



# *Environment Statistics*

# **Water Accounts Samoa**

**2022-2023**



## Foreword

This report presents information on the physical supply and use of water in Samoa for the financial year 2022-23. It is also including some monetary information. The report is the 8<sup>th</sup> edition of the Water Accounts Samoa (WAS) since its first compilation in 2015.

This compilation marks a new milestone by the bureau for stringing together a data series of ten years of water statistics and indicators from 2013-14 up to 2022-23. On that note, we acknowledged the pioneer work done by Dr. Michael Vardon who assisted the bureau in compiling Samoa's first ever water accounts in 2015, as well as the technical assistance provided by the Australian Bureau of Statistics (ABS), through the attachment training for one of our environment statistics officer in 2014.

The water accounts are compiled in alignment with the United Nation System of Environmental-Economic Accounting 2012 (UN SEEA 2012) central framework and SEEA-Water 2012. The SEEA conceptual framework is a standardized information system, which is capable of harmonizing information from different sources and is used for derivation of water statistics and indicators. It generally records the flow of water from the environment into the economy, its uses in the economy and return flows back into the environment.

The report provides useful and basic water statistics and water-related indicators that can be used for inform water policies and monitoring purposes. Some of the basic water statistics and aggregates are abstracted water, water use, distributed water use, wastewater discharged to treatment plant and water losses. The water-related indicators include implicit prices, water productivity, water use per capita, water use per household and distributed water use expenditure by industry and households.

I am hopeful that this report will provide the necessary statistical information for the betterment of water management and development in Samoa through informed policies and strategic planning.

I would like to acknowledge the usual contributions of our valued water partners and all stakeholders for sharing and providing the water data and information for our water accounts compilation.



Leota Aliielua Salani

**Government Statistician**

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## Executive Summary

The Water Account Samoa for the financial year 2022-23 (WAS 2022-23) presents information on the physical supply and use of water in Samoa with some monetary information also included. This is the 8<sup>th</sup> edition of the Physical Supply and Use of Water Account for Samoa and it provides the highlights of water statistics, aggregates and indicators with comparison to the previous years. This account compilation closely follow the United Nation System of Environmental-Economic Accounting Central Framework 2012 (UN-SEEA CF 2012) and SEEA-Water 2012 guidelines and principles.

## Key Statistics

In 2022-23,

- Total Self-abstracted water was 144,069 ML, an increase of 5.1% from 2021-22. Most come from surface water and is abstracted to generate electricity.
- Households water use increased by 4.8% to 14,911 ML from 14,203 ML in 2021-22. This corresponds to an average daily water use per person of 262 liters.
- Total Distributed water use increased by 5.9% to 16,796 ML from 15,809 ML in 2021-22.
- Total expenditure on distributed water use was \$19.5 million<sup>1</sup>, a decrease of 3.3% from 2021-22.
- Average price per cubic meter of distributed water used by Households decreased by 8.0% to \$1.04 from \$1.12 in 2021-22. On average, household spent \$451 on distributed water in 2022-23.
- Proportion of households with metered water use increased to 94.2% from 87.6% in 2021-22. This is an increase from 63.0% in 2013-14.
- Samoa's water productivity increased by 10.1% to \$17.70 per cubic meter of abstracted water from \$15.91 in 2021-22.
- Each person used an average of 96 m<sup>3</sup> of water, an increase of 3.8% from 92 m<sup>3</sup> calculated in 2021-22.
- Total wastewater discharged to the Wastewater treatment plant decreased by 2.7% to 378 ML from 389 ML recorded in 2021-22. Total expenditure also decreased by 2.8% from \$2.12 million in 2021-22 to \$2.06 million in 2022-23.

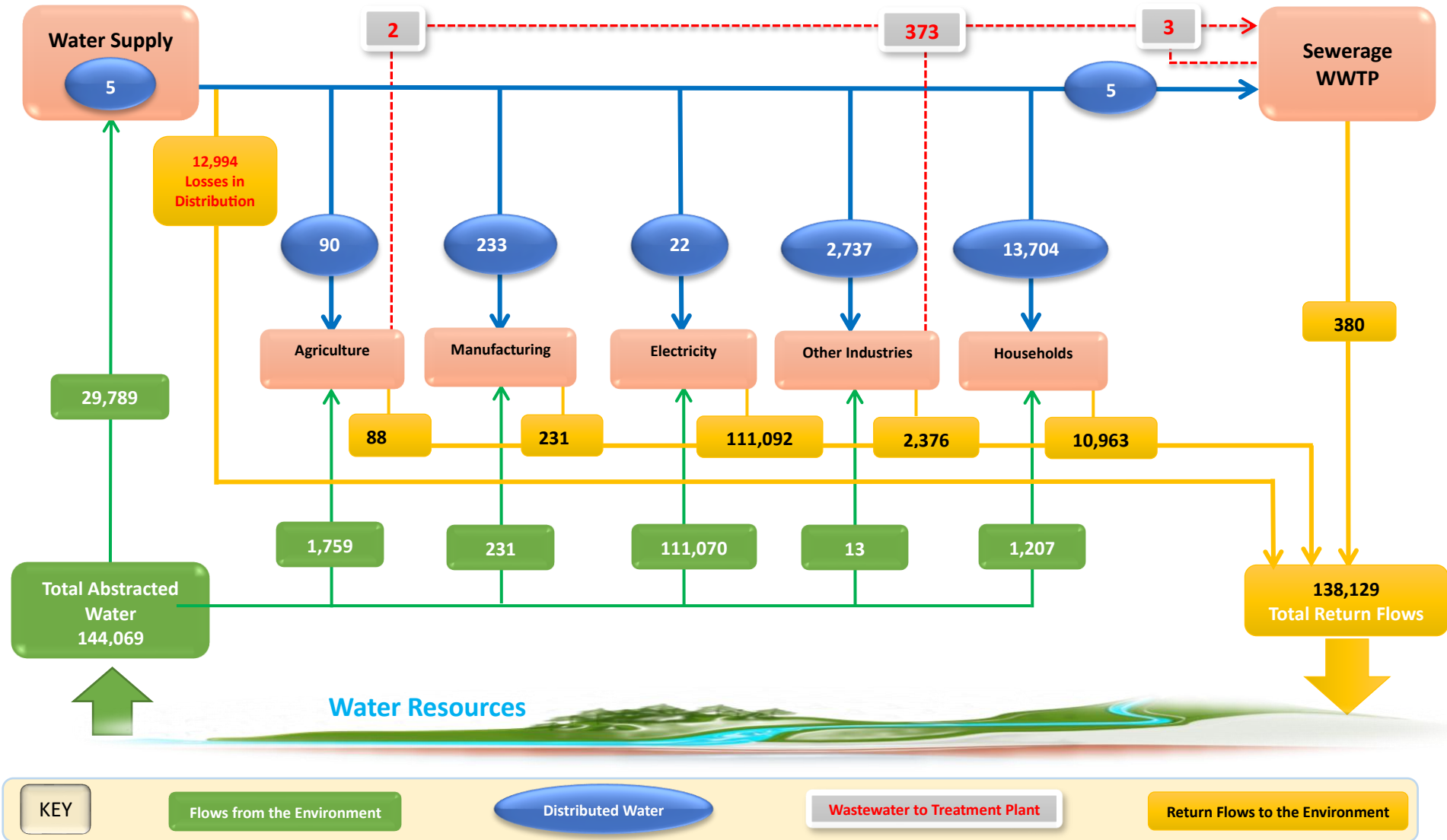
**Figure 1** Summarises the physical supply and use flow of water from the environment into the economy, its flows within the economy and the return flows back to the environment

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<sup>1</sup> In Samoan Tala



**Figure 1: Physical Water Flows, Samoa 2022-23 (ML)**



## A. Account Results and Findings

### 1. Self-Abstracted Water

*Self-Abstracted Water* refers to water that is removed from the environment, either permanently or temporarily for consumption or production activities (SEEA-Water, 2012). Water used for hydroelectricity is also abstracted water. SEEA identifies the environment as the supplier and the industry/households as the water users. Self-abstracted water for Samoa is mainly sourced from surface water, groundwater and rainwater.

In 2022-23, an estimated total of 144,069 ML of water was abstracted from the environment into Samoa’s economy, an increase of about 5.6% compared to 136,399 ML of abstracted water in 2021-22.

#### Self-Abstracted Water by Source

Surface water constituted most of the total self-abstracted water with 92.9% or 133,851 ML, groundwater accounts for 6.3% or 9,010 ML while rainwater accounts for the remaining 0.8% or 1,207-ML. Surface water remained as the main source for self-abstracted water use for the last 5 years as depicted below in Table 1 & Chart 1.

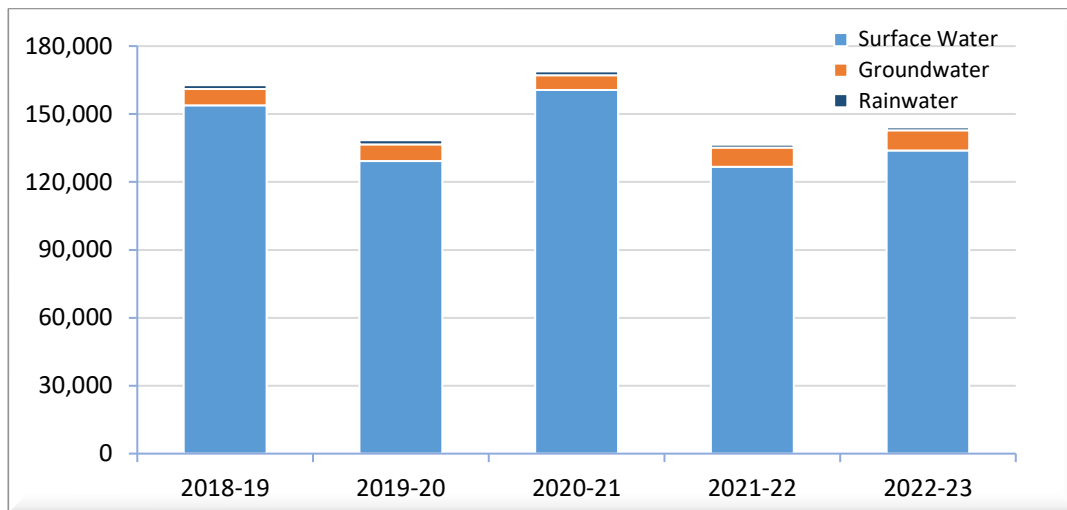
**Table 1: Self-Abstracted Water by Source, Samoa 2018-19 to 2022-23**

