Own-account production of water

by households: A method for rainwater tanks.

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Few environmental accounts provide estimates of own-account production and use of natural resources although both are within scope of the SNA and SEEA. As a result there is little practical guidance in the SEEA for estimating this production, which may be important in countries with significant production of this type. This paper begins to explore this area, as a large part of own-account production and use of water collected in rainwater tanks by households is not currently included in the ABS Water Account.

This paper explores how the ABS could further develop its water accounts via a method for estimating household storage and use of rainwater and include the estimates in the physical and monetary supply and use tables. The method may be of use in other countries with environmental, social and economic characteristics similar to Australia but it is hoped that by drawing attention to this issue some more generalised approaches suitable for a broader range of countries and natural resources can be investigated.

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1.0 Background

1. Own-account production is within scope of System of National Accounts 2008 (SNA) and the System of Environmental-Economic Accounting Central Framework (SEEA). While both the SNA and SEEA cover the topic conceptually, how to estimate the levels of production and use is not something that has been the focus of international attention, particularly in the context of the implementation of the SEEA and the own-account production of natural resources. Own-account production of water, food and timber (for firewood or construction) may be particularly important in developing economies.

2. While this paper presents a method for estimating own-account production and use of water by households (which is a relatively small fraction of total production and use), a key purpose of the paper is to focus attention more generally on how to estimate own-account production of natural resources.

3. The ABS welcomes comments on the methodology as well as information on other methods used to measure own-account production of water or other natural resources.

2.0 Introduction

4. The installation of rainwater tanks has grown in Australian households due to a number of factors, including the increasing cost of distributed water in Australia, the availability of subsidies for households installing rainwater tanks, and the implementation of mandatory building regulations requiring water efficiency savings for new dwellings.

5. Currently water use estimates for households in the ABS Water Accounts do not include water from rainwater tanks usage for households connected to mains supply. This paper sets out a method to estimate the use of water by households from rainwater tanks

6. There is no comprehensive data on rainwater tank usage across Australia. As such this paper has drawn on regional studies of urban water issues which focussed on water security and recycling through the use of rainwater tanks in South East Queensland. The studies were conducted by the Urban Water Security Research Alliance, a partnership between the Queensland government, CSIRO, Griffith University and University of Queensland.

7. The ABS Water Accounts[2] presents information on the physical and monetary supply and use of water in the Australian economy compiled mostly in accordance with the SEEA. The SEEA water flow accounts describe water flows, in physical units, from the initial abstraction of water resources from the environment into the economy, to the water flows within the economy in the form of supply and use by industries and households, and finally flows back to the environment.

8. Water abstracted may be abstracted from artificial reservoirs, rivers, lakes, and groundwater and soil water. The capture of precipitation via, for example, the capture of water from the roofs of houses in water tanks, is recorded as abstraction via precipitation.[3] In the SEEA abstraction is defined

[2] Australian Bureau of Statistics. Water Account, Australia, 2010-11. (cat. no. 4610.0)

[3] System of Environmental- Economic Accounting. Central Framework 2012

as the amount of water that is removed by any source, either permanently or temporarily, in a given period of time.[4]

9. Following the general treatment of household own-account activity, the abstraction of water by households for own-consumption should be recorded as part of the activity of the water collection, treatment and supply industry (ISIC 36).[5]As far as we are aware Australia is the only country to estimate household storage and use of water in rainwater tanks.

10. The ABS Water Account is conceptually aligned with the SEEA although there are differences in terminology and presentation as well as aggregate known as “water consumption” a type of net water use. For household water use in the ABS Water Account, water use can include self-extracted water, distributed water, or reuse water and sometimes a combination of all three sources are used. Distributed and reuse water use is the amount supplied to households by water providers (these data are sourced mainly from the ABS run Water Supply and Sewerage Services Survey).

11. In the ABS Water Account self-extracted water use by households is calculated by applying average state "volume (KL) per connection" coefficients and applying these to the households known not to be served by water providers (estimated by subtracting the connections served by water providers from the total number of households in each State and Territory).

