



# **SAFE DRINKING WATER**

## **Performance Report**

**An analysis of the effectiveness of Access  
to Safe Drinking Water in the State of Yap**



**Office of the Public Auditor  
State of Yap**



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### EXECUTIVE SUMMARY

This report presents the results of our performance audit of the effectiveness of access to safe drinking water in the State of Yap, in particular the area serviced by the Yap State Public Service Corporation (YSPSC).

The purpose of our audit was to assess the existence of a legal and policy framework for access to safe drinking water, the process by which the legal and policy framework is implemented, including whether risks to implementation have been considered and compliance with the legal policy and framework, including monitoring arrangements. This audit was conducted pursuant to the authority vested in the Public Auditor and in accordance with the standards for performance audits contained in Government Auditing Standards issued by the Comptroller General of the United States.

Our audit disclosed the need for improvement in the existing legal and policy framework and the lack of an operational plan by YSPSC for implementing that framework. Additionally, we were not able to confirm compliance with the legal and policy framework, including monitoring arrangements.

A copy of this report was circulated to YSPSC and the Yap Environmental Protection Agency (EPA), neither of which provided a response to our findings and recommendations.

A handwritten signature in black ink, appearing to read "Ronald C. Yow".

Ronald C. Yow  
Acting Public Auditor  
March 5, 2012

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**INTRODUCTION**

**Background**

Water has a major impact on human health, and the provision of adequate supply of good quality drinking water is vital to communities worldwide. The economic and social well-being of small island states like Yap is greatly influenced by the quality of water and its effective management.

Yap is one of four states comprising the Federated States of Micronesia. It covers an expansive 78,000 square mile area of the Western Pacific (7 to 10 degrees North and 137 to 140 degrees East). The State of Yap is made up of five volcanically raised islands and eight major atolls. These and other uninhabited islands constitute 46 square miles of land. Currently the population is 11,348<sup>1</sup>.



<sup>1</sup> Yap State Statistics (census year: 1995-2000)

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Most parts of Yap State are served by reliable filtered and treated potable water systems. These systems are maintained by the Yap State Public Services Corporation (YSPSC) Water System, the Gagil/Tomil Water Authority (GTWA), and the Southern Yap Water Authority (SYWA). The following table reflects the details of the level of service provided by each supplier of water to residential customers in Yap.

<b>WATER ENTITIES</b>	<b>SERVICE AREA</b>	<b>APPROX. NO. CUSTOMERS AT STARTUP</b>	<b>INPUT</b>	<b>PROCESS</b>	<b>OUTPUT</b>
<b>Southern Yap Water Authority (SYWA)</b>	Communities of Southern Rull and Southern Villages of Dalipebinaw and municipalities of Kanifay and Gilman	254	Funding staff and water system equipment	Maintenance, distribution and record keeping	Accessible water
<b>Gagil-Tomil Water Authority (GTWA)</b>	Communities within the municipalities of Gagil-Tomil	344	Funding staff and water system equipment	Maintenance, distribution and record keeping	Accessible water
<b>Yap State Public Service Corporation (YSPSC)</b>	Serves mainly central Yap proper	2000	Funding staff and water system equipment	Maintenance, distribution and record keeping	Accessible water

Source: YSL 1-221, YSL 1-183 & YSL 4-4

YSPSC is a legally separate component unit of the Government of Yap Sate providing electrical, water and sewer services in the State of Yap. YSPSC commenced operations on April 1, 1996, with the assets and liabilities of the Division of Public Utilities of the Yap State Department of Public Utilities and Contracts transferred as of that date. YSPSC is governed by a seven member Board of Directors nominated by the Governor with the advice and consent of the Legislature. The utility is self-funding through charges to customers and does not receive any government appropriations. YSPSC's operations include a Water and Waste Water Division, which are responsible for providing water and sewerage services to the population within their service area.



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The Yap State Environmental Protection Agency (EPA) was created in 1994 through the Environmental Quality Protection Act, passed by the Yap State Legislature. The EPA focuses on safeguarding land, water and air quality of the State, and protecting natural resources and all living things from human and chemical pollution. In particular they are responsible for monitoring water quality to ensure safe drinking water is provided to the residents of Yap.

