

IS THE RISK MANAGEMENT PLAN GOING TO WORK?

PILLARS FOR EFFECTIVE IMPLEMENTATION

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ABSTRACT

Poorly managed water supplies present a risk to the safety and aesthetic quality of drinking water. The greatest risk is from microbial contamination. In response to managing the risks and for protection of public health, having risk based management plans for drinking water quality is recognised as the most effective means in the Australian water industry, as well as globally. However, the desired benefits from developing a risk management plan will only be achieved if implementation is undertaken. The 'ACE' pillars (Adequate, Champion, Enabling environment) are the key foundations to enable effective implementation of the plan.

The plan should be adequate to manage risks, which can be ensured through considering the Australian Drinking Water Guidelines as a reference when preparing the plan and undertaking comprehensive periodic reviews and audits of the plan. There should be a champion who can coordinate the implementation of the various elements of the plan and provide motivation to ensure impetus is not lost. An enabling environment is required to support the champion implement the plan, including, for example, finances, resources and time. The 'ACE' pillars are needed for effective implementation, as without implementation the plan will not achieve the desired benefits.

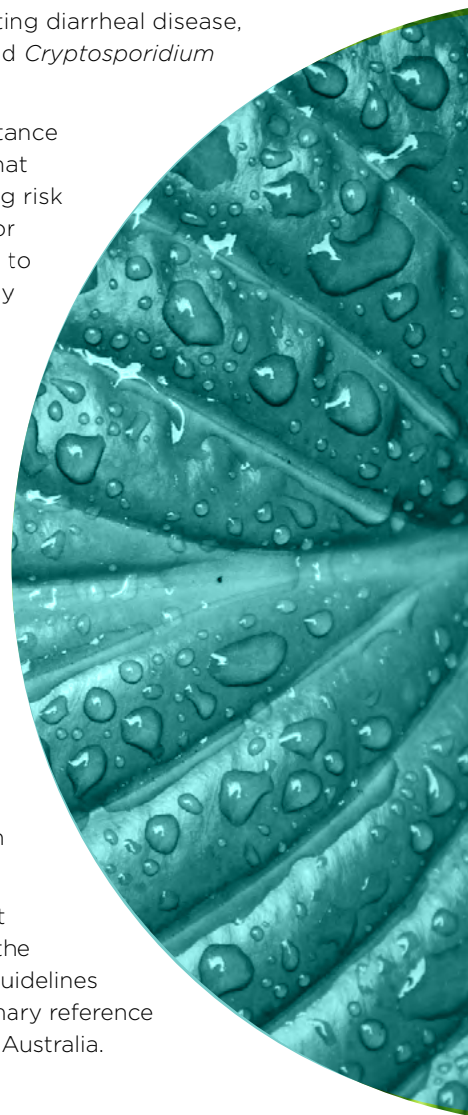
INTRODUCTION

The safety and aesthetic quality of drinking water is vital. The greatest risks to consumers of drinking water are pathogenic microorganisms (NHMRC, NRMCC, 2011). However, the aesthetic quality should also be acceptable as many customers equate aesthetics with the safety of drinking water. Some of the pathogens that are known to be transmitted through contaminated drinking water

lead to severe and at times life-threatening diseases. Examples include typhoid, cholera, infectious hepatitis and diseases caused by *Shigella spp.* and *E. coli O157*. Others are typically associated with less severe outcomes, such as self-limiting diarrheal disease, for example, noroviruses and *Cryptosporidium* (WHO, 2011).

There is widespread acceptance in Australia, and globally, that preparing and implementing risk based management plans or systems is an effective way to assure the consistent supply of safe quality drinking water, thereby protecting public health. Most water providers in Australia now have a drinking water quality management plan or system. The requirement to have a plan is generally supported through legislation, for example, the Water Supply (Safety and Reliability) Act 2008 in Queensland, the Public Health Act 2005 in New South Wales and the Safe Drinking Water Act 2003 in Victoria, to name a few.

The risk based management approach is well defined in the Australian Drinking Water Guidelines (ADWG), which are the primary reference on drinking water quality in Australia.



The ADWG are designed to provide an authoritative reference on what defines safe quality water, how it can be achieved and how it can be assured. Chapters two and three of the ADWG specifically detail the *Framework for Management of Drinking Water Quality* (Framework), which is the preventive risk management approach (NHMRC, NRMCC, 2011).

