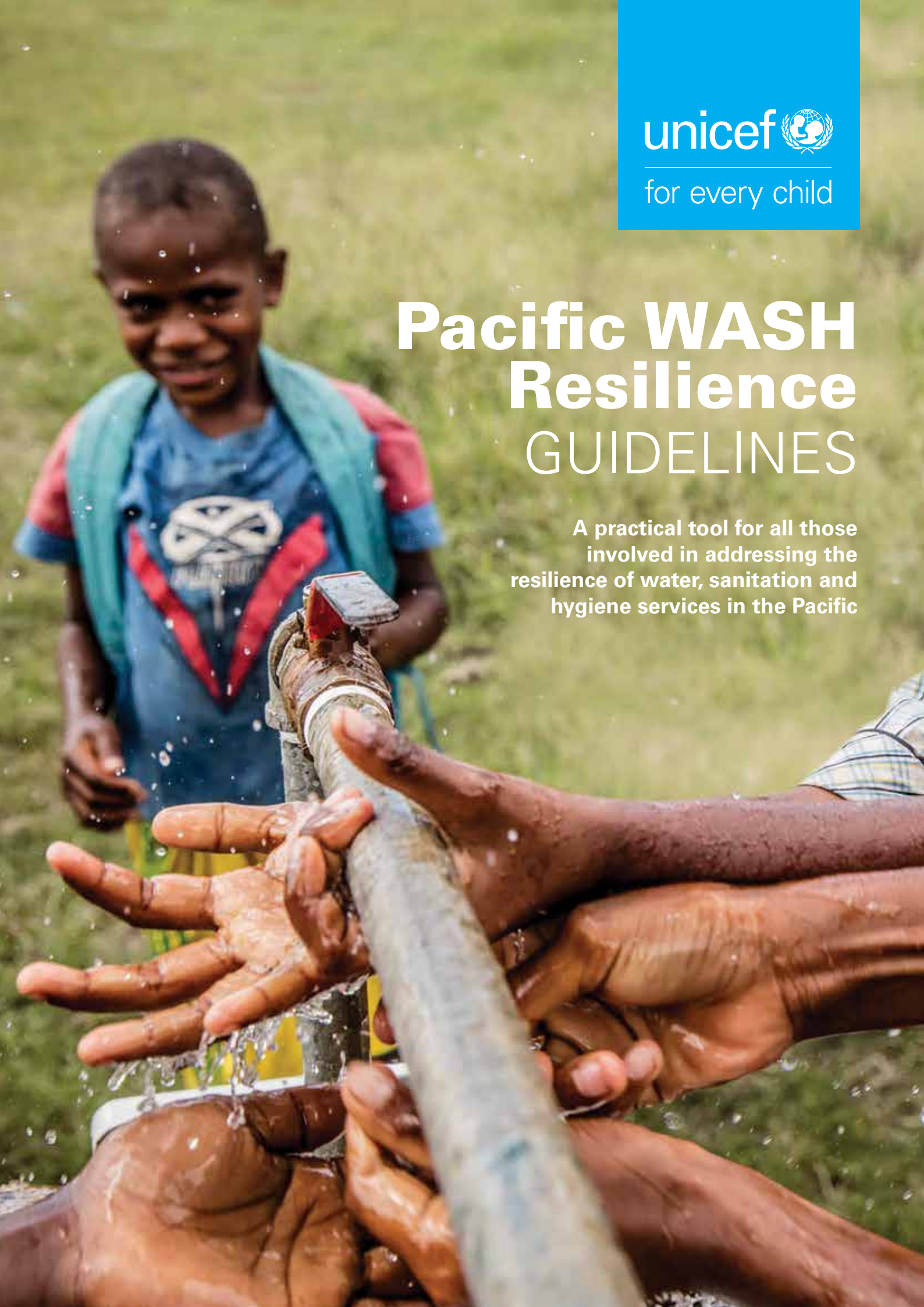

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Pacific WASH Resilience GUIDELINES

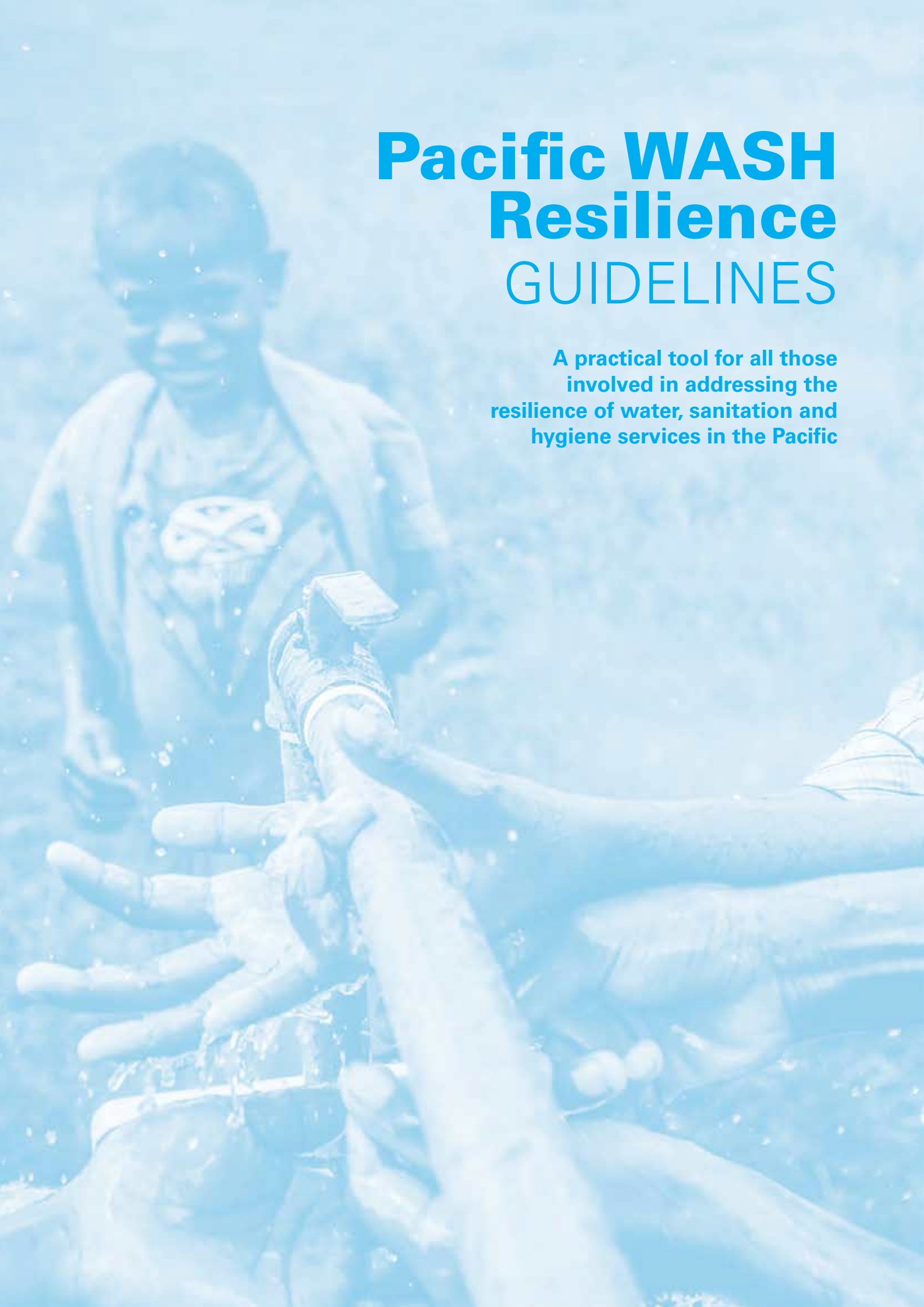
A practical tool for all those involved in addressing the resilience of water, sanitation and hygiene services in the Pacific

Pacific WASH Resilience Guidelines: *A practical tool for all those involved in addressing the resilience of water, sanitation and hygiene services in the Pacific*

These guidelines have been produced by UNICEF Pacific and encompass a number of tools to expand and strengthen the work of governments and other partners to improve water, sanitation and hygiene services, whilst building resilience for communities in the Pacific. By addressing disaster risk reduction and climate change adaptation in a comprehensive approach across the disaster and climate risk continuum, it serves as a contribution to the Framework for Resilient Development in the Pacific.

Cover photograph: © MarkChew/CARE

Ensuring that schools like Divine Primary School on Tanna Island, Vanuatu have functioning handwashing facilities is an essential step in reducing illness among the community's children.



Pacific WASH Resilience GUIDELINES

A practical tool for all those involved in addressing the resilience of water, sanitation and hygiene services in the Pacific

© UNICEF Pacific/Sevenier
A young girl fills her water bottle from a tap stand in Vanuatu.

