



Samoa Bureau of Statistics

Environment Statistics

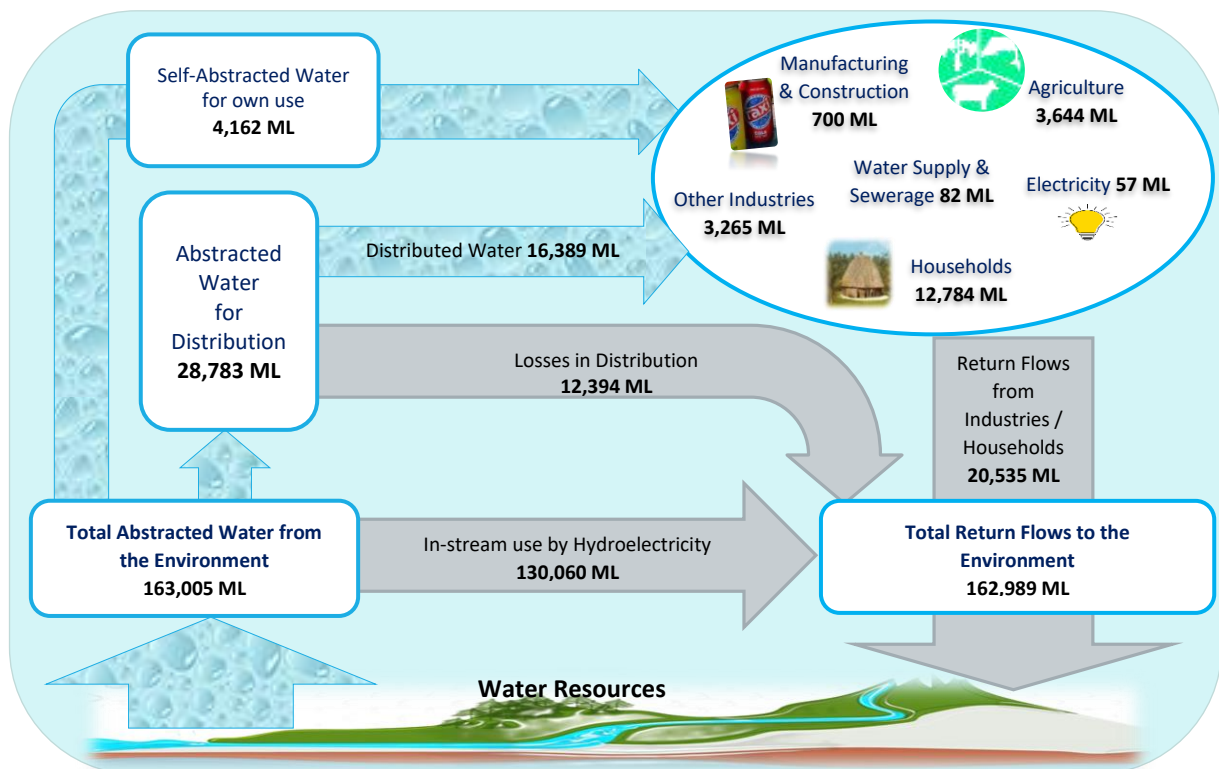
Samoa Water Accounts, 2018-19

Executive Summary

The Samoa Water Account for the financial year 2018-19 presents information on the physical and monetary supply and use of water in Samoa. This is the 5th edition of the Samoa's Water Accounts and it provides the highlights of water statistics, aggregates and indicators with comparison to the previous years. This account compilation closely followed the 2012 United Nation System of Environmental-Economic Accounting Central Framework (UN SEEA) guidelines and principles.

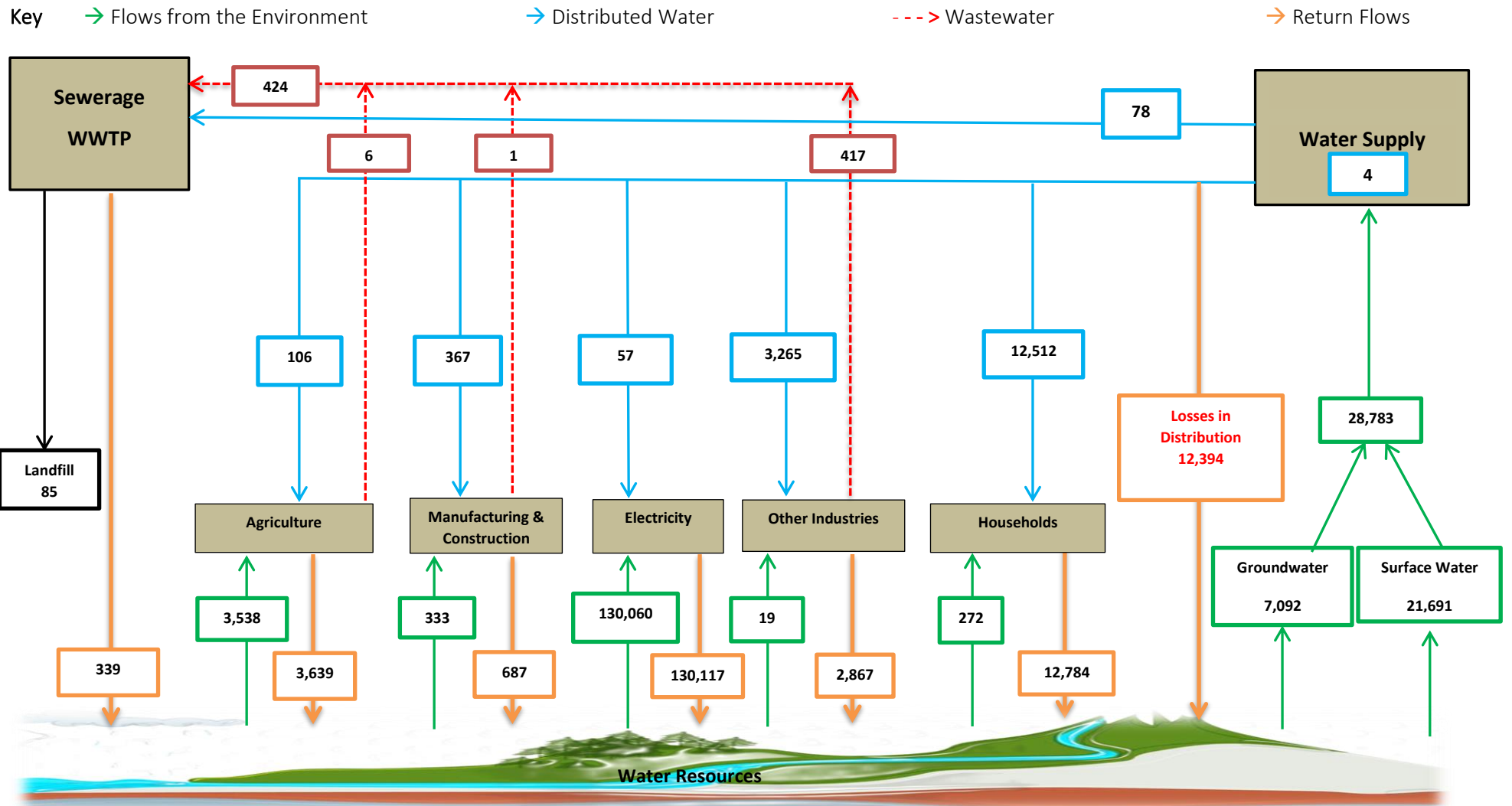
Figure 1 briefly summarizes the physical flows of water from the environment into the economy, its flows within the economy and return flows back to the environment. This flow diagram is shown in detail in Figure 2.

Figure 1: Samoa's Main Water Flows Diagram, 2018-19 (Megalitres¹)



¹ 1 ML = 1,000 Cubic meters (m³)
1m³ = 1,000 Litres (L)

Figure 2: Major Water Flows for Samoa, 2018-19 in Megalitres (ML)



1. Account Results and Findings

1.1 Physical Water Supply and Use

Table 1 below summarizes water statistics from water abstraction to water use for the last five financial years from 2014-15 to 2018-19.