Meeting in a summit in 2000, the largest gathering of world leaders in history adopted the United Nations (UN) Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty. This set out a series of time-bound targets, with a deadline of 2015 which have become known as the Millennium Declaration Goals (MDG's). The MDGs are the world's time-bound and quantified targets for addressing extreme poverty in its many dimensions (income poverty, hunger, disease, lack of adequate shelter, and exclusion) while promoting gender equality, education, and environmental sustainability. They are also basic human rights, that is, the right of each person on the planet to health, education, shelter, and security. The aim is to encourage development by improving social and economic conditions in the world's poorest countries. The Millennium Declaration led to the formulation of numerical targets and quantifiable indicators, the MDG's, where efforts are designed toward achieving significant and measurable improvements in people's lives. For example, MD Goal 7, Target 7C is to cut in half the "proportion of the population without sustainable access to improved drinking water & sanitation."

FSM has shown little progress towards meeting the MDG timeline by 2015. Poverty incidence is estimated to be high, and basic social services fail to reach the poorer strata of society. The outer islands and rural areas of FSM have poor health indicators, and only 41% of the population in 2000 had access to a clean water source. The FSM Infrastructure Development Plan (IDP), prepared by the Department of Transportation, Communications and Infrastructure (DTC&I), notes there is a need to have mechanisms to track progress on goals and targets and to improve data quality and data collection<sup>2</sup>. IDP is an assessment of the current state of infrastructure in nine sectors, including water/wastewater management.

## **Objectives**

The purpose of this audit was to evaluate the effectiveness of access to safe drinking water within the State of Yap, in particular the area of Yap proper that is serviced by the Yap State Public Service Corporation (YSPSC).

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<sup>2</sup> FSM Infrastructure Development Plan, vol 1, p. 308.

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The specific objectives were to determine:

1. The existence of a legal and policy framework for access to safe drinking water
2. The process by which the legal and policy framework is implemented, including whether risks to implementation have been considered.
3. Compliance with the legal and policy framework, including monitoring arrangements.

### **Scope**

This audit includes the operation of YSPSC, in its role of providing water services to Yap proper, and the Yap EPA concerning its role in water quality monitoring.

The 3<sup>rd</sup> World Water Forum, Kyoto, 2003 recognized the following issues which are of particular importance to the Pacific region and which impact on the health of the environment as well as the health of Pacific Island communities:

- Uniquely *fragile water resources* due to small size, lack of natural storage, competing land use, vulnerability to natural and man-made hazards, including drought, cyclones and urban pollution.
- Water and wastewater service providers constrained by lack of *human and financial resource bases*, restricting the availability of experienced staff and investment, and effectiveness of cost-recovery.
- Highly complex water governance due to the “disconnect” between *traditional community and national administration* practices and instruments.

The 13<sup>th</sup> PASAI Congress held in Kiribati in July 2010 endorsed the topic of *access to safe drinking water* for the 2<sup>nd</sup> regional cooperative performance audit. Supreme Audit Institutions (SAIs) which are participating in the audit include: Cook Island, Federated States of Micronesia (Kosrae and Yap), Fiji, Kiribati, Palau, Papua New Guinea, Tonga and Tuvalu.

We wanted to know what Yap Government has done thus far to address the safe drinking water needs of its people; we wanted to know whether YSPSC created by law responds to its



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serviced area population's water needs effectively, and; we wanted to know whether there is any legal framework in place setting forth standards or guidelines to "safe drinking water" for the general public.

## **Methodology**

In conducting our audit, we interviewed key personnel from the Yap State Office of Planning & Budget (OPB) and obtained relevant information from departments and agencies charged with the legal framework of ensuring access to safe and drinkable water. This included responses to inquiries made with SYWA and GTWA. We did not, however, receive responses to our Inquires made to FSM Environmental Health & Sanitation Division, the Division of Contracts & Engineering (Public Works), and YSPSC. We additionally obtained, through research and review, written and electronic copies of studies, surveys, analyses, and reports in connection with the management of water resources, in general and specifically for Yap. Also reviewed was the interview of Asian Development Bank (ADB) consultant Margaret Chung with regards to the implementation of the water supply project for the northern part of Yap.

We conducted our audit in accordance with standards for performance audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States and pursuant to the authority vested in the Public Auditor as codified under Title 13, Chapter 7, and Section 703 of the Yap State Code, which states in part:

*"The Public Auditor shall inspect and audit all accounts, books, and other financial records of the State Government, to include but not limited to, every branch, department, office, political subdivision, board, commission and agency, and other public legal entities or non-profit organizations receiving public funds from the State Government, and to prepare written reports of such inspections and audits for presentation to the Governor and the Legislature;"*

## **Prior Audit Coverage**

This is the first engagement of its kind in connection with access to safe drinking water conducted by this office.