FY	SURFACE WATER		GROUNDWATER		RAINWATER		TOTAL	
	ML	%	ML	%	ML	%	ML	%
<b>2018-19</b>	153,893	94.5	7,146	4.4	1,761	1.1	<b>162,800</b>	<b>100</b>
<b>2019-20</b>	129,212	93.4	7,448	5.4	1,737	1.3	<b>138,398</b>	<b>100</b>
<b>2020-21</b>	160,573	95.1	6,505	3.9	1,736	1.0	<b>168,814</b>	<b>100</b>
<b>2021-22</b>	126,663	92.9	8,466	6.2	1,270	0.9	<b>136,399</b>	<b>100</b>
<b>2022-23</b>	133,851	92.9	9,010	6.3	1,207	0.8	<b>144,069</b>	<b>100</b>

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

**Chart 1: Self-Abstracted Water by Water Source, Samoa 2018-19 to 2022-23 (ML)**



Source: Samoa Bureau of Statistics

### Self-Abstracted Water Use by Purpose of Use

- **for Electricity:** an estimated 111,070 ML or 77.1% of total self-abstracted water was abstracted for hydroelectricity. This is non-consumptive use of water as almost all of the abstracted water is returned immediately into the environment.
- **for Distribution:** 20.7% or 29,789 ML of water was abstracted mainly by the Water Supply Industry for the purpose of supplying other industries and households as distributed water.
- **for Own Use:** The remaining 2.2% or 3,209 ML was abstracted for own use by industries and households (Refer Table 2 & Chart 2).

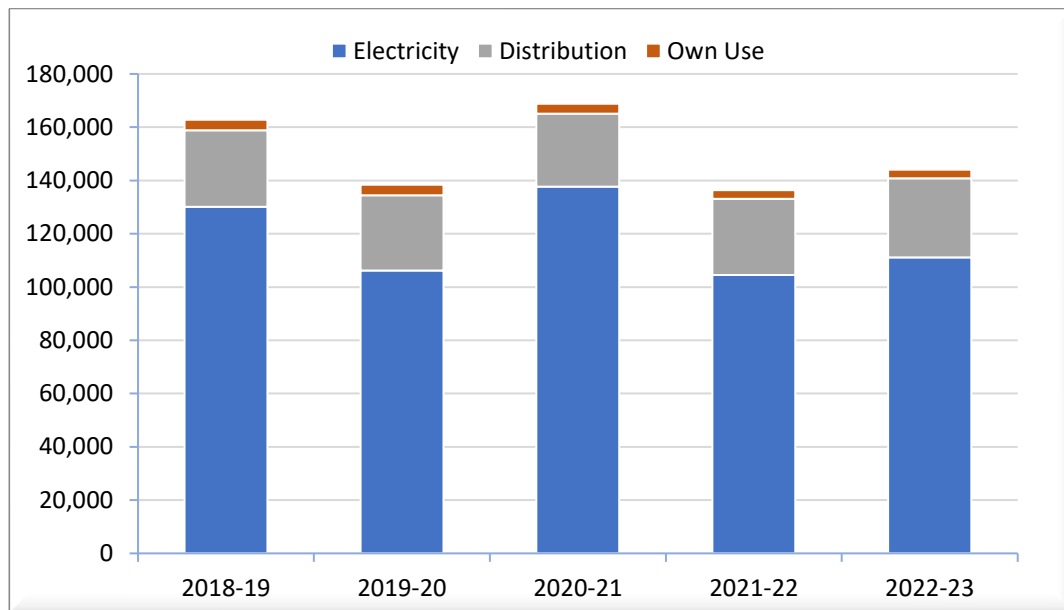
**Table 2: Self-Abstracted Water by Purpose of Use, Samoa 2018-19 to 2022-23**

FY	ELECTRICITY		DISTRIBUTION		OWN USE		TOTAL	
	ML	%	ML	%	ML	%	ML	%
2018-19	130,060	79.9	28,783	17.7	3,957	2.4	162,800	100
2019-20	106,230	76.8	28,180	20.4	3,988	2.9	138,398	100
2020-21	137,700	81.6	27,415	16.2	3,699	2.2	168,814	100
2021-22	104,570	76.7	28,536	20.9	3,293	2.4	136,399	100
2022-23	111,070	77.1	29,789	20.7	3,209	2.2	144,069	100

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

**Chart 2: Self-Abstracted Water by Purpose of Use, Samoa 2018-19 to 2022-23 (ML)**



Source: Samoa Bureau of Statistics

### Self-Abstracted Water by Industry and Households

Electricity and the Water Supply industries are the main users of total abstracted water use. In 2022-23, both industries abstracted a total of 140,859 ML or 98.0% of total abstracted water use as shown in Table 3.

**Table 3: Self-Abstracted Water by Industries and Households, Samoa 2022-23 (ML).**

INDUSTRIES	SURFACE WATER	GROUND WATER	RAIN WATER	TOTAL INDUSTRY	TOTAL SHARE %
Agriculture	1,759	-	-	1,759	1.0
Manuf. & Construction	207	25	-	232	0.0
Electricity	111,070	-	-	111,070	77.0
Water Supply	20,816	8,973	-	29,789	21.0
Other Industries	-	13	-	12	0.0
Households	-	-	1,207	1,207	1.0
<b>Total</b>	133,851	9,010	1,207	144,069	100.0

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

Over the last 5 years, both electricity and water supply industries accounted for most of the self-abstracted water use as portrayed in Table 4 & Chart 3.



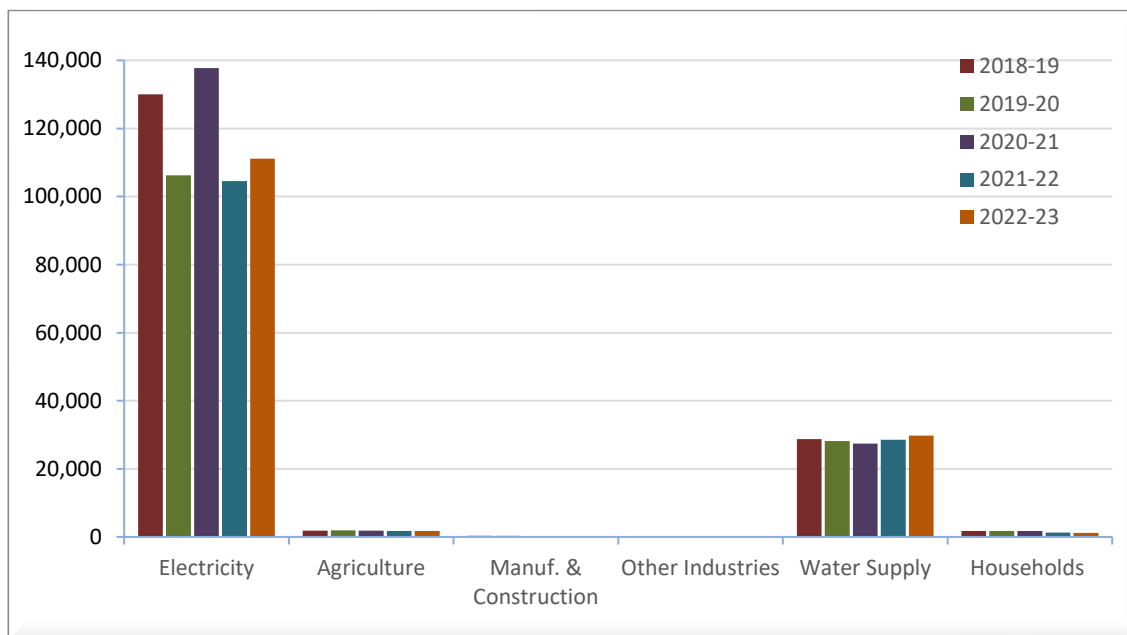
**Table 4: Self-Abstracted Water by Industries and Households, Samoa 2018-19 to 2022-23 (ML)**

FY	Electricity	Agriculture	Manuf. & Construction	Other Industries	Water Supply	Households	Total
2018-19	130,060	1,844	333	19	28,783	1,761	162,800
2019-20	106,230	1,899	297	54	28,180	1,737	138,398
2020-21	137,700	1,797	154	13	27,415	1,736	168,814
2021-22	104,570	1,779	231	13	28,536	1,270	136,399
2022-23	111,070	1,759	231	13	29,789	1,207	144,069

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

**Chart 3: Self-Abstracted Water by Industries and Households, Samoa 2018-19 to 2022-23**



Source: Samoa Bureau of Statistics

## 2. Water Use

*Water Use* refers to water intake by an economic unit, or the economy. Water use is the sum of the amount of self-abstracted water use from the environment and water use within the economy (i.e. water received from other economic units as distributed water, reuse water and wastewater) (SEEA-Water, 2012).

In 2022-23, total water use was estimated to be 161,243 ML, where most of it was used by the Electricity Industry accounting for 68.9% or 111,092 ML. This was followed by the Water Supply Industry with 18.5% or 29,794 ML (Refer Table 5 & Chart 4).

