

# **PACIFIC DRINKING WATER SAFETY PLANNING**

*A report on the lessons learned and action plan*

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## 1 Introduction

Access to safe drinking water is a basic need and is one of the most important contributors to public health. Morbidity and mortality from the consumption of unsafe drinking water and hygiene continues to impact communities in the Pacific. Efforts by Pacific Island countries to improve sanitation, hygiene and drinking water quality will need to quintuple if the Pacific's Millennium Development Goal targets are to be met. This was revealed in a recent report published jointly by WHO and SOPAC<sup>1</sup>.

A major recommendation in the report was:

*“Promote and support the inclusion of national drinking-water safety plans into the national development planning process for the Pacific Islands countries as a crucial measure to improve drinking-water quality generated by the existing and future islands water supply systems.”*

The Pacific Drinking Water Safety Planning Programme (DWSP Programme) was initiated in late 2005, taking the approach of planning the mitigation of water quality risks through water safety plans (WSP), and implementing improvement schedules. WSP is a World Health Organization (WHO) tool to systematically address drinking water quality risks from the water source through the water supply system to the consumer in their home. In the Pacific region, a WSP is referred to as a DWSP (Drinking Water Safety Plan).

### 1.1 Pacific Characteristics and Challenges

Various regional forums have identified the main challenges and constraints that hamper the ability of the countries of the Pacific region to provide effective sanitation and drinking-water services to urban and rural communities.

Pacific Island countries have uniquely fragile water resources due to their small size, lack of natural storage, competing land use, and vulnerability to natural hazards.

Drinking-water service providers face challenging constraints to sustaining drinking-water and wastewater provision due to the lack of both human and financial resource bases, which restrict the availability of experienced staff and investment and effectiveness of cost recovery.

Water governance is highly complex due to the specific socio-political and cultural structures relating to traditional community, tribal and inter-island practices, rights and interests. These are all interwoven with past colonial and 'modern' practices and instruments.

A holistic approach to natural resource management and provision of essential sanitation and drinking-water services is vital to preserve limited freshwater and to protect the environment and the health of the people.

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<sup>1</sup> WHO, 2008. Sanitation, hygiene and drinking water in the Pacific Island countries: Converting commitment into action.

## 1.2 Pacific Framework for Action on Drinking Water Quality and Health

The 2005 *Pacific Framework for Action on Drinking Water Quality and Health*<sup>2</sup> was developed to support the implementation of the water quality actions envisioned in the 2002 *Pacific Regional Action Plan on Sustainable Water Management*<sup>3</sup> (RAP).

One of the recommendations in the *Framework* specifically refers to WSPs:

*“The use of Water Safety Plans should be encouraged in the Region, and countries should be supported with manuals, guidelines and training on the use and implementation of this tool.”*

In response to the *Framework*, an integrated Pacific regional programme has been established including drinking-water safety planning, drinking-water quality monitoring, water demand management, rainwater harvesting, and integrated water resources management.

## 1.3 Pacific Drinking Water Safety Planning Programme

**The goal of a supply-specific DWSP and a national DWSP Programme is to provide the confidence of consistently safe drinking-water.**

The Pacific DWSP Programme commenced in late 2005, supported with AusAID funding. The programme has been implemented by SOPAC and WHO, and supported by New Zealand Ministry of Health (NZMoH) that provides ‘in-kind’ technical expertise, training materials and resources.

Preparation and implementation of supply-specific DWSPs are at the heart of the Pacific DWSP Programme, for both urban and rural drinking-water supplies. A DWSP is a comprehensive risk assessment and management tool that encompasses all aspects of the drinking-water supply from catchment to consumers.

The tool asks three questions:

- What could happen to cause the water to become unsafe to drink, and how significant are these events;
- How does the water-supplier know whether these events are being managed well or actually happening; and
- What is the water supplier going to do to prevent the event happening or manage the consequences of the event if it should happen?

The key objectives of a DWSP are to:

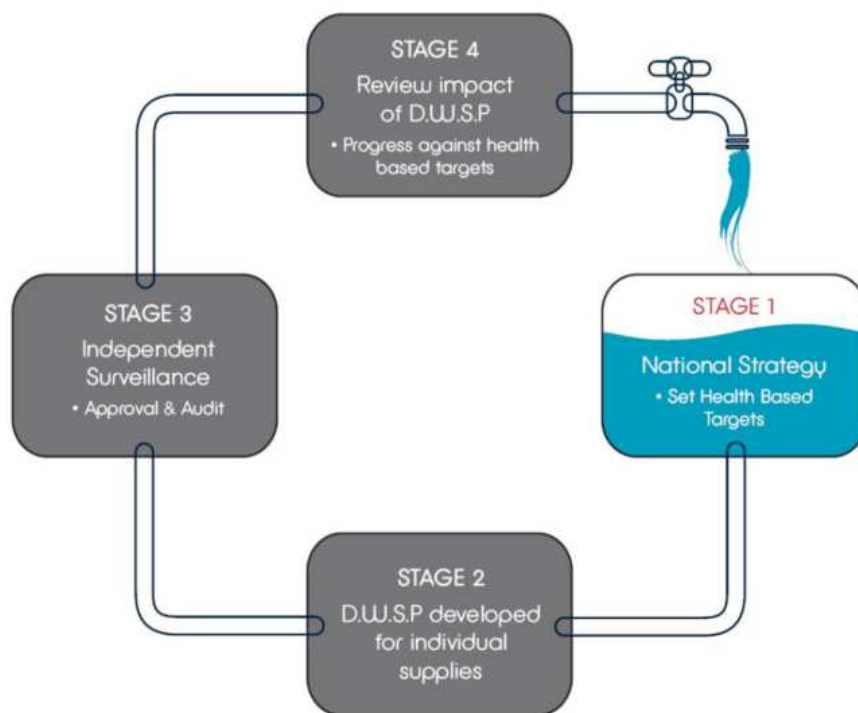
- Prevent the contamination of source waters;
- Treat water to reduce or remove contaminants; and
- Prevent re-contamination during storage, distribution and handling of treated water.