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**Conclusion**

Although there are gaps between the National and State level with regards to the legal and policy framework to provide access to safe drinking water, YSPSC was established to carry out the services of providing electricity, water, sewer, and refuse collection and disposal to the residents of the State of Yap. YSPSC does the treating and distribution of the water while Yap Environmental Protection Agency does the water quality monitoring.

Good water quality has been maintained and the majority of the population in the service area of YSPSC has access to safe drinking water at the minimal price. However, there are several areas that we believe require further attention by responsible agencies to improve access to safe drinking water. YSPSC should develop a specific operational plan for the management and upgrade of its water services and see that the plan is monitored and reported on accordingly. Legislation should be reviewed to enhance support for the delivery of safe drinking water to communities in Yap, and relevant and practical state water quality standards should be developed and established by law. In addition, YSPSC and EPA as the responsible agencies should develop targeted public awareness programs concerning safe drinking water for the communities they service, including timely notification on water quality.

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**FINDINGS & RECOMMENDATIONS**

**Existence of a legal and policy framework**

***Criterion 1: There should be a legal and policy framework to ensure access to safe drinking water in the State of Yap.***

YSPSC is a public corporation created in 1995 pursuant to Yap State Law No. 4-4 to provide electricity, water and sewer services, and refuse collection and disposal to the residents of Yap State. The Corporation is governed by a seven-member Board of Directors, appointed by the Governor with the advice and consent of the State Legislature. The duties of the Corporation include:

- The supervision of the construction, maintenance, operations, and regulation of all utility services, including power, sewage, refuse collection and disposal, and water; provided, that whenever feasible the Corporation may contract for private businesses to assume its duties with respect to one or more of its divisions; and
- The Corporation shall take all steps necessary to accurately meter and bill all consumers, including government consumers and all government buildings, for electrical power, sewage, refuse collection and disposal, and water consumption.

YSPSC is entrusted with the treatment and distribution of water to the public in Colonia (central Yap proper), covering its communities and municipalities and most of the commercial and government operations on Yap.

***Criterion 2: Plans (National and State) should be in place to support access to safe drinking water for the residents of Colonia.***

**The Federated States of Micronesia (FSM) Infrastructure Development Plan (IDP)**

The IDP was developed in 2003 in recognition that FSM had entered a new phase of its development with the implementation of the amended Compact<sup>3</sup> with the United States of America (USA), and that FSM required a process to identify its development strategy for the

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<sup>3</sup> The FSM Government's Compact of Free Association with the USA provides for financial assistance to the FSM. The initial funding period ran for 15 years from 1986 until 2001, and was extended for a further transition period until September 30, 2003. A new Compact was agreed for a 20 year period from 2004.



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new era. This largely entailed developing a sustainable growth strategy. Utilizing a strategy for sustainable management of the environment, under the plan put forth by IDP, 100% of the communities in FSM would have ample access to safe drinking water by 2020. This is in recognition of the fact that as much as three-quarters of the population currently lack access to "safe" water, and water-borne diseases are the third largest cause of death in the nation<sup>4</sup>. The Plan further suggests that State authorities, in partnership with Municipal governments, churches, nongovernmental organizations (NGOs) and others, need to improve management of forested surface catchments and aquifers to meet projected water supply demands and improve community water systems in rural areas to assure access to safe drinking water supplies.

**Planning and Budgeting – FSM Infrastructure Development Plan**

Based on an estimated average funding availability for infrastructure from all sources of \$35 million, a total investment of \$748 million has been envisaged over the 20-year IDP period in the nine infrastructure sectors. The allocation nationally for infrastructure projects concerned with water supply/waste water systems is \$142 million for the period 2004-2023. This illustrates that, at the national level, that FSM considered its water supply/waste water infrastructure sector as vital to national development and consequently has directed roughly 20% of its infrastructure budget toward improvements in that sector. The primary objectives of the provision of water and wastewater infrastructure within the national IDP are to:

- Meet the demand for water supply and wastewater infrastructure in an effective and efficient manner.
- Improve existing water abstraction, treatment and distribution systems.
- Evaluate and institute technologically appropriate liquid waste management Systems.
- Improve and initiate wastewater facilities to increase coverage and contribute towards improvements in public health and environmental conditions.
- Contribute towards the prevention of water borne diseases through the provision of potable water supplies.