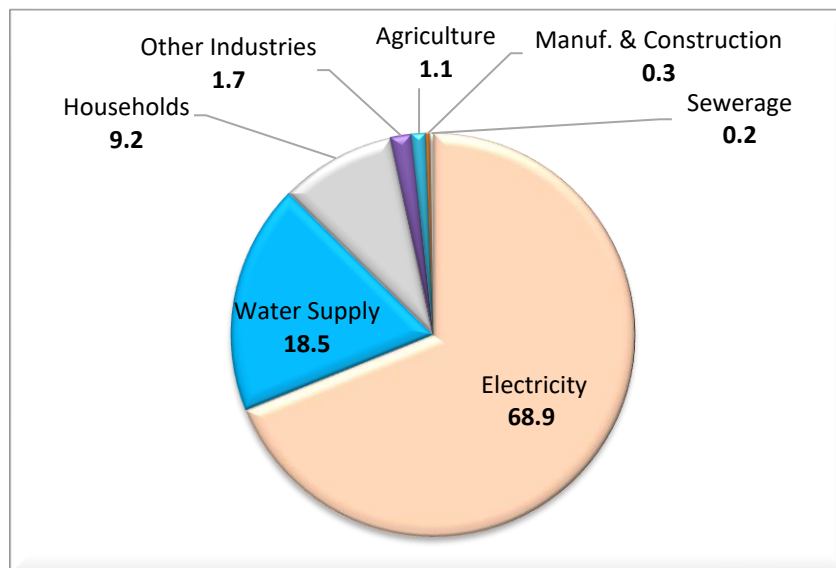
**Table 5: Total Water Use by Industry and Households, Samoa 2018-19 to 2022-23 (ML)**

FY	Electricity	Water Supply	Households	Other Industries	Agriculture	Manuf. & Cons.	Sewerage	Total
2018-19	130,117	28,787	14,273	3,284	1,950	700	501	179,613
2019-20	106,291	28,184	14,443	2,721	2,033	556	449	154,678
2020-21	137,716	27,423	14,800	2,728	1,898	311	466	185,342
2021-22	104,611	28,540	14,203	2,486	1,931	428	397	152,297
2022-23	111,092	29,794	14,911	2,749	1,849	464	384	161,243

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

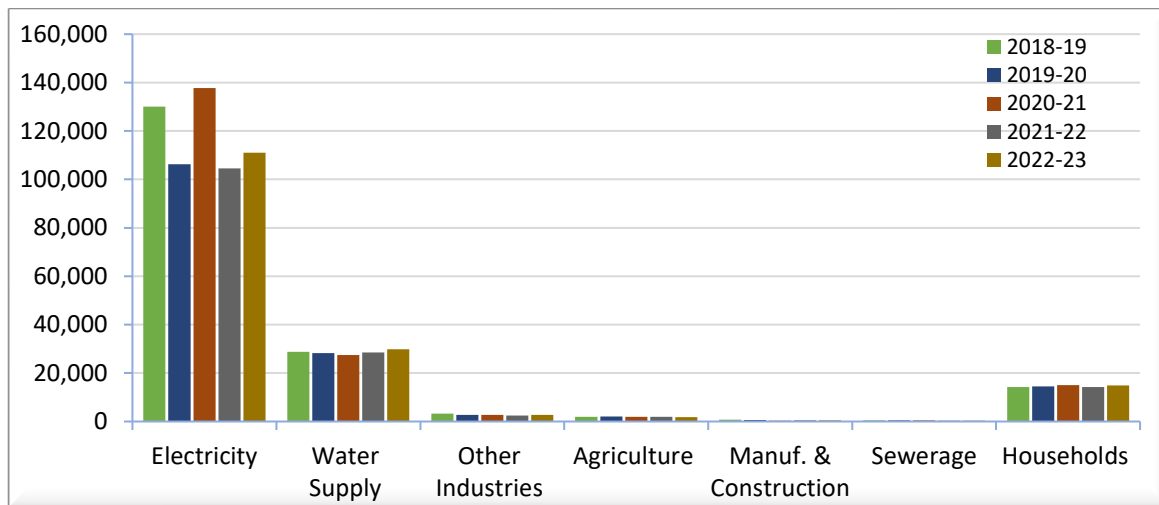
**Chart 4: Percentage Share of Total Water Use by Industries and Households, 2022-23**



Source; Samoa Bureau of Statistics

Chart 5 below shows the total water use for the last 5 years, depicting Electricity as the main user of water. Most of the Electricity water use is non-consumptive water use as it is used for hydropower (Refer Table 5 and Chart 5).

**Chart 5: Total Water Use by Industry and Households, Samoa 2018-19 to 2022-23 (ML)**



Source: Samoa Bureau of Statistics

### 3. Distributed Water Use

*Distributed Water Use (DWU) refers to water flows from one user to another user after abstraction, excluding self-abstracted water use such as rainwater harvesting. It simply the water supplied by the water suppliers through pipe water systems like the Samoa Water Authority, the Independent Water Scheme Association and also the Self-managed Village and Community Water Scheme (SEEA-Water, 2012).*

**Total Distributed Water Use:** From a total abstracted water of 29,794 ML for distribution by the Water Supply industry, 16,796 ML (56.4%) was used by industries and households. The remaining 12,994 ML or 43.6% was Non-Revenue Water (NRW) or losses.

#### At a Glance!

*Non-Revenue Water (NRW): refers to all water losses including real losses (e.g. leakages & overflows from storage), apparent losses (e.g. illegal connections), unbilled authorised consumption (e.g. water carting, firefighting and other use for operational purposes) (SWA Annual Report, 2014-15).*

*According to the Annual Performance Review Report 2022-23 for the Water, Sanitation and Hygiene Sector, it stated that “some of the factors impeding the progress of reducing NRW included frequent and significant pipe bursts in aging water supply systems, utilisation of hydrants for firefighting, water carting or deliveries during extended drought periods”*

In 2022-23, distributed water use increased by 5.9%, with a total of 16,796 ML compared to 15,809 ML recorded in the previous financial year. Households use accounted for most of the distributed water use with 13,704 ML or 81.6% and the remaining 3,091 ML or 18.4% by industries.

Households remain as the predominant user of distributed water use from 2018-19 to 2022-23 as shown in Table 6 and Chart 6.

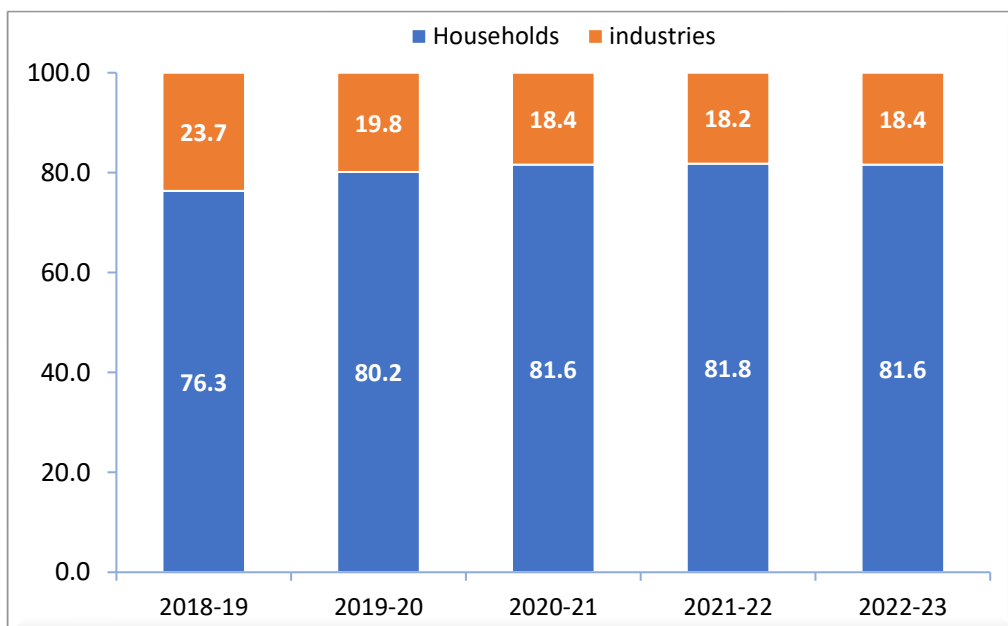
**Table 6: Total Distributed Water Use, Samoa 2018-19 to 2022-23 (ML).**

FY	HOUSEHOLDS	INDUSTRIES	TOTAL
<b>2018-19</b>	12,512	3,878	<b>16,390</b>
<b>2019-20</b>	12,706	3,144	<b>15,850</b>
<b>2020-21</b>	13,342	3,012	<b>16,354</b>
<b>2021-22</b>	12,933	2,876	<b>15,809</b>
<b>2022-23</b>	13,704	3,091	<b>16,796</b>

Source: SWA, IWS & SBS

Note: Totals may not add up due to rounding

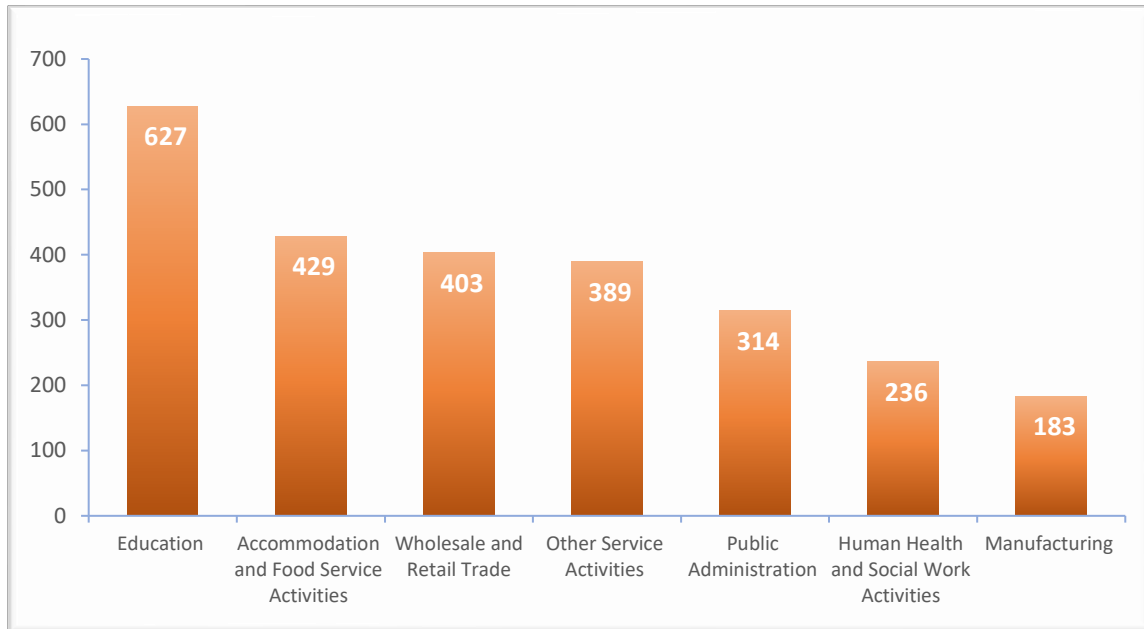
**Chart 6: Percentage Share of Distributed Water Use by Households and Industries, Samoa 2018-19 to 2022-23**



Source: SWA, IWS & SBS

For detailed industries, Chart 7 depicts the top 7 industries using most of the distributed water clearly depicting Education as the industry with the highest user with 627 ML.