FOREWORD

Pacific island countries are exposed to a wide range of natural hazards, including earthquakes, tsunamis, volcanoes, landslides, floods, drought and cyclones; and continue to be threatened by the impacts of climate change, such as sea-level rise, increased saltwater intrusion, coastal erosion and reduced freshwater availability. These lead to serious environmental sustainability challenges that put communities, and specifically children as well as entire countries, in the region at risk of having to be abandoned if not urgently addressed. These mounting pressures are placed on top of other challenges such as rapid and unplanned urbanization, lack of access to education, insufficient infrastructure, and lack of access to improved sanitation. In spite of these challenges, it is essential that work continues to support populations in achieving basic services, with water, sanitation and hygiene (WASH) being a cornerstone for other development. To assist in this, Pacific island countries must incorporate disaster and climate risk, and new forms of financing into WASH programmes and service delivery, and integrate WASH into disaster risk reduction and climate-change adaptation programmes in line with the Framework for Resilient Development adopted by Pacific island countries' governments.

Through financing provided to UNICEF under the Dutch Preparedness Window, support was provided for three core elements defining WASH resilience:

1. Systematically scale up the use of community Drinking Water Safety and Security Plans (DWSSPs) to enable communities, schools and health care facilities to assess and manage risks to their own water and sanitation systems.
2. Improve overall preparedness for natural hazards through strengthened WASH Cluster interaction.
3. Establish examples to facilitate the access to funding for communities, schools and health care facilities to make sustained improvements.

Related activities were implemented over the period from 2015 to 2017 in the at-risk countries of Fiji, Kiribati, Solomon Islands, Tonga and Vanuatu. As Tropical Cyclone Pam and Tropical Cyclone Winston provided further impetus to address WASH related risks in Vanuatu and Fiji, valuable lessons were drawn from building-back-better and risk-resilience approaches. These best practices have been used to compile this set of guidelines for Pacific WASH resilience that can be further rolled out as a simple, scalable and sustainable model for all Pacific island countries.

Marc Overmars
WASH Specialist, UNICEF Pacific Island

ACKNOWLEDGEMENTS

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Fiji

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Department of Water and Sewerage, Ministry of Infrastructure and Transport
Ministry of Lands and Mineral Resources
Water Authority of Fiji
Partners in Community Development Fiji
WHO Representative/South Pacific

Vanuatu

Department of Water
CARE International in Vanuatu
Oxfam in Vanuatu

UNICEF Pacific Multi Country Office,

United Nations Children's Fund, 3rd Floor, FDB Building,
360 Victoria Parade, Suva, Fiji

In addition, we would like to thank Lotte Blair, Jose Gesti Canuto, Clive Carpenter, Sue Cavill, Maria Carmelita Francois, Jan Gregor, Kathryn Harries, Aaron Jenkins, Rodney Lui, Marc Overmars, Regina Souter, Gabrielle String, Waqa Tikoisuva, Ian White and Brooke Yamakoshi for their contributions to the Pacific WASH Resilience Programme.

Particular acknowledgement is provided to Roger Singleton for drafting the contents of the WASH Resilience Guidelines.

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Government of the Netherlands

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CONTENTS

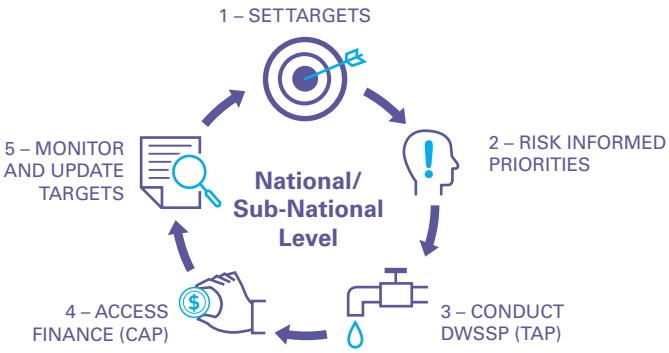
PART 1
Why WASH Resilience

PART 2
Dealing with risk

PART 3
WASH Resilience at national/sub-national level

NATIONAL/SUB-NATIONAL SUPPORTING FACTORS

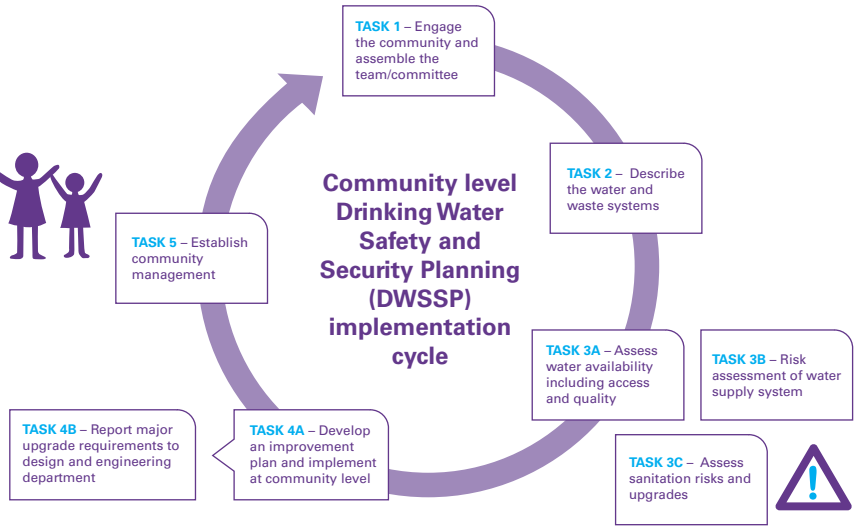
- Sector policy and strategy
- Sector coordination, service delivery, regulation and accountability
- Sector planing, monitoring and review
- Sector budgeting and financing
- Sector capacity building



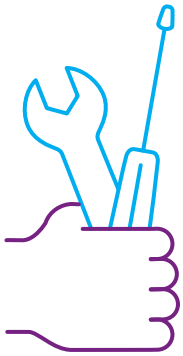
PART 4
WASH Resilience in communities

COMMUNITY SUPPORTING FACTORS

- Good governance structures
- Strong hygiene practices



PART 5
Toolkits and case studies



ABOUT THIS GUIDE

Purpose

This document has been written to support water, sanitation and hygiene (WASH) professionals from government, non-governmental organizations (NGOs) and civil society organizations (CSOs) to improve the provision of sustainable and resilient WASH services for communities across the Pacific. It collates current approaches and previous guidance on WASH and resilience in one location, covering theory, guidance and practical tools. It has been designed to improve the resilience of communities and the sustainability of WASH services even after disaster events.

The guidelines are written to assist a number of WASH stakeholders in delivering sustainable solutions that can adapt to climate and disaster risks. As the content covers a number of topics and areas, the purpose varies depending on the stakeholder. The targeted stakeholders for the guidelines are as follows:

Primary users

WASH professionals from government, NGOs and CSOs to improve the provision of sustainable and resilient WASH services for communities across the Pacific

Reference/Secondary users

Government regulators and donors to obtain reference information on the Pacific WASH resilience approach in order to aid in funding applications and/or the implementation of national/sub-national level processes that encourage national-level oversight and improves consistency of WASH approaches

Beneficiaries of the guidelines

Communities and individuals, with a focus on children, within the Pacific region that will receive the highest quality training and required infrastructure from the primary users to meet their WASH needs in a sustainable and resilient manner

Structure of this guide

In order to satisfy all stakeholders, and provide the relevant information to support the entire WASH resilience process, the guideline is divided into five parts:

Part 1 Introduces WASH resilience, the rationale for the approach and provides an overview of a recommended process for implementation.

Part 2 Provides background information on risk and how to utilize a risk-based approach in WASH programming; a key concept integrated into the WASH resilience process.

Part 3 Describes strengthening the national and sub-national enabling environments to support the work of implementing partners in the provision of sustainable and resilient WASH interventions.

Part 4 Details step-by-step guidance for implementers engaging at the community level using Drinking Water Safety and Security Planning (DWSSP). This incorporates provision of training at the community level, infrastructure design, methods for accessing finance and construction.

Part 5 Provides tools and case studies that support the implementation of the WASH resilience approach.

