covered by the above reports, annual reports and financial statements were used wherever possible. Annual reports and financial statements were also used for all large water providers to reference the information presented in ABS surveys and State government and industry association reports.

Subsidies are usually shown in a separate column in the supply table. Because so many data sources were used to compile the supply estimates it was not possible to separately identify subsidies with confidence. Consequently, in this paper subsidies are included in the estimates for revenue from the sales of each water-related product identified above.

Use side

The use table was constructed to show the expenditure on water-related products by households and industries. Total expenditure is shown as it was not possible to separate fixed and variable charges. Household expenditure on water was calculated using estimates from State/territory government reports of the percentage of total water revenue from sales to households. This was supplemented with financial information for all major urban water suppliers from *WSAA Facts*, including the number of residential properties receiving water supply services and the average revenue per property. In those cases where no alternative was available, household expenditure on water was estimated from the percentage of water supplied for domestic use in the ABS *Water Account*.

Expenditure on water by the agriculture industry was based on data from *Water Use on Australian Farms 2002–03* (ABS cat. no. 4618.0), which contained estimates of volumetric and usage charges associated with irrigated agriculture. However, this information was not collected for 2003–04. In the absence of actual data, monetary estimates for 2003–04 were generated by extrapolating the 2002–03 estimates by the proportional increase in physical agricultural water use between 2002–03 and 2003–04. Data for expenditure on water by industries other than agriculture were available from the ABS EAS. This survey collects information on water expenses for the non-government sector, excluding the agriculture, mining, and manufacturing industries.

There are no current data for expenditure on waste water and sewerage services by industries and households. Therefore estimates in this paper were generated by

distributing the supply side total across industries based on their relative levels of expenditure on water.

Water supply and sewerage infrastructure assets

Values for water supply and sewerage infrastructure assets were calculated using the same approach used in the supply table, that is using information from State government, industry associations and company annual reports. Infrastructure asset valuation methods can differ between organisations and therefore the values shown here should be used with caution.

4. RESULTS AND TABLES

Tables 4.1 to 4.6 present experimental monetary water account estimates. Ideally comparisons between physical and monetary water accounts should be for the same reference year, however physical water accounts are not available for the year 2003–04, so comparisons have been made with the recently released 2004–05 Water Account. Given the broad level at which comparisons between monetary and physical information is undertaken, the use of different reference periods for the two sets of data is considered acceptable.

The 2004–05 Water Account showed that 11,160 Gigalitres (GL) of water was supplied to the economy by the Water Supply, Sewerage and Drainage Services industry. This included 2,022 GL of water losses and 842 GL of water provided to the environment. Excluding these amounts, there were 8,296 GL of water distributed to users, and it is this amount that should be used when making comparisons to monetary estimates. The mining, manufacturing and electricity and gas supply industries supplied 14 GL of water to users, however the corresponding monetary values are not available.

Supply side

The supply side of the monetary account, i.e. revenue from sales of urban water, rural water and waste water and sewerage services is presented in tables 4.1 and 4.2. Table 4.1 shows that $3,466 million of revenue was generated from the supply of urban and rural distributed water by the Water Supply, Sewerage and Drainage Services industry in 2003-04. In 2004-05, 8,296 GL of rural and urban distributed water was supplied by this industry, and 14 GL by other industries.

4.1 Monetary and physical water supply, by industry

	Monetary units	*Physical units*
Industry	*Distributed water (urban and rural) $m*	*Supply to other economic units GL*
Agriculture, forestry & fishing	–	–
Manufacturing	na	8
Mining	na	5
Electricity & gas supply	na	1
Water supply, sewerage & drainage	3,466	8,296
Cultural, recreational & personal services	–	–
All other industries	–	–
Total supply at purchasers prices	**3,466**	**8,310**

Notes: Monetary data relate to 2003–04, and physical data to 2004–05.
Monetary data in this table are considered experimental.

Table 4.2 presents the revenue from sales of urban water, rural water, bulk water and waste water and sewerage services. Data are presented for each State and territory and at the national level. Subsidies are included in these revenue figures. The total revenue from sales of water-related products was $7,271 million in 2003–04, $3,350 million from sale of waste water and sewerage services, $3,155 million from sale of urban distributed water, $455 million from sale of bulk water, and $311 million from sale of rural distributed water.