12. The location of a dwelling is a major factor that influences the sources of water used by Australian households.

13. Mains or town water was the most common source of water for Australian households in 2010, with 93% of households being connected to either mains or town water.[6]

14. The prevalence of rainwater tanks as a source of water for Australian households continues to increase. Twenty six per cent of households used a rainwater tank as a source of water in 2010 compared with 19% of households in 2007 and 17% in 2004.[7]

15. In 2010 over 90% of households in capital cities reported mains or town water as their main source of water for drinking compared with 69% of households living outside capital cities. For households living outside capital cities, water from rainwater tanks was the second most popular main source of water for drinking (22%).[8]

16. From March 2007 to March 2010, households with a suitable dwelling which had a rainwater tank installed increased from 24% to 32%. During this period, households in capital cities experienced the greatest increase in the proportion of rainwater tanks installed at their dwelling (from 15% in 2007 to 26% in 2010).[9]

17. Households living in newly built dwellings were more likely to have a rainwater tank installed. Rainwater tanks are mandatory in NSW, ACT, Victoria and South Australia for all new dwellings. Rainwater tanks were also mandatory for new dwellings in Queensland from 2006 to 2013.

[4] See SEEA 2012 paragraph 3.195
[5] See SEEA 2012 paragraph 3.196
[6] Australian Bureau of Statistics – Environmental Issues: Water Use and Conservation, March 2010 (cat. no. 4602.0.55.003) – Table 2
[7] See 2010 Environmental Issues Table 2
[8] See 2010 Environmental Issues Table 3
[9] See 2010 Environmental Issues Table 5

18. The size of the rainwater tank installed will depend on a range of environmental, economic and legal factors including rainfall in the household area, catchment area (size of the roof), garden type and size, the number of people living in the dwelling and water usage by households with rainwater tanks, income and government mandates.

3.0 Data Sources and Methodology

19. The data needed for modelling the production of water by households includes rainfall, number and sizes of tanks used by households, volumes of water collected by rainwater tanks, overflow amounts and water usage within households. Data would be needed for different areas, e.g. capital cities and the balance of Australia. To collect all the data would be extremely costly and impose significant respondent burden. As no resources for data collection were available, existing data sources on these attributes were used.

20. The method applied utilises regional studies, ABS household surveys and modelling. It involved the use of estimates for the number of private dwellings in capital cities and the balance of Australia which have rainwater tanks sourced from the ABS publication Environmental Issues: Water Use and Conservation (cat. no. 4602.0.55.003).

21. It assumed the type of dwelling (bedroom number) was an indication of the size of rainwater tank the household would be able to use and accommodate. Larger dwellings have a greater catchment area (roof size) enabling the household to install larger tanks and capture more water and hence to improve the tank's capacity to provide a reliable water supply. Smaller dwellings are also limited to the size of tank that can be installed due to the lack of space available to site a rainwater tank. Estimates for the number and size of dwellings are based on ABS census data and household estimates. The details of the data sources and methods are found in Appendix 1.

4.0 Results

22. Table 1 shows estimates for the total storage capacity of rainwater tanks in Australia from 2006 to 2011.The total storage capacity in Australia has increased by 30% (6,345ML) largely fuelled by increased storage capacity in capital cities (4,227ML or 67% of total storage increase).

Table 1 – Total storage capacity of rainwater tanks, Australia, 2006 to 2011 (ML)

	2006	2007	2008	2009	2010	2011
Capital cities	5,024	5,574	6,220	6,335	8,142	9,251
Balance of Australia	16,346	16,638	17,077	17,186	18,061	18,463
Total	**21,369**	**22,212**	**23,296**	**23,521**	**26,203**	**27,714**

23. The water use from tanks in capital cities and the balance of Australia is shown in Table 2. The average household water use from all sources decreased from 0.261 ML/hh/year in 2006 to 0.184 ML/hh/year in 2011 and water use from rainwater tanks has increased during this period in capital cities. Water use from tanks has increased by 66% in capital cities and the number of households with tanks has increased by 129% during the period 2006 to 2011. However, for the balance of Australia water use from rainwater tanks has decreased by 8% from 2006 to 2011. The number of households with rainwater tanks has increased by 31% but coupled with the fall in average household use the water use from tanks has decreased by 12,005ML.