**Chart 7: Top 7 Industries Using the Most Distributed Water, Samoa 2022-23 (ML).**



Source: Samoa Bureau of Statistics

**Metered and Unmetered Distributed Water Use:** In 2022-23, distributed metered water use accounted for 86.3% or 14,492 ML of total distributed water use. This represents an increase of about 6.8% or 990 ML reported when compared with 2021-22. The remaining 2,303 ML or 13.7% was distributed unmetered water use. Table 7 and Chart 8 depicts the distribution of water from 2018-19 to 2022-23.

**Table 7: Metered and Unmetered Distributed Water Use, Samoa 2018-19 to 2022-23 (ML)**

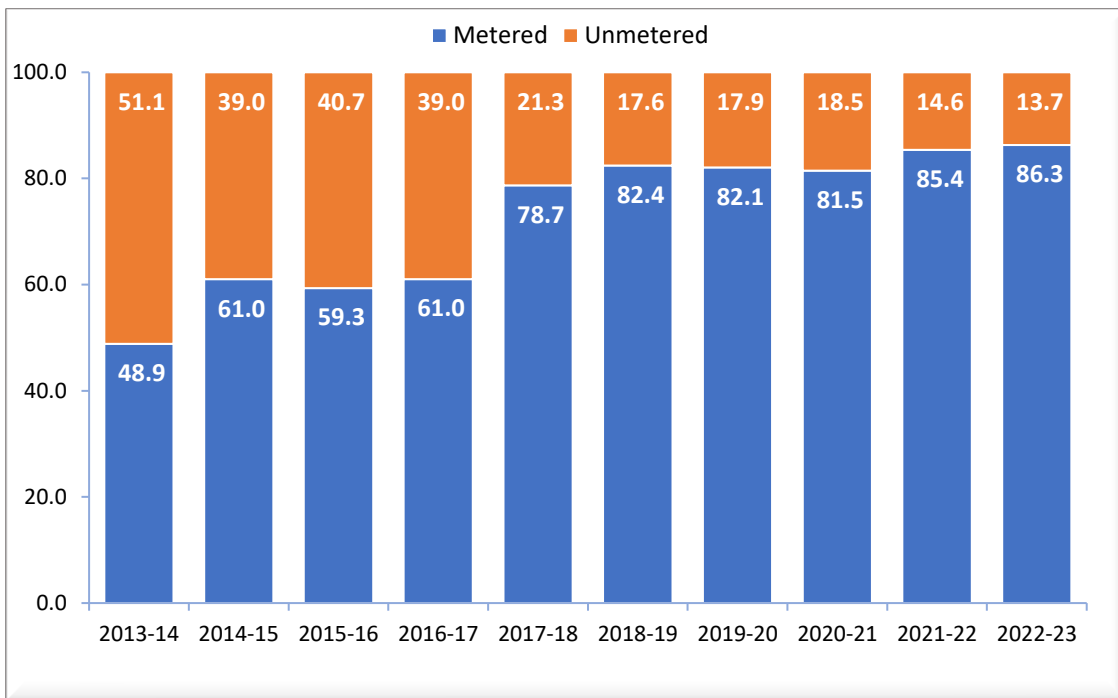
FY	METERED	UNMETERED	TOTAL
2018-19	13,512	2,877	16,390
2019-20	13,005	2,844	15,850
2020-21	13,325	3,029	16,354
2021-22	13,502	2,307	15,809
2022-23	14,492	2,303	16,796

Source: SWA, IWS & SBS

Note: Totals may not add up due to rounding



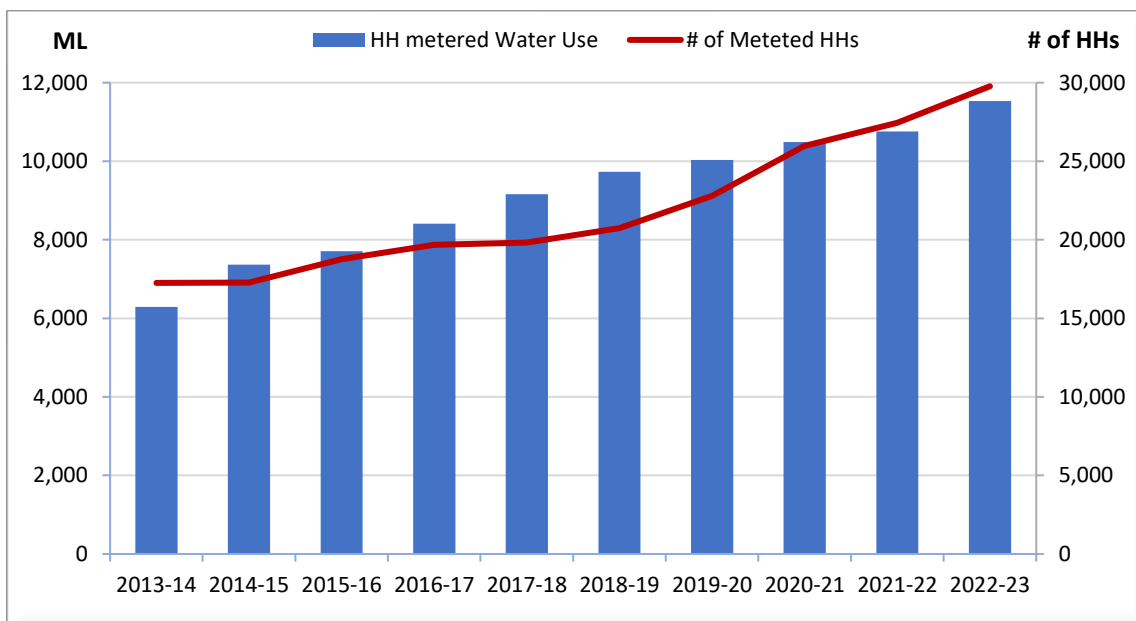
**Chart 8: Percentage Distribution of Metered and Unmetered Water Use, Samoa 2013-14 to 2022-23**



Source: Samoa Bureau of Statistics

The increase in total distributed meter water use was mainly due to the increase in the number of households connected to the metered water supply (Refer Chart 9).

**Chart 9: Number of Metered Households and Distributed Metered Water Use, Samoa 2013-14 to 2022-23**



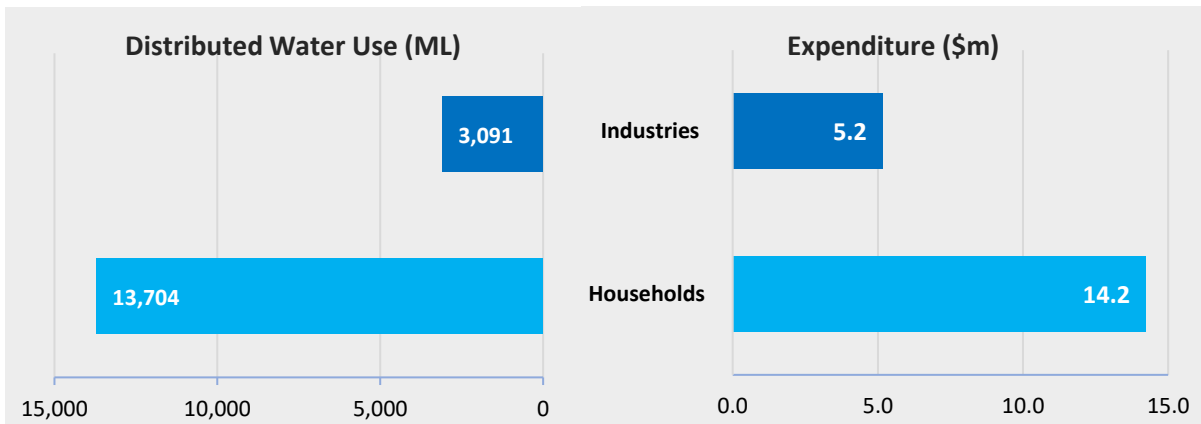
Source: Samoa Bureau of Statistics

## 4. Monetary Supply and Use

**Monetary Information:** Coverage of financial information is still limited to the expenditure paid for the use of distributed water. Expenditure does not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditure does not necessarily cover all costs of supplying water. All values are in Samoan Tala.

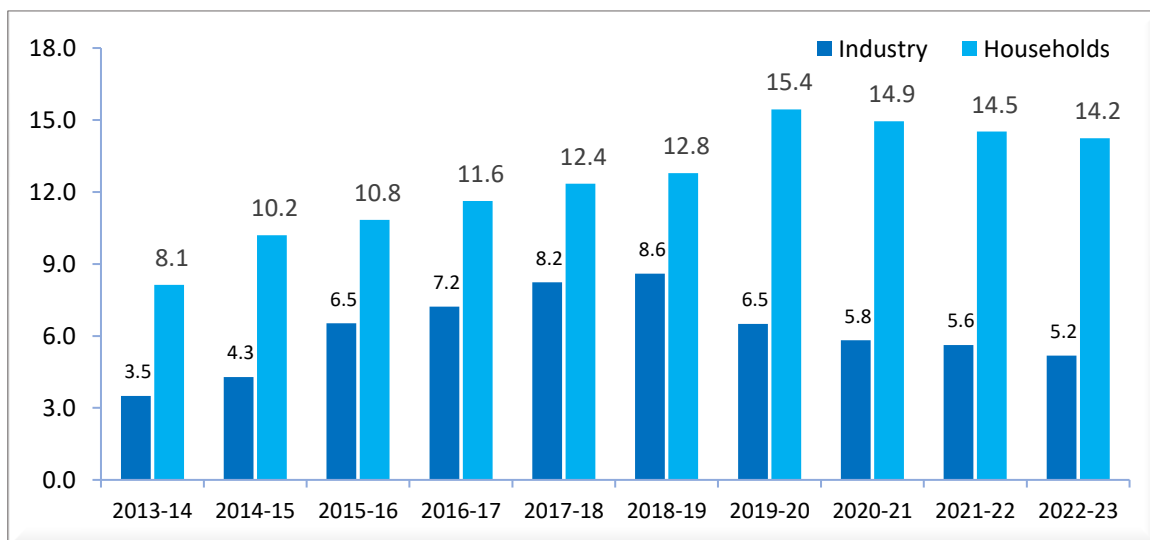
In 2022-23, the total expenditure on distributed water was \$19.4 million, a marginal decrease of less than 1.0% from \$19.7 million in 2021-22. Households paid \$14.2 million or 73.0% while the remaining \$5.2 million or 27.0% of total expenditure was paid by industries as presented in Charts 10 & 11.