4.2 Supply table – Revenue from sales of water-related products by the Water Supply, Sewerage and Drainage Services industry, 2003–04

	Distributed water		*Bulk water suppliers*			
	Urban $m	*Rural $m*	*Urban $m*	*Rural $m*	*Waste water & sewerage $m*	*Total $m*
New South Wales & ACT	1,250	64	126	40	1,244	2,724
Victoria	527	116	159	5	783	1,590
Queensland	600	86	85	5	563	1,339
South Australia	306	19	–	–	261	585
Western Australia	336	25	–	–	403	763
Tasmania	75	1	35	–	69	181
Northern Territory	61	–	–	–	27	88
Total	**3,155**	**311**	**405**	**50**	**3,350**	**7,271**

Note: Data in this table are considered experimental.

Use side

The use side of the account is shown in tables 4.3 and 4.4. Physical and monetary water use is presented in table 4.3 and shows that households had the highest expenditure on distributed water of any sector or industry in 2003–04 at $2,046 million (59% of total expenditure), though they only used 1,874 GL (23%) of distributed water in 2004–05. The agriculture industry spent $293 million (8% of total expenditure) in 2003–04 but consumed 64% of distributed water (5,329 GL) in 2004–05. Expenditure by the other industries totalled $1,125 million in 2003–04 (32% of total expenditure) while they consumed 998 GL (12%) of distributed water in 2004–05. The Difference in the patterns of expenditure on water observed between households and agriculture largely reflect the different costs of storage, treatment and delivery between water products used by urban and rural users.

Table 4.4 shows expenditure on urban, rural and bulk water, and waste water and sewerage services, and provides greater industry detail. Data are presented at the national level as State level estimates are not available, with the exception of household expenditure which is shown in table 4.5.

4.3 Monetary and physical distributed water use by industry and households

	Expenditure on water, 2003–04		*Physical use of water, 2004–05*	
	Distributed water $m	*Percent of total %*	*Distributed water GL*	*Percent of total %*
Intermediate consumption				
Agriculture, forestry & fishing	293	8	5,354	64
Manufacturing	235	7	341	4
Mining	51	1	72	1
Electricity & gas supply	92	3	115	1
Water supply, sewerage & drainage	2	0	23	0
Other Industries	746	22	531	6
Total intermediate consumption	1,419	41	6,436	77
Final consumption by households	2,047	59	1,874	23
Total use	**3,466**	**100**	**8,310**	**100**

Note: Monetary data in this table are considered experimental.

4.4 Use table – Expenditure on water-related products supplied by the Water Supply, Sewerage and Drainage Services Industry, 2003–04

	Urban water $m	*Rural water $m*	*Bulk water $m*	*Waste water & sewerage $m*	*Total $m*
Intermediate consumption –					
Agriculture, forestry & fishing	1	293	–	0	294
Manufacturing	225	10	–	239	474
Mining	49	2	–	53	104
Electricity & gas supply	87	5	–	92	184
Water supply, sewerage & drainage	2	–	455	2	459
Construction	12	–	–	13	25
Wholesale & retail trade	79	–	–	84	163
Accommodation, cafes & restaurants	62	–	–	66	128
Transport & storage	63	–	–	66	129
Finance, property & business services	94	–	–	100	194
Government administration	80	–	–	85	165
Education	61	–	–	65	126
Health & community services	59	–	–	63	122
Cultural, recreational & personal services	235	–	–	250	485
Total intermediate consumption	1,109	310	455	1,177	3,052
Final consumption by households	2,046	1	–	2,172	4,219
Exports	–	–	–	–	–
Total	**3,155**	**311**	**455**	**3,350**	**7,271**

Note: Data in this table are considered experimental.

Household expenditure on urban distributed water by State/territory is shown in table 4.5. In 2003–04 New South Wales and the ACT had the highest household expenditure on urban distributed water of $768 million (38% of total expenditure), and also used the largest amount of water in 2004–05 (29% of total water consumed by the household sector). Queensland recorded the second highest level of household spending on urban distributed water in 2003–04 (20% of total) and the second highest level of household water consumption in 2004–05 (24% of total). Average per capita expenditure for 2003–04 for Australia was $102, with the Northern Territory the highest at $140 per person and Victoria the lowest at $79 per person. Average household expenditure on water in Australia in 2003–04 was $263. A price per KL for household expenditure on water is shown, although the expenditure relates to 2003-04, and the volume of water to 2004-05. The price per KL of urban distributed water averaged $1.09 for Australia, with NSW and the ACT recording the highest average price ($1.33) and Tasmania the lowest ($0.76).