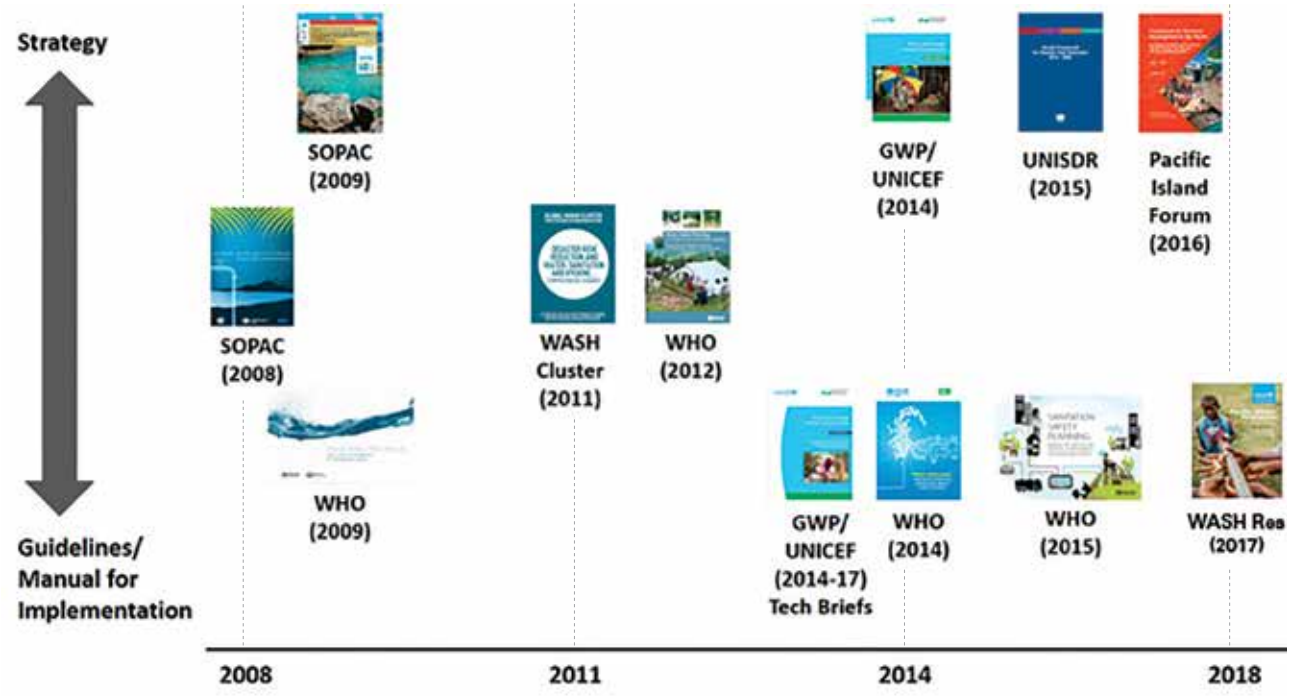
Implementation toolkit

In addition to guidelines, the WASH resilience approach has an implementation toolkit that can be found online. The implementation toolkit contains relevant training materials and templates for conducting WASH resilience training, with a focus on DWSSP, an integral tool used in this approach. The toolkit is referenced within these guidelines, particularly in Part 4 which looks at implementing the programme at the community level and all supporting material is detailed in Part 5, and available online at www.washresilience.com.

How does this fit into other documents?

Many guidelines and manuals exist for WASH interventions. However, these guidelines have been designed to add value to the material already present in the public sphere, with a with a focus on smaller island states in the Pacific region. Figure 1 presents a timeline of other strategies or implementing guidelines with relevance for the following topics: water safety planning, water security, and WASH resilience and sanitation safety planning, categorized by year of publication and purpose. These guidelines supplement this material, and have drawn on them extensively to create consistency of content. This set of guidelines brings together in one document the range of topics listed above to provide a central resource for stakeholders.

Figure 1 Publication timeline for WASH resilience



How this guideline is organized

The WASH sector is made up of many stakeholders, each of which has different support requirements when implementing WASH interventions. These guidelines have been written with various sections of the document supporting different stakeholder needs. To help readers navigate the guidelines, reference symbols are incorporated within each section to indicate for whom the material is most relevant. These reference symbols and the relevant stakeholders are detailed in Table 1.

Table 1 Reference symbols for stakeholder navigation

	**Beneficiaries in communities and settlements** – The end users who receive resilient and sustainable WASH services. These stakeholders can use the guidance, especially the tools, where capacity, interest and funds align
	**Non-government and civil society organizations (NGOs and CSOs)** – Implementing partners who support interventions in the field
	**Government** – Regulators and sometimes implementers who set targets and coordinate sector activities
	**Donors/Private sector/External agencies** – Assist in providing the necessary resources/support for work to be undertaken

At the beginning of each section there is a table listing the relevance of the material to the stakeholder groups, and a summary of the section's contents. This provides guidance as to what sections will be most appropriate to the reader depending upon the organization they represent. The tables are colour coded with additional notes explaining the relevance of that section to the reader: green represents very relevant material that should be read to gain full benefit to that stakeholder group, yellow represents some relevance and reading is recommended, and red represents limited relevance but can be read for interest (*see Table 2*). This allows users to engage in the material that is of most use to them, although reading all sections of the guidelines would provide the context for the full WASH resilience approach.

Table 2 Example introduction at each part of the guidelines

 **Beneficiaries (communities, individuals)**	 **Civil society (NGOs, CSOs)**	 **Government**	 **Donors/Private sector/ External agencies**
Material is used in communities so of relevance to community members.	Key material for programme implementation.	Good overview of material to see implementing partner method.	Good overview of material to see implementing partner method.

It is recommended that Part 1 and Part 2 are read by all users of the guidelines to provide essential background information. Part 3 is recommended for government stakeholders, with Part 4 aligned to government and NGO stakeholders. Part 5 provides a repository of all the tools and case studies conducted to date in association with the WASH Resilience Programme. Although presented in Part 5, both the tools and the case studies are heavily referenced throughout the document via diagrams and text boxes to provide insights of field experiences obtained during programme implementation.

EXECUTIVE SUMMARY

According to the WHO/UNICEF Joint Monitoring Programme for Water and Sanitation, globally around 663 million people did not have access to improved water sources in 2015, and around 2.4 billion people did not use improved sanitation (WHO and UNICEF, 2015). The reasons for inadequate WASH practices and facilities vary in different parts of the world, but the Pacific region presents some unique challenges. These include fragile water resources on small islands, and limited government service provision and financing, combined with high logistics costs. Furthermore, the Pacific is among the most at-risk regions in the world, exposing children, and their families and communities to a wide range of shocks and gradual resource deterioration, including earthquakes, tsunamis, volcanoes, landslides, floods, drought, cyclones, saltwater intrusion, pollution and land erosion.

With a broad number of challenges facing Pacific communities in terms of WASH provision, WASH resilience focuses on delivering sustainable water and sanitation services whilst taking into account the impacts of shocks and processes of change using three areas of programming:

- risk-informed programming,
- resilience at national/sub-national level, and
- resilience at the community level.

Risk-informed programming

WASH systems are at risk from many factors, and risk assessments can be conducted for many different geographical areas and types of hazards. However, the use of risk in the WASH resilience approach focuses on using risk information to aid in WASH programming in two ways: the first is using risk information to prioritize the use of resources at national and sub-national levels depending on the WASH needs of the population, and the second is using risk information at the community level to determine appropriate infrastructure upgrades and management actions. At national/sub-national level, one of the biggest uses of risk information is deciding where and what action a programme needs to take. At the community level, risk information is used to evaluate the biggest health risks to a community from their water and sanitation systems. This includes considerations of water availability, water safety, sanitation and disaster risks.

WASH resilience at national/sub-national level

As WASH challenges for peri-urban and rural populations in the Pacific are significant and varied, with minimal external support, it is key that government services have the appropriate mechanisms in place to support communities that have limited resources. The primary method for achieving this is the establishment of an effective enabling environment that promotes sustainable and resilient WASH programming. The WASH resilience approach promotes a number of supporting factors, and recommends a process of implementation for government and sector coordinators that encourages the delivery of resilient WASH services.

Supporting factors at national/sub-national level: From a strategic perspective, ensuring that effective policy and sector planning is undertaken gives all stakeholders clarity on embedding resilience. With significant demand for services, strong sector coordination, capacity-building activities and monitoring systems ensure resources are allocated effectively. Securing adequate financial resources and allocating realistic WASH budgets help to strengthen a resilient enabling environment.

Implementing WASH resilience at national/sub-national level: With support factors in place, WASH resilience promotes supporting beneficiaries through a combined technical and capital assistance process. After setting WASH targets that are mindful of resilience factors, and prioritizing implementation areas using risk principles, WASH resilience aims to establish community management capacity through a Technical Assistance Programme (TAP), and to assist with infrastructure through a Capital Assistance Programme (CAP). CAP provides financial assistance to beneficiaries most in need of developing infrastructure, which has been identified through the TAP process. Monitoring and updating of targets on a regular basis completes the implementation cycle at the national/sub-national level and provides a reporting framework on the progress of external assistance to communities.

WASH resilience at the community level

The Pacific has the most geographically dispersed population in the world, which results in a large proportion of the population utilizing multiple, small and often variable water resources for their needs. The geography also poses particular challenges to governments in terms of provision of services, especially to communities in remote locations or in peri-urban and informal settlements, where water and sanitation are managed at the household or community level. This is where the majority of the vulnerable populations in the Pacific live, and where they access their schools and healthcare services. Therefore, to ensure safe water and sanitation, investments have to be made at the community level. As such, the WASH resilience approach puts community management, and the capacity building thereof, at the forefront of the intervention, in addition to the provision of infrastructure.