24. Water use from rainwater tanks from 2006 to 2011 has remained relatively constant at approximately 200,000ML per year. In 2006 water use from rainwater tanks in capital cities was 41,969ML (21% of total household water use from rainwater tanks) and has increased to 69,916ML (33% of total household water use from rainwater tanks) in 2011. Total water use from rainwater tanks for Australia has increased from 197GL in 2006 to 213GL in 2011.

Table 2 – Water use from rainwater tanks, Australia, 2006 to 2011

		No. of households with tank	Av household use (ML/hh/yr)	Household water use (ML)	Water use from tank (ML)	Total water use from tank (ML)
2006	**Capital city**	536,600	0.261	139,896	41,969	196,925
	Balance of Aust.	989,500	0.261	258,260	154,956	
2007	**Capital city**	625,500	0.247	154,499	46,350	197,485
	Balance of Aust.	1,019,800	0.247	251,891	151,135	
2008	**Capital city**	738,100	0.234	172,715	51,815	203,658
	Balance of Aust.	1,081,500	0.234	253,071	151,843	
2009	**Capital city**	758,400	0.198	150,163	45,049	173,971
	Balance of Aust.	1,085,200	0.198	214,870	128,922	
2010	**Capital city**	1,073,400	0.200	214,680	64,404	211,140
	Balance of Aust.	1,222,800	0.200	244,560	146,736	
2011	**Capital city**	1,266,600	0.184	233,054	69,916	213,083
	Balance of Aust.	1,296,800	0.184	238,611	143,167	

Source: ABS Water Account, Australia, 2010-11 (cat. no. 4610.0)
Source: ABS Water Account, Australia, 2009-10 (cat. no. 4610.0)
Source: ABS Water Account, Australia, 2008-09 (cat. no. 4610.0)
Source: ABS Household and Family Projections, 2004 (cat. no. 3236.0)
Source: ABS Household and Family Projections, 2010 (cat. no. 3236.0)

25. Whereas total water use from rainwater tanks for 2006 to 2011 has increased by 8% Table 3 shows own account equivalent monetary expenditure on tank water from 2006 to 2011 has increased by 45% ($358m to $519m) due to the average price of household water increasing from $1.82 to $2.44[10].

Table 3 – Own account equivalent monetary expenditure on tank water, Australia, 2006 to 2011 ($m)

	2006	2007	2008	2009	2010	2011
Capital cities	76	85	97	87	134	170
Balance of Australia	281	278	283	248	306	349
Total	**358**	**363**	**380**	**335**	**441**	**519**

5.0 Conclusion

26. Water use by households in 2010-11 was 1,699 gigalitres and the estimated water use from rainwater tanks by households in 2011 is 213 gigalitres (or 12% of total household use).

27. A total of 71,796 GL of water was supplied by the environment and used within the Australian economy in 2010-11. Water use by all industries and households was 13,337 GL in 2010-11 and the remainder was mainly in-stream use for hydro-electricity. When compared to the total water supplied by the environment rainwater tank extraction is 0.3% and in comparison to water use by industries and households 1.6%.

28. Overall the amount of water extracted by rainwater tanks is small but the estimated amount used by households from rainwater tanks is significant and inclusion of this data in the annual ABS Water Account would provide improved reporting on the physical and monetary supply and use of water in the Australian economy. In previous ABS Water Account publications information on the supply and use of water in the Australian economy has not included the water from rainwater tanks. The SEEA Central Framework which is used by the ABS records as completely as possible the stocks and flows relevant to the analysis of environmental accounting and the inclusion of water use from rainwater tanks will complete the picture provided by the ABS Water Account.

6.0 Questions to the London Group

29. The ABS is seeking feedback from the London Group on the method the ABS is using to review rainwater tank use and incorporate it into the main supply and use tables of the ABS Water Account.

[10] See ABS Water Account 2010-11

30. Specific questions are:

- Is own-account production an important enough issue for it to be a focus of international methodological research and hence added to the SEEA research agenda?
- Are there alternative methods in use or proposed that could estimate rainwater tank use by households?
- Does the London Group know of any other work investigating the use of water from rainwater tanks by either households or industry?
- Does the London Group view this method as suitable for estimating household production of water from rainwater tanks for d inclusion in the national accounts?