Table 1: Total Water Abstraction and Total Water Use, Samoa 2014-15 to 2018-19 (ML)

	2014-15	2015-16	2016-17	2017-18	2018-19
Total Abstraction by Water Type	115,004	101,836	82,530	114,144	163,005
Surface Water	106,634	93,335	74,045	106,846	155,587
Ground Water	7,670	7,912	7,843	6,634	7,147
Rainwater	700	589	641	665	272
Total Abstraction by Industry & Households	115,004	101,836	82,530	114,144	163,005
Industries	114,304	101,247	81,892	113,482	162,733
Electricity	75,250	68,130	50,180	80,050	130,060
Water Supply Industry	35,428	29,727	28,164	29,949	28,783
Agriculture, Livestock & Fishing	3,040	3,127	3,277	3,393	3,538
Manufacturing & Construction	550	83	92	66	333
All other Industries	36	180	180	25	19
Households	700	589	637	662	272
Total Water Use by Industry & Households (a)	115,004	101,836	82,530	114,144	163,005
Industries	81,272	75,230	57,771	87,312	137,828
Electricity	75,260	68,131	50,184	80,062	130,117
Agriculture, Livestock & Fishing	3,110	3,206	3,369	3,476	3,644
All other Industries	2,190	3,475	3,765	3,339	3,284
Manufacturing & Construction	710	415	449	413	700
Sewerage	-	1	2	16	78
Water Supply Industry	2	2	2	6	4
Households	16,830	13,574	13,994	13,060	12,783
Losses (b)	16,902	13,032	10,765	13,772	12,394

Source: Samoa Bureau of Statistics

Note:

- (a) Total Water Use = Self-Abstracted water use + Distributed water use
- (b) Include distribution losses through leakages, illegal connections, overflows and other authorized unbilled consumption
- Nil or not available

1.1.1 Water Abstraction

An estimated total of 163,005 ML of water was abstracted from the environment into Samoa's economy in 2018-19, an increase of about 30.0 % or 48,860 ML of water when compared to 2017-18. Electricity Industry is the main contributor which accounted for 79.8 % of total water abstracted or 130,060 ML

Surface water remains the main water type for abstracted water throughout the financial years. For 2018-19, it accounted for approximately 155,600 ML (95.5%) of total water abstraction. Groundwater accounted for 7,100 ML (4.4%) and the rest was rainwater harvesting at about 300 ML (0.2%) (Refer, **Chart 1**)

Chart 1: Total Water Abstraction by Water Type, Samoa 2014-15 to 2018-19 (ML)

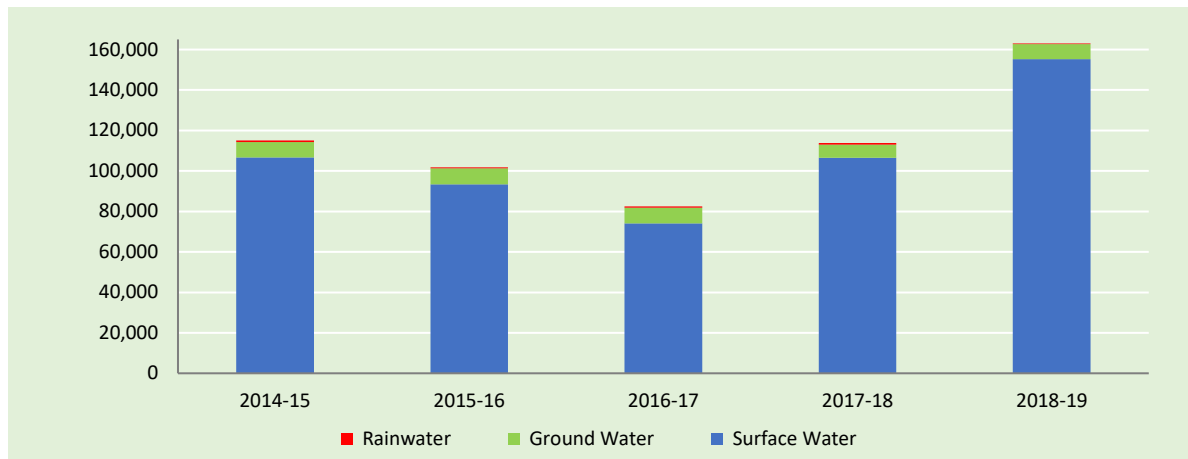
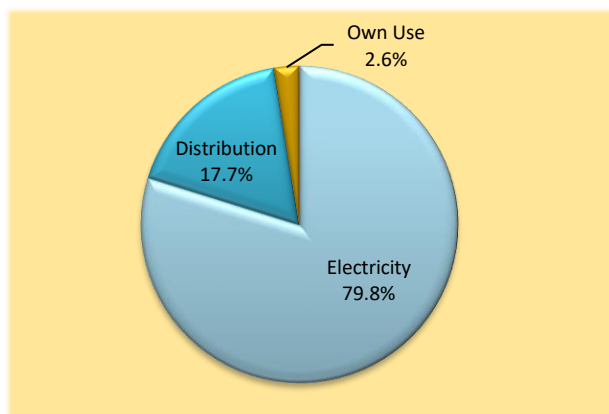


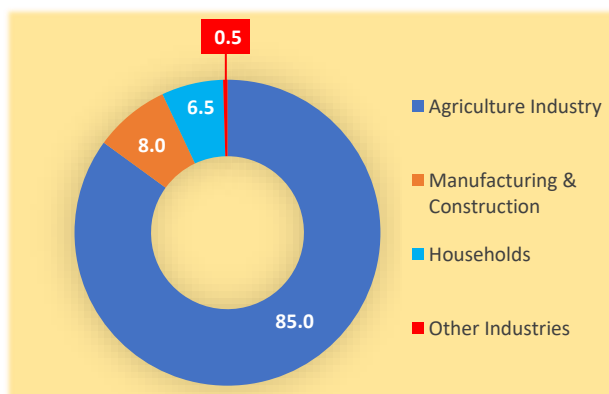
Chart 2: Proportion of Total Water Abstraction by Purpose of Use, 2018-19



- **Electricity:** 79.8 % or 130,060 ML of total abstraction was self-abstracted² water by the Electricity Industry for hydropower and the vast majority of this water is returned back to the environment.
- **Distribution:** 17.7 % or about 28,800 ML of water was abstracted by the Water Supply industry mainly for distribution.
- **Own Use:** The remaining 4,100 ML of water or 2.6 % was self-abstracted for own use by industries and households (Refer Chart 2)

Note: Please note that the following charts (Chart 3 & 4) exclude figures for hydroelectricity used by the Electricity Industry and self-abstracted water for distribution by the Water Supply Industry. It only includes self-abstracted water for own use by the selected industries and households.

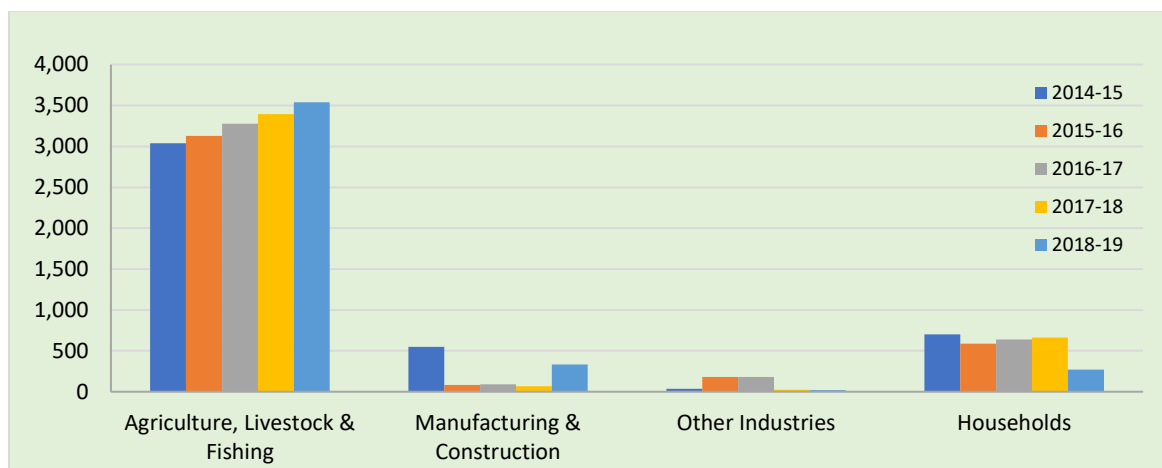
Chart 3: Proportion of self-abstracted water for own use, Samoa 2018-19



- Out of the 4,100 ML or 2.0 % of self-abstracted water for own use, 85.0 % or 3,600 ML comes from the Agriculture Industry.
- Manufacturing and Construction accounted for about 300 ML or 8.0 %.
- Households accounted for 6.5 % or 272 ML of water
- The remaining 20 ML of water or 0.5 % was self-abstracted by Other Industries.