Although the ADWG are not mandatory standards, they provide a basis for determining the quality of water to be supplied to consumers in all parts of Australia, and are used by regulators to provide the acceptable reference for use to assure safe quality of drinking water. Globally, the risk based framework is supported and described in the World Health Organization's *Guidelines for Drinking Water Quality*, specifically in chapter four, referred to as Water Safety Plans, WSPs (WHO, 2011).

With the risk management plan in place, the obvious question which comes to mind: is it going to achieve the desired benefits or outcomes?

The desired benefits from implementing a risk management plan include:

- ▶ public health is protected by assuring safe drinking water for consumers
- ▶ water quality supplied to customers is of high aesthetic quality, including taste, odour and appearance
- ▶ holistic, integrated and preventive approach to management of drinking water quality is practiced
- ▶ stakeholders work in an integrated and collaborative manner for drinking water quality management
- ▶ compliance is improved
- ▶ customer confidence and satisfaction are improved, which can lead to reduction in relatively costly tap water alternatives such as bottled water and point of use treatment devices

A study undertaken by Gunnarsdottir et al (2012) in Iceland on the benefits of implementing WSPs provided systematic evidence of the positive impacts on drinking water quality and health. The data indicated that implementation of the plan resulted in substantial and measurable reductions in drinking water non-compliance, number of heterotrophic bacteria in water (both at the source and in the distribution system), and incidence of diarrhea in communities served by utilities implementing a risk management plan. The study shows that the key for the plan to result in benefits is effective implementation.

This paper discusses how to ensure effective implementation, which is the important piece of the puzzle between having a plan and achieving the desired outcomes or benefits.

'ACE' PILLARS NEEDED

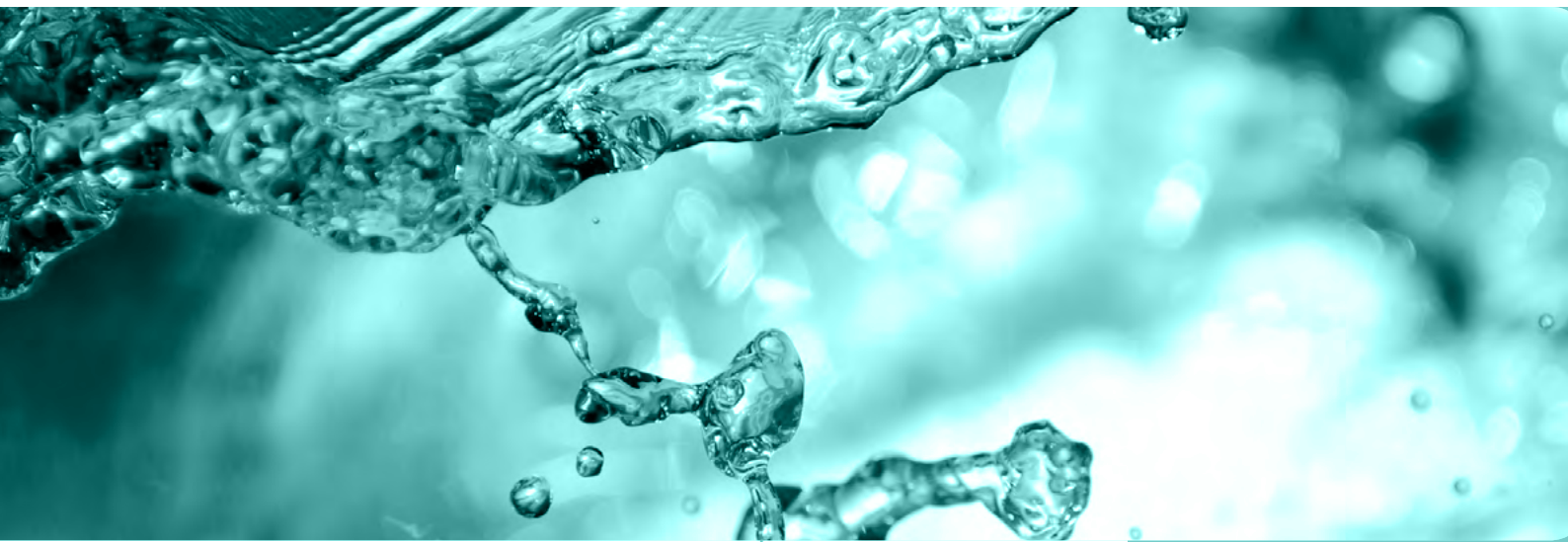
The following should be acknowledged (or are the hypotheses) for this paper.