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<sup>2</sup> WHO, July 2005. *Pacific Framework for Action on Drinking Water Quality and Health*. Finalised at WHO Regional Workshop on Drinking Water Standards and Monitoring in Pacific Island Countries held at Fiji, February 2005.

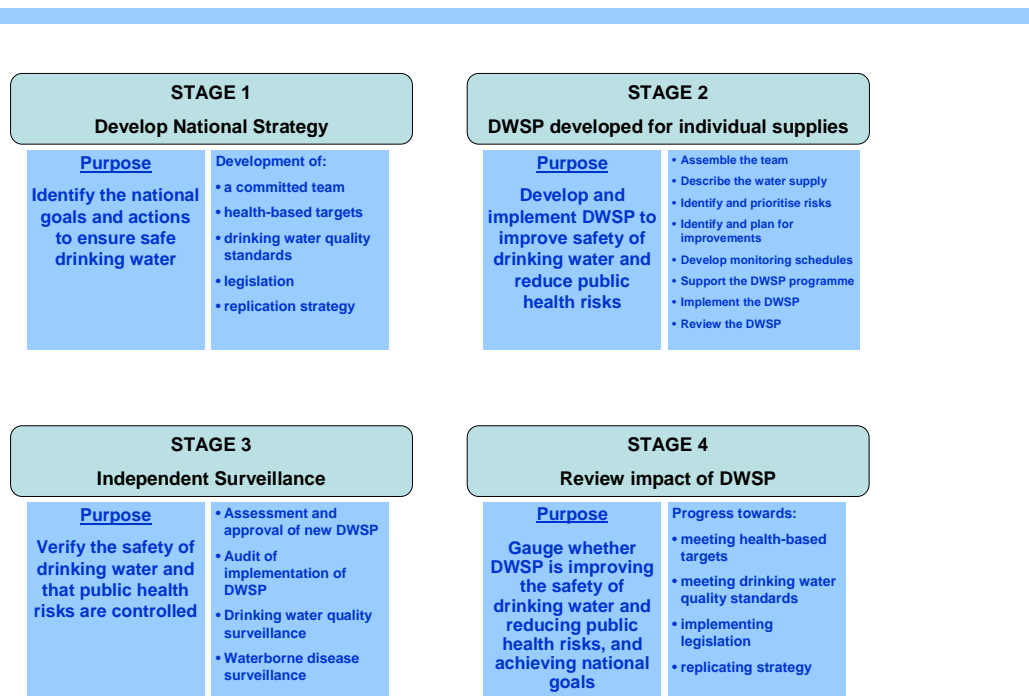
<sup>3</sup> ADB and SOPAC, 2002. *Pacific Regional Action Plan on Sustainable Water Management*. Endorsed at the Regional Consultation Meeting in Sigatoka, Fiji, July/August 2002.

The development of a DWSP for an individual drinking-water supply is only one component of a wider drinking-water safety planning process. In order to achieve sustainability, supporting processes – generally co-ordinated at a national level – should be put in place. Figure 1 summarises the DWSP Programme process, and Figure 2 provides a summary of the purposes and tasks associated with each stage.



**Figure 1: Stages in the Drinking Water Safety Planning Process<sup>4</sup>**

<sup>4</sup> Taken from WHO/SOPAC Joint Contribution Report 193, 2008. Drinking Water Safety Planning: A practical guide for Pacific Island Countries.