The IDP notes that the existing water system on Yap proper is generally operating satisfactorily but requires extension and augmentation during the course of IDP's implementation.

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<sup>4</sup> FSM Infrastructure Development Plan, vol 3, p. 31.

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To ensure that the objectives of the National IDP are met and that these extensions and augmentations occur within a realistic timeframe and at a reasonable price, there needs to be a plan in place at the state level concerning water and wastewater infrastructure improvements. The responsibility for improving the Yap proper water supply system rests with YSPSC and consequently it is their responsibility to develop such a plan. To date, YSPSC has not provided a plan which outlines its objectives, strategies and timetable concerning improvements to the Yap proper water supply system. As a result, exactly how YSPSC will respond to national strategic priorities to support access to safe drinking water cannot be readily determined.

**The Yap Biodiversity Strategy and Action Plan**

This plan was put in place by the Governor of Yap in September 2004. It seeks to ensure that the resources of Yap are managed and utilized sustainably. The action plan identifies seven priority and relevant action areas to manage natural resources on a sustainable basis. It's focus is on: *addressing threats: Biosecurity, Earthmoving, Water Quality, Solid Waste and Hazardous Material*. Concerning Water Quality, priority actions with an accompanying timetable include:

- Groundwater quality assessment to be completed by 2009; and
- Develop local water quality standards and thresholds and incorporate these into water quality protection regulations to be completed by 2009.

Implementing and reporting on the successful completion of these priority actions would assist the State of Yap and its communities to manage an important natural resource – freshwater. However, there does not appear to be any report which provides details of the successful implementation or otherwise of the Yap Biodiversity Strategy and Action Plan.

Recommendation

To support its legislated mandate to provide water services to the residents of the State of Yap, YSPSC should develop a specific plan for the management and upgrade of its water services. Such plan, when implemented, should be monitored and reported on.



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**Criterion: *There should be standards, set by law, to regulate the quality of drinking water.***

Drinking Water Standards are fundamental to ensuring the provision of good quality drinking water suitable for public consumption. It is important that standards be sensitive to the geology of the environment from which the water is sourced. In particular the presence of metals such as arsenic, lead and iron in any appreciable concentrations can have detrimental health effects and it is important that these levels are monitored. Additionally, there should be standards set as to acceptable levels of bacteria found in the water supply to ensure that public health is not put at risk from consuming drinking water.

We note that United States Environmental Protection Act (USEPA) standards are generally relied on to monitor water quality. However, Yap State does not have any legislated water quality standards. This means that they are not enforceable by law.

**Recommendation**

Legislation in Yap State should be reviewed to better support the delivery of safe drinking water to communities and relevant and practical state water quality standards should be developed and established in law.

**Process by which legal and policy framework is implemented**

**The framework has been implemented**

The YSPSC water plant draws its water from the Gitam Reservoir and wells. Types of treatment done at the water treatment plant are coagulation, sedimentation, filtration and chlorination before the water is distributed to the serviced areas of YSPSC. The approximate number of population served is about 3,150<sup>5</sup>. The figure below provides details of water access by municipality within the service area of YSPSC.

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<sup>5</sup> Pacific Regional Consultation on Water in Small Island Countries – FSM Report.

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Source of Water of all Housing Units by Municipality: 1994 and 2000								
Municipality	1994				2000			
	Total Housing Units	Hot & Cold Water	Cold Water Only	No piped Water	Total Housing Units	Hot & Cold Water	Cold Water Only	No piped Water
Weloy	219	11	137	71	256	21	156	79
Fanif	96	2	35	59	105	1	47	57
Rull	128	11	101	16	143	17	105	21
Dalipebinaw	62	1	39	22	79	0	51	28
Tomil	42	1	30	11	56	4	36	16
<b>Totals</b>	<b>547</b>	<b>26</b>	<b>342</b>	<b>179</b>	<b>639</b>	<b>43</b>	<b>395</b>	<b>201</b>

Note: The numbers of housing units were calculated based on estimated percentage of each municipality that receives services from the Yap State Public Service Corporation.  
Source: Yap State Statistical Yearbook 2000.