Supporting factors at the community level: With management being a key component of resilient WASH, having effective governance structures, and functioning WASH support at the community level is essential. In addition, operation and maintenance requires money, so promoting adequate resources at the community level is also important.

Implementing WASH resilience at the community level: Implementing WASH resilience at the community level is dependent on communities receiving the required assistance. The TAP component, implemented through the DWSSP process, provides a risk-based training method to communities in order to aid them in managing their systems and understanding required infrastructure to meet defined WASH targets. Using these plans to both manage their systems and apply for capital assistance provides both the management capacity and infrastructure to ensure resilient WASH communities in the region.

Securing WASH for communities now and in the future

The Pacific is a dynamic region in rapid transformation, with several parallel processes of change at play. As the challenges are interlinked, and many have impacted WASH provision over the years, it is now critical that WASH programming is not isolated from disaster risk reduction (DRR) and climate change adaptation (CCA), but instead planned for in an integrated manner. The WASH resilience approach entails ensuring that water supply and sanitation systems and services, and hygiene practices meet the needs of children, and their families and communities, whilst taking into account the potential shocks and processes of change that have inhibited the provision of WASH in the region.

Ensuring that schools like Divine Primary School on Tanna Island, Vanuatu have functioning handwashing facilities is an essential step in reducing illness among the community's children.

UNICEF staff demonstrate handwashing to children in Vanuatu.

PART 1

Why WASH Resilience?

Purpose of Part 1

To explain the rationale for the WASH resilience approach and provide an overview of the method of implementation.

Summary

This part contains the following information:

- A background overview of why the WASH resilience approach was developed
- The key aspects of the Pacific WASH resilience approach and how it aims to address previous slow progress in the region in achieving WASH targets
- Introduction of the WASH resilience implementation process at the national/ sub-national and community levels

Who is this for?

Beneficiaries (communities, individuals)	Civil society (NGOs, CSOs)	Government	Donors/Private sector/External agencies
Not intended for beneficiary guidance.	Very relevant for implementers in understanding the WASH resilience approach.	Very relevant for implementers in understanding the WASH resilience approach.	Very relevant for potential funders in understanding the WASH resilience approach.

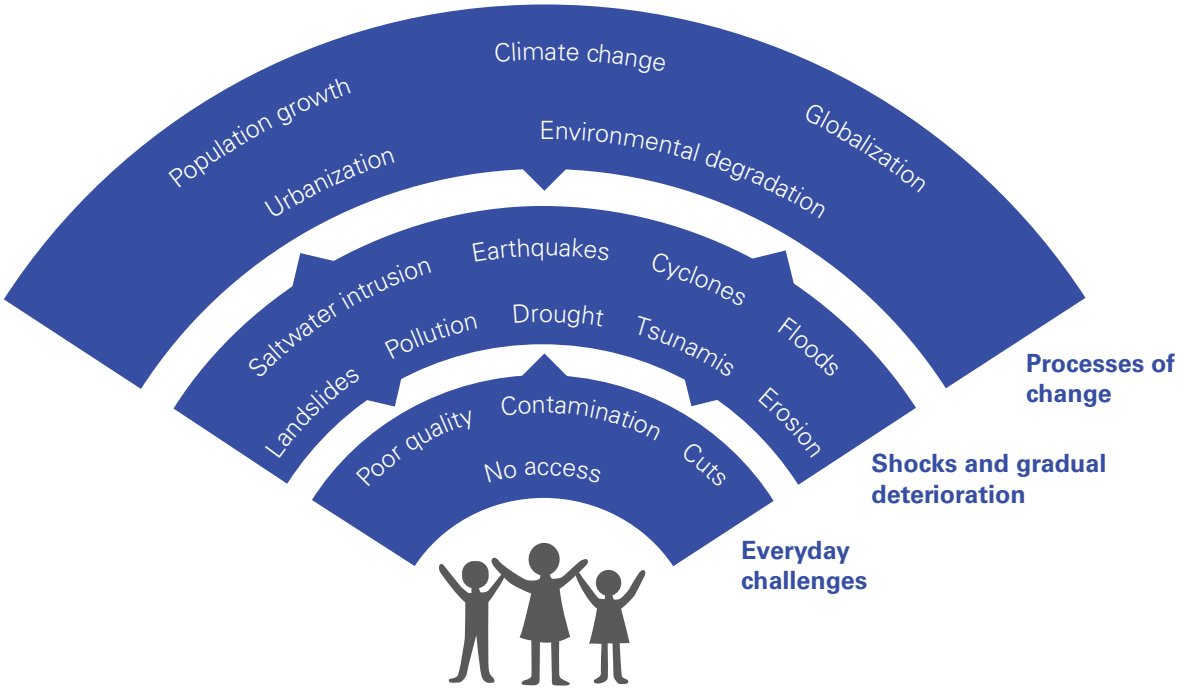
Objectives and varying challenges

According to the WHO/UNICEF Joint Monitoring Programme for Water and Sanitation, globally around 663 million people did not have access to improved water sources in 2015, and around 2.4 billion people did not use improved sanitation (WHO and UNICEF 2015). These figures show that significant work remained to be done. Although progress had been made in global statistics, certain areas displayed a significant lack of progress, with the Pacific region showing the slowest change in improved access in the world (UNICEF, 2015).

The reasons for inadequate WASH practices and facilities vary in different parts of the world, but the Pacific region presents some unique challenges. These include fragile water resources on small islands, and limited government service provision and financing, combined with high logistics costs. Furthermore, the Pacific is among the most at-risk regions in the world, exposing children, and their families and communities to a wide range of shocks and gradual resource deterioration, including earthquakes, tsunamis, volcanoes, landslides, floods, drought, cyclones, saltwater intrusion, pollution and land erosion. These factors regularly impact water supply and sanitation systems and services, slowing progress against WASH targets, and, sometimes, shock events destroy years of development work.

It is a dynamic region in rapid transformation, with several parallel processes of change at play. Climate change is raising sea levels, changing rainfall patterns, and generating more erratic and extreme weather, including more frequent and severe cyclones, floods and droughts, as well as more intense saltwater intrusion and erosion. Population growth, the principal reason for slow progress against the Millennium Development Goals (MDGs), and urbanization are increasing and shifting demands for safe water and sanitation, while drastically intensifying vulnerability in the growing urban or peri-urban areas. Globalization is not only making the small economies of the Pacific susceptive to trends and crises elsewhere, but is changing the values and aspirations of the people in ways that not only foster ambition and entrepreneurship, but also undermine indigenous knowledge and strategies for addressing risk and environmental sustainability. Increasing environmental degradation is disturbing sensitive and often unique ecosystems on which livelihoods and many of the economies depend. Combined, this adds layers of mounting pressure on top of fragile resources that frequently impact WASH provision (*see Figure 1.1*).

Figure 1.1 Three interconnected layers of mounting pressure



These three levels of mounting pressures from everyday challenges, shocks and gradual deterioration, and processes of change are interdependent and it is inefficient to attempt to address one in isolation. As these challenges are interlinked and have impacted WASH provision over the years, it is now critical that WASH programming is not isolated from disaster risk reduction (DRR) and climate-change adaptation (CCA), but instead is planned for in an integrated manner. The WASH resilience approach entails ensuring that water supply and sanitation systems and services, and hygiene practices meet the needs of children, and their families and communities, whilst taking into account the potential shocks and processes of change that have inhibited the provision of WASH in the region.

The WASH resilience approach in Pacific island countries

Resilience is a broad concept that has several definitions in different disciplines. For example, in biological sciences, the resilience of ecological systems e.g., coral reefs, is defined as the capacity of a system to respond to a disturbance by resisting damage and recovering quickly. In business management, resilience is defined as the ability of an organization to withstand changes in its environment and still function. In engineering, resilience is defined as the ability to absorb energy or avoid damage without suffering complete failure.

Although varying, these definitions share a common thread of an entity being able to absorb and adapt to negative events in an environment, and return to a desired state. The majority of references to resilience in international development is in response to disaster events, and their effects on populations. Resilience is defined by the United Nations Office for Disaster Risk Reduction (UNISDR) as an ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard, or hazardous event. When referring to WASH resilience in this document, this is considering the ability of Pacific communities and their WASH systems, the infrastructure for water and sanitation schemes, and the people who are managing them to adapt to changing conditions in their environment, absorb negative impacts/shocks, and have the ability to recover.

With the number of challenges facing Pacific communities in terms of WASH provision, and the dynamic nature of these, WASH resilience focuses on delivering sustainable water and sanitation services whilst taking into account the impacts of shocks and processes of change. This includes incorporating concepts of resilience into national and sub-national government processes to support WASH interventions, incorporating resilience in the design and construction of water and sanitation infrastructure, and, very importantly in the Pacific context, embedding knowledge and skills at the community level to be able to manage WASH systems and adapt to changing circumstances.