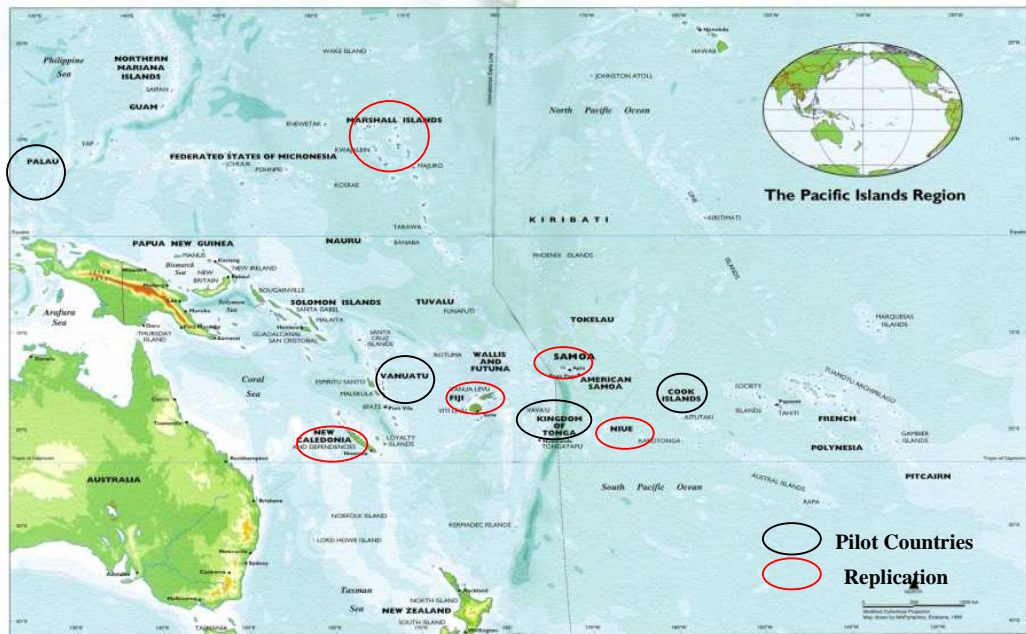


**Figure 2: Purposes and Tasks of Drinking Water Safety Planning Process Stages**

### 1.3.1 Pacific Drinking Water Safety Planning Programme Progress

The first phase of the programme was completed in 2008 having established national and local level DWSP activities in four pilot countries in the Pacific (Tonga, Cook Islands, Vanuatu and Palau). **Phase 1** produced several outputs including DWSPs drafted for all pilot countries, the 'Pacific Drinking Water Safety Planning Guide' and a 'Toolkit' for community-based water quality monitoring including sanitary surveys and simple presence/absence water tests for bacteria.

**Phase 2** began in 2008 and focussed on implementation of the prepared DWSPs by pilot countries while also supporting replication countries to develop DWSP (Samoa, Niue, Fiji, Marshall Islands and Solomon Islands). Figure 3 shows the spread of adoption of DWSP Programmes throughout the Pacific Region.



**Figure 3: Spread of Adoption of DWSP Programmes throughout the Pacific Region**

Figure 4 provides a snapshot of the progress in DWSP Programmes for all countries involved in the Pacific DWSP Programme. Two of the four pilot countries are at the stages of implementing improvement schedules and have completed the development of monitoring programmes, and two of the four replication countries have also completed improvement schedules.

Drinking Water Safety Planning	Countries													
	CI	FSM	FJ	KI	RMI	NR	NI	PA	PNG	SA	SI	TO	TV	VA
DWSP team in-country	P		R		R		R	P		R		P		P
Water supply system description	P		R		R		R	P		R		P		P
Hazard identification and prioritization.	P		R		R		R	P		R		P		P
Improvement schedule	P		R		R		R	P		R		P		P
Monitoring schedule	P		R		R		R	P		R		P		P
Process optimization	P		R		R		R	P		R		P		P
Using the DWSP	P		R		R		R	P		R		P		P
DWSP review	P		R		R		R	P		R		P		P

KEY: ■ Not existing    ■ Completed    ■ Underway or ongoing    P - Pilot country  
R - Replication country

**Figure 4: Overview of Progress in the Pacific Drinking Water Safety Planning Programme**

#### 1.4 This Report

The programme partners SOPAC, WHO and NZMoH met in October 2008 and February 2009 in Suva and agreed that a Pacific 'lessons learned' workshop should be organised by mid-2009 on water safety planning to allow both pilot and replication countries to share their experiences and their respective outcomes from urban and rural trials. The workshop would also provide a forum to gauge the interest of 'new' countries to adopt the DWSP risk management framework.

The lessons-learned workshop was linked to the Pacific Water and Wastes Association (PWWA) 2009 Water Conference in Tonga, as representatives from the water utilities, allied members and other individuals from the Pacific water sector would already be assembled. An expert in water quality risk assessment and risk management, also familiar with countries of the Pacific and the Pacific DWSP Programme, was engaged to provide support to the workshop.

This report provides a summary of the workshop programme and proceedings, with a specific focus on capturing the benefits of adopting a national DWSP Programme and the lessons learned to date, from the perspectives of those countries that have been part of the regional programme (pilot or replication country).

## **2 Benefits and Lessons Learned**

The workshop was structured to provide a mix of listening to presentations from country representatives who have adopted a national DWSP Programme, and small group discussions about the practical aspects of DWSP, benefits and lessons learned.

A summary of the benefits and lessons learned, inferred [by the authors] from the country representative's presentations, is given in section 2.1. Section 2.2 provides a summary of the small group discussions on the benefits and lessons learned overall and about each of the stages of a DWSP programme. Section 2.3 presents the output of small group discussions on a number of the DWSP supporting programmes.