² Self-abstracted water refers to water that is directly abstracted from the environment.

Chart 4: Total Self-Abstracted Water for Own Use by Industries & Households, Samoa 2014-15 to 2018-19 (ML)



Source: Samoa Bureau of Statistics

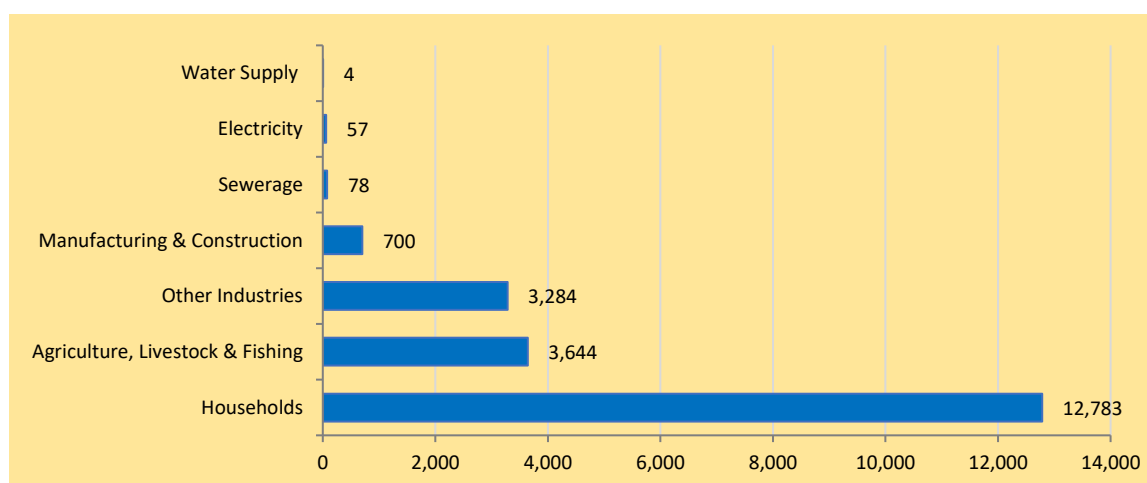
Chart 4 summarizes self-abstracted water for own use from 2014-15 to 2018-19. Agriculture industry is clearly the dominant industry and has steadily increased during the reference period. Further details on agriculture water use by different livestock and poultry are tabulated in Appendices A6 & A7. Furthermore, the decrease in self-abstracted water for households partially due to more households been connected to pipe water supply.

1.1.2 Water Use

The total water use (hydroelectricity excluded) in 2018-19 was about 20,600 ML (Refer **Chart 5**).

- 62.2 % or 12,800 ML of total water use was used by households
- 17.7 % or 3,600 ML was used by Agriculture, Livestock and Fishing;
- 16.0 % or 3,300 ML was used by Other Industry;
- 3.4 % or 700 ML was used by Manufacturing and Construction;
- The remaining 0.7 % or 140 ML was used by Sewerage (78 ML), Electricity (57 ML) and Water Supply Industry (4 ML)

Chart 5: Total Water Use by Industries and Households, Samoa 2018-19 (ML)

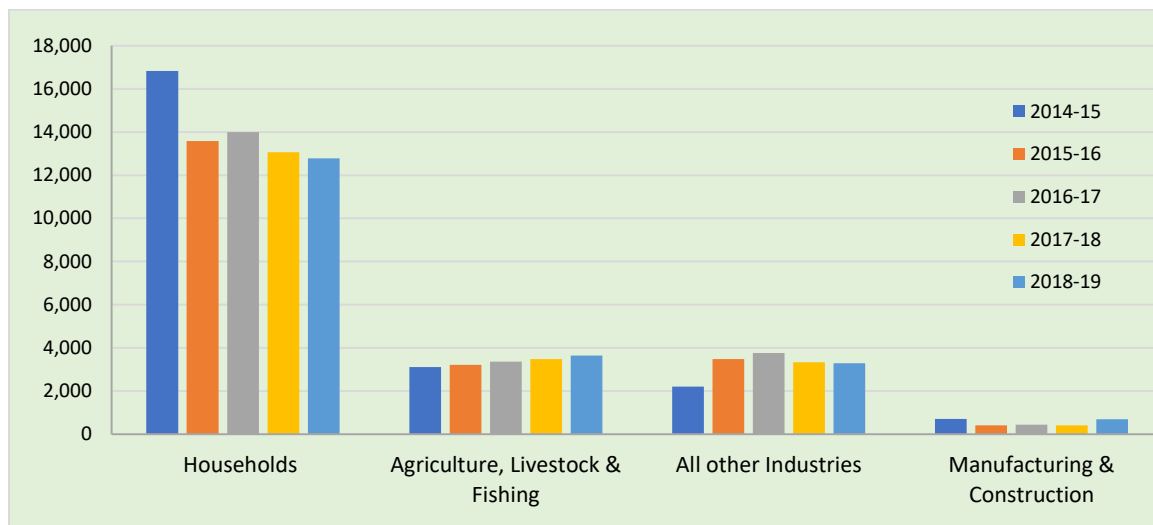


Source: Samoa Bureau of Statistics

Note: Hydroelectricity water use is excluded

Households are the main users of water, which accounted for the majority of water use across all the financial periods (Refer **Chart 6**).

Chart 6: Total Water Use by Industries and Households, Samoa 2014-15 to 2018-19 (ML)

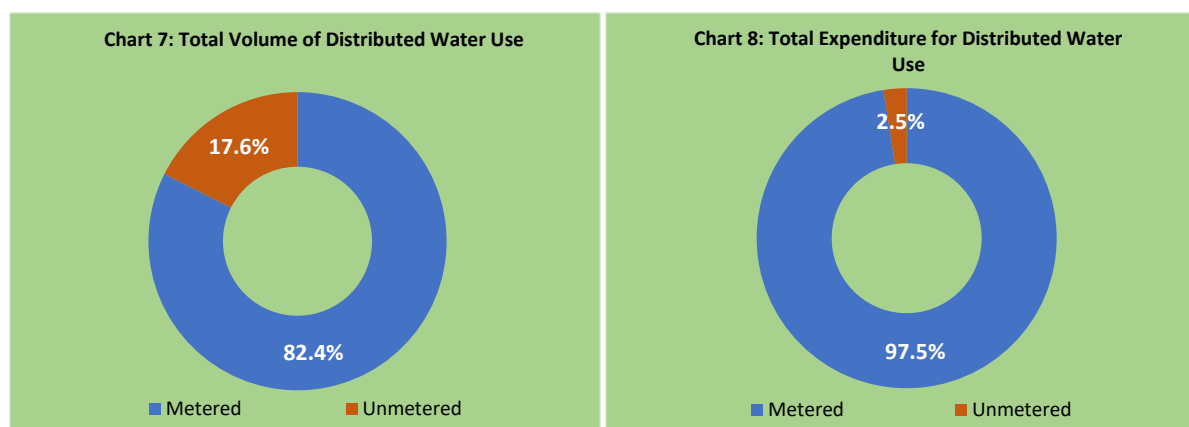


Source: Samoa Bureau of Statistics

1.2 Monetary Water Supply and Use

Coverage of financial information is still limited to distributed water use. With more than 82.0 % of distributed water³ use comes from metered water; the monetary estimates are considered reliable but should still be interpreted with caution. All monetary values are in Samoan Tala and notes under Table 2 briefly describe how monetary values were calculated. The following charts provide detailed graphical analysis on distributed water use for 2018-19 together with Table 2 & 3.