When using the WASH resilience approach, it is intended that beneficiaries not only receive improved WASH services, but also gain the ability to:

- reduce exposure to future difficulties,
- adapt to changing difficulties, and
- minimize difficulties when they occur.

Considering this, the WASH resilience approach recommends a number of interventions designed to overcome the barriers to WASH delivery (*see Table 1.1*).

Table 1.1 WASH resilience interventions

Barrier to WASH delivery		How does WASH resilience overcome this?
1	Shocks and dynamic factors (disaster events, processes of change, e.g., population growth)	**Programme Focus 1: Risk-informed programming** • Risk management is integrated in government planning processes and community management
2	Varying challenges to be addressed with limited resources, e.g., water availability, quality, sanitation, etc.	**Programme Focus 2: Resilience at national/sub-national level** • Resources and intervention are guided by appropriate prioritization according to population most in need • Technical assistance programme (TAP) for system management provided to communities • Integration of flexible funding to allow appropriate infrastructure financing and scaling; establishment of a Capital Assistance Programme (CAP) such that communities can apply for infrastructure funding based on successfully completed planning activities
3	Limited government service provision and high logistics costs	
4	Lack of funding at the community level for appropriate infrastructure	
5	Limited and variable water resources Majority of communities are isolated from government services and assistance	**Programme Focus 3: Resilience at the community level** • WASH resilience focuses on community management through the implementation of TAP using Drinking Water Safety and Security Planning (DWSSP) • Capacity strengthening through facilitating DWSSP focuses intervention activities at the community level helping to provide system management with limited government service provision • Best practice infrastructure design and construction promoted to resist damage from key hazards
6	Fragile community WASH infrastructure	

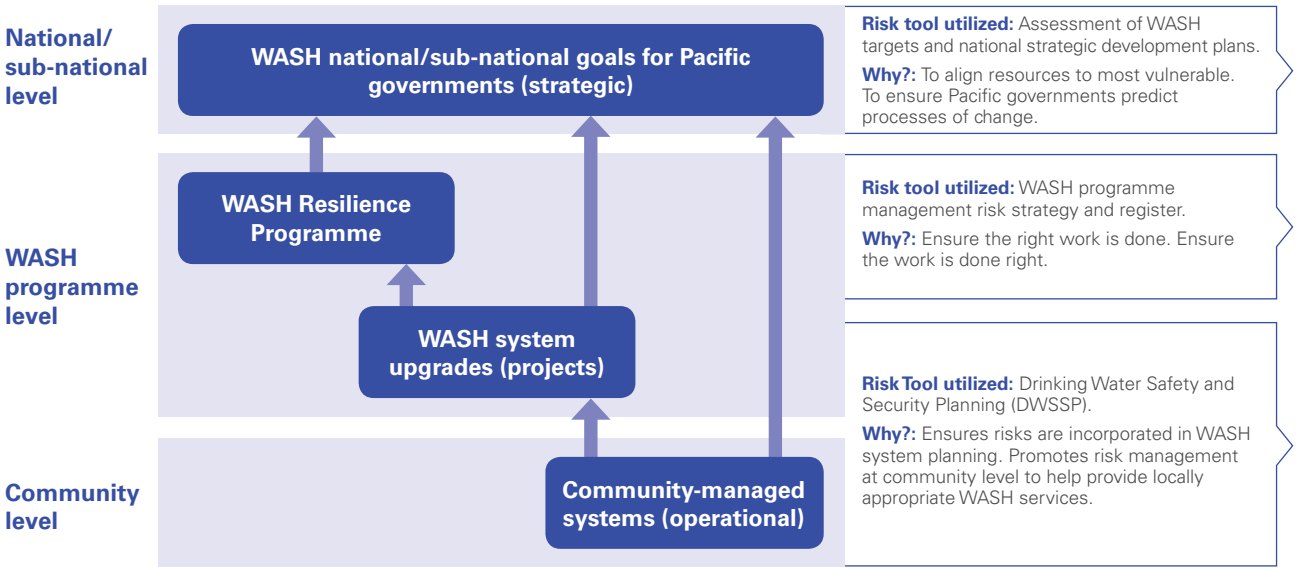
Programme Focus 1: Risk-informed programming

As shocks and dynamic factors, such as population growth, have made it difficult to keep pace with achieving WASH targets in the region, it is important that risk is integrated into programming to mitigate these effects as much as possible. This requires working with risk at multiple levels (*see Figure 1.2*):

1. **At national and sub-national government levels (strategic):** To ensure that resources are aligned by government, with support from partners, in areas where risks to vulnerable populations are high. This should also include potential/future risks caused by climate change and population growth, which allows interventions to be planned to incorporate the effects of these changes moving forward.
2. **At WASH programme level:** To ensure that the correct projects are being undertaken that directly contribute towards national/provincial/strategic goals.
3. **At the community level (operational):** To ensure improvements are achieved and maintained on the ground, risk management through community management looks at the risks in supplying safe WASH provision. Drinking Water Safety and Security Planning (DWSSP), introduced later in these guidelines, is recommended as a method of achieving this.

Using multiple levels of risk management provides a mechanism to guide governments in prioritizing their support to communities, so they can focus on resource provision to communities most at risk that do not yet have access to adequate services. The same applies to lower administrative levels, such as provinces or municipalities, which may also have important roles in WASH provision. These guidelines layout a method of risk prioritization that can be utilized for planning the use of risk at the national/sub-national/strategic level. This method is designed to inform decisions on where to focus resources and not the detail of the required investments and activities, which will vary by location.

Figure 1.2 Risk management at national/sub-national, WASH programme and community levels



As each community has specific needs and resources, and its members are responsible for maintaining the water and/or sanitation systems after the project is completed, a more appropriate risk tool is recommended at the community/operational level. The DWSSP approach is suitable for the community-level interventions, as it is tailored specifically for assessing risk to drinking water and sanitation in communities, and for mobilizing communities to take the necessary ownership to ensure the sustainability of improvements. The DWSSP approach is also utilized to ensure system upgrade planning is conducted to known national standards and ensures that the relevant country WASH targets are being met through infrastructure provision.

Programme Focus 2: Resilience at national/sub-national level

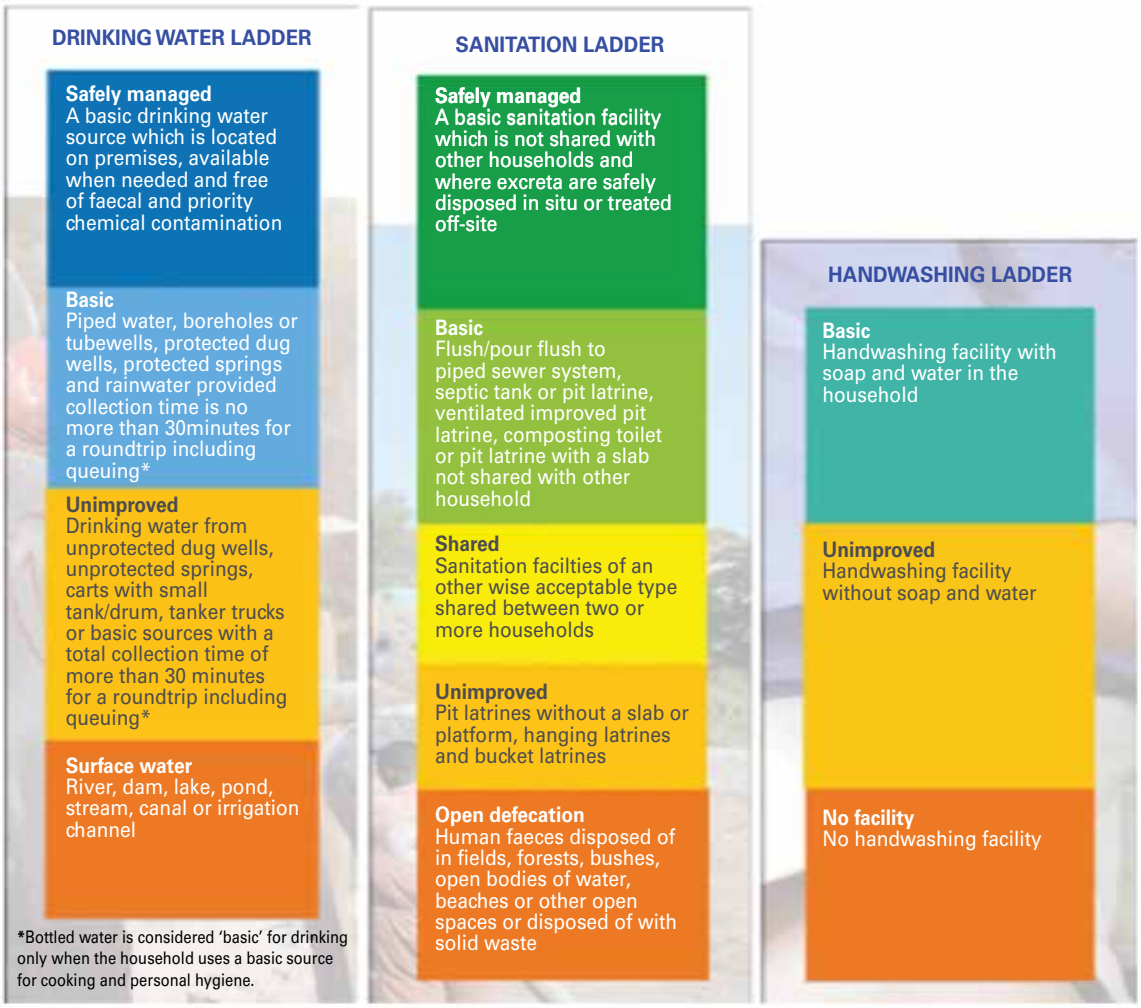
As the challenges for peri-urban and rural populations in the Pacific are significant and varied, it is key that government services have the appropriate mechanisms in place to support communities with limited resources. To support this, WASH resilience promotes a number of supporting factors such as strong sector policy and coordination mechanisms, and recommends a process of implementation that encourages the delivery of resilient WASH services. This includes setting targets, using risk to guide planning, and providing technical support to communities in advance of infrastructure provision. The approach recognizes that governments have limited capacity to provide water and sanitation services in rural environments, and resilient WASH depends significantly on the capability of the community to manage the system, as explained below. As a result, WASH resilience looks to establish the required capacity within government to support community governance structures to effectively manage their systems.