### **2.1 Country Representative's Presentations**

- A National Water Strategy provides the link between a national DWSP programme and other water initiatives that can contribute to the provision of safe drinking-water (eg. IWRM, disaster risk reduction, water demand management).
- Source water quality is becoming more of a concern as people move closer to the source. Assuring safe drinking-water through a DWSP is founded on preventing contamination of source water.
- It takes time to see the progress from initiating a national DWSP Programme. The Pacific experience seems to be about two years from the time of introduction of the concept to having an improvement schedule.
- There can be difficulties in prioritising. Many things need improving.
- Cost recovery for operations and maintenance is an issue. Awareness and education programmes can go some way to addressing this issue.
- Cost recovery for capital improvements is beyond the internal capability of most countries. Documented improvement schedules, having gone through the DWSP process, provide a sound basis for project/funding proposals.
- Constructive consultation with, and involvement of communities are important factors to making progress. Involving NGOs on the steering committee helps connect with the needs of community schemes.
- Stakeholder collaboration is worthwhile, but can also be a challenge. A national steering committee helps to bring agencies together. There needs to be a DWSP champion to lead the process and a commitment from the stakeholders to achieve a common goal.
- Government endorsement of a DWSP seems important, ensuring that the DWSP and the national DWSP Programme align with other national development plans and government financial support.
- Inclusion of operational staff (utility- and community-based) in DWSP training and development of DWSPs is important for buy-in to the concept.
- Capacity building, for both utility staff and community-based drinking-water supplies, is important for a sustainable national DWSP Programme.
- Legislation, policies and water quality standards can support the implementation of a national DWSP Programme.
- Lessons learned from Asian experiences: water suppliers and associations can be effective partners in DWSP programmes; health and environment authorities and water suppliers need to collaborate to fulfil the expectations of DWSP programmes; assessment of benefits of DWSP programmes have

been largely qualitative; some countries are moving towards regulation while lacking capacity to review/approve DWSPs; need to strengthen regulators' own capacities in monitoring, audit and certification programmes; and consider a period of voluntary compliance with regulations.

## **2.2 Discussion of Benefits and Lessons Learned**

The workshop participants divided into four groups for a structured discussion about the benefits and lessons learned of adopting a DWSP Programme.

Five prompt questions were provided to encourage the discussion to consider all four stages in a DWSP Programme (see Figure 1 and Figure 2).

- What does each stage mean from a practical point of view?
- Who needs to be involved in each stage?
- What resources/support is needed in each stage?
- What advice could you give a newcomer to DWSP about each stage?
- What questions does a newcomer to DWSP have about each stage?

At the end of the discussions the groups were asked to report back on:

1. What are the benefits of Drinking Water Safety Planning, so far?
2. What are the lessons learned about Drinking Water Safety Planning, so far?

## Overall

Benefits	Lessons Learned
<ul style="list-style-type: none"><li>• Puts needs of community/people into perspective, with focus on health.<ul style="list-style-type: none"><li>○ Provide safe drinking water.</li><li>○ Improve water quality.</li><li>○ Reduce public health risks.</li></ul></li><li>• Promotes collaboration between different government agencies and stakeholders (not previously part of water).<ul style="list-style-type: none"><li>○ All agencies coming together to achieve the same goal.</li><li>○ All agencies receive updated information.</li></ul></li><li>• Process has helped set political commitment.</li><li>• DWSPs are resulting in:<ul style="list-style-type: none"><li>○ Water systems being operated in better ways;</li><li>○ Critical points identified;</li><li>○ Prioritised and justified investments in water supply improvements.</li></ul></li><li>• Providing the opportunity for training and capacity building.</li></ul>	<ul style="list-style-type: none"><li>• Bringing in technical expertise has worked well.</li><li>• Have not yet decided whether the technical expertise has resulted in capacity building in-country.</li><li>• Need a documented plan for the external expert to have a local understudy when they stay, and to stay for enough time to build capacity.</li><li>• Need all stakeholders to have one vision.</li><li>• Need coordination of policy and legislation development.</li><li>• Often the community does not accept the DWSP, unless they can see the benefit to them.</li></ul>

## Stage 1: Develop National Strategy

Benefits	Lessons Learned
<ul style="list-style-type: none"><li>• Close collaboration between stakeholders.</li><li>• Sharing knowledge and information throughout various stages.</li><li>• High level approval/endorsement.</li><li>• Involvement from the beginning raises awareness at the same time.</li></ul>	<ul style="list-style-type: none"><li>• Need a committed team of champions working on the same goal.</li><li>• Initial stages difficult to motivate stakeholders.</li><li>• Consultation from bottom up through stakeholders.</li><li>• Increased collaboration, avoids creating duplication – advisory committee, donors, NGOs, selected communities.</li><li>• Need income/resources for investment and operations &amp; maintenance of a safe water supply system – users must pay.</li><li>• National strategy needs to be comprehensive and simple so people know their roles.</li></ul>

Communications strategy is critical.