4.5 Household Expenditure on urban distributed water – by State, 2003–04

	Expenditure on urban water						
	Total $m	*Per capita $*	*Per household $*	*Population 30 Jun 04 '000*	*Households 30 Jun 04 '000*	*Water use 2004–05 GL*	*Urban water $/KL*
New South Wales & ACT	768	109	285	7,055.3	2,698.8	576	1.33
Victoria	392	79	205	4,972.8	1,911.1	389	1.01
Queensland	405	104	270	3,882.0	1,498.1	458	0.88
South Australia	177	115	280	1,534.3	633.1	143	1.24
Western Australia	233	118	298	1,982.2	782.8	226	1.03
Tasmania	43	89	218	482.1	197.3	57	0.76
Northern Territory	28	140	507	199.9	55.2	25	1.10
Total	**2,046**	**102**	**263**	**20,108.6**	**7,776.4**	**1,874**	**1.09**

Note: Monetary data in this table are considered experimental.

Water supply and sewerage infrastructure assets

Table 4.6 shows the value of infrastructure assets of the Water Supply, Sewerage and Drainage Services industry. The total value of these assets at 30 June 2004 was estimated to be $73 billion. Urban water infrastructure assets were worth $32 billion, and irrigation and drainage assets $6 billion. Valuation of these assets is as recorded in the various annual reports, but as valuation methods differ between organisations these estimates should be used with caution.

4.6 Water supply and sewerage infrastructure assets – by State, 30 June 2004

	Urban water infrastructure assets $m	*Waste water & sewerage infrastructure assets $m*	*Irrigation & drainage infrastructure assets $m*	*Total $m*
New South Wales & ACT	12,774	15,231	761	28,766
Victoria	4,943	5,114	2,610	12,667
Queensland	5,379	6,685	1,977	14,041
South Australia	4,859	3,578	329	8,766
Western Australia	2,949	3,583	297	6,829
Tasmania	775	626	48	1,449
Northern Territory	360	113	0	473
Total	**32,039**	**34,930**	**6,022**	**72,991**

Note: Data in this table are considered experimental.

5. QUALITY OF THE ESTIMATES

Overall, the ABS considers these estimates to be experimental. At the most aggregated level, such as for total revenue from sales of water-related products by the Water Supply, Sewerage and Drainage Services industry, the estimates are of reasonable quality, but there is less confidence in the quality of estimates at various levels of disaggregation.

Monetary water accounts are in the early stages of development in Australia and a number of data gaps currently exist, most notably for certain aspects of water usage. Also, the estimates contained in this research paper were prepared from a wide variety of sources. Many data sources are compatible with the desired accounting basis, however in some instances, this is not the case and some data sources are less than completely satisfactory in terms of concepts measured.

Water supply

The majority of data required to compile supply side estimates for the Water Supply, Sewerage and Drainage Services industry were generally available at the State/territory level, though, as many data sources were used, the terminology and definitions used are not necessarily all consistent.

Water use

The data gaps on the use side are greater than on the supply side. In particular, there is little information on expenditure on water by government or by the mining and manufacturing industries. Data for mining and manufacturing could potentially be collected via ABS EAS.

There are no recent data available on expenditure on sewerage services by households, government and industry. This information was published previously in *Environment Protection Expenditure, Australia, 1995–96 and 1996–97* (ABS cat. no. 4603.0), when specific surveys were run to collect information on environmental protection expenditures. There are presently no plans to repeat these surveys.

Considering these data deficiencies, the breakdown of expenditure on water and waste water and sewerage services by industry (shown in table 4.3 and 4.4) must be used with caution.

6. CONCLUDING REMARKS AND AREAS FOR FUTURE DEVELOPMENT

The estimates in this paper represent the first set of monetary water accounts for Australia. Because of the developmental nature of this work and because of the data gaps and data deficiencies described in Section 5, estimates published here are considered experimental. Nevertheless, the ABS sees value in demonstrating the use of the analytical framework and in presenting the data that are available. The ABS is planning to expand its research to a second edition of monetary water accounts for the period 2004–05 in mid 2007. The following paragraphs describe where the ABS intends to extend its research as well as other potential areas for development.

Self-extracted water

A significant gap in these monetary accounts is the absence of data for the supply and use of self-extracted water. Self-extracted water makes up a large proportion of water used in the Australian economy. Water extracted for own use in 2004–05 was 67,634 GL or 85% of all water used, although 59,867 GL or 89% of self-extracted water was used for hydo-electricity generation, and is considered 'in-stream use' because once it is used it is discharged and made available for downstream users. Consumption of self-extracted water totalled 7,767 GL. In contrast, 8,296 GL was supplied by the Water Supply, Sewerage and Drainage Services industry to other economic units as distributed water. The monetary figures contained in this paper relate only to the 8,296 GL supplied to other units.