In addition to management capacity, resilience is also promoted through appropriate infrastructure. Addressing infrastructure challenges in terms of water supply and sanitation in the Pacific requires scaling up from individual project-based interventions to a scaled national WASH programme, and providing a flexible funding mechanism that can support the required infrastructure provision. With backing from donors and a national WASH programme, the WASH resilience approach supports the establishment of a national/ sub-national CAP that makes funding available to communities which need it. This ensures that capacity established through training at the community level is further reinforced through provision of resilient infrastructure via a managed process.

Programme Focus 3: Resilience at the community level

The Pacific has the most geographically dispersed populations in the world. This results in a large proportion of the population utilizing multiple limited, and often variable, water resources for their needs. The geography also poses particular challenges to governments in terms of provision of services, especially to communities in remote locations or in peri-urban or informal settlements, where water and sanitation are managed at the household or community level. These remote locations are where the majority of the vulnerable population in the Pacific live, and where they access their school and healthcare services. Therefore, to ensure safe water and sanitation, investments have to be made at the community level. As such, the WASH resilience approach puts community management, and capacity building for community management, at the forefront of the intervention, rather than the provision of infrastructure. The principle tool for this is DWSSP, a method that standardizes planning against global WASH provision standards, whilst promoting community management through a health-based risk approach. When facilitated at the community level, this triggers community management actions and sets the infrastructure provision standards for system upgrades. This combined approach works towards achieving the new 'safely managed' level of service provision, which is a key target in the Sustainable Development Goals (SDGs) (see Figure 1.3). In addition, resilient water and sanitation infrastructure is promoted during the design and construction phase of community interventions.

Figure 1.3 WASH development ladders



Source: WHO and UNICEF, 2017

Introducing the WASH Resilience Framework

WASH resilience focuses on providing three principle outcomes:

- integrating risk-informed programming in WASH,
- establishing national and sub-national environments and processes to support resilient WASH, and
- improving community capacity for system management combined with appropriate infrastructure.

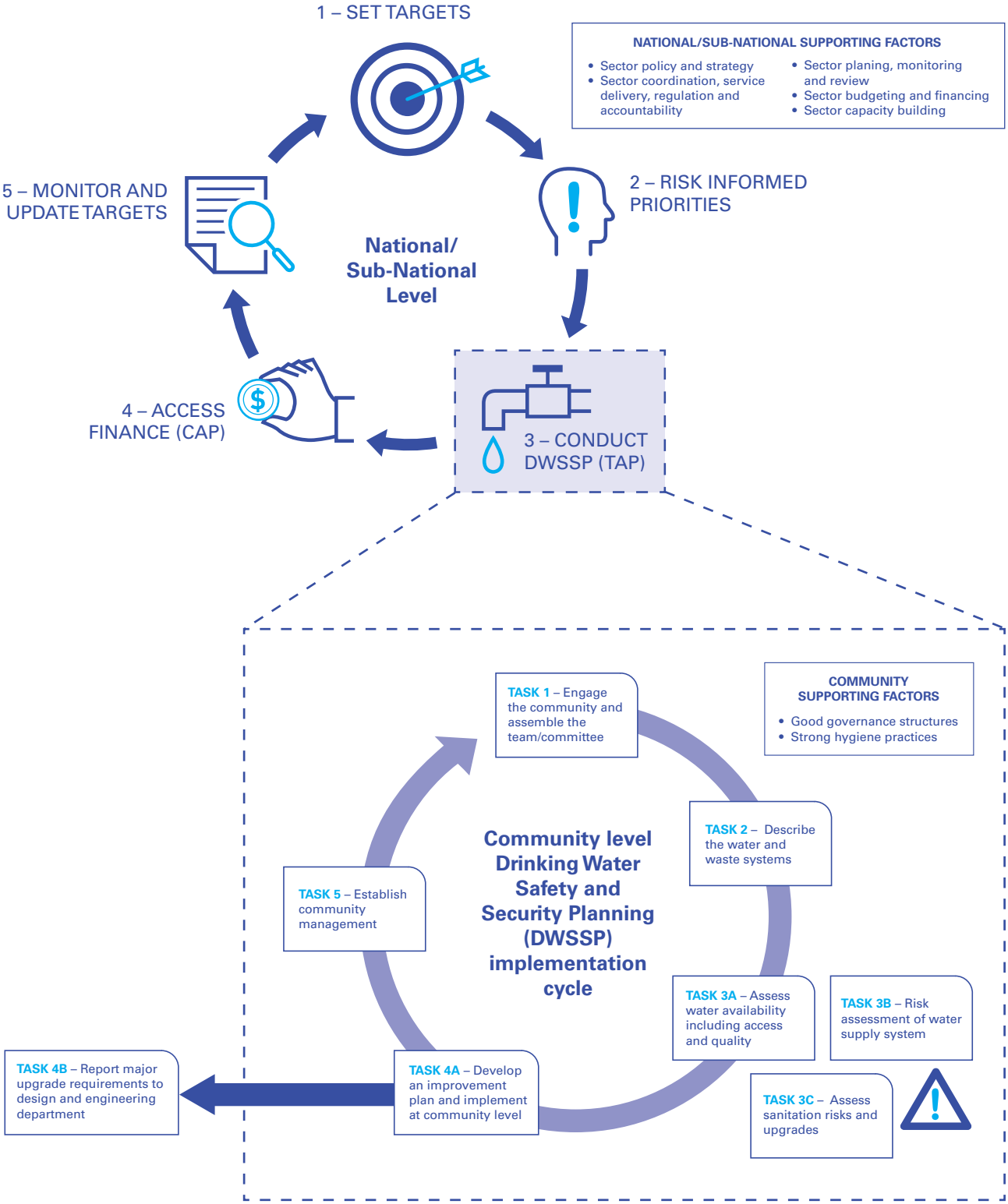
All of these outcomes are designed to increase the overall resilience of WASH interventions. Implementation of the approach is promoted at both the national/sub-national and community levels using the process for the WASH Resilience Framework shown in Figure 1.4. Each level of the intervention has recommendations for supporting factors that assist with implementation, and then present a method of implementing the WASH resilience approach.

At national/sub-national level, the government is supported in setting WASH targets and using a relevant risk model to prioritize implementation areas. Once priority areas are established, the relevant implementation partners, either government or external organizations, support the provision of technical assistance using DWSSP within community environments. This process involves community engagement, mapping of systems, planning for WASH improvements from a risk perspective, and developing improvement and maintenance plans. With completed DWSSPs, financial assistance can be applied for through CAP, or an equivalent government funding process, for communities that have proven management competence through an accountability process. Auditing and monitoring of community progress is then undertaken and fed back into the national process of reviewing the WASH targets and planning for future interventions. The supporting factors that aid in this implementation are also discussed in the relevant parts of this document.

The cycle can be repeated in intervals determined at the national/sub-national level, and the process can adapt to varying conditions through the flexibility provided by the risk models and DWSSP processes. This makes the WASH resilience approach ideal for continuing to work towards achieving improved WASH services in the region whilst mitigating and adapting to the varying challenges that have impacted progress to date.

© UNICEF Pacific
Children fill their water bottles in Fiji.