While there has been an increase of some 17% in the total number of homes in YSPSC's service area, there has also been an improvement in the number of dwellings connected to YSPSC's water line.

***Criterion:*** *The national water strategy should be translated into instruments such as plans, systems and processes, programs, Policies, Budgets,<sup>6</sup> and financial tools by key agencies to allow them to meet their individual responsibilities governing the distribution of safe drinking water to households.*

The primary objective for the establishment of YSPSC was to create a self-sustaining public corporation to take over services formerly provided by the Department of Public Utilities and Contracts. Section 9 of YSPSC's enabling law YSL 4-4 states, "the manager and board shall manage the Corporation in a business-like manner so as to provide the most efficient delivery of its services at the most reasonable cost to the consumers." Section 4(b) further states, "The Corporation shall within one year of confirmation of all board members implement a plan by which it or its designee will establish rates, metering, billing, and collecting fees in a fair and

<sup>6</sup> Charges levied for the supply of water from the three main systems are subsidized. The water rates in the Colonia System are \$4.00 for the 1st 5000 gallons with higher rates for more excessive use. There is a \$5.00 minimum charge for use of the systems.



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rational manner from all consumers of utility services so that the Corporation will be financially independent of all appropriations by the Yap State Legislature as soon as possible.”

One year after the establishment of YSPSC, the Corporation broke away from the Yap State Government to form an independent corporation and now operates completely on its own revenue. YSPSC was able to provide a schedule of rates and charges for water services that are sufficient to recover the costs associated with the operations and delivery of its water services. Water meters are read and bills rendered monthly. Notwithstanding YSPSC has a sound financial arrangement in place to provide water services to the population within its area, the corporation has no operational plan.

YSPSC Water System Regulations have been adopted by the Corporation pursuant to YSL Law 4-4 of the State of Yap. The adopted regulation includes the following:

- 1.3.1 When residential and non-residential building must be connected to YSPSC available water system.
- 1.3.2 When an YSPSC Water System will be considered as being available for connection.
- 1.3.3 Design Standards and requirements for water service connection to YSPSC water line.
- 1.3.4 Establishment of fees for water use and connection to YSPSC water lines.
- 1.3.5 Sanctions and penalties for failure to pay water charge and for any other violation to these regulation.

As stated in the Water System Regulation, “YSPSC will exercise reasonable diligence and care to deliver an adequate and supply of safe potable water to the customer and avoid shortage or interruptions in water services but will not be liable for any interruptions, shortage, insufficiency of supply, or any loss or damage occasioned thereby.” YSPSC has an enabling legislation and a water system regulation. The regulation provides the planning framework to meet the requirements of Section 4(b) of YSL 4-4.

Recommendation

YSPSC should develop an operational plan for water distribution network.

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**Criterion: access to, and availability of information on water management should be publicised.**

The Government of Yap does not have co-ordinated programs or activities directed towards educating the public about safe drinking water.

Yap EPA indicates they report to the water authorities regarding water quality and test results and these are further disseminated to consumers. However, announcements are made only sporadically regarding water quality testing results over public radio. Public announcements are made especially in cases where water quality is deemed unsafe for consumption. Other general announcements regarding water conservation are made from time to time. Water quality monitoring is done monthly by Yap EPA to ensure safe water quality. Monitoring schedule is monthly water testing of the three public water systems with more testing conducted as needed and required for follow up or confirmations. Private residence and facilities can also have drinking water sources tested per request and are free of charge.

There is a need to develop a more comprehensive public awareness campaign to ensure that the public is informed on a regular basis when the water is safe to consume and when it is not and what to do in these circumstances to ensure that public health is protected. This could include the implementation of a Public Notification system providing water consumers with the results of the monthly scheduled testing of water quality.

**Recommendation**

As the responsible agencies, both YSPSC and EPA should develop targeted public awareness programs concerning safe drinking water for the communities it services, including timely notification on water quality.

**Compliance with the legal and policy framework, including monitoring arrangements**

**Criterion 1: There should be adequate oversight by an independent agency of water quality and monitoring.**

The Yap EPA is responsible for water quality monitoring through testing to ensure safe water quality for consumption. EPA is an independent agency separate from the authorities responsible for providing water to the residents of Yap. The monitoring schedule involves monthly testing the three public water systems on Yap with more frequent testing conducted



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as needed and required for follow up or confirmations. Private residences can also have drinking water sources tested by request. This service is free of charge.