It is difficult in practice to calculate a monetary value for self-extracted water. Activities that are undertaken by firms to produce goods for their own use, such as extracting water for own use, are not separately identified in the national accounts and are included with the output of the main activity of the business. To value output of such activity separately, all the costs associated with the activity need to be identified and this is often difficult. For example, if a manufacturing plant treats its own waste water, the value of the waste water treatment activity could be given by the sum of all the costs associated with operating the treatment plant: energy, chemicals, labour costs, certain taxes, and the depreciation of the capital equipment used. Similarly, a farmer who extracts water for irrigation incurs costs associated with labour, materials, fuel, and depreciation of the machinery and equipment used. The information required to value the cost of such self-extraction is generally not available, though it is possible to collect such data through specialised surveys.

Output and Value added

Monetary water accounts could also provide information on the output and value added related to water supply services. Total output is the value of goods and services produced within an industry. Value added is output less the value of goods and

services consumed as intermediate inputs to the process of production. At the broad level, these statistics are already compiled by the ABS for the Water Supply, Sewerage and Drainage Services industry and are published in *Electricity, Gas, Water and Sewerage Operations* (ABS cat. no. 8226.0), and the *Australian System of National Accounts* (ABS cat. no. 5204.0). The industry value added for the Water Supply, Sewerage and Drainage Services industry was $5,031 million in 2003–04.

In order to calculate value added for water supply and sewerage services separately it would be necessary to identify not only the incomes from each activity (as in this paper), but also the value of goods and services consumed as intermediate inputs through the process of production for each activity. Existing data sources generally don't have the necessary detail to make this possible. Also, the organisations that supply both water and waste water services would need to separate the income and expenses associated with each activity. Not all of these organisations are currently able to do so.

Valuation of water stocks

The information presented in this paper generally relates to the 'flow' of water in the economy, or the amount of water used in a year. Estimates of the value of water and sewerage infrastructure assets at 30 June 2004 are also provided. Estimates of the value of assets at a point in time are termed 'stocks', and complete monetary accounts include values for stocks at the beginning of the accounting period, the value of monetary flows and other changes in assets during the accounting period, and the value of stocks at the end of the period. The value of water stocks would thus be included in complete monetary accounts for water. However, no estimates of the value of the stock of water stored in dams, rivers, etc., are available at present.

Water not only has economic value, but also environmental and social or cultural values. Environmental values are associated with ecosystem health, and social values are related to such things as scenic values, preservation of the resource for future generations and recreational uses. Environmental and social values of water are very difficult to measure, so work on the valuation of water has concentrated on economic values. Economic values can be used to address efficiency in the development and allocation of water resources and are useful for setting water pricing policy and in the design of economic instruments to achieve better use of water resources.

While it is more feasible to measure the economic value of water rather than social and environmental values, there are still many difficulties associated with assigning an economic value to water, particularly at a national level.

SNA93 and SEEA recommend that goods and services be valued according to their market value. However it is difficult to establish market values for water as it is rarely supplied in a competitive market. The barriers that prevent water from operating in

competitive markets are both social and economic. The government is usually the owner of the water and often provides it to the community at a subsidised cost. Governments will often ration the resource through regulation (e.g. water restrictions) rather than through pure pricing mechanisms. The natural characteristics of water also inhibit competitive markets. Water cannot be transferred easily from one system to another, so water supply often has the characteristics of a natural monopoly.

There are markets for trading water both on a permanent and temporary basis in Australia. These markets could potentially be used to value water used for irrigation or agricultural purposes, but these markets are currently too thin (i.e. the volume of water traded is small compared to the total volume used) to reliably value water on a national basis as a competitive market requires a large number of buyers and sellers. If the trading of water entitlements operated in a competitive market, it would be possible to establish a price that represents the marginal value of water at a specific time and place. Key objectives of the National Water Initiative (2004) include increasing the efficiency of water markets and increasing the opportunities for trading within and between states and territories where the water supply systems and hydrological conditions permit.

It may become possible to value the stock of water if water prices are set to reflect the value of water itself, and if a greater volume of water is traded between users. The Intergovernmental Agreement on a National Water Initiative sets out pricing objectives for water. It states that the:

> "States and Territories agree to bring into effect pricing policies for water storage and delivery in rural and urban systems that facilitate efficient water use and trade in water entitlements through the use of consumption based pricing and full cost recovery for water services to ensure business viability and avoid monopoly rents, including recovery of environmental externalities, where feasible and practical."

The ABS has not yet attempted to assign a value to the stock of water although estimates for the volume of water stored in large dams are presented in the 2004–05 Water Account. Valuation of water stocks is considered important and is being considered by the ABS. The ABS intends to extend the range of information in future monetary water accounts.

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