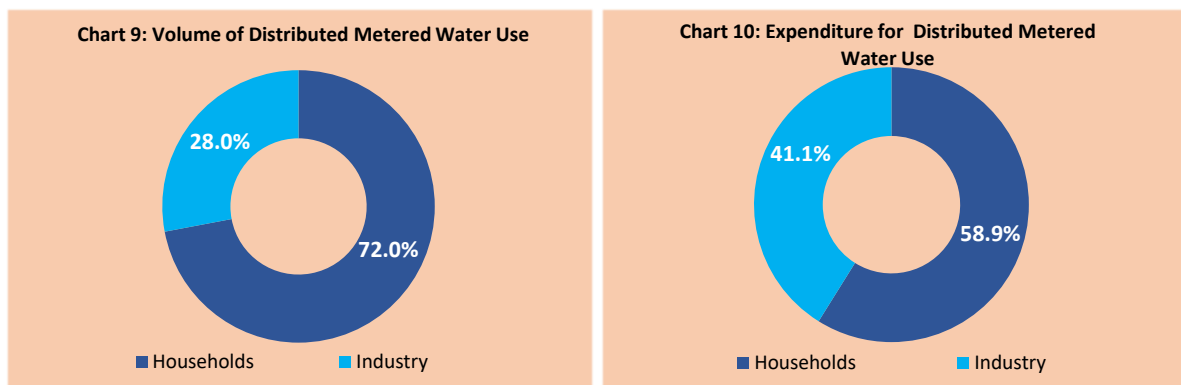
Total Distributed Water Use: Out of 16,400 ML of total distributed water use, about 82.4 % or 13,500 ML is metered water with the rest, 17.6 % or 2,877 ML is unmetered water use (Refer **Chart 7**).



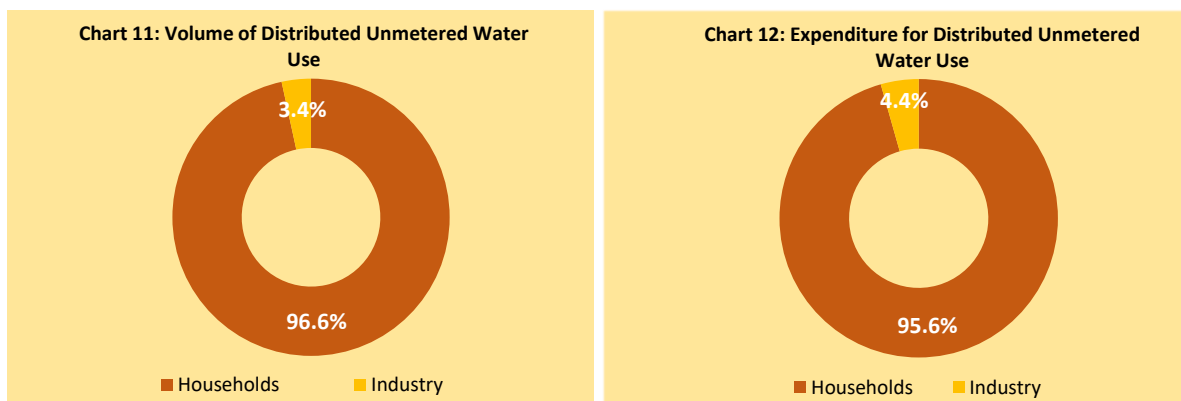
³ **Distributed water** refers to water supplied by the water suppliers to industries and households or between economic units where an economic transaction occurs.

An estimated 20.8 million Tala were paid by users for distributed water use, accounting for 97.5 % of total payments for distributed water of about 21.4 million Tala in 2018-19. Unmetered distributed water use makes up the remaining 2.5 % or 0.6 million Tala of total payment during the reference period (Refer **Chart 8**).

Distributed Metered Water Use: Households accounted for most of the metered water use at about 72.0 % or 9,700 ML with the remaining 28.0 % or 3,800 ML used by industries. Furthermore, households also paid the highest share among the various categories for distributed metered water with 58.9 % or 12.3 million Tala while Industry accounted for the remaining 41.1 % or 8.6 million Tala (Refer **Chart 9**).



Distributed Unmetered Water Use: Households dominated both volume and payments made for unmetered water use with 96.6 % and 95.6 % respectively.

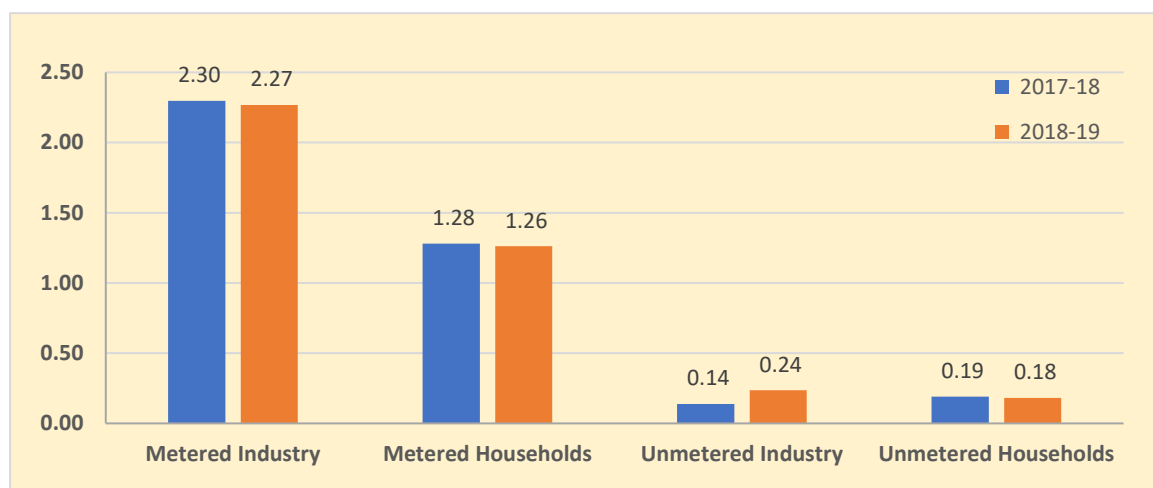


Implicit Price ⁴: In 2018-19, the average price per cubic meter of distributed water use for metered industry was the highest with \$2.27 while distributed unmetered water to households accounted for the cheapest at \$0.18 per cubic meter.

All implicit prices for all types of distributed water use in 2018-19 have slightly decreased compare to 2017-18, except for distributed unmetered water use by industry which has increased from \$0.14 to \$0.24 per cubic meter of water used (Refer **Chart 13**).

⁴ **Implicit Price** is imputed as the Water expenditure divided by water supplied (\$SAT/m³). The expenditures used to calculate the price do not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditures for not necessarily cover all the costs of supplying water.

Chart 13: Implicit Price for Distributed Water Use, Samoa 2017-18 to 2018-19



Source: Samoa Bureau of Statistics

Table 2: Monetary Supply and Use Table, Samoa 2017-18 to 2018-19

Volume in Megaliters (ML)	2017-18	2018-19
Metered Water Use	12,729.50	13,512.28
Industry	3,573.20	3,779.79
Households	9,156.30	9,732.49
Unmetered Water Use	3,446.10	2,877.20
Industry (a)	205.67	98.09
Households (b)	3,240.43	2,779.10
Total Distributed Water	16,175.60	16,389.48
Value in Million Tala (\$AT\$)	2017-18	2018-19
Metered Water Use	19.94	20.84
Industry	8.21	8.57
Households	11.73	12.27
Unmetered Water Use	0.65	0.53
Industry (c)	0.03	0.02
Households (d)	0.62	0.51
Total Value	20.59	21.37
Implicit Price (\$/m ³)	2017-18	2018-19
Metered Industry	2.30	2.27
Metered Households	1.28	1.26
Unmetered Industry	0.14	0.24
Unmetered Households	0.19	0.18

Source: Samoa Water Authority, Independent Water Scheme and Samoa Bureau of Statistics

Note:

- Unmetered water use for industry was estimated by calculating the average metered water use for each individual industry
- Unmetered household water use was estimated by calculating the average household metered water use.
- Revenue for unmetered industries was estimated at \$SAT32/month flat rate for SWA commercial customers and \$SAT10 for IWS Commercial customers.
- Revenue for unmetered households was estimated by \$SAT10 maintenance fee/month for IWS customers and \$SAT20/month flat rate for SWA household customers.