Figure 1.4 WASH Resilience Framework



A man fills his water bottles from the well in Vanuatu.

A young boy watches as clean water buckets are refilled.

PART 2

Dealing with risk

Purpose of Part 2

To provide background information on risk for use in the WASH resilience approach.

Summary

This part contains the following information:

- An introduction to the concept of risk including assessment and management
- An outline of the principle risks associated with WASH programming and how they can be addressed
- How to use risk in WASH programming to help achieve objectives

Who is this for?

Beneficiaries (communities, individuals)	Civil society (NGOs, CSOs)	Government	Donors/Private sector/External agencies
Not intended for beneficiary guidance.	Essential reading for background knowledge on risk and uses in the WASH resilience approach.	Essential reading for background knowledge on risk and uses in the WASH resilience approach.	Useful reading if background in risk is required.

What is risk?

Before looking at integrating risk into programming, it is important to have a clear understanding of what risk is within the context of WASH. Risk is a concept that can be confusing as it is used in many different scenarios. It is a concept that has developed over many years and is now used commonly in development fields such as climate change adaptation (CCA) and disaster risk reduction (DRR). In addition, it is also used in other sectors such as finance, and is commonly discussed in project and programme planning. Box 1 provides a small selection of definitions available for risk.

Box 1 Risk definitions

Climate and disaster risk context – "The combination of the probability of an event and its negative consequences." [United Nations Office for Disaster Risk Reduction (UNISDR)]

Health context – "The likelihood (or chance) of a hazard causing harm…." [World Health Organization (WHO), 2012]

Project management context – "An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives." [Project Management Body of Knowledge (PMBOK)]

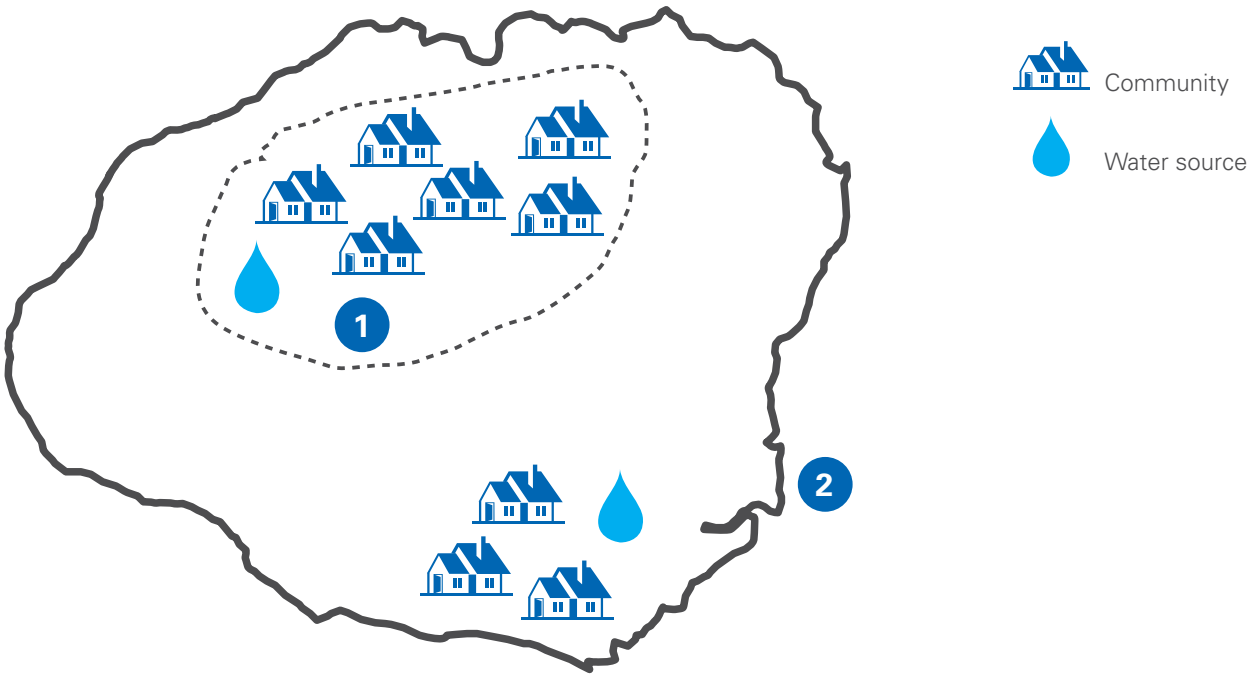
Although the definitions differ in exact words, there are some similarities that revolve around key terms, these include:

- Event – Something that happens or takes place, especially one of importance
- Hazard – A source of danger that can cause harm
- Impact/Consequence – The magnitude of harm or something undesirable
- Objective – Something aimed at or sought; a goal
- Probability/Likelihood – The extent to which something is likely to happen

A common thread that can be drawn from all the definitions is that something (an event), may happen (probability/likelihood), that can lead to harm being caused (hazard), or not achieving something (impact/consequences, that can be either good or bad). So although a diverse and sometimes complicated topic, risk is essentially looking at what and how likely it is that something will happen that is not desirable to a population.

Risk is defined by the system being considered and what can impact on it. This significantly alters how risk analysis and management is undertaken. Figure 2.1 highlights an example of this within a WASH context, showing a number of communities accessing different water sources on an island. If the health risk posed to a community from drinking contaminated water was to be considered, then each water source would have to be individually investigated, and testing performed to see if the water is safe. The system in that case, shown by "1" in Figure 2.1, would include a single water source and the community using it. However, if you consider the effect of a natural disaster, e.g., a cyclone, on a community, then the system to be considered would include the whole island, show by "2", due to disasters generally being large in scale and covering areas that may incorporate many known water systems. Knowing what particular risk is being investigated and what areas/systems it applies to is a very important aspect in risk management.

Figure 2.1 Risk at different system levels



Risk management is the process by which risks are considered within a system, and how they are addressed. The risk management process incorporates three main steps:

1. Identification of risk
2. Assessment and prioritization of risk
3. Plan and action to minimize risk

The identification of risk relates to identifying the system and what negative consequences need to be avoided or mitigated. Most likely there will be many different risks that can impact a system, which is where the second aspect of risk management (assessment and prioritization) applies. It can be quite difficult to manage all risks associated with a system, therefore, it is important to be able to assess which are the most likely to happen and which will have the most impact to ensure that the worst risk is dealt with first. Finally, once the risks and the order they need to be addressed in are known, a plan of action is required to minimize the risks. This is known as 'risk action' and the common forms of this are detailed below:

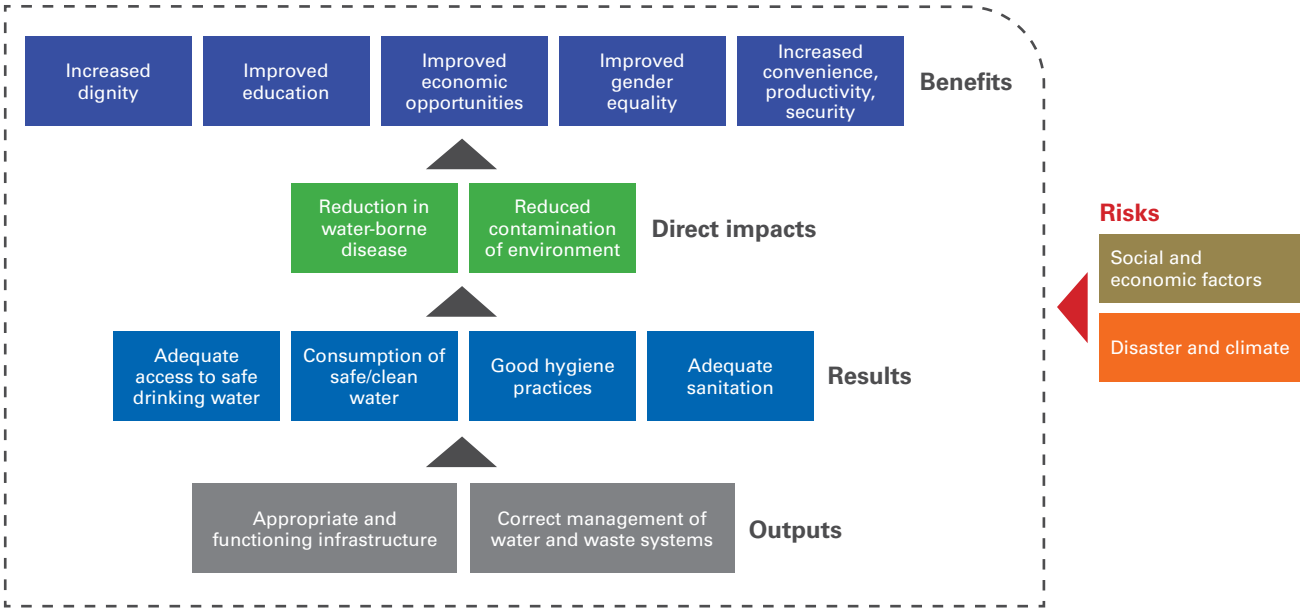
- Avoidance – Act to stop the risk from happening.
- Contingency – Allow the risk to happen, but absorb the impact.
- Mitigation – Reduce the probability that a risk will happen, or minimize the impact if it does.
- Take no action – A conscious decision not to take action on the risk. Maybe there is nothing that can be done to avoid or mitigate the risk.
- Transfer – Get someone else to take as much of the risk as possible. A good example of this is taking out insurance.