Bacteriological testing is conducted to monitor water quality. Where additional or more rigorous testing is required, assistance is sought from regional agencies such as Guam EPA, Palau Environmental Protection Board (EQPB), Saipan Division of Environmental Quality (DEQ) or University of Guam's Water and Environmental Research Institute (WERI).

Testing quality and staff performance is maintained through participation in the United States Environment Protection Agency (USEPA) Water Quality Lab Certification program. USEPA personnel conduct an audit of the laboratory and laboratory staff every two years. Yap EPA has identified improvements in testing procedures and laboratory staff as a main focus to ensure accuracy of the testing method and testing results to improve water quality monitoring, health and safety.

The YAP State Statistical Yearbook 2009 reported the following data on new reportable health incidence by disease. These are likely related to the consumption of poor quality drinking water.

<b>Disease/Syndrome</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Diarrhea and gastroenteritis	484	120	34	210	640
Typhoid fever	0	0	35	7	1
Salmonella gastroenteritis	0	0	0	0	1
Gardiasis	0	0	2	2	23

Note: Between 2006 and 2007, a new reporting system was put in place which may account for some of the variability in the data reported. It also needs to be noted that these results are for the entire population of Yap. (Source: Department of Health Services, Yap as reported in the Yap Statistical Yearbook 2009)

The lack of access to safe drinking water is a likely contributor to the incidence of disease reported in the above table. Of particular note is the increase in the number of diarrhea and gastroenteritis cases reported to health facilities.

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***Criterion2: Responsible agencies should demonstrate improvement in the effectiveness of their actions over time (benchmarking)***

In 2004, a project was initiated through the Water and Environmental Research Institute (WERI) of the Western Pacific University of Guam to undertake a qualitative examination of the important surface and ground water sources of Yap proper and some of its neighbouring islands. This study represents a benchmark and provides the basis for future evaluations to determine improvements in the management and distribution of drinking water in Yap. The results of the study were:

- Water samples from five sites were tested for various physical and chemical parameters including inorganic components and metals. Tests were also performed for volatile organic compounds and disinfection by-products.
- No significant levels of contamination were noted in samples collected from the water systems of Yap.
- Of the 179 water samples tested for bacteria in Yap proper, 37 were positive for faecal coliforms.<sup>7</sup>

These findings provide an opportunity for YSPSC to benchmark its management of the distribution of drinking water to the communities of Yap proper.

**Recommendation:**

YSPSC should ensure there are regular external evaluations of water sources and the quality of water it supplies to the residents of Yap, and timely corrective action taken to address results that indicate poor water quality.

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<sup>7</sup> WERI, *Qualitative Examination of groundwater from Yap and some of its neighbouring islands*, p.5.



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***Criterion: There should be regular reporting of key agency performance of key elements to supply safe drinking water to the service areas.***

YSPSC reports annually on its mission to provide reliable water and electricity services adequate to meet the needs of the people of Yap at a minimum price available. The YSPSC 2010 annual report states that the water distribution system is in reasonably good shape. Water quality in the distribution system is monitored weekly at various locations throughout the system and monthly at all sampling points throughout the system. Water quality remains the same as of last year. Good water quality has been maintained throughout the year. The filtration and disinfection procedures followed by the operators have been effective in controlling these conditions at the water plant. Water quality parameters monitored are turbidity and chlorine levels. The system is on a quarterly flushing schedule or on an as needed basis.

Although water quality has been the same, complaints still exist, e.g., bad odor and/or discoloured tap water. Operators at the water plant normally increase the chlorine and alum dosage to maintain an acceptable level of residual in all parts of the system. The discoloured water complaints are distribution related (old filtration system, old lines and old valves in the ground).

## A GLOSSARY OF TERMS

These terms are useful to understanding the subject matter of this report. They have been adopted from documents produced by the World Health Organisation (WHO) and the Applied Geosciences and Technology Division of the Secretariat of the Pacific Community (SOPAC).