## Stage 2: DWSP developed for individual supplies

Benefits	Lessons Learned
<ul style="list-style-type: none"><li>• Risks/hazards identified, knowledge of risks, knowing the problems.</li><li>• Know the status of the system.</li><li>• Know the corrective measures to take.</li><li>• Proactive - monitoring schedules allow staff to be proactive in monitoring water quality before any problems, reduce public health risks.</li><li>• Possible to reduce the monitoring, reduce the cost.</li><li>• Building capacity.</li><li>• Strengthening collaboration amongst agencies.</li></ul>	<ul style="list-style-type: none"><li>• Need for constant communication and clear understanding.</li><li>• Need to develop institutions to work with the community, especially for locally-run systems.</li><li>• Awareness/education on water quality links to health needs to be given more emphasis.</li><li>• Process of protecting water needs to cover all stages from the source right through the distribution.</li><li>• You see the results (lessons learned) after a long time.</li><li>• A DWSP is a living document, something that needs to be reviewed, revised etc.</li><li>• Can use simple water quality test for rural communities.</li></ul>

## Stage 3: Independent surveillance

Benefits	Lessons Learned
<ul style="list-style-type: none"><li>• Surveillance becomes and integral operational need for the water safety plan.</li><li>• Reduced health hazards.</li><li>• More buy-in from donors.</li><li>• More attendance at school and work, and visitors.</li><li>• Healthier communities.</li><li>• Build trust and confidence in water utility.</li></ul>	<ul style="list-style-type: none"><li>• Challenge – preparer of the DWSP should not audit their own DWSP. Maybe an independent or separate regulatory/auditing entity.</li><li>• Water quality monitoring, needs a process of data analysis to help identify actual causes of contamination.</li><li>• H<sub>2</sub>S test is effective in motivating people to take action on their water systems.</li><li>• DWSPs need to be constantly reviewed and updated to reflect changing circumstances.</li><li>• Use comparisons, controlled vs. uncontrolled, or water quality vs. health data. Can compare health status of communities with and without a DWSP.</li><li>• Possible to reduce the monitoring, reduce the cost.</li><li>• Needs funds for surveillance and</li></ul>

**Stage 4: Review impact of DWSP**

<b>Benefits</b>	<b>Lessons Learned</b>
<ul style="list-style-type: none"> <li>• Health benefits for the population.</li> <li>• Water use efficiency plan.</li> <li>• Continuous data collection.</li> <li>• Improved compliance enforcement.</li> </ul>	<ul style="list-style-type: none"> <li>• Challenge – collection, recording, analysis of data to generate indicators.</li> <li>• Timing of review important. Process needs to recognise the level of development in community systems.</li> <li>• Periodic inspection can be replicated.</li> <li>• Move away from fines to incentives.</li> <li>• Different countries have different levels of enforcement and legislation.</li> </ul>

**2.3 Discussion of Supporting Activities**

As has been noted in section 1.3, the goal of a national DWSP Programme is to provide the confidence of consistently safe drinking-water, and a supply-specific DWSP is one component of this. This section discusses some of the activities that support the development and implementation of a DWSP at the level of a national DWSP Programme. Section 2.3.1 focuses on setting the target measure of safe drinking-water (water quality), while section 2.3.2 discusses how to demonstrate the target measure is being met. Section 2.3.3 looks at what is needed to support replication of a DWSP Programme throughout a country, and section 2.3.4 follows this up with a discussion of how to determine the success of a national programme. Finally, sections 2.3.5 and 2.3.6 discuss the links between DWSP and two important overlapping programmes - integrated water resources management (IWRM) and water demand management.

**2.3.1 Setting health-based water quality (& disease) targets.**

*Q1. How practical is it to have a common health-based water quality target (ie. standard or guideline) throughout the Pacific region?*

- Yes, for microbiological factors. Set minimum standards for the region.
- No for physical/chemical factors. Not every supply has the same chemical issues.
- It is OK to have a national standard, ie. do not have to adopt WHO guidelines. Example given of the Samoa National Drinking Water Standards 2008.

*Q2. If you have Standards, how do you enforce them?*

- Why have a standard? To measure performance of water utilities.
- Using a DWSP, community or water utility commit, health requirements.
- Publication of non-compliance.
- Frequency of testing.

- Regulations.

### **2.3.2 Role of Water Quality Monitoring and compliance**

*Q1. For what purposes is water quality monitoring carried out?*

- To assess efficiency of the treatment processes overall.
- To save public health.
- Monitoring improvements of the system.
- To give confidence to utilities and consumers.
- Analyse where problems are.
- Use tool for education and community awareness.

*Q2. For each of these purposes, what is an adequate level of monitoring and for what parameters?*

- For i. - full chemical and microbiological analyses monthly.
- For ii. - residual chlorine.
- For iii. - should have a database and look for trends.
- For iv. - utilities do own testing and an independent regulator.
- For v. - at different stages/processes of treatment.
- For vi. - H<sub>2</sub>S test.

### **2.3.3 Developing national strategies for Drinking Water Safety Planning roll-out**

*Q1. What support would be needed for all communities to have a DWSP and be part of a national Drinking Water Safety Planning programme?*

*Q2. How reasonable/likely is this?*

- No group discussion.

### **2.3.4 Evaluating drinking-water safety planning through monitoring & evaluation framework, in-country and regional programmes.**

*Q1. What does a successful/unsuccessful drinking-water safety planning programme look like?*

Based on the following principles, must have:

- Indicators, targets and objectives.
- A timeframe.
- An indication of responsible parties.
- A review mechanism.
- A methodology for each indicator.
- Adequate funding/resources (human & finance).
- A validation mechanism.
- DWSP is continued and sustainable.

*Q2. How can success be measured?*

Related to targets and objectives:

- Collection of data for performance indicators.
- Using independent review.
- Use focus groups and community consultation.
- Compliance with standards.
- Using appropriate methodology, eg. benchmarking.
- Quality assurance.
- Customer satisfaction survey, eg. no complaints.