By detailed industry (Refer **Table 3**), the most significant contributors to the Total Expenditure on distributed water use was depicted by both the Accommodation and Food Services Industry and the Public Administration Industry with an estimated \$1.5 million Tala (17.1%) and \$1.2 million Tala (13.5%), respectively.

Table 3: Estimated Expenditure on Distributed Water Use by Industries and Households, 2015-16 to 2018-19 (Samoa Tala).

Industries	2015-16	2016-17	2017-18	2018-19
Agriculture, Livestock and Fishing	147,916.7	152,762.7	156,964.7	206,714.0
Manufacturing and Construction	606,379.8	628,073.2	662,035.7	712,484.8
▪ Manufacturing	538,457.2	546,828.7	543,855.5	590,403.6
▪ Construction	62,250.1	79,926.5	89,085.8	87,426.4
▪ Mining & Quarrying	5,672.5	1,318.0	29,094.4	34,654.8
Electricity Industry	1,379.0	6,749.0	23,236.5	113,889.0
Water Supply Industry	480.0	400.0	7,094.5	7,586.5
Sewerage	1,364.0	3,542.0	55,795.5	52,081.7
Other Industries	5,815,303.5	6,434,566.5	7,334,470.2	7,500,143.7
▪ Accommodation and Food Services	1,010,250.4	1,415,161.1	1,704,785.9	1,469,555.4
▪ Education	1,108,299.4	1,102,703.0	1,112,031.9	1,096,745.1
▪ Public Administration and Defense	753,963.2	754,431.9	841,490.2	1,155,997.6
▪ Human Health and Social Work	384,237.2	607,176.1	1,015,173.8	1,030,093.1
▪ Wholesale & Retail Trade	665,723.0	710,681.4	675,623.6	748,139.1
▪ Real Estate, Rental and Leasing Activities	480,756.3	499,702.6	382,479.6	412,395.8
▪ Other Service Activities	465,054.1	379,767.1	477,654.7	465,451.3
▪ Financial and Insurance Services	443,391.0	356,712.6	479,765.9	512,414.5
▪ Arts, Entertainment and Recreation	171,747.5	214,746.8	169,762.4	182,955.5
▪ Transportation and Storage	170,033.3	197,676.1	234,326.4	213,779.0
▪ Administrative and Support Service Activities	88,250.1	92,106.6	87,171.3	73,431.9
▪ Activities of Extraterritorial Organizations	47,850.3	63,120.5	76,316.0	77,706.0
▪ Information and Communication	13,295.0	20,158.8	29,728.0	21,947.8
▪ Professional, Scientific and Technical Activities	12,452.7	14,483.9	14,340.0	14,733.6
▪ Waste Collection and Management	-	5,938.0	6,383.5	6,507.0
▪ Unclassified	-	-	27,437.0	18,291.0
Total Industries	6,572,823.0	7,226,093.4	8,239,597.1	8,592,899.7
Households	10,356,546.3	11,182,834.0	12,439,347.2	12,779,568.1
Grand Total	16,929,369.3	18,408,927.4	20,678,944.3	21,372,467.8

Source: Samoa Water Authority, Independent Water Scheme and Samoa Bureau of Statistics

Note: Unclassified – are unidentified industries supplied by IWS

-: Nil or not available

1.3 Water Productivity

Water Productivity is the amount of GDP generated per cubic meter of water abstracted, calculated by GDP divided by total abstraction. Table 4 highlights water productivity over the last five financial years.

Samoa's economy in 2018-19 produced \$13.69 of GDP from every cubic meter of total water abstracted, which is less productive compared to \$18.45 recorded in 2017-18. Generally, Samoa's water productivity has decreased from \$17.52 in 2014-15 to \$13.69 in 2018-19 (Refer **Table 4**).

Table 4: Samoa Water Productivity for the financial years 2014-15 to 2018-19

	Total Abstracted m ³	GDP (Bill. Tala)	Water Productivity (\$/m ³)
2014-15	115,004,000	2,015,114,000	17.52
2015-16	101,836,320	2,107,457,000	20.69
2016-17	82,529,566	2,109,400,000	25.56
2017-18	114,144,000	2,105,500,000	18.45
2018-19	163,005,000	2,231,200,000	13.69

Source: Samoa Bureau of Statistics

1.4 Wastewater and Treatment Plant

The Wastewater Treatment Plant operated by SWA is used mainly by some businesses and government ministries within the Apia business area. There are no households connected to this wastewater treatment plant.

A total of 423.1 ML of wastewater was discharged to the Wastewater Treatment Plant by all industries in 2018-19, an increase of about 11.2 % or 42.9 ML compared to the previous financial year 2017-18. An estimated total payment of about \$2.2 million Tala was recorded for all the wastewater discharged by different industries to the Wastewater Treatment Plant for 2018-19, an increase of about 8.0 % from \$2.1 million Tala in 2017-18 (Refer Table 5).

Table 5: Wastewater Treatment Plant Use and Expenditure, Samoa 2017-18 to 2018-19

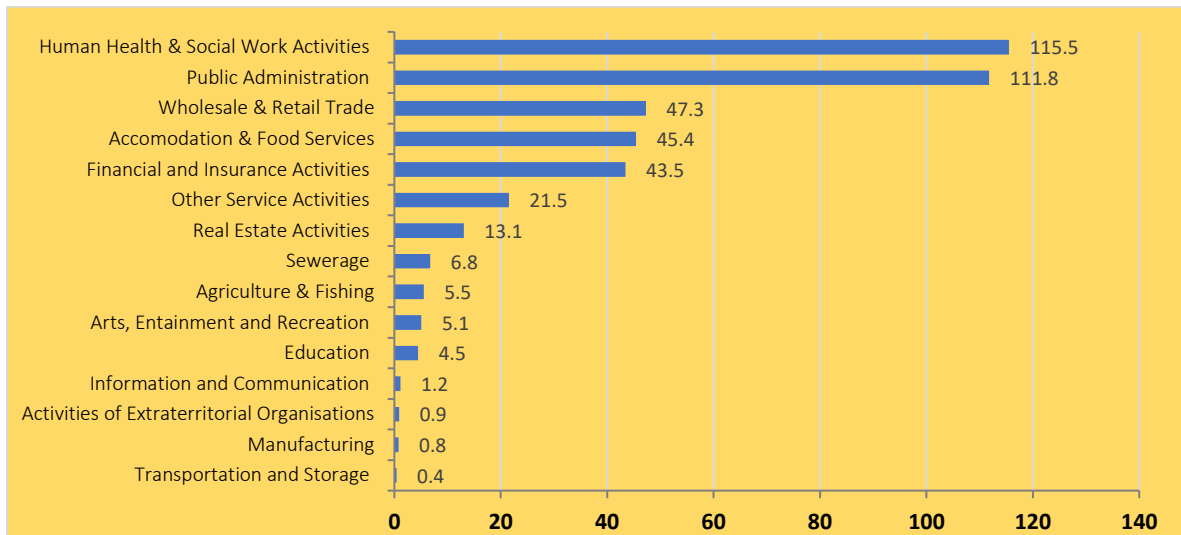
Industries	Megaliters (ML)		Value \$SAT	
	2017-18	2018-19	2017-18	2018-19
Human Health & Social Work Activities	118.6	115.5	686,930.9	666,417.0
Public Administration	80.2	111.8	439,241.6	612,123.5
Wholesale & Retail Trade	33.6	47.3	159,482.7	202,564.2
Accommodation & Food Services	53.9	45.4	301,857.7	230,009.9
Financial and Insurance Activities	38.7	43.5	218,984.6	247,164.9
Other Service Activities	12.6	21.5	63,758.9	107,157.9
Real Estate Activities	17.5	13.1	97,372.1	71,818.4
Sewerage	7.2	6.8	38,291.5	35,683.7
Agriculture & Fishing	5.0	5.5	14,473.3	16,907.2
Arts, Entertainment and Recreation	3.9	5.1	15,780.2	20,814.7
Education	5.6	4.5	27,423.2	22,290.1
Information and Communication	2.0	1.2	9,087.8	4,922.1
Activities of Extraterritorial	0.5	0.9	1,858.5	3,076.5
Manufacturing and Construction	0.7	0.8	2,292.5	2,709.0
Transportation and Storage	0.3	0.4	1,011.5	1,456.0
Total Wastewater Discharge	380.2	423.1	2,077,847.0	2,245,125.1

Source: Samoa Water Authority

Human Health and Social Work Activities industry accounted for most of the wastewater discharged 115.5 ML (27.3%), followed by Public Administration industry with 111.8 ML (26.4%).