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Appendix 1 – Data sources and methods

1.1 Data sources and methods: dwelling types

1. Data on the numbers and types of dwellings (the number of bedrooms for occupied private dwellings for capital cities and the balance of Australia) is compiled and presented by profile.id in the Australian Community Profile. Profile.id sources data from ABS Census of Population and Housing data and builds demographic information products for Australia and New Zealand. Profile .id was used was used to estimate dwelling size for households with rainwater tanks for 2006 and 2011.

2. The number of bedrooms for capital cities and the balance of Australia for the intervening years 2007, 2008, 2009 and 2010 were estimated using the percentage change for the period 2006 to 2011. The lognormal difference was chosen to represent the percentage change over time.

$$X = (LN(A) - LN(B))/n$$

X – percentage change from 2006 to 2011
LN(A) - natural logarithm of the number of bedrooms for 2011
LN(B) – natural logarithm of the number of bedrooms for 2006
n - number of periods from 2006 to 2011

Table 4 – Estimates of Dwelling Size for Capital Cities, Australia, 2006 to 2011

No of bedrooms	2006	2007	2008	2009	2010	2011
0 or 1	250,324	273,433	277,654	281,943	286,365	290,943
2	942,304	950,369	965,039	979,949	995,317	1,011,229
3	2,038,050	2,002,858	2,033,775	2,065,197	2,097,585	2,131,118
4 or more	1,333,356	1,467,250	1,489,900	1,512,919	1,536,645	1,561,211
Not stated	313,502	258,639	262,632	266,689	270,872	275,202
Total	4,877,536	4,952,548	5,028,999	5,106,698	5,186,784	5,269,703

Source: http://profile.id.com.au/australia

Table 5 – Estimates of Dwelling Size for balance of Australia, 2006 to 2011

No of bedrooms	2006	2007	2008	2009	2010	2011
0 or 1	145,948	149,816	151,897	153,993	156,101	158299
2	478,790	472,239	478,800	485,406	492,050	498979
3	1,237,437	1,212,511	1,229,357	1,246,318	1,263,376	1,281,167
4 or more	687,324	763,052	773,654	784,328	795,063	806,259
Not stated	169,117	158,373	160,574	162,789	165,017	167,341
Total	2,718,616	2,755,992	2,794,283	2,832,836	2,871,607	2,912,045

Source: http://profile.id.com.au/australia

3. The numbers of bedrooms for capital cities were validated using the projected number of household's percentage increases for each year. The percentage increase for households was used to validate the dwelling size (number of bedrooms) for private dwellings 2007, 2008, 2009, and 2010. The ratio of 0-1, 2, 3 and 4 or more bedrooms for 2011 was used in validating for 2007, 2008, 2009, and 2010 as there had been little change since 2006 census data. The household projection series used assumes that there is no change in propensities. Living arrangement propensities for 2006 remain constant to 2031.

1.2 Data sources and methods: dwellings with rainwater tanks

4. Household water use and conservation is collected every three years 2004, 2007, and 2010. In 2010 the ABS publication Environmental Issues: Water use and Conservation, Mar 2010 (cat. no. 4602.55.003) published household information including the use of rainwater tanks. Previously this information was provided in Environmental Issues: People's Views and Practices published in 2004 and 2007.

5. Table 6 shows whether a dwelling has a rainwater tank and Table 7 shows the number of dwellings where the main source of drinking water is a rainwater tank in Australia from 2006 to 2011. Both tables are a compilation of data from ABS publications and modelled estimates.

$$X = (LN(A) – LN(B))/n$$

X = dwelling has a rainwater tank
LN(A) - natural logarithm of the number of households which have a rainwater tank in 2010
LN(B) – natural logarithm of the number of households which have a rainwater tank in 2007
n - number of periods from 2007 to 2010

Table 6 – Dwelling has a rainwater tank, Australia, 2006 to 2011 ('000)