- ▶ There is no benefit in implementing a plan that is not appropriate and relevant.
- ▶ There is no value in having a plan if it is not going to be implemented.
- ▶ There is not going to be any implementation if there is no enabling environment.

Considering the above reflective statements, this paper proposes the 'ACE' pillars, which are needed for effective implementation. The 'ACE' pillars are:

- ▶ **A**dequate plan or system
- ▶ **C**hampion to drive implementation
- ▶ **E**nabling environment

Note, the three pillars are interrelated or closely linked. Figure 1 shows the 'ACE' pillars in the overall context of the plan achieving desired benefits.



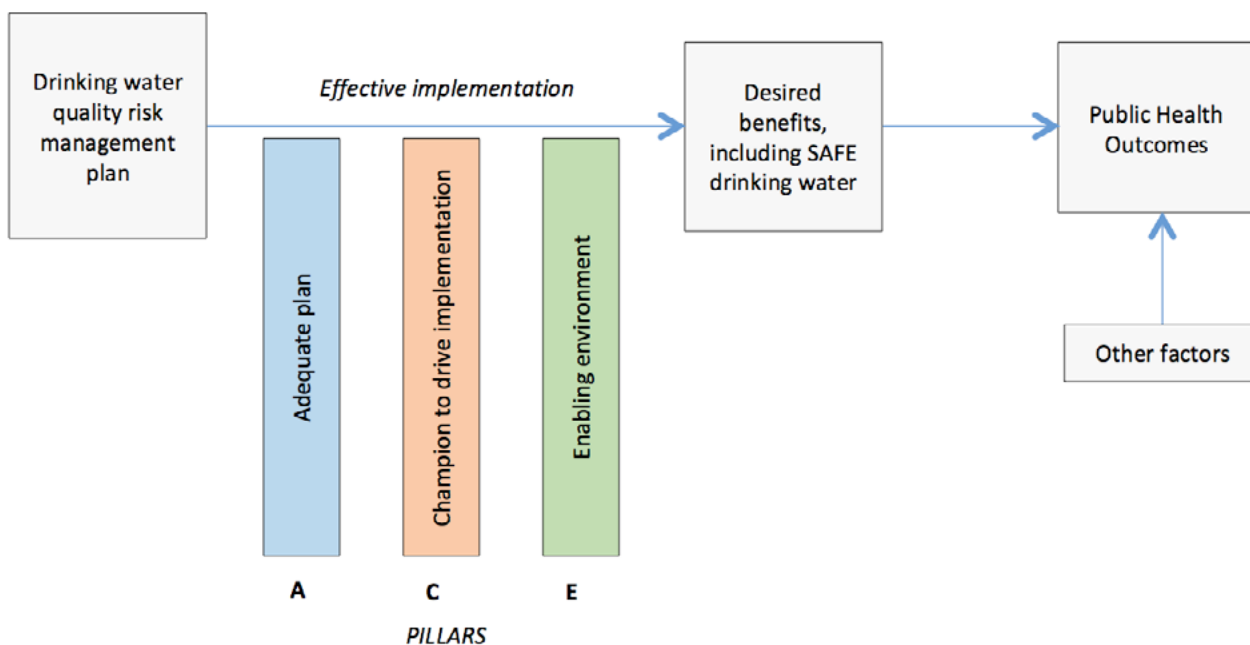


Figure 1: ‘ACE’ Pillars Needed for the Plan to Work

DISCUSSIONS

Adequate plan or system

“There is no benefit in implementing a plan that is not appropriate and relevant!”

GIGO (garbage in garbage out) describes what is referred to here very well, which is basically that the output is no better than the input. Hence, it should be ensured that the plan comprehensively and adequately covers the water supply system, from catchment to consumer.

Often the treatment component of the supply system is managed relatively well by drinking water suppliers. However, for effective risk management a multi-barrier approach and holistic assessment of risks is required, encompassing the important areas of catchment (or source) and distribution network.