Conversely, Transportation and Storage together with Manufacturing and Construction Industries accounted for the least of the wastewater discharged with 0.4 ML (0.1%) and 0.8 ML (0.2%) respectively (Refer **Chart 14**).

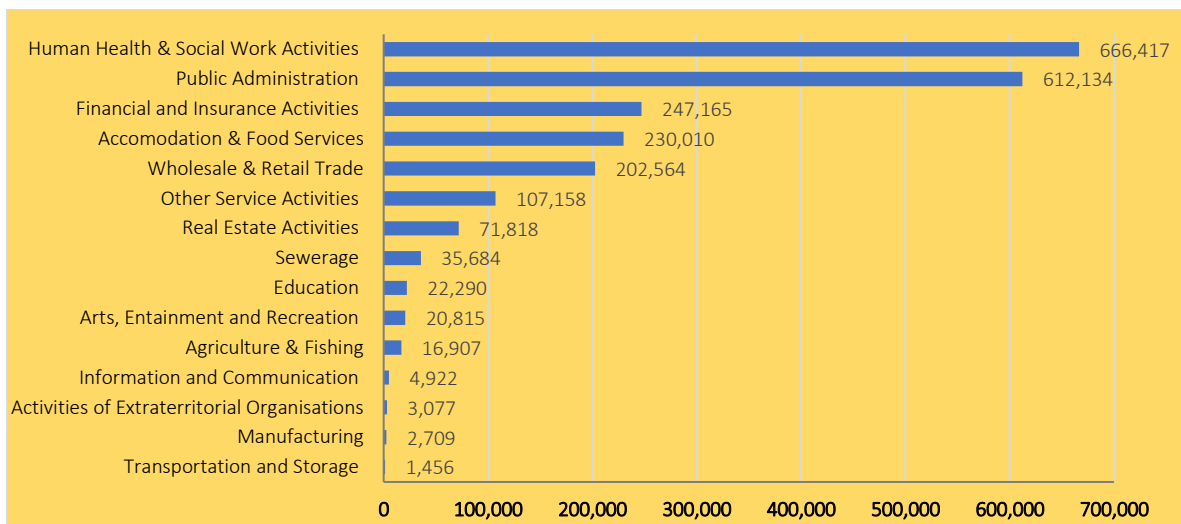
Chart 14: Volume of Wastewater Discharged to Wastewater Treatment Plant by Industry, 2018-19 (ML)



Source: Samoa Water Authority

Human Health & Social Work Activities industry spent the most with \$666,417.00 accounting for 29.7 % of total expenditure, while Transport and Storage industry spent the least with \$1,456.00 representing only 0.06 % of total expenditure (Refer **Chart 15**)

Chart 15: Expenditure on Wastewater Discharged to Wastewater Treatment Plant by Industry, 2018-19 (SAT\$)

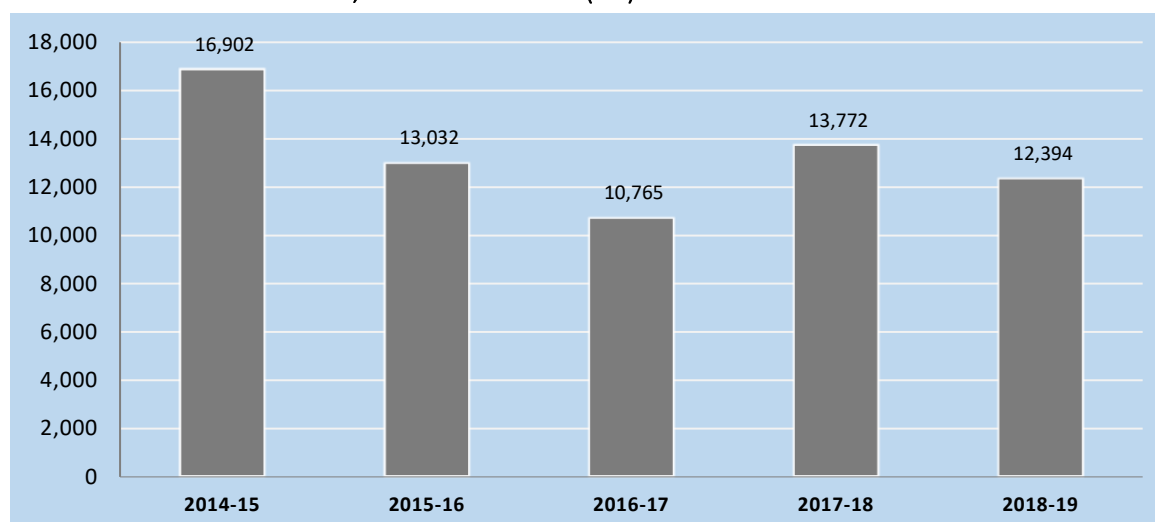


Source: Samoa Water Authority

1.5 Water Losses

Water Losses continue to be a major challenge for the Water Supply Industry. Losses are referred to as unaccounted water including leakages through aging networks, overflows, authorized unbilled consumption and illegal connections.

Chart 12: Estimated Water Losses, 2014-15 to 2018-19 (ML)



Source: Samoa Bureau of Statistics

Water losses has declined from 13,772 ML in 2017-18 to 12,394 ML in 2018-19. The decline, according to the water suppliers, was due to the increase in metered connections and the upgrading of old leaking systems. The continuous public awareness programs to all levels of customers especially the village communities also contributed to the decline effort in water losses.

1.6 Other Key Water Indicators

Table 6: Other Key Water Indicators, Samoa 2015-16 to 2018-19

	Unit	2015-16	2016-17	2017-18	2018-19
Water use by Industry	ML	75,230.0	57,771.0	87,312.3	137,827.9
Water use by Households	ML	13,574.0	13,994.0	13,059.9	12,783.2
Total Water Use	ML	88,804.0	71,765.0	100,372.2	150,611.2
Total Population (Nov) (a)	Persons	194,238.0	195,979.0	197,611.0	199,243.0
Total number of households (Nov)	HHs	27,748.0	28,880.0	29,060.0	29,950.0
Total number of metered households	HHs	18,768.0	19,686.0	19,832.0	20,737.0
Water use per capita (b)	m ³	457.2	366.2	507.9	755.9
Water use per households (c)	m ³	489.2	484.6	449.4	426.8
% of HHs with Metered Water Use (d)	%	67.6	68.2	68.2	69.2

Source: Samoa Bureau of Statistics

Note:

- (a) Projection based on average household size of 7 people for all years except 2016-17, the Census year
- (b) Calculated by **total water use** divided by the total population multiply by 1000
- (c) Calculated by **water use by households** divided by the total number of households multiply by 1000
- (d) Calculated by Total number of metered households divided by Total Number of Households

Changes in this Issue

There was new information emerged for the financial period 2017-18 and revisions were made to certain areas of the account. Hence, the 2018-19 Water Account overwrite the previous reports as it contains the updated and revised figures for 2017-18.

Methodology for the rest of the account is very much similar to the last water account for the financial year 2017-18. There is also a slight change in terminology where distributed water replaces the supplied water used in the previous accounts. Due to these changes, please note that caution should still be taken into consideration when trends and changes over time are interpreted.

2. Methodological Notes

This account was solely dependent on administrative datasets provided. The timeliness of responses to various questionnaires and small surveys is still an issue. Hence, most of the estimates and aggregates are derived from the best available information presented to the bureau. Please refer Appendices for all the tables used for this compilation.

3. Conclusion and Way Forward

Samoa's Water Account is building towards solidifying data series for years and it will keep on improving in terms of quality, compilation, coverage and application. The physical supply and use information have been consistently improved as well as monetary information.

The application and usefulness of water accounts for users at every level and in policy decision making will be achieved as accounts will be produced consistently. That will come with challenges as data access and data quality through data sharing are still majors issues faced by the Bureau.