**Chart 10: Distributed Water Use and Expenditure, Samoa 2022-23**



Source: Samoa Bureau of Statistics

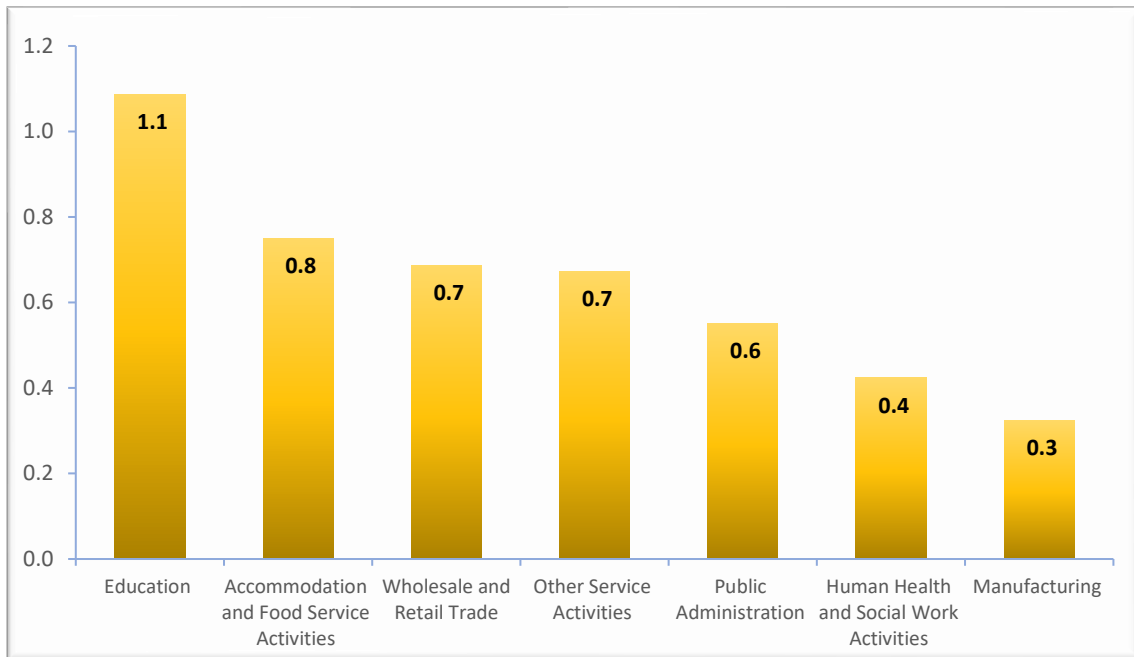
**Chart 11: Expenditure by Industries and Households, Samoa 2018-19 to 2022-23 (\$m)**



Source: Samoa Bureau of Statistics

A detailed analysis by industry reveals that Education spend about \$1.1million on distributed water and representing 21.0% of total expenditure on water by all industries. Accommodation and Food service activities is next with about \$0.8 million and representing 14.5% then followed by Human health and social work activities with \$0.7 million representing 13.3% of total expenditure (Refer Chart 12).

**Chart 12: Distributed Water Use Expenditure by the Top 7 industries, Samoa 2022-23 (\$m)**



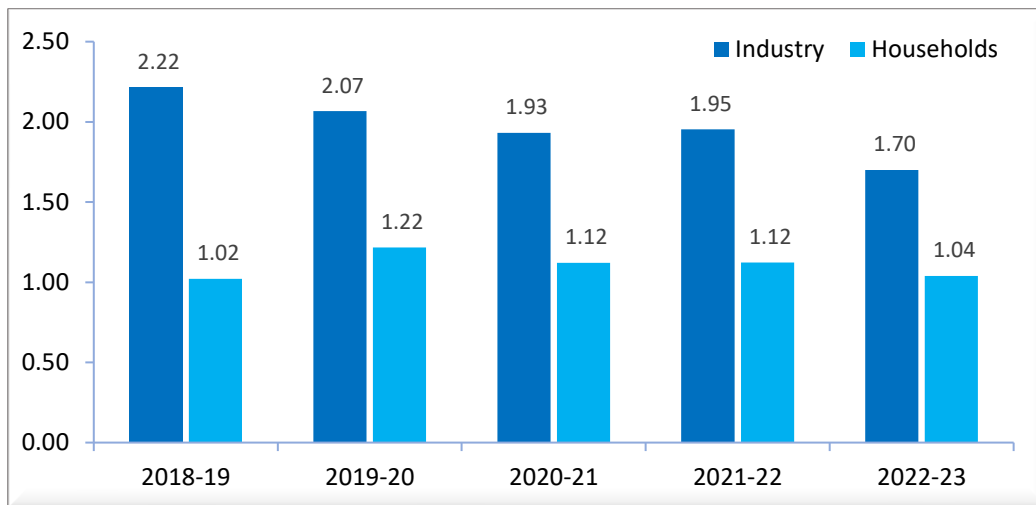
Source: Samoa Bureau of Statistics

## 5. Implicit Price

*Implicit Price* is an imputed price where water expenditure is divided by water supplied ( $\$/m^3$ ). Expenditure does not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditure does not necessarily cover all costs of supplying water

In 2022-23, the average price per cubic meter of distributed metered water use by industry was calculated to be \$1.70 while household was \$1.04 per cubic meter as shown in Chart 13.

**Chart 13: Implicit Prices for Distributed Water Use, Samoa 2018-19 to 2022-23 (\$/m<sup>3</sup>)**



Source: Samoa Bureau of Statistics

## 6. Water Productivity

*Water Productivity is the amount of Gross Domestic Product (GDP) generated per cubic meter of water abstracted, calculated by GDP (nominal GDP/at current prices) divided by Total Abstracted Water. It gives an indication of how much GDP can be produced from every cubic meter of water abstracted (SEEA-Water, 2012).*

In 2022-23, Samoa produced \$17.70 of GDP from every cubic meter of total abstracted water, an increase of 10.1% compared to \$15.91 calculated in 2021-22. Overall, Samoa’s water productivity has increased from \$14.68 in 2018-19 to \$17.70 in 2022-23 implying that the amount of GDP generated by every cubic meter of abstracted water has increased (Refer Table 8 & Chart 14).

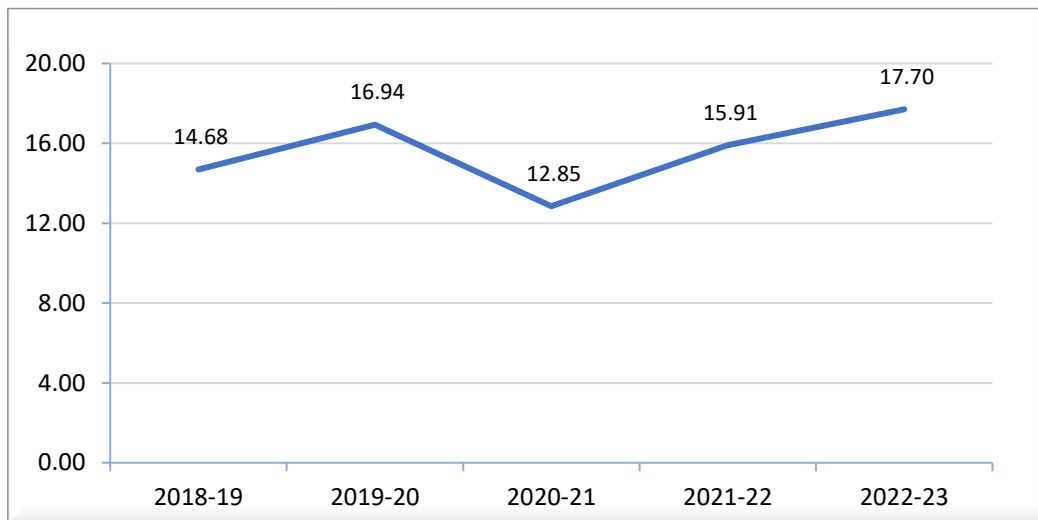
**Table 8: Water Productivity, Samoa 2018-19 to 2022-23**

FY	TOTAL ABSTRACTED WATER (m <sup>3</sup> )	GDP (\$ million)	WATER PRODUCTIVITY (\$/m <sup>3</sup> )
2018-19	162,799,964	2,390.09	14.68
2019-20	138,397,651	2,344.13	16.94
2020-21	168,814,083	2,169.45	12.85
2021-22	136,398,950	2,170.17	15.91
2022-23	144,068,652	2,550.56	17.70

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

**Chart 14: Water Productivity, Samoa 2018-19 to 2022-23 (\$/m<sup>3</sup>)**



Source: Samoa Bureau of Statistics

## 7. Wastewater and Treatment Plant

*Wastewater as it is treated in the Water Accounts Samoa refers only to the sewage discharged to the Wastewater Treatment Plant (WWTP) in Sogi, Apia.*

A total of 378 megalitres of wastewater was generated and discharged to the WWTP in 2022-23, a decrease of about 2.7 % compared to 389 ML reported in 2021-22.

Total expenditure also decreased by 2.8% from \$2.12 million in 2021-22 to \$2.06 million in 2022-23. Between 2018-19 and 2022-23, the highest volume and expenditure of wastewater generated and discharged to the WWTP was recorded both in 2020-21 with the least being recorded in 2022-23 (Refer Table 9 & Chart 15).