	2006	2007	2008	2009	2010	2011
Capital city	536.3	625.5	738.1	758.4	1,073.4	1,266.6
Balance of Aus.	989.5	1,019.8	1,081.5	1,085.2	1,222.8	1,296.8
Total	1,525.8	1,645.3	1,819.6	1,843.6	2,322.2	2,565.4

Source: Environmental Issues: Water use and Conservation, Mar 2010 Table 5 (cat. no. 4602.0.55.003)
Source: Environmental Issues: People's Views and Practices, Mar 2007, (cat. no. 4602.0)

$$X = (LN(A) – LN(B))/n$$

X – dwelling has a rainwater tank
LN(A) - natural logarithm of the number of households using rainwater tanks as the main source of drinking water in 2010
LN(B) – natural logarithm of the number of households using rainwater tanks as the main source of drinking water in 2007
n - number of periods from 2007 to 2010

Table 7 – Rainwater tank as the main source of drinking water, Australia, 2006 to 2011 ('000)

	2006	2007	2008	2009	2010	2011
Capital city	127.4	127.3	127.2	127.2	127.1	127.0
Balance of Aus.	680.5	686.0	691.5	697.1	702.8	708.5
Total	807.8	813.3	818.8	824.3	829.9	835.5

Source: Environmental Issues: Water use and Conservation, Mar 2010 Table 5 (cat. no. 4602.0.55.003)
Source: Environmental Issues: People's Views and Practices, Mar 2007, (cat. no. 4602.0)

6. For years where no data was collected estimates were interpolated using a proportional growth method using the percentage change between 2007 and 2010 collections for whether a household has a rainwater tank.

1.3 Data sources and methods: tank sizes

7. Web based research of rainwater tank retailers was undertaken to ascertain rainwater tank sizes in relation to the size of dwelling. Regional studies in South East Queensland, Perth, Ballarat, Melbourne, Brisbane, Sydney and Adelaide were also used to allocate tank sizes to dwellings.

8. Larger tank sizes were also assumed for dwellings that used rainwater tanks as the primary source of drinking water. The logic being if a household relied on rainwater tanks as their primary water supply their tank would be larger than normal. Tank sizes were allocated to the population based on the size of the dwelling by Environmental Issues: Water Uses and Conservation (cat. no. 4602.0.55.003), regional studies and retail information. For examples of studies and reports on rainwater tank sizes see Appendix 2.

9. It was assumed that households who used rainwater tanks as the main source of drinking water would be larger dwellings in a rural or semi-rural setting where the household was not connected to a mains water supply. Data for these households is provided by the ABS publication Environmental Issues: Water Use and Conservation (cat. no. 4602.0.55.003). Based on retail information a 22,700 litre tank size was assigned to these dwellings.

10. Household tank storage capacity was estimated via interpolation for the periods between the data source and Environmental Issues: Water Use and Conservation (cat.no. 4602.0.55.003) data. The estimated use from rainwater tanks in capital cities and the balance of Australia was based on assumptions of water usage from rainwater tanks.

1.4 Data sources and methods: rainwater tank use

11. Estimates of mains water savings through the use of rainwater tanks have been based on studies of four local government areas of South East Queensland by the Urban Water Alliance, a report by the Master Builders Queensland on domestic rainwater tanks in Queensland and their cost effectiveness and impact on housing costs, the ACT Planning and Land Authority rainwater tank guide and the report by Ballarat council on the benefits of rainwater tanks in Ballarat.

12. It was estimated that savings on main water use from rainwater tank usage for capital cities amount to 30%. These savings arise when rainwater tanks are plumbed into washing machine cold water taps and toilets. Greater savings can be achieved if rainwater tanks are plumbed into hot water washing machine taps and bathroom taps. Internal hot water taps use 30 to 35 per cent of mains water use[11]. External use of rainwater tanks can also yield savings from 12% to 43%. The average external use of water in South East Queensland was estimated to be 12%[12], Ballarat 17%[13] and Canberra 43%[14].