Lessons learned from this compilation will also provide room for more work for the bureau to improve water accounts. Some of these works will be;

- ✓ Assessing a reliable methodology to quantify and estimate household wastewater and treatment
- ✓ Trialing compilation of water productivity by industries (start with the most relevant).
- ✓ Revisit and revise estimated livestock daily water requirements (currently using 1995 FAO study on Livestock Daily water Requirements)

4. Feedback on the Accounts

The accounts will be improved significantly as we keep publishing series of water accounts over the years and any feedback provided will further enhance this. Any feedback or issues on this report for future improvements are mostly welcome.

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5. Acknowledgement

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We would also like to thank our SEEA Experts, Mr. Sokol Vako from Statistics Institute for Asia and the Pacific (SIAP) in Japan and also Mr. Anthony Dvarskas from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in Thailand for their usual expert advice from time to time.

6. Appendices

A1: Estimated population and number of households, 2015 to 2020

	2015	2016 (a)	2017	2018	2019	2020
Population	193,483	195,979	197,611	199,243	200,874	202,506
Estimated no. of households (b)	27,251	28,880	29,120	29,950	30,485	31,020

Source: Samoa Bureau of Statistics

Note:

(a) Population and Housing Census year

(b) Based on (6.8) persons per household (PHC, SBS 2016)

A2: Samoa Water Authority Metered and Estimated Unmetered Water Supply by ISIC Industry, FY2018-19

Industries	Metered Water (ML)	Est. Unmetered Water (ML)	Total Supply (ML)
Agriculture, Forestry and Fishing	106.4	-	106.4
Manufacturing and Construction	365.7	1.4	367.1
▪ Manufacturing	300.4	-	300.4
▪ Construction	47.2	1.4	48.6
▪ Mining & Quarrying	18.1	-	18.1
Electricity, Gas and Air Conditioning	57.2	-	57.2
Water Supply, Collection and Treatment	4.0	-	4.0
Sewerage	77.7	0.2	78.0
Other Industries	3,168.8	21.8	3,190.6
▪ Accommodation and Food Services	675.6	1.6	677.2
▪ Education	563.4	10.2	573.6
▪ Public Administration and Defense	424.5	2.0	426.5
▪ Wholesale and Retail Trade	357.8	0.6	358.4
▪ Human Health and Social Work Activities	305.7	1.6	307.3
▪ Real Estate, Rental and Leasing Activities	145.2	-	145.2
▪ Other Service Activities	248.1	4.7	252.8
▪ Financial and Insurance Services	149.3	-	149.3
▪ Transportation and Storage	92.1	1.1	93.3
▪ Arts, Entertainment and Recreation	109.9	-	109.9
▪ Administrative and Support Service Activities	35.4	-	35.4
▪ Activities of Extraterritorial Organizations	39.1	-	39.1
▪ Information and Communication	10.9	-	10.9
▪ Professional, Scientific and Technical Activities	8.3	-	8.3
▪ Waste Collection and Management	3.5	-	3.5
Total Industries	3,779.8	23.5	3,803.3
Total Households	9,732.5	291.3	10,023.8
Total SWA	13,512.3	314.8	13,827.1

Source: Samoa Water Authority and Samoa Bureau of Statistics

Note: -: Nil or rounded to zero

A3: Expenditure on SWA Distributed Metered and Unmetered Water Use by ISIC, FY2018-19 (SAT\$)

Industries	Metered	Unmetered	Total
Agriculture and Fishing	206,714.0	-	206,714.0
Manufacturing and Construction	712,164.8	320.0	712,484.8
▪ Manufacturing	590,403.6	-	590,403.6
▪ Construction	87,106.4	320.0	87,426.4
▪ Mining and Quarrying	34,654.8	-	34,654.8
Electricity, Gas and Air Conditioning	113,889.0	-	113,889.0
Water Supply, Collection and Treatment	7,586.5	-	7,586.5
Sewerage	52,081.7	-	52,081.7
Other Industries	7,477,196.7	4,656.0	7,481,852.7
▪ Accommodation and Food Service Activities	1,469,315.4	240.0	1,469,555.4
▪ Education	1,094,905.1	1,840.0	1,096,745.1
▪ Public Administration and Defense	1,155,613.6	384.0	1,155,997.6
▪ Wholesale and Retail Trade	747,915.1	224.0	748,139.1
▪ Human Health and Social Work Activities	1,029,853.1	240.0	1,030,093.1
▪ Real Estate Activities	412,395.8	-	412,395.8
▪ Other Service Activities	464,107.3	1,344.0	465,451.3
▪ Financial and Insurance Services	512,414.5	-	512,414.5
▪ Arts, Entertainment and Recreation	182,571.5	384.0	182,955.5
▪ Transportation and Storage	213,779.0	-	213,779.0
▪ Administrative and Support Service Activities	73,431.9	-	73,431.9
▪ Activities of Extraterritorial Organizations	77,706.0	-	77,706.0
▪ Information and Communication	21,947.8	-	21,947.8
▪ Professional, Scientific and Technical Activities	14,733.6	-	14,733.6
▪ Waste Collection and Management	6,507.0	-	6,507.0
Total Industries	8,569,632.7	4,976.0	8,574,608.7
Households	12,273,688.1	140,060.0	12,413,748.1
Grand Total	20,843,320.8	145,036.0	20,988,356.8

Source: Samoa Water Authority and Samoa Bureau of Statistics

A4: Estimated Unmetered Household Water Use, Supplied by IWS, FY2014-15 to 2018-19.

	Unit	2014-15	2015-16	2016-17	2017-18	2018-19
1. Average water use by SWA metered households	m3	482.3	410.4	437.8	466.1	480.0
2. Estimated no. of households supplied by IWS (a)	No.	4,633	3,466	3,494	3,594	3,049
4. Estimated water use by households supplied by IWS	m3	4,469,121.5	2,417,921.4	2,600,492.1	2,848,034.0	2,487,779.4
5. Estimated water use by households supplied by IWS	ML	4,469.1	2,417.9	2,600.5	2,848.0	2,487.8

Note:

- (a) 17% of total population was applied 2014-15, while new census coverage of 12% applied to 2015-16 to 2017-18, 10% for 2018-19
- (b) Two times in 2014-15 and for 2015-16 to 2017-18, an improvement of 15% from previous year or 1.7 times the average SWA household average metered water use.

A5: Estimated Distributed Water Use, Samoa 2017-18 to 2018-19

Distributed Water Type and Supplier	2017-18	2018-19
Volume in Cubic Meters (m3)		
SWA metered industry	3,573,201.0	3,779,792.0
SWA metered households	9,156,298.0	9,732,490.0
SWA unmetered industry	63,273.0	23,463.1
SWA unmetered households	392,393.5	291,324.8
IWS unmetered Industry	142,401.7	74,630.0
IWS unmetered Households	2,848,034.0	2,487,780.0
Total	16,175,601.2	16,389,479.9
Value in Samoan Tala (SAT\$)		
SWA metered industry	8,212,160.1	8,569,632.7
SWA metered households	11,730,441.7	12,273,688.1
SWA unmetered industry	6,932.0	4,976.0
SWA unmetered households	187,612.0	140,060.0
IWS unmetered - Industry	21,564.0	18,291.0
IWS unmetered - Households	431,280.0	365,820.0
Total	20,589,989.8	21,372,467.8

Source: Samoa Bureau of Statistics

A6: Livestock Numbers and Daily Water Requirement, Samoa 2014-15 to 2018-19

Livestock (a)	2014-15	2015-16	2016-17	2017-18	2018-19	Daily water requirement used (liters)
Cattle (c)	56,504	58,834	62,597	65,960	70,178	75
Horses	1,259	1,259	na	na	179,004	45
Pigs	168,597	170,046	172,981	175,966	692,608	23
Chickens	513,260	535,711	583,601	635,772	1,259	0.30
Sheep and goats	827	451	494	541	592	18

Source: FAO AGRI FACTS Water Requirements for Livestock (Upper limit)

Note:

(a) Livestock numbers from Agriculture Survey 2015 is used for 2014-15 and all the other years, we used livestock number estimates from GDP

(b) Beef cattle water requirement used.