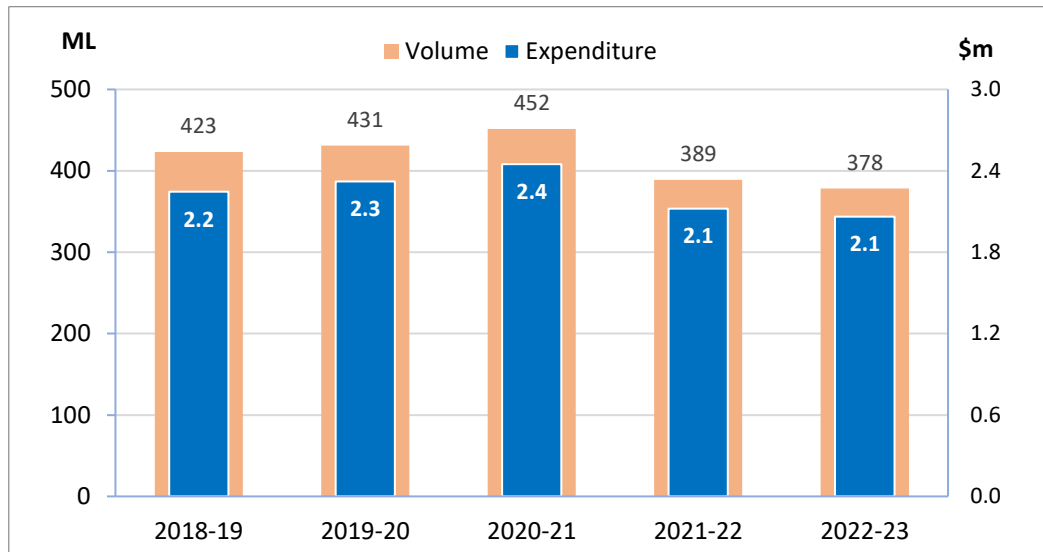
**Table 9: Volume and Expenditure of Wastewater Discharged to the WWTP, Samoa 2018-19 to 2022-23**

FY	VOLUME (ML)	EXPENDITURE (\$m)
<b>2018-19</b>	423	2.3
<b>2019-20</b>	431	2.3
<b>2020-21</b>	452	2.5
<b>2021-22</b>	389	2.1
<b>2022-23</b>	378	2.1

Source: Samoa Water Authority



**Chart 15: Total Volume and Expenditure of Wastewater Discharged to the WWTP, Samoa 2018-19 to 2022-23**



Source: Samoa Water Authority

Human health and social work activities accounted for most of the wastewater discharged throughout the five-year period from 2018-19 up to 2022-23. In 2022-23, it accounted for 35.8% or 139 ML of total wastewater discharged to the WWTP (Refer Table 10 & Chart 16).

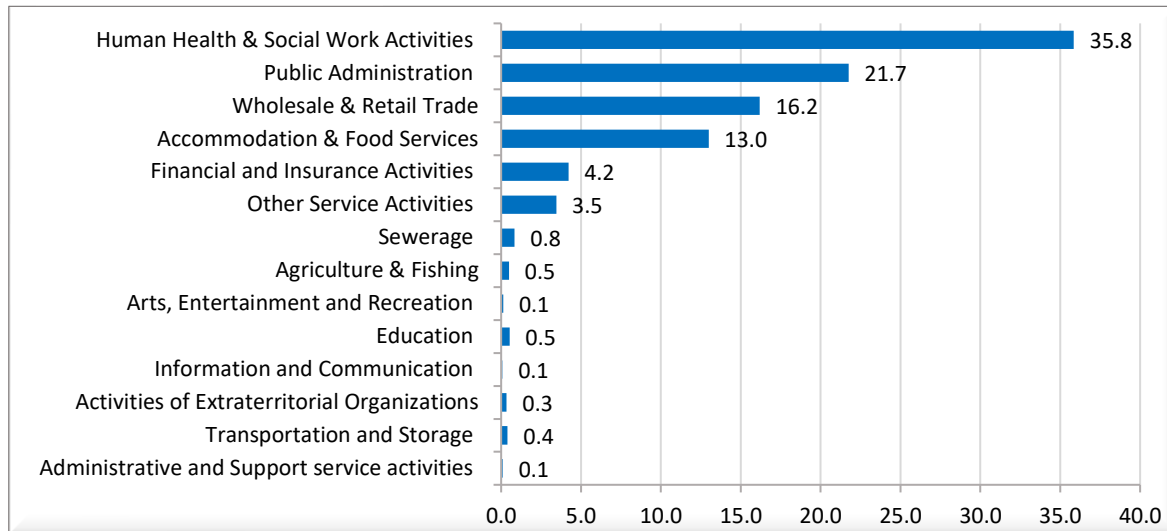
**Table 10: Volume of Wastewater Discharged to the WWTP by Industries, Samoa 2018-19 to 2022-23 (ML)**

Industries	2018-19	2019-20	2020-21	2021-22	2022-23
Human health & social work activities	115.5	117.0	138.5	131.8	139.4
Public administration	111.8	119.7	136.5	123.8	84.6
Wholesale & retail trade	61.1	70.0	75.5	49.1	63.0
Accommodation & food services	45.4	42.7	27.2	34.7	50.5
Financial and insurance activities	43.5	41.1	25.1	16.1	16.4
Other service activities	21.5	12.7	15.6	9.5	13.4
Sewerage	6.8	4.8	2.7	3.0	3.3
Agriculture & fishing	5.5	5.2	6.4	3.5	1.9
Arts, entertainment and recreation	5.1	6.2	3.7	0.4	0.5
Education	4.5	7.1	9.2	11.7	2.1
Information and communication	1.2	0.7	0.6	0.5	0.3
Activities of extraterritorial organizations	0.9	2.2	0.7	1.3	1.3
Transportation and storage	0.4	1.6	9.7	3.4	1.6
Administrative and support service activities	0.0	0.0	0.0	0.0	0.4
<b>Total Wastewater</b>	<b>423.1</b>	<b>431.0</b>	<b>451.6</b>	<b>388.8</b>	<b>378.5</b>

Source: Samoa Water Authority

Note: Totals may not add up due to rounding

**Chart 16: Percentage distribution of Wastewater Discharged to WWTP by Industries, Samoa 2022-23**



Source: Samoa Water Authority

During the reference period, Human health and social work activities paid the highest expenditure for the wastewater discharged with a total of \$811,000, accounting for 39.3% of total wastewater expenditure. Table 11 & Chart 17 below gives a clear account of the expenditure by industry and its relevant percentage distribution to total expenditure discharged to the WWTP.

**Table 11: Expenditure on Wastewater Discharged to the WWTP by Industries , Samoa 2018-19 to 2022-23 (\$ 000's)**

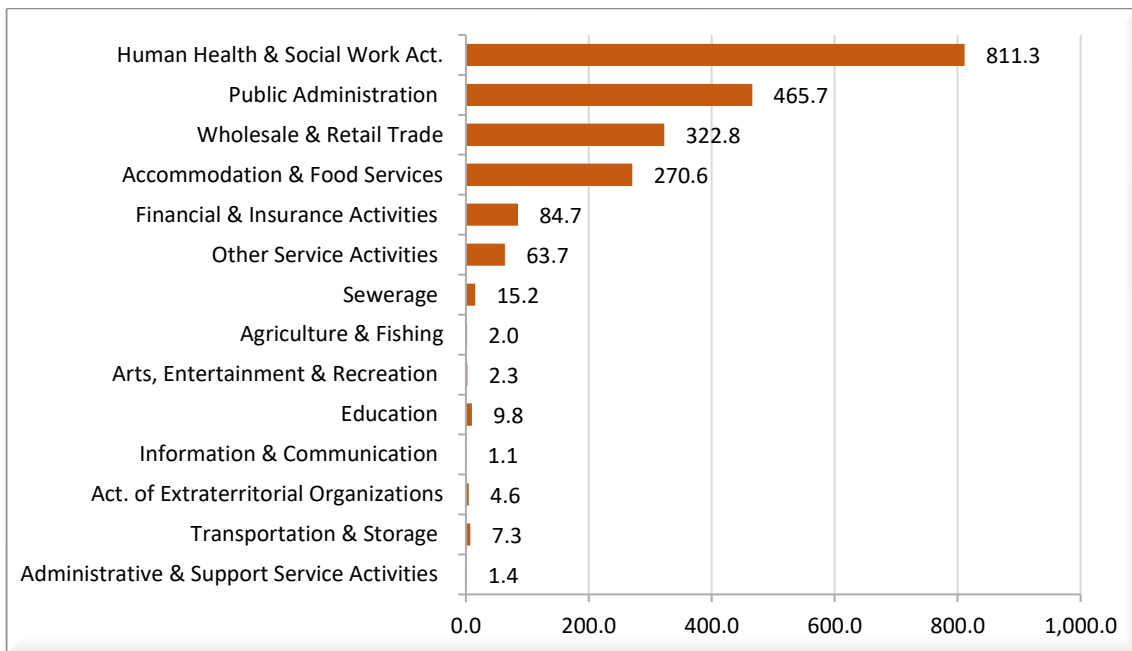
Industries	2018-19	2019-20	2020-21	2021-22	2022-23
Human health & social work act.	666.4	677.5	803.0	763.7	811.3
Public administration	612.1	663.3	762.2	695.6	465.7
Wholesale & retail trade	277.1	333.3	372.7	239.0	322.8
Accommodation & food services	230.0	229.7	145.7	182.0	270.6
Financial & insurance activities	247.2	232.1	134.0	80.8	84.7
Other service activities	107.2	60.0	76.3	47.7	63.7
Sewerage	35.7	24.7	12.7	13.9	15.2
Agriculture & fishing	16.9	17.0	21.2	11.2	2.0
Arts, entertainment & recreation	20.8	27.0	14.1	1.2	2.3
Education	22.3	38.3	46.2	61.3	9.8
Information & communication	4.9	2.5	2.2	1.8	1.1
Act. Of extraterritorial organizations	3.1	9.2	2.5	4.8	4.6
Transportation & storage	1.5	7.5	55.2 <sup>a</sup>	18.0	7.3
Administrative & support service activities	0.0	0.0	0.0	0.0	1.4
<b>Total Expenditure</b>	<b>2,245.1</b>	<b>2,322.0</b>	<b>2,448.1</b>	<b>2,121.3</b>	<b>2,062.4</b>

Source: Samoa Water Authority

Note: Totals may not add up due to rounding

<sup>a</sup> Samoa Post Office was the administration centre for the Disaster Management Office during the COVID-19 pandemic.