13. For the balance of Australia estimated savings on main water use from rainwater tank usage are 60%. Table 7 shows that in 2010, 829,900 households used a rainwater tank as the main source of their drinking water, 85% (702,800) of these households were located in areas other than capital cities. Table 6 provides estimates of dwellings in areas other than capital cities with a rainwater tank and in 2010 there were 1.2 million dwellings that had a rainwater tank and 57% (702,800) used the tank as the main source of their drinking water. In addition to using rainwater tanks as a source of water rural households also source water from waterways, groundwater and dams. It was assumed that in addition to using rainwater tanks for toilet and washing machine use, tank water would also be used for shower/bath and internal taps. Average household water use for 2009 to 2011 was taken from ABS Water Accounts for the corresponding years.

14. The total water use from rainwater tanks is dependent on the water practices of each household. For capital cities estimated water savings of 30% were assumed and for the balance of Australia estimated savings were assumed to be 60%.

1.5 Data sources and methods: monetary expenditure

15. Estimates for the household price of water for 2009, 2010 and 2011 were sourced from ABS Water Account publications. The household price of water was estimated using the average price paid for distributed water by households in 2009 less average consumer price index for 2006, 2007 and 2008. Table 8 shows the estimated household price of water rose from $1.82 in 2006 to $2.44 per kilolitre in 2011. The estimated household price of water for capital cities and the balance of Australia is the same.

Table 8 – Household price of water per kilolitre, Australia, 2006 to 2011 ($)

2006	2007	2008	2009	2010	2011
$1.82	$1.84	$1.87	$1.93	$2.09	$2.44

Source: ABS Water Account, Australia, 2010-11 (cat. no. 4610.0)
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Source: ABS Water Account, Australia, 2008-09 (cat. no. 4610.0)
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16. A monetary value for water use from rainwater tanks was estimated using the value at cost of water that would otherwise had to have been purchased from water suppliers. The equivalent monetary expenditure on tank water for capital cities and the balance of Australia was calculated using the estimated household price of water per kilolitre.

17. The equivalent monetary expenditure on tank water was derived from the estimates of water use from tanks for capital cities and the balance of Australia together with the estimated household price of water per kilolitre.

X= (AxC) + (BxC)

X – Total own account equivalent monetary expenditure on tank water
A – Water use from tank for capital city
B – Water use from tank for balance of Australia
C – price of water $/KL

1.6 Data sources and methods: rainwater tank storage capacity

18. The storage capacity of rainwater tanks for capital cities and the balance of Australia were derived from the estimates of the number of households with rainwater tanks, the size (bedroom size) of the dwellings together with the estimates of tank sizes for each dwelling.

X = (A x B)/1,000,000

X - Storage capacity
A – tank size (L)
B – number of dwellings

Appendix 2 – Rainwater tank sizes

1. In 2007 under the Queensland Development Code (QDC) 4.2 it became mandatory to incorporate a method of reducing mains water consumption in all new residential properties that were located in a reticulated town water supply in Queensland. In South East Queensland the QDC 4.2 was modified to include a section mandating Class 1 residential buildings built after 2007 to achieve mains water savings of 70 kilolitres/household/year. The most effective way of achieving this was to install a 5,000 litre rainwater tank plumbed into toilet cisterns, cold tap(s) of washing machines and external garden tap(s). Surveys undertaken by the Urban Water Alliance estimated that 78% of homes built in South East Queensland since 2007 had rainwater tanks with a volume of 5,000 litres or more[15].

[15] Urban Water Security Research Alliance Technical Report No. 48. Baseline Characteristics of Mandated Rainwater Tank Users in South East Queensland (Phase 1). August 2011.

2. A study for the Perth Water Corporation and Department of Water Western Australia into the cost effectiveness and yield of rainwater tanks concluded that the data available on tank sizes in Perth was limited (as is the case for Australia) but the data they had available from Victoria indicated that the most common tank size sold was around 2,000L and a 5,000L was considered to be a large residential rainwater tank. [16]

3. In NSW new housing must meet BASIX (a building sustainability index). Every new dwelling, including multi-storey buildings must meet BASIX targets which are expressed as a percentage saving against the NSW benchmark. Since 2004 an average of 95% of BASIX certificates nominated a rainwater tank as the preferred requirement, 90% chose to connect an alternative supply to toilets and 75% connected to an alternative supply for laundry use.[17]Multi-storey units can achieve compliance using water efficient appliances (e.g. washing machine) instead of using rainwater tanks. Under BASIX there are no tank capacity requirements but a recent audit found that most single detached dwellings had a 4,000L tank installed.[18]