The multi-barrier approach encourages effective controls to be put in place in the following four areas: source water protection; removing particles from the water; killing or inactivating pathogens; and preventing re-contamination of treated water (Mudaliar et al., no date).

There are a range of existing risk identification and management methodologies that could be used to

form the basis of the plan such as ADWG, Hazard Analysis Critical Control Point (HACCP), ISO 22000 or AS/NZS ISO 31000:2009. The management of drinking water quality from catchment to consumer poses several challenges that are unique to the water industry, which not all risk management approaches consider in whole. The Framework of the ADWG, however, incorporates the preventive risk management approach, including elements of HACCP, ISO 9001 and AS/NZS 4360:2004, but applies them in a drinking water supply context to support consistent and comprehensive implementation by suppliers (NHMRC, NRMCC, 2011).

Hence when developing the drinking water quality risk management plan, it will be beneficial to refer to the ADWG Framework as a model for best practice, along with the state/territory specific regulator developed guidelines, if any. The application of the ADWG Framework may vary between the states/territories, however, the emphasis on the preventive risk based management approach remains the core.

Using the ADWG as a guide when developing the plan will ensure that all important elements and components in relation to drinking water management are considered.

The Framework comprises 12 elements broken down into 32 components and 76 actions (Chapter 3 ADWG). Although listed as separate components, the 12 elements are interrelated and each supports the effectiveness of the others. To assure a safe and reliable drinking water supply, these elements need to be addressed together because most water quality problems are attributable to a combination of factors (NHMRC, NRMCC, 2011).

The plan is not a document that is completed once and then placed on a shelf. It should not be developed only for the sake of ticking a regulatory box. Implementation of the plan is ongoing and the plan should be regularly reviewed and audited to ensure it remains valid to achieve the desired benefits. The reviews and audits contribute to the continuous improvement of the management plan.

There are various triggers to initiate a review, for example, the outcome of an incident or near miss may require a process change. A simple check can be performed to find out the 'health' status of the plan, that is, whether it is still relevant and appropriate.

The aim of the 'health' check outlined in Table 1 is to get an indication of the need to undertake a detailed review. If the answer to any of the questions is 'yes', then the plan may need to be reviewed to ensure that it is still able to achieve the desired benefits. Note, this check does not comprehensively cover all elements but rather gives a quick bigger picture indication.

It does not preclude the need to undertake effective reviews at regular intervals or as triggered by other factors.

The audit of the plan can also ensure that it remains appropriate and relevant. Auditing can be defined as an independent and systematic check, in line with the audit scope, which generally can include: confirming plan completeness, adequate implementation and plan relevance (WHO and IWA, 2015). Providers should undertake periodic internal audits for maintaining a functional plan and for identifying areas for improvement (NHMRC, NRMCC, 2011).

External audits should also be facilitated by providers, and in some cases, is a regulatory requirement, for example, in Queensland, Victoria, South Australia and Tasmania, to name a few. Appointing auditors requires careful consideration. Not everyone with the appropriate experience and training will necessarily make a good auditor (WHO and IWA, 2015). Guidance can be sought from the relevant state/territory regulator on regulatory audit timeframes, audit scope and auditors to use. In some states the regulator maintains a register of approved auditors to be used, for example, in Tasmania and South Australia.

Champion to Drive Implementation

"There is no value in having a plan if it is not going to be implemented!"

This is often where implementation lags or fails. The plan is developed in some cases as a check box exercise for

regulatory compliance or as a best practice token. Once developed, it is back to business as usual, where management actions are reactive, responding only to incidents and events rather than following the plan's proactive approach.

The biggest difference between high performing teams and teams which fail are 1) how they are led and 2) whether their organisation provides them with the support they need (Coles K, 2013).

Table 1 Drinking Water Risk Management Plan - Quick Health Check

Question	Y/N
Any change to the service area?	
Changes to regulatory or formal requirements?	
Any change to the treatment processes?	
Any new hazard in the catchment area or raw water?	
Issues with drinking water quality performance or meeting water quality criteria?	
Any issue identified through customer complaints?	
Any concerns from the regulator?	
Risk register or risk assessment checked more than 24 months back?	
Issues with or changes to the incident management protocols?	
Plan was checked or reviewed more than 12 months back?	