**Chart 17: Expenditure on Wastewater Discharged to WWTP by Industries, 2022-23 (\$ 000's)**



Source: Samoa Water Authority

## 8. Other Key Water Indicators

### 8.1 Other Key Indicators for Water Use

**Table 12: Indicators for Water Use, Samoa 2013-14 to 2022-23.**

	Water Use by Industry	Water Use by Industry (Excl. Ele, Water Supply & Sewerage)	Water Use by Households	Total Water Use	Total Water Use (Excl. Ele, Water Supply & Sewerage)	Est. Population (Jun) <sup>A</sup>	Est. No of Households (Jun)	Est. No. of Metered Households	Annual Water Use per Capita (Excl. Ele, Water Supply & Sewerage) <sup>B</sup>	Daily Water Use per person	Total Household Water Use per Household <sup>C</sup>	% of Households with Metered Water Use <sup>D</sup>
Unit	ML	ML	ML	ML	ML	Persons	Households	Households	m <sup>3</sup> per person	Litres per person	m <sup>3</sup> per Households	%
<b>2013-14</b>	123,090.0	4,500.0	16,668.0	139,758.0	21,168.0	192,134	27,448	17,255	110.2	302	607.3	62.9
<b>2014-15</b>	116,478.3	5,788.3	15,077.4	131,555.7	20,865.7	193,766	27,681	17,267	107.7	295	544.7	62.4
<b>2015-16</b>	104,802.6	6,942.6	16,000.9	120,803.6	22,943.6	195,398	27,914	18,768	117.4	322	573.2	67.2
<b>2016-17</b>	85,348.1	6,998.1	17,356.7	102,704.9	24,354.9	197,030	28,975	19,686	123.6	339	599.0	67.9
<b>2017-18</b>	116,113.1	5,700.0	14,160.1	130,273.2	19,860.1	198,661	29,215	19,832	100.0	274	484.7	67.9
<b>2018-19</b>	165,340.0	5,934.8	14,272.6	179,612.5	20,207.3	200,293	29,455	20,737	100.9	276	484.6	70.4
<b>2019-20</b>	140,235.4	5,310.9	14,442.8	154,678.2	19,753.8	201,925	29,695	22,793	97.8	268	486.4	76.8
<b>2020-21</b>	170,541.9	4,936.6	15,077.7	185,619.5	20,014.3	204,841	30,124	25,982	97.7	268	500.5	86.3
<b>2021-22</b>	138,393.2	4,845.3	14,203.4	152,596.6	19,048.6	206,730	31,323	27,447	92.1	252	453.5	87.6
<b>2022-23</b>	146,331.3	5,062.0	14,911.4	161,242.6	19,973.3	208,628	31,610	29,773	95.7	262	471.7	94.2

Source: Samoa Bureau of Statistics

**Note:**

Excl = excluding.

Totals may not add up due to rounding

- A. Projected population numbers based on the latest Population and Household Census 2021 by the Samoa Bureau of Statistics
- B. Calculated by total water use excluding Electricity, Water Supply and Sewage divided by the total population multiplied by 1000
- C. Calculated by water use by households divided by the total number of households multiplied by 1000
- D. Calculated by total number of metered households divided by the total number of households

## 8.2 Other Key Water Indicators for Water Expenditure

**Table 13: Indicators for Water Expenditure on Distributed Water Use, Samoa 2013-14 to 2022-23**

	Exp. by Industry	Exp. by Households	Total Expenditure	Water Used by Industry	Water Used by Households	Exp. Per Cubic Meter of Water Used by Industry <sup>A</sup>	Exp. Per Cubic Meter of Water Used by Households <sup>B</sup>	Estimated Population (June) <sup>A</sup>	Total Exp. Per Capita <sup>C</sup>	Estimated Number of Households (June)	Total Exp. Per Household <sup>D</sup>
UNIT	\$m	\$m	\$m	ML	ML	\$/m <sup>3</sup>	\$/m <sup>3</sup>	Persons	\$ per Person	Households	\$ per household
<b>2013-14</b>	3.5	8.1	11.6	2,090.0	15,060	1.68	0.54	192,134	60.6	27,448	296.2
<b>2014-15</b>	4.3	10.2	14.5	2,174.3	13,456	1.97	0.76	193,766	74.7	27,681	368.3
<b>2015-16</b>	6.5	10.8	17.4	3,555.6	14,366	1.84	0.75	195,398	88.9	27,914	388.5
<b>2016-17</b>	7.2	11.6	18.8	3,455.1	15,608	2.09	0.74	197,030	95.6	28,975	401.1
<b>2017-18</b>	8.2	12.4	20.6	3,778.9	12,397	2.18	1.00	198,661	103.6	29,215	422.7
<b>2018-19</b>	8.6	12.8	21.4	3,877.9	12,512	2.22	1.02	200,293	106.7	29,455	433.9
<b>2019-20</b>	6.5	15.4	21.9	3,143.9	12,706	2.07	1.22	201,925	108.7	29,695	520.2
<b>2020-21</b>	5.8	14.9	20.8	3,012.3	13,342	1.93	1.12	204,841	101.4	30,124	496.1
<b>2021-22</b>	5.2	14.5	19.7	2,875.9	12,933	1.81	1.12	206,730	95.3	31,323	462.7
<b>2022-23</b>	5.2	14.2	19.4	3,091.2	13,704	1.70	1.04	208,628	93.5	31,610	450.7

Source: Samoa Bureau of Statistics

**Note:**

Exp. = Expenditure

Totals may not add up due to rounding

- A. Calculated by Expenditure by Industry divided by Volume of Water used by Industry 1000
- B. Calculated by Expenditure by Households divided by Volume of water use by Households
- C. Calculated by Total expenditure divided by Total population
- D. Calculated by Expenditure by Households divided by the estimated number of households



## B. Accounts Methodology

The Water Account, Samoa 2022-23 (WAS) is produced by the Samoa Bureau of Statistics and it closely followed the System of Environmental-Economic Accounting Central Framework 2012 (SEEA-CF 2012). The account focused on the Physical Supply and Use of water and some monetary supply and use information for Samoa. The methodology for this compilation is similar to the previous water accounts with few changes to some of the data and methods.

### 1 Concepts

The WAS 2022-23 was developed using the SEEA Central Framework and it started in 2013 with Samoa's first account published in 2015 for the financial years 2011-12 to 2013-14. The WAS supply and use tables represent the flows of water from the environment to the economy, within the economy and going back to the environment.

The monetary supply and use information is limited to distributed water use by industries and households. It includes the monetary value associated with the use of distributed water and using of the Waste Water Treatment Plant for sewage discharge. The key concepts are as followed;

#### **Self-Abstracted Water (flows from the environment)**

Self-Abstracted water refers to water that is removed from any source or the environment, either permanently or temporarily for consumption and production activities (SEEA Water, s 3.26). Water used for hydroelectricity is also abstracted water. The Abstracted water is disaggregated according to purpose (for hydroelectricity, for distribution and for own use) and type of water source.

#### **Water Use**

Total water use of an industry is computed as the sum of the amount of abstracted water and the amount of water received from other economic units (distributed water and wastewater collected). Although it might be perceived that water abstracted for distribution is counted twice—first as a use when water is abstracted by the distributing industry and second when it is delivered to other users – water abstracted for distribution is a water use of the distributing industry even though that industry is no the end-user of the water (SEEA Water, s 3.31).

## Water Supply

Water leaving or flowing out from an economic unit. It is computed as the sum of water supply to other economic units (distributed water and wastewater) and water supply to the environment or return flows (SEEA Water, s 3.40).

## Expenditure

Refers only to the cost paid by economic units and households for distributed water use and water discharged to the wastewater treatment plant. It does not include any water-related subsidies that might have been received by the supplier of water or use of water. Furthermore, expenditures do not necessarily cover all the costs of supplying water.

## Classification of Industries

The WAS uses the International Standard Industrial Classification Revision 4 (ISIC Rev.4) for its industry classification.

## Wastewater

Wastewater represents water that is no longer needed by an economic unit and is discharged to the wastewater treatment plant. The SWA only recorded wastewater treated by the wastewater treatment plant.

## Return Flows

Represents the flows of water from industries and households to the environment. It does not include the flows of water to wastewater treatment plant (WWTP) but includes wastewater from economic units that flows directly to the environment.

## 2 Data Sources

Data for WAS is sourced from different sources such as government ministries and corporations, non-governmental organizations, private sector and existing census and surveys conducted by the bureau.

### Water Supply Industries

The two main water suppliers provide the core data for the WAS compilation through administrative data. The administrative data provided the following information;

- water production (abstracted water) by sources of water (surface & groundwater)
- number of connections (metered & unmetered)
- estimated coverage by population and households
- metered water supply by volume (m<sup>3</sup>) and value (\$)
- unmetered water by value

- wastewater collected/discharged to the treatment plant and value by individual industry
- water losses as non-revenue water (distribution losses)

### **Water Abstraction Licensing**

The Ministry of Natural Resources and Environment (MNRE) administered the licensing of water abstraction for all types of water use. Most of these licenses are issued to Construction Companies, Water Supply Industry, Electricity Industry, Manufacturing Companies and some to Other Service Activities. The administrative data includes;

- water user
- purpose of abstraction
- rate of abstraction and operational time
- duration of license

### **Hydroelectricity Water Use**

The Electric Power Corporation (EPC) provides the administrative data on the water use for hydropower. The hydroelectricity water use is provided by quarter.

- name and location of stations
- amount of water abstracted by month or quarter

### **Agriculture, Forestry and Fishing**

The core data for Agriculture and Livestock is the number of livestock. The Agriculture Census Data and Agriculture Survey provided this information. There is no information on the water use for livestock in Samoa, hence documented water requirements by FAO (FAO, 1995, *Water requirement Livestock* [Fact Sheet]) was used to estimate the abstracted water use by livestock such as;

- number of livestock by type of livestock
- average water consumption by livestock type

### **Population and Housing Census**

The bureau conducts its Population and Housing Census every five years. This provides demographic information for the accounts such as;

- census household number
- average household size

## **3 Methods**

### **Physical Water Supply and Use**

Self-Abstracted water use for different industries is calculated using different data sources. All the abstracted water is used to calculate the amount of water that is taken off the environment (flows from the environment). The following provides the methods used for each industry;

### **Water Supply Industry**

Water production by surface water and groundwater (boreholes) provides the backbone of abstracted water for the water supply industry. For the unmetered community-managed water supply systems, the average metered water use for households and individual industry is used to estimate the water production or abstracted water.

### **Agriculture, Livestock and Fishing**

Abstracted water for Agriculture is only estimated for livestock. Most of the agricultural crops in Samoa are mainly rainfed, hence making it difficult to estimate abstracted water use due to lack of data.

The abstracted water by livestock presented in this report is slightly different to the data presented in the previous account in 2019-20 but quite similar to 2021-22. This is due to a large difference between the number of livestock estimated for the years where no Agriculture census was conducted, compared with the Agriculture census years. Because of this, a simple straight-line method was used to estimate the number of livestock using the Agriculture Census 1999 as the base year.

The livestock numbers were then multiplied by the average water requirements for each livestock type to estimate the abstracted water by livestock.

### **Manufacturing and Construction**

The abstraction licensing data provided by MNRE, is the sole information available and used to estimate the abstracted water by manufacturing and construction. The abstraction rate and operational time were used to estimate annual figures for each industry. For 2021-22, attempts were made to collect data directly from major road construction companies, but it was not successful.