### **2.3.5 IWRM and Drinking Water Safety Planning**

*Q1. In what ways are IWRM and Drinking Water Safety Planning linked?*

*Q2. What needs to happen to make the link strong?*

- No group discussion.

### **2.3.6 Demand management and Drinking Water Safety Planning**

*Q1. In what ways are demand management and Drinking Water Safety Planning linked?*

- Consumers want water, as much as they can get.
- Suppliers have to effectively manage the resource available within a safety framework.
- Interrupted supplies, eg. reducing operation hours or pressure in the system reduces amount supplied which will reduce operating costs (eg. treatment costs), but can affect quality of water through leaks/ingress and backflow.

*Q2. What needs to happen to make the link strong?*

- Improve operations and management.
- Charges and tariffs, or government set aside money for maintenance.
- If we do not charge, we will not be able to provide sustainable supply.
- Once charge in place, demand for water will decrease to the amount required.

### 3 Action Plan

*The problem is high burden of water borne disease.*

*The vision is to eliminate the burden of water borne disease.*

*The way forward is to develop and implement National Drinking Water Safety Planning Programmes.*

*The outcome is safe drinking water for all.*

The lessons learned and actions are structured under the four stages of drinking water safety planning. Nine high-level lessons learned have been taken from the country representative's presentations (section 2.1) and corresponding Actions are derived from the discussion of benefits and lessons learned (section 2.2). These actions are descriptions of what needs to be done to achieve the high-level lessons learned, acknowledging that not all actions will be required by all countries. The next level of detail, the how to take forward the actions, is usually best decided at the country level, although some actions may be suited to a regional intervention.

<b>Stage 1 Develop National Strategy</b>	
<b>Purpose</b> Identify the national goals and actions to ensure safe drinking water	<i>Development of:</i> <ul style="list-style-type: none"> <li>• A committed team</li> <li>• Health-based targets</li> <li>• Drinking water quality standards               <ul style="list-style-type: none"> <li>• Legislation</li> </ul> </li> <li>• Replication strategy</li> </ul>
<b>Lesson 1:</b> Drinking water safety planning needs champions and committed stakeholders with a common goal.	Action 1.1: Form a national steering committee to bring agencies together.
<b>Lesson 2:</b> Stakeholder collaboration is beneficial but conflict of interests regarding the end goal must be identified and managed.	Action 2.1: Involve all stakeholders from the beginning to raise their awareness at the same time and motivate them to participate.
	Action 2.2: Establish clear roles for stakeholders in the national drinking water safety planning programme strategy, and a communications strategy between stakeholders.
<b>Lesson 3:</b> Drinking water safety planning should be integral with other in-country water initiatives.	Action 3.1: Develop a national water strategy to provide the link between the national drinking water safety planning programme and other water initiatives.
	Action 3.2: Seek government endorsement of the national drinking water safety planning programme, and individual supply DWSPs to ensure these align with national development plans

	and government financial support.
<b>Lesson 4:</b> Legislation, policies and water quality standards can support the implementation of a national drinking water safety planning programme.	Action 4.1: Ensure the development of drinking water legislation and policy is coordinated with development of overlapping legislation and policy, eg. resource management.

<b>Stage 2</b> <b>Drinking Water Safety Plan Developed for Individual Supplies</b>	
<b>Purpose</b> Develop and implement DWSP to improve safety of drinking water and reduce public health risks.	<ul style="list-style-type: none"> <li>• <i>Assemble the team</i></li> <li>• <i>Describe the water supply</i></li> <li>• <i>Identify and prioritise risks</i></li> <li>• <i>Identify and plan for improvements</i></li> <li>• <i>Develop monitoring schedules</i></li> <li>• <i>Support the DWSP programme</i></li> <li>• <i>Implement the DWSP</i></li> <li>• <i>Review the DWSP</i></li> </ul>
<b>Lesson 5:</b> Water resource protection is vital in the Pacific.	Action 5.1:
<b>Lesson 6:</b> Water users should pay for safe drinking water.	Action 6.1: Develop and implement awareness and education programmes on the link between water, sanitation and health, and the cost of providing safe drinking water.
<b>Lesson 7:</b> All operation staff and all involved in the supply of safe drinking water should understand and be committed to drinking water safety planning.	Action 7.1: Promote the use of simple water quality tests for rural communities, eg. H2S test for bacteria. This can be effective in motivating people to take action.
<b>Lesson 8:</b> Recognise that a realistic timeframe is necessary for capacity building and training.	Action 8.1: Use external technical expertise, but plan for how capability will be developed in-country.
<b>Lesson 9:</b> A DWSP is a living document; something that needs to be reviewed and revised regularly.	Action 9.1: Review water quality monitoring data on a regular basis to identify causes of contamination.