A7: Estimated Total Water Use by Livestock, Samoa 2014-15 to 2018-19 (ML)

Livestock	2014-15	2015-16	2016-17	2017-18	2018-19
Cattle-beef	1,547	1,611	1,714	1,806	1,921
Pigs	1,415	1,428	1,452	1,477	1,503
Chickens	56	59	64	70	76
Horses, sheep and goats	31	29	24	38	38
Total	3,045	3,127	3,254	3391	3,391

A8: Hydro Electricity Water Abstraction, FY2014-15 to 2018-19 (ML)

Hydro Stations	Total Abstraction	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2014-15					
Vaisigano	11,940	1,350	1,500	5,500	3,590
Lalomauga	34,520	6,340	9,030	9,730	9,420
Afulilo	28,800	7,220	6,260	6,930	8,390
Total	75,260	14,910	16,790	22,160	21,400
2015-16					
Vaisigano	7,090	1,310	3,000	1,160	1,620
Lalomauga	37,150	7,260	8,830	9,250	11,810
Afulilo	23,890	8,610	6,640	4,420	4,220
Total	68,180	17,180	18,470	14,830	17,650
2016-17					
Vaisigano	8,280	500	510	2,140	5,130
Lalomauga	23,770	4,640	6,830	9,050	3,250
Afulilo	18,130	4,780	4,250	4,880	4,220
Total	50,180	9,920	11,590	16,070	12,600
2017-18					
Vaisigano	24,150	2,980	6,090	440	14,640
Lalomauga	31,290	8,730	11,310	3,290	7,960
Afulilo	24,610	5,740	7,710	1,460	9,700
Total	80,050	17,450	25,110	5,190	32,300
2018-19					
Vaisigano	52,540	7,730	11,670	20,080	13,060
Lalomauga	33,280	5,960	12,720	12,240	2,360
Afulilo	34,150	9,630	7,080	9,750	7,690
Fausaga/Tafitoala (a)	10,090	-	-	8,150	1,940
Total	130,060	23,320	31,470	50,220	25,050

Source: Electric Power Cooperation

Note:

(a) Started commissioning in 2018-19

A9: Total Estimates of Water Use by Households, FY2014-15 to 2018-19 (ML).

	2014-15	2015-16	2016-17	2017-18	2018-19
Est. water use by households - SWA	11,661.2	10,566.8	11,756.0	9,548.7	10,023.8
<i>Metered</i>	<i>7,363.9</i>	<i>7,709.6</i>	<i>8,617.7</i>	<i>9,156.3</i>	<i>9,732.5</i>
<i>Unmetered</i>	<i>4,297.2</i>	<i>2,857.2</i>	<i>3,138.3</i>	<i>392.3</i>	<i>291.3</i>
Est. water use by households supplied by IWS	4,469.1	2,417.9	2,600.5	2,848.0	2,487.8
Est. water use by households self-abstracted	657.2	588.8	637.4	662.3	271.6
Total Estimated water use by households	16,787.5	13,573.7	14,993.9	13,059.0	12,783.2

Source: Samoa Bureau of Statistics.

A10: Physical Water Supply Table, Samoa 2018-19 - Megalitres (ML)

	Agriculture, Livestock & Fishing	Manufacturing & Construction	Electricity	Water Collection, Treatment & Supply	Sewerage	Other Industries	Households	Flows from the Environment	Total Supply
1. Sources of abstracted water									
Inland water resources									
Surface water								155,587	155,587
Ground water								7,147	7,147
Soil water								-	-
Total								162,733	162,733
Other water sources									
Precipitation								272	272
Total								272	272
Total abstracted water								163,005	163,005
2. Abstracted Water									
For distribution				16,389					16,389
For own use	3,538	333	130,060	272	-	19			134,222
<i>of which: Abstraction by Households</i>	-	-	-	272	-	-			272
3. Wastewater and reused water									
Wastewater									
Wastewater to treatment	6	1	-	-	-	417	-		423
Own treatment	-	-	-	-	-	-	-		-
Reused water									
For distribution	-	-	-	-	-	-	-		-
For own use	-	-	-	-	-	-	-		-
Total	6	1	-	-	-	417	-		423
4. Return flows of water									
To inland water resources									
Surface water	-	-	130,060	-	-	-	-		130,060
Ground water	3,639	687	57	12,394	416	2,867	12,783		32,844
Soil water	-	-	-	-	-	-	-		-
Total	3,639	687	130,117	12,394	416	2,867	12,783		162,904
To other sources									
Total return flows	3,639	687	130,117	12,394	501	2,867	12,783		162,989
of which: Losses in distribution	-	-	-	12,394	-	-	-		12,394
5. Evaporation, transpiration, water incorporated into products									
Evaporation of abstracted water	-	-	-	-	-	-	-		-
Transpiration	-	-	-	-	-	-	-		-
Water Incorporated into products	-	12	-	4	-	-	-		16
TOTAL Supply	7,182	1,033	260,059	29,059	501	3,303	12,783	163,005	477,044

Source: Samoa Bureau of Statistics

Note: - : Nil or not available

A11: Physical Use Table, Samoa 2018-19 - Megalitres (ML)

	Agriculture, Livestock & Fishing	Manufacturing & Construction	Electricity	Water Collection, Treatment & Supply	Sewerage	Other Industries	Households	Accumulation	Flows to the Environment	Total Use
1. Sources of abstracted water										
Inland water resources										
Surface water	3,538	297	130,060	21,691	-	-				155,587
Ground water	-	36	-	7,092	-	19				7147
Soil water	-	-	-	-	-	-				-
Total	3,538	333	130060	28,783	-	19				162,733
Other water sources										
Precipitation	-	-	-	272	-	-				272
Total	-	-	-	272	-	-				272
Total abstracted water	3,538	333	160,060	29,055	-	19				163,005
2. Abstracted Water										
Distributed water	106	367	57	4	78	3,265	12512			16389
For own use	3,538	333	130,060	-	-	19	272			134222
<i>of which: Abstraction by households</i>	-	-	-	-	-	-	272			272
3. Wastewater and reused water										
Wastewater										
From other units				-	423					423
Own treatment	-	-	-	-	-	-	-			44
Reused water										
Distributed reuse	-	-	-	-	-	-	-			-
For own use	-	-	-	-	-	-	-			-
Total	-	-	-	-	423	-	-			423
4. Return flows of water										
To inland water resources										
Surface water										
Ground water										
Soil water										
Total									162,904	162,904
To other sources									85	85
Total return flows									162,989	162,989
<i>of which: Losses in distribution</i>										
5. Evaporation, transpiration, water incorporated into products										
Evaporation of abstracted water									-	-
Transpiration									-	-
Water Incorporated into products								16		16
Total Use	7,182	1,033	260,177	29,059	501	3,303	12,783	16	162,989	477,044

Source: Samoa Bureau of Statistics

Note: - Nil or not available

7. References

Electric Power Corporation, 2019; *EPC Hydroelectricity Water Usage 2017-18*.

Food Agriculture Organization, 1995; Date updated, *Water requirement Livestock*. [Fact Sheet]

Samoa Bureau of Statistics, 2009; *Agriculture Census*, Available URL (<https://www.sbs.gov.ws/digi/2009Census%20&%20SurveyAgriculture%20Census%20%20Analytical%20Report.pdf>)

Samoa Bureau of Statistics, 2015; *Samoa Agriculture Survey*, Available URL (<https://www.sbs.gov.ws/digi/2015%20Samoa%20Agricultural%20Survey.pdf>)

Samoa Bureau of Statistics. 2016; *Population and Housing Census 2016 Analytical report*, Available URL (<https://www.sbs.gov.ws/populationanddemography>)

Samoa Bureau of Statistics, 2019; *Gross domestic product report*, Available URL (<http://sbs.gov.ws/index.php/new-document-library?view=download&fileid=1492>)

Samoa Water Authority, 2019; *Annual Report 2018-19*

Samoa Water Authority, 2019; *Samoa Water Authority Supplied Water Use by Industries and Household Data 2018-2019*

Samoa Water Authority, 2019; *Samoa Water Authority Wastewater Data 2018-19*

United Nations et al. 2012; *System of Environmental-Economic Accounting Central Framework*. United Nations New York.