### **Hydroelectricity**

The Electric Power Corporation's water abstraction is used to compute the amount of abstracted water for hydropower which is provided to the bureau on a monthly and a quarterly basis.

### **Households abstracted water**

According to the 2021 Population and Household Census, a proportion of about 8.5% of total population or 2,656 households depended on sources other than distributed water by the water suppliers. For this account, that percentage is assumed to be self-abstracting water from other sources, mainly rainwater. The estimated abstracted water use by these households is computed using the average metered household water use multiplied by the number of households not supplied by piped water.

### **Distributed Water Use**

The detailed customer use data from one of the main water suppliers was classified into relevant industries using the International Standard Industry Classification (ISIC Rev.4) before tabulation and analysis. The bulk of water users (industry & households) have metered water supply. The average water use for metered individual industries and metered households is used to estimate the unmetered water use by industry and households.

On the other hand, the community-managed water supply systems are mostly unmetered except in one scheme where meters were installed for monitoring water use and losses. Water fees are paid based on households' consumption with very low rates. Proportions from that scheme were used to estimate production and supply for the other self-managed schemes.

### **Monetary Supply and Use**

Abstracted water use and return flows are not valued as there is a lack of available information and data. The monetary information is limited to only the distributed water use and wastewater to treatment plant. The value of distributed metered and unmetered water use are provided as well as expenditure paid by industry for their wastewater discharged to the wastewater treatment plant.

For community-managed water supply systems, monthly maintenance fee paid by households is used to estimate the value of distributed water use for the unmetered water schemes.

## C. Industries Classification

Industry is a group of establishments engaged in the same or similar activities. The bureau classified establishments according to relevant industry based on the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev.4). With data sets and information scattered across different data sources and custodians, the classification task was challenging. However, the following industries are the major ones used throughout this report for the purpose of water accounts.

**Agriculture:** Includes Agriculture, Forestry and Fishing. Livestock Is also included (ISIC A).

**Electricity:** Includes Electricity, Gas and Air Conditioning (ISIC D).

**Manufacturing and Construction:** Includes Manufacturing, Mining and Quarrying and Construction (ISIC B, C & F).

**Water Supply Industry:** Only includes Division 36 of ISIC E.

**Sewerage:** Refers to Division 37 of ISIC E.

**Other Industries** refers to the following industries;

- Accommodation and Food Service Activities
- Activities of Extraterritorial Organizations and bodies
- Administrative and Support Service Activities
- Arts, Entertainment and Recreation
- Education
- Financial and Insurance Services
- Human Health and Social Work Activities
- Information and Communication
- Other Service Activities
- Professional, Scientific and Technical Activities
- Public Administration and Defence
- Real Estate Activities
- Transportation and Storage
- Waste Management
- Wholesale and Retail Trade; repair of motor vehicles

## D. Abbreviations and Acronyms

-	nil or not available
\$	Samoa Tala
\$m	million Tala
%	percentage
Act.	Activities
DWU	Distributed Water Use
EPC	Electric Power Corporation
Est.	Estimated
FAO	Food and Agriculture Organization of the United Nations
FY	Financial Year (June – July)
HHs	Households
ISIC Rev.4	International Standard Industrial Classification Revision 4
IRWS	International Recommendations for Water Statistics
IWSA	Independent Water Scheme Association
m <sup>3</sup>	cubic meter
ML	megalitres (1,000 cubic meters)
MNRE	Ministry of Natural Resources and Environment
NRW	Non-Revenue Water
PHC	Population and Household Census
SBS	Samoa Bureau of Statistics
SEEA-CF	System of Environmental-Economic Accounting Central Framework
SEEA-Water	System of Environmental-Economic Accounting for Water
SWA	Samoa Water Authority
UN	United Nations
Vol.	Volume
WAS	Water Account Samoa
WWTP	Wastewater Treatment Plant



## E. Feedback on the Accounts

For more information or any feedback on any issue with the Water Accounts, Samoa 2022-23, please don't hesitate to contact;

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## F. Acknowledgement

This edition of the Water Account Samoa 2022-23 would not be possible without the usual assistance and valuable contribution of our partners and stakeholders through the provision of the required data and information for the account compilation.

On that note, we would like to record our sincere gratitude to our colleagues at SWA, EPC, MNRE and IWSA. We would also like to acknowledge the technical expertise of Mr. Sokol Vako from the UN-SIAP and Mr. Teerapong Praphotjanaporn from UN-ESCAP for their valuable feedback and assistance.

In addition, we sincerely commend the contribution of our pioneering consultant, Dr. Michael Vardon for the initial effort in compiling the first Water Accounts for Samoa in 2015 and the opportunity offered by the Australian Bureau of Statistics for the first ever attachment training for our environment statistics officer in 2014, which laid the foundation for the SEEA development in Samoa.

## G. Appendices

### 1. Physical Supply Table, Samoa 2022-23 (ML)

PHYSICAL SUPPLY TABLE	Industries (by ISIC)							Households	Accumulation	Flows from the Environment	TOTAL SUPPLY
	Agriculture, Forestry & Fishery	Manufacturing & Construction	Electricity	Water collection, treatment & supply	Sewerage	Other Industries	Total Industry				
	(ISIC A)	(ISIC B,C & F)	(ISIC D)	(ISIC 36)	(ISIC 37)						
<b>1. Sources of Abstracted Water:</b>											
Inland Water Resources										142,862	142,862
<i>Surface water</i>										133,851	133,851
<i>Groundwater</i>										9,010	9,010
Other Water Sources (Rainwater)										1,207	1,207
<b>TOTAL SUPPLY ABSTRACTED WATER</b>										<b>144,069</b>	<b>144,069</b>
<b>2. Water:</b>											
For distribution				16,795			<b>16,795</b>				<b>16,795</b>
For own use	1,759	231	111,070	1,207	-	13	<b>114,279</b>				<b>114,279</b>
<b>3. Wastewater and reused water:</b>											
Total Wastewater	2	-	-	-	3	373	<b>378</b>	-			<b>378</b>
<i>of which: wastewater to treatment</i>	2	-	-	-	3	373	<b>378</b>	-			<b>378</b>
<i>of which: own treatment</i>	-	-	-	-	-	-	-	-			-
<b>TOTAL WASTEWATER AND REUSED WATER</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>373</b>	<b>378</b>	<b>-</b>			<b>378</b>
<b>4. Return flows of water:</b>											
To inland water resources	88	231	111,092	12,999	296	2,376	<b>127,081</b>	10,963			<b>138,045</b>
To other sources	-	-	-	-	85	-	<b>85</b>	-			<b>85</b>
<b>TOTAL RETURN FLOWS</b>	<b>88</b>	<b>231</b>	<b>111,092</b>	<b>12,999</b>	<b>380</b>	<b>2,376</b>	<b>127,166</b>	<b>10,963</b>			<b>138,129</b>
<i>of which: losses in distribution</i>	-	-	-	12,994	-	-	<b>12,994</b>	-			<b>12,994</b>
<b>5. Evaporation of abstracted water, transpiration and water incorporated into products:</b>											
<b>TOTAL WATER EVAPORATED, TRANSPIRED AND INCORPORATED INTO PRODUCTS</b>	<b>1,759</b>	<b>233</b>	<b>-</b>	<b>1,207</b>	<b>-</b>	<b>-</b>	<b>3,199</b>	<b>2,741</b>			<b>5,939</b>
<b>6. TOTAL SUPPLY</b>	<b>1,849</b>	<b>464</b>	<b>111,092</b>	<b>29,794</b>	<b>384</b>	<b>2,749</b>	<b>146,331</b>	<b>14,911</b>		<b>144,069</b>	<b>161,243</b>

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

## 2. Physical Water Use Table, Samoa 2022-23

PHYSICAL USE TABLE	Industries (by ISIC)							Households	Accumulation	Flows to the Environment	TOTAL SUPPLY
	Agriculture, Forestry & Fishery	Manufacturing & Construction	Electricity	Water collection, treatment & supply	Sewerage	Other Industries	Total Industry				
	(ISIC A)	(ISIC B,C & F)	(ISIC D)	(ISIC 36)	(ISIC 37)						
<b>1. Sources of Abstracted Water:</b>											
Inland Water Resources	1,759	231	111,070	29,789	-	13	<b>142,862</b>				142,862
<i>Surface water</i>	1,759	207	111,070	20,816	-	-	<b>133,851</b>				133,851
<i>Groundwater</i>	-	25	-	8,973	-	13	<b>9,010</b>				9,010
Other Water Sources (Rainwater)	-	-	-	1,207	-	-	<b>1,207</b>				1,207
<b>TOTAL USE ABSTRACTED WATER</b>	<b>1,759</b>	<b>231</b>	<b>111,070</b>	<b>30,996</b>	<b>-</b>	<b>13</b>	<b>144,069</b>				<b>144,069</b>
<b>2. Water (use):</b>											
Distributed water	90	233	22	5	5	2,737	<b>3,091</b>	13,704			<b>16,795</b>
Own use of water	1,759	231	111,070	1,207	-	13	<b>114,279</b>	-			<b>114,279</b>
<b>3. Wastewater and reused water:</b>											
Total Wastewater				-	378		<b>378</b>				378
<i>of which: wastewater received from other units</i>				-	378		<b>378</b>				378
<i>of which: own treatment</i>	-	-	-	-	-	-	-	-			-
<b>TOTAL WASTEWATER AND REUSED WATER</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>378</b>	<b>-</b>	<b>378</b>	<b>-</b>			<b>378</b>
<b>4. Return flows of water:</b>											
To inland water resources										138,045	138,045
To other sources										85	85
<b>TOTAL RETURN FLOWS</b>										<b>138,129</b>	<b>138,129</b>
<b>5. Evaporation of abstracted water, transpiration and water incorporated into products:</b>											
TOTAL WATER EVAPORATED, TRANSPIRED AND INCORPORATED INTO PRODUCTS									5,939	-	<b>5,939</b>
<b>6. TOTAL USE</b>	<b>1,849</b>	<b>464</b>	<b>111,092</b>	<b>29,794</b>	<b>384</b>	<b>2,749</b>	<b>146,331</b>	<b>14,911</b>	<b>5,939</b>	<b>138,129</b>	<b>161,243</b>

Source: Samoa Bureau of Statistics

Note: Totals may not add up due to rounding

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