Bacteria	A group of organisms that are regarded as the simplest form of life. They reproduce by cellular division. Bacteria can reproduce quite rapidly if conditions are optimal. Some of the group are disease causing, e.g. Salmonella Typhi, a bacteria that causes Typhoid Fever.
Chlorine residual or free available chlorine	The amount of freely available chlorine still present in water at any time during reticulation.
Coli form bacteria	<b>Coli form bacteria</b> are a commonly used bacterial indicator of sanitary quality of food and treated water. Coli forms are abundant in the faeces of warm-blooded animals, but can also be found in the aquatic environment, in soil and on vegetation. Their presence is used to indicate possible re-contamination of treated water.
Contamination	The introduction of 'agents' that cause deterioration of drinking water, making the drinking water unsafe for human consumption.
Cryptosporidium	A group of water-borne protozoa that can cause gastro-intestinal illness with acute diarrhoea in humans. Characteristic of water contaminated with faecal waste.
Drinking Water Safety Plan	A Drinking Water Safety Plan is a holistic, systematic, and Integrated management approach used to identify and prioritize potential threats to water quality at each step in a specific system's water supply chain - from catchment to consumer - and implement best practices to mitigate those threats and ensure quality drinking water. It is a written document.
Drinking water supply	The provision of safe water intended for human consumption.
E.coli	The most commonly used bacterial indicator for faecal contamination. Presence would indicate possible presence of pathogens.



Filtration		A drinking water treatment process that removes suspended particles from water by passing the water through a sand bed, cartridge or membrane. Some forms of filtration can also remove colour, odour, taste and suspended organic material.
Flocculation		The drinking water treatment process of gathering together coagulated clumps of suspended material into floc.
Groundwater		Water contained beneath the land surface in zones of saturated soil, which can be extracted as a drinking water source.
Millennium Development Goals (MDGs)	Goals	MDGs are targets agreed by nations under a UN resolution. Goal 7, Target 7C aims to: 'halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.'
Monitoring		The process of inspection and sampling and analysing drinking water samples to verify consistent supply of safe drinking water. Monitoring is also used to demonstrate compliance with National Drinking Water Standards or other relevant legislation, where applicable. Can be operational monitoring which is done by the water provider or can be surveillance monitoring which is done by the regulator.
pH		Measure of the relative acidity or alkalinity of water.
Pathogen		An organism capable of causing disease in humans.
Safe water		Water that is free of any harmful substance (contaminants) including physical, chemical, biological and microbiological agents that may cause serious health effects.
Standard Operating Procedures (SOPs)		A set of clear, concise, step-by-step procedures, written in a simple language, describing how to perform a task. SOPs are developed to standardise procedures within a supply system to ensure all operators, technicians etc do the same task, the same way. This minimises the risk of operator error.
Surface water		Water found on the land surface usually as a result of run-off or precipitation. It can be running (rivers and streams), or quiescent (lakes, reservoirs and impoundments).
Turbidity		A measure of the suspended particles in water that causes the water to lose its clarity by scattering light.

Water quality	'Water quality' is used to describe the microbiological, physical and chemical properties of water that determine its fitness for a specific use. These properties are determined by substances which are either dissolved or suspended in water.
Water borne diseases	Infectious diseases transmitted through pathogens transported in drinking water.
Water supply system	A water supply system or water supply network is a system of engineered components which provide water supply to consumers.
Water treatment	An important component of a water supply system is water treatment. This must occur before the product reaches the consumer. Traditional surface water treatment plants generally consist of three steps: clarification, filtration and disinfection. Clarification refers to the separation of particles (dirt, organic matter, etc.) from the water stream. Filtration refers to the process to refine the water: sand, anthracite or activated carbon filters refine the water stream, removing smaller particulate matter. While other methods of disinfection exist, the preferred method is via chlorine addition. Chlorine effectively kills bacteria and most viruses and maintains a residual to protect the water supply through the supply network.
Water distribution	The method of distributing water to consumers is another important component of the water supply system. The product, delivered to the point of consumption, is called fresh water if it receives little or no treatment or drinking water if the treatment achieves the water quality standards required for human consumption. Once treated, chlorine is added to the water and it is distributed by the local supply network. Water is usually distributed by circular pipes typically constructed of plastic, ferrous, or concrete. However, other "pipe" shapes and material may be used, such as square or rectangular concrete boxes, arched brick pipe, or wood. Near the end point, the network of pipes through which the water is delivered is often referred to as the water mains.
Water system maintenance	Planned and systematic documentation of maintenance works is a key to a successful operation of a water utility.



**PERFORMANCE REPORT  
ACCESS TO SAFE DRINKING WATER IN YAP**

**MANAGEMENT RESPONSES**

None received