The latter is discussed later under Enabling Environment. The former basically translates to the need of having a champion to ensure that the plan does not lose impetus. Often there is no person in the organisation who assumes or is given the role of a champion to drive implementation of the developed plan.

The definition of a champion is varied. For example, according to a publication by the Centers of Disease Control and Prevention, champions often help in initiating and organizing the WSP process and also motivate other partners to get or stay involved (CDC, no date).

Within the ACE pillars, a champion is someone who can coordinate the implementation of the various elements of the plan and ensure that things do not fall behind. While effective implementation of the plan requires everyone to play their role, the champion keeps an oversight, ensures things are undertaken as detailed in the plan and provides motivation for implementation.

Without continuing motivation, the plan can become an exercise in report writing that stops at the output phase when the initial document is finished, never achieving the plan's full potential for change (CDC, no date). Box 1 provides an example of the tasks of the champion.

Box 1: Champions Tasks

The champions tasks in relation to plan implementation could include, but is not limited to:

- ▶ leverage or maintain executive level support
- ▶ ensure processes and procedures detailed or referenced in the plan are followed
- ▶ promote preventive risk management philosophy and a culture of continuous improvement
- ▶ ensure plan is reviewed regularly and kept updated
- ▶ ensure water quality performance and customer satisfaction are reviewed
- ▶ support staff training, skills upgrade and professional development
- ▶ ensure improvement actions are implemented by action owners
- ▶ arrange for regular external audits
- ▶ ensure regulatory compliance is maintained e.g. annual report submission and incident reporting to regulator

In addition, the champion would act as the link between the operational team, senior management and the regulator. The champion hence needs to have a mix of technical and managerial skills, and an awareness of management systems.

The champion has the delicate job of negotiating the ongoing use and update of water quality management practices with the various stakeholders. For example, the finance team - to justify need for increase in operational budget; the operations group - who are very busy running the water treatment plant and do not want more paperwork associated with the plan such as critical limits and record keeping; the Chief Executive Officer/General Manager - who has been told to reduce the rate of increase in water/sewage rates for the customers; and the environmental team - who do not want chlorinated water flushed to the environment following new/repared mains or to minimise risks due to stagnant zones in the reticulation.

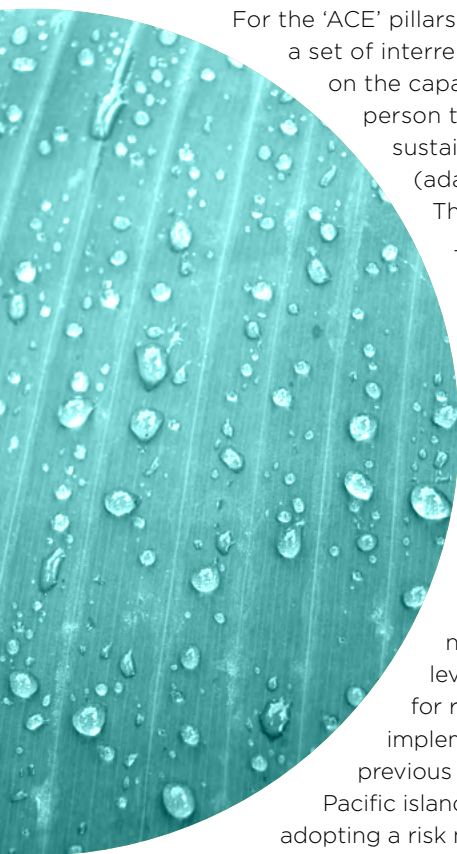
Often the tasks mentioned in Box 1 are managed by the Water (and Sewer) Manager or like mid-level Manager/ Officer. This in most cases is the ideal position and works well, enhanced by training on management systems. However, in some cases the tasks are perceived as going beyond the traditional role of a Water Manager.

There are various ways in which providers can overcome this, such as greater clarity in the role description (for new recruits), review existing position commensurate with champions tasks, or create a specific drinking water quality coordinators role. However, it should be noted that the champion should also have some personal attributes for this to be successful, the key one being interest in the adoption, implementation and success of the plan. That is why it is termed champion here, and not merely a manager or team leader.

Enabling Environment

“There is not going to be any implementation if there is no enabling environment!”