<b>Stage 3</b> <b>Independent Surveillance</b>	
<b>Purpose</b> Verify the safety of drinking water and that public health risks are controlled.	<ul style="list-style-type: none"> <li>• <i>Assessment and approval of new DWSPs</i></li> <li>• <i>Audit of implementation of DWSP</i></li> <li>• <i>Drinking water quality surveillance</i></li> <li>• <i>Waterborne disease surveillance</i></li> </ul>
<b>Lesson 10:</b> An agency independent of the water supplier should audit a DWSP.	Action 10.1: Allow a period of voluntary compliance with regulatory requirements to have an approved DWSP.
	Action 10.2: Build in-country capacity to approve and audit DWSPs.
	Action 10.3: Ensure a budget is set for

	approval/audit functions and for gathering of surveillance data.
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<b>Stage 4</b> <b>Review Impact of Drinking Water Safety Planning Programme</b>	
<b>Purpose</b> Gauge whether DWSP is improving the safety of drinking water and reducing public health risks, and achieving national goals.	<i>Progress towards:</i> <ul style="list-style-type: none"> <li>• <i>Meeting health-based targets</i></li> <li>• <i>Meeting drinking water quality standards</i></li> <li>• <i>Implementing legislation</i></li> <li>• <i>Replicating strategy</i></li> </ul>
<b>Lesson 11:</b> Improving water supply takes time and money.	Action 11.1: Move away from fines for non-compliance to incentives for progress towards compliance.
<b>Lesson 12:</b> Better mechanisms are needed to support community and rural water supplies.	Action 12.1: Involve NGOs on the national steering committee to connect with the needs of community schemes.
	Action 12.2: Develop and implement awareness and education programmes on the link between water, sanitation and health, and other benefits to the community of providing safe drinking water.
<b>Lesson 13:</b> Comparisons of drinking water quality data and health data for communities with and without a DWSP may demonstrate the benefits of a DWSP.	Action 13.1: Establish a mechanism, at the level of the national steering committee, for gathering, storing and sharing data sets (eg. water quality, disease) between agencies.
	Action 13.2: Review water quality monitoring data together with health data on a regular basis, and look for relationships.
	Action 13.2: Generate a set of indicators of progress towards national drinking water quality and health goals.

## Appendix 1: Workshop Programme



**SOPAC**



### Pacific Drinking Water Safety Planning Lessons Learned Workshop

3 August 2009, Vava'u, Tonga

#### PROGRAMME

Session	Times	Details
<b>Opening</b>	8.30 – 9.00am	<b>Opening and Welcome</b> Brief from <i>Mr Saimone Helu</i> , CEO Tonga Water Board (TWB) Prayer, Introductions, Appointment of Officers, Housekeeping Chair <i>Latu Kupa</i>
<b>Session 1</b>	9.00 -9.30am	<b>Background</b> Workshop Purpose and structure: <i>Jan Gregor</i> Pacific Drinking Water Safety Planning Programme Overview and Status – <i>Kamal Khatri, Alan Freshwater</i>
<b>Session 2</b>	9.30 – 10.30am (20 minutes each including Q&A)	<b>Sharing experiences 1:</b> Facilitator: <i>Dave Neru</i> <ul style="list-style-type: none"> <li>Developing Drinking Water Safety Planning in urban and rural settings: <b>Vanuatu</b></li> <li>Improvement schedule costing and benefits: <b>Niue</b></li> <li>Implementing improvements schedules: <b>Tonga</b></li> </ul>
<b>Morning tea 10.30 – 10.45am</b>		
<b>Session 3</b>	10:45 – 11:15am	<b>1st Interactive lessons learned session:</b> Facilitators: <i>Jan Gregor/Alan Freshwater</i>  A quick refresher of the Pacific Drinking-water Safety Planning Cycle.  Task: <ul style="list-style-type: none"> <li>Think about your experiences in drinking-water safety planning, and</li> <li>Write a caption for as many of the photos as possible in the time allowed.</li> <li>Assign each photo to one of the four stages of drinking-water safety planning.</li> </ul>

<b>Session 4</b>	11:15 – 12:00pm (20 minutes each including Q&A)	<p><b>Sharing experiences 2:</b> Facilitator: <i>Kamal Khatri</i></p> <ul style="list-style-type: none"> <li>• Role of Drinking Water Safety Planning steering committee and high-level buy-in: <b>Palau</b></li> <li>• Capacity building in Drinking Water Safety Planning: <b>Samoa</b></li> </ul>
<b>LUNCH 12.00 – 1.00pm</b>		
<b>Session 5</b>	1:00 – 2:00pm (15 minutes each including Q&A)	<p><b>Sharing experiences 3:</b> Facilitator: <i>Alan Freshwater</i></p> <ul style="list-style-type: none"> <li>• Replication of urban Drinking Water Safety Planning development within <b>Fiji</b></li> <li>• Public/Consumer awareness and education on Drinking Water Safety Planning: <b>Cook Islands</b></li> <li>• Use of simple water quality monitoring tests like H2S for rural/outer island communities: <b>Marshall Islands</b></li> <li>• Global and Asian Experiences on Water Safety Planning – <b>Terrance Thompson (WPRO, WHO)</b></li> </ul>
<b>Session 6</b>	2.00 –3.45pm	<p><b>2<sup>nd</sup> Interactive lessons learned session:</b> Facilitator: <i>Jan Gregor</i></p> <p>Group discussions, covering the steps in Drinking Water Safety Planning.</p> <p><u>Reporting back on group discussions:</u></p> <ol style="list-style-type: none"> <li>1. What are the benefits of Drinking Water Safety Planning, so far?</li> <li>2. What re the lessons learned about Drinking Water Safety Planning, so far?</li> </ol> <p><i>Prompt questions to help answer questions 1 &amp; 2.</i></p> <ul style="list-style-type: none"> <li>• <i>What does each stage mean from a practical point of view?</i></li> <li>• <i>Who needs to be involved in each stage?</i></li> <li>• <i>What resources/support is needed in each stage?</i></li> <li>• <i>What advice could you give a newcomer to DWSP about each stage?</i></li> <li>• <i>What questions does a newcomer to DWSP have about each stage?</i></li> </ul>