4. A study into the water supply benefits from rainwater tanks in Australian capital cities evaluated the performance of 1,000L to 10,000L tanks in supplementing mains supply for domestic toilet, laundry, hot water and external uses. The study determined that water supply benefits form rainwater tanks diminished with larger tank volumes. In each city the optimum sized rainwater tank seemed to be about 5,000L for mains water savings.[19]

5. A further study on the development of a tool to determine the optimal size of a rainwater tank to meet the demands of households in the Greater Melbourne area was completed in 2008. The reliability of the tank to meet the demand was based on geographic location of the house, the catchment area of the roof and the usage patterns of the household. The tank sizes were limited to 20,000L as the study concentrated on determining the optimum size for domestic use. A tank size of more than 5,000L was considered large for an average house.[20]

Appendix 3 - Data Limitations

1. The data from ABS publications for Water Use and Conservation for capital cities does not include data for Canberra and Darwin. There was no regional split between capital city and balance of State/territory for the Australian Capital Territory (ACT) and Northern Territory (NT) as the survey sample did not support any breakdown beyond the whole territory.

However, data on the number of bedrooms per dwelling for capital cities includes Darwin and the ACT. This can lead to an over estimation of dwellings with rainwater tanks in areas other than capital cities and also those dwellings that use rainwater tanks as the main source of drinking water in areas other than capital cities.

[16] Marsden Jacobs Associates. The cost effectiveness of residential tanks in Perth. A report prepared for Water Corporation and the Department of Water. April 2009.
[17] Australian Government National Water Commission. Jan Warnken, Nicole Johnston, Chris Guilding. Exploring the regulatory framework and governance of decentralised water management systems: a strata and community title perspective. Waterlines Report Series No 19, September 2009.
[18] See 2009 Australian Government National Water Commission Table 1
[19] Peter J Coombes and George Kuzcera. Analysis of the Performance of Rainwater Tanks in Australian Capital Cities. 2003.
[20] Anirban Khastagir. School of Civil, Environmental and Chemical Engineering RMIT University. Optimal use of Rainwater Tanks to Minimize Residential Water Consumption. A thesis submitted in fulfilment for the degree of Masters of Engineering. July 2008.

In this paper the ACT is used to represent the capital city of Canberra when data for the number of dwellings is used. As a result the estimates for the number of dwellings in capital cities could be overstated.

2. Allocation of tank sizes to dwelling sizes was based on research of rainwater tank retail web sites to determine the tank sizes sold, the most suitable use for each tank size and size of household purchasing the tank.

In addition to research on tank retailers' information was sourced from local government, the Australian government and not-for-profit industry associations incorporating water businesses, government agencies and product and technology providers.

The size of the residence and the number of occupants in the house should determine the size of rainwater tank chosen. The larger the household the faster the rainwater supply will be used. The amount of rainwater collected by a tank can be calculated by using the following formula:

Run-off (litres) = 0.85 (efficiency) x Rainfall (median average rainfall) x Roof area (square metres)

Generally, rainwater tanks can be classed as:

Small – less than 2,000L

Medium – between 2,000L and 10,000L

Large – greater than 10,000L

To gain a more accurate picture of the size of households using small, medium or large tank sizes more data on the sales of tank sizes and location of tank sales would enable better estimates of tank sizes and the region (capital city or balance of Australia) they were used.

3. The ABS publication Environmental Issues: Water Use and Conservation is published every three years and presents information on a range of topics including household water uses, water usage and water saving practices. At present it does not include questions on the size of rainwater tanks but only on whether a household has a rainwater tank and the usage of the tank. This survey could be a source of information on the size of rainwater tanks if future funding became available. However, in a survey of a South East Queensland study region a total of 14% of householders reported not knowing the size of their rainwater tanks.[21]

[21] Baseline Characteristics of Mandated Rainwater Tank Users in South East Queensland. Urban Water Security Research Alliance Technical Report No. 48 August 2011.