As mentioned earlier, success is dependent on whether an organisation provides the team with the support they need, in other words an enabling environment. The term “enabling environment” is used in different fields ranging from business, agriculture, education, and water supply, among others, and there is general agreement that an “enabling environment” needs to be present to bring about positive outcomes (Amjad et al., 2015).



For the 'ACE' pillars, an enabling environment is a set of interrelated conditions that impact on the capacity of an organisation or person to engage in processes in a sustained and effective manner (adapted by author from Thindwa J, 2001).

The discussion for this paper focuses on the enabling environment within an organisation, which is needed for effective implementation of the developed plan. However, before considering the enabling environment within an organisation, it should be noted that there is a need for a national or state level enabling environment for risk management plan implementation. From the author's previous experience in working with Pacific island developing countries, adopting a risk management plan such as

WSPs is slower and in cases dies off without continuous momentum (usually from external support and donor agencies). This is partially because WSPs are promoted as best practice and not legislated.

Baum (2016) found the same, that creating regulations requiring implementation of risk based plans promoted the adoption and implementation of the plan. To demonstrate compliance with regulation, water providers need to develop and have risk based plans, which is the first step. In Australia, the regulatory level enabling environment is present through state regulations (mentioned earlier under Introduction).

Coming back to the enabling environment within a drinking water providers organisation for plan implementation, these can include, for example, finances, resources, skilled staff, executive support and time. These can impact upon the ability of the 'champion' to coordinate implementation of the plan. For example, if it is required to test for turbidity (one of the identified actions in the plan) but there is no testing instrument (the budget to buy a turbidity meter is not being approved), then the testing cannot be undertaken. This may lead to lack of control relating to

process performance (e.g. filtration process), which in turn can lead to compromised water quality reaching consumers. Executive level support and approved budget are required to procure the testing meter - enabling environment.

It was found that water managers in the United States who lacked an adequate enabling environment did not widely implement and sustain the practice of WSPs (Baum R, 2016). While they realise the benefits of improving risk management, a perceived lack of time and resources posed barriers to implementation. These barriers all pointed towards a lacking enabling environment.

A number of building blocks that collectively may create a structural enabling environment for plan implementation include:

- ▶ organisational buy-in into the risk management philosophy, for example, approved and endorsed drinking water quality policy
- ▶ awareness raising programs for decision makers on benefits and requirements of plan implementation, which can assist get approval for required funds and resources (regulators should provide support with this, where possible)
- ▶ establishment of vital support structures to capacitate, train and aid operators
- ▶ strengthening of documentation and information management systems, for example, relevant procedures and software, including for example, telemetered online analysers to strengthen process control
- ▶ skilled and motivated staff to implement the risk management measures
- ▶ regulatory oversight to ensure the plan is relevant and implemented

CONCLUSION

Poorly managed water supplies present a risk to the safety and aesthetic quality of drinking water, for example, the potential for microbial contamination and outbreaks of infectious disease, such as acute diarrheal illness. In response to managing the risks and for protection of public health, the risk based framework for management of drinking water quality has been recognised as the most effective means.

However, the desired benefits from developing a risk based management plan will only be realised if implementation is undertaken. The 'ACE' pillars have been discussed in this paper as the key foundations to enable effective implementation in order for the plan to work.

The risk plan should be adequate to manage risks. This can be ensured through considering the ADWG as a reference when preparing the plan, undertaking comprehensive periodic reviews of the plan and internal/external audit of compliance with the plan. There should be a champion who can coordinate the implementation of the various elements of the plan and provides motivation for implementation. The champion will also act as the link between the operational team, senior management and the regulator.

An enabling environment is required to support the champion implement the plan, including, for example, finances, resources, skilled staff, executive support and time.

In a nutshell, the discussions conclude that for effective implementation there should be an adequate plan which the champion will coordinate implementation of through an enabling environment. Without effective implementation, supported through the 'ACE' pillars, the plan will not achieve the desired benefits.

THE AUTHOR



Tasleem Hasan, has 15 years of experience in drinking water quality management, including sanitation and hygiene. Over the past several years, he has been working with Australian drinking water providers identifying and discussing key water supply issues and challenges, and providing advice on potential improvements and regulatory compliance. Tasleem also has extensive working knowledge on risk management plan reviews and audits. Previously, Tasleem assisted many Pacific island developing countries on various WASH projects, including risk management plans, monitoring, demand management and IWRM.

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