<b>Session 7</b>	3.45 – 4.45pm	<p><b>Discussion session:</b> Facilitator: <i>Jan Gregor</i>  <b>Supporting programmes</b></p> <p>Group discussions, covering the following supporting programme topics:</p> <ul style="list-style-type: none"> <li>• Setting health-based water quality (&amp; disease) targets</li> <li>• Developing national strategies for Drinking Water Safety Planning roll-out</li> <li>• Evaluating Drinking Water Safety Planning using a monitoring &amp; evaluation framework</li> <li>• Role of Water Quality Monitoring and compliance</li> <li>• Demand management and Drinking Water Safety Planning</li> <li>• IWRM and Drinking Water Safety Planning</li> </ul> <p><u>Reporting back on group discussions</u></p>
<b>Session 8</b>	4.45 – 5.00pm	Workshop wrap up: <i>Steve Iddings</i> and <i>Marc Overmars</i>
<b>Closing</b>		Chair: <i>Latu Kupa</i>

## Appendix 2: Participants List

	<b>Name</b>	<b>Job Title</b>	<b>Organization</b>	<b>Country</b>
1	Otheniel Tangianau	Acting Director of Works	Ministry of Infrastructure & Planning	Cook Islands
2	Wilson Rani		Water Works	Cook Islands
3	Sher Singh	Senior Scientific Officer	Water & Sewerage Dept	Fiji
4	Apisake Soakai	CEO	Nauru Utilities	Nauru
5	Mark Hiram	Senior Supervisor	Nauru Utilities	Nauru
6	Dave Neru		Water Industry Operations Group of NZ	NZ
7	Nick Hewer Hewitt	Senior Water Quality Compliance Advisor	Parsons Brinckerhoff	NZ
8	Renee Reweti	Project Manager	Ministry of Health	NZ
9	Jeff Booth	Director	Jeff Booth Consulting Ltd	NZ
10	Jan Gregor	Science Leader	ESR	NZ
11	Andre Siohane	Water Manager	Dept of Public Works	Niue
12	John Hetutu	Chief Environmental Health Officer	Ministry of Health	Niue
13	David Dengokl	Manager-Koror-Airai Water Treatment	Public Infrastructure Industry & Commerce	Palau
14	Joseph Asinimbu	Manager Consumer and Development Services	Eda Ranu	PNG
15	Ori Avea	Executive Manager Corporate Affairs	Eda Ranu	PNG
16	Abe Malae	Senator	American Samoa Legislation	American Samoa
17	Neemia Mareko	Water Division Manager	American Samoa Power Authority	American Samoa
18	Faamausili Tuimalealiifano	President	Independent Water Scheme	Samoa
19	Fetolola'i Yandall-Alama	Water Sector Coordinator	Ministry of Finance	Samoa
20	Paulo Seuseu Pemitā	Senior Water Quality Officer	Ministry of Health	Samoa
21	Latu S Kupa	Executive Director	Pacific Water and Wastes Association	Samoa
22	Kisa Kupa	Project Corporate Services Manager	Pacific Water and Wastes Association	Samoa
23	Semi Lesa	Water Engineer	Pacific Water and Wastes Association	Samoa
24	Afaese Meredith	Environmental Lab Tech	Samoa Water Authority	Samoa
25	Nick Roberts	EU Advisor	Ministry of Finance	Samoa
26	Marc Overmars	Water Advisor	SOPAC	Fiji

27	Alan Freshwater	Coordinator Drinking Water Safety Planning	SOPAC	Fiji
28	Chelsea Giles- Hansen	Water Demand Management Officer	SOPAC	Fiji
29	Willie Wari	Leak Detection Engineer	PNG Waterboard	PNG
30	Sibone Vavia	Executive Manager Planning	PNG Waterboard	PNG
31	Terry Mellan	Manager	Majuro Water & Sewerage Company	Republic of Marshall Island
32	Abraham Hicking	Chief Water & Sanitation	RMI-EPA	Republic of Marshall Island
33	Saimone Helu	CEO	Tonga Waterboard	Tonga
34	Pita Moala		Tonga Waterboard	Tonga
35	Kalolaine Fifita		Tonga Waterboard	Tonga
36	Semisi Tuiniua		Tonga Waterboard	Tonga
37	Elisiva Tapueluelu		Tonga Waterboard	Tonga
38	Tangikiliva Taunisila		Tonga Waterboard	Tonga
39	Kamal Khatri	Programme Officer	WHO	
40	Steven Iddings	Environmental Engineer	WHO	
41	Terrence Thompson	Regional Advisor	WHO	
42	Christopher Ioan	Director	Dept of Geology, Mines & Water Resources	Vanuatu