Although risk management sounds difficult, it is actually quite simple. It comes down to going through the previously mentioned three steps of identifying risk, assessing and prioritizing risk, and planning and acting to minimize risk. If these three steps are being performed, then risk management is being undertaken.

To know the risks, know the objectives!

This section of the guidelines shows how risk can be used to inform WASH programming. But before we start we need to know what we're trying to achieve. WASH interventions are usually undertaken to improve the health and well-being of a population. This leads to many other benefits such as improved dignity, and increased economic and education opportunities. WASH interventions are usually achieved through a combination of improving community capacity and building infrastructure so people can have access to improved and safe water, and sanitation services. This generic theory of change (ToC) for WASH interventions is presented in Figure 2.2 to assist in explaining the application of risk in programming. It is understood that ToCs vary significantly in different contexts.

Figure 2.2 Generic WASH theory of change



As shown in the diagram, WASH interventions commonly are used to try to increase the capabilities of water and sanitation systems, leading to results that have an impact on the people's health and the environment and additional benefits stem from this. Understanding this helps to define the actions that could stop the events from happening, or as mentioned, identify the risk.

So what could go wrong?

The process of identifying what can go wrong can start once it is clear what is trying to be achieved. With WASH interventions, the primary risk that is being addressed is harm to the population through either consuming poor water or getting ill through non-hygienic vectors, both of which are hugely influenced by the level of sanitation and hygiene practices. The risk to health is minimized by having the correct infrastructure, and promoting appropriate behaviours. This is defined as the immediate health risk from existing water and sanitation services.

But risk in WASH interventions does not stop there, as there are many different factors, such as money, conflict and land rights issues, that can prevent infrastructure from being built or changes in behaviour from occurring. Therefore, the first step in the risk management process (identification of risk) is to look at all the potential risks (*see Table 2.1*).

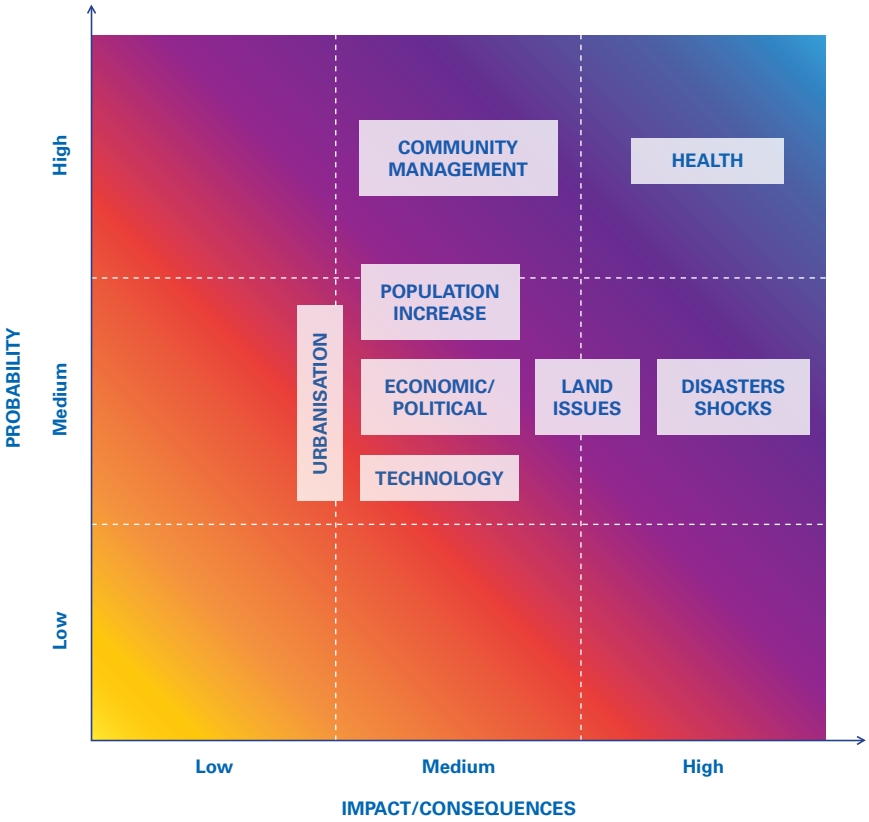
Table 2.1 Risk identification for generic WASH interventions

Risk category	Description of event (If…)	Description of impact/ consequences (Then…)	Probability: Low, Medium or High	Impact: Low, Medium or High	Timeframe: Immediate or Future
Health	**(a)** People do not have access to adequate amounts of water	People die, people move, water quality is reduced, people consume dirty water, increase in hygiene-related disease	High	High	Immediate
	(b) People consume reduced-quality drinking water	Increase in waterborne disease			
	(c) People utilize poor sanitation	Increased exposure to reduced-quality drinking water leading to an increase in waterborne disease			
	(d) People do not practice good hygiene	Increase in waterborne and person-to-person (communicable) disease			
Disasters/ Shocks	If any of the following occurs • earthquake • tsunami • landslide • volcanic eruption • flooding	Infrastructure is damaged and Health events (a), (b), (c) and (d) are likely to occur	Medium	High	Future
	If drought occurs	People do not have access to adequate amounts of water – see Health event (a)			
Social	Community does not have the capacity to manage the system	Increased likelihood of people consuming reduced quality drinking water and utilizing poor sanitation – see Health events (b) and (c)	Medium to High	High	Immediate and Future
	Population of community increases/ more water demand	Amount of water available per person would decrease, increased risk of Health event (a)	Medium	Medium	Future
	Increased urbanization of the community (movement of community members to urban areas)	Potential positive impact for rural WASH system, reduced demand Potential negative impact for rural WASH and loss of management capacity	Medium	Low to Medium	Future
Economic/ Political	No funding is available for WASH, or WASH activities are not prioritized	Inadequate infrastructure will be constructed impacting Health events (a), (b) and (c) Community loses desire to implement management actions	Medium	Medium	Immediate and Future
Technology	Incorrect technology is utilized in construction	Community cannot sustainably manage improvements	Medium	Medium	Future
Legal	Community cannot access water supplies due to land ownership issues	Infrastructure cannot be built and management actions can be compromised	Medium	Medium to High	Immediate and Future

With so many things to think about, where to start?

As explained, there are many potential risks to obtaining the health impacts and benefits when undertaking a WASH intervention. This corresponds to the different layers of pressure that are highlighted in the Introduction to these guidelines (see page 6 and Figure 1.1). With so many risks to manage, which should be prioritized? Here is where some qualitative risk analysis can be used to begin to prioritize. Table 2.1 shows the risks and impact/consequences, along with an estimation of the probability, impact/consequence and timeframe for each. This was estimated from experience in Pacific island countries, but can be changed according to specific contexts. Probability is the chance of the event happening, impact/consequence is how much effect it will have, and timeframe is whether the risk is present right now (immediate), or is something that may happen in the future. Making estimations on these factors allows a simple analysis to be undertaken. Figure 2.3 shows how to determine which risks require the highest priority.

Figure 2.3 Qualitative risk analysis



As can be seen from the analysis, the immediate health risks are probably most likely to impact community health in the short term and should be the primary focus. Other prominent risks include disaster or shock events, which, although they are not guaranteed to happen, have a reasonable chance of occurrence, and often cause very significant impacts to both health and WASH infrastructure.

In addition to health and disasters or shocks, other significant risks include lack of community management, use of inappropriate technology, and lack of available funding, which prevent infrastructure and management capabilities being achieved at the community level. Once there is an understanding of the order in which the priority risks should be addressed, it is time to plan how to manage these risks (*see Table 2.2*). The risk management actions are taken from the list at the start of this section (*see page 17*).

Table 2.2 Risk management actions for WASH Resilience

Priority	Risk category	Risk management	How to manage risk?
1	Health	Avoidance	Undertake WASH intervention to eliminate health risk. **Note: As this is the most immediate and high-impact risk, this category should be used to prioritize where and what intervention is undertaken.**
2	Disasters/Shocks	Mitigate	Use the DWSSP process to plan community management actions and infrastructure for most likely disasters/shocks. **Note: Identify the main disasters/shocks that have impacted the province/area in recent years as part of the risk prioritization process.**
3	Land issues	Mitigate	Ensure that land ownership or agreements between parties are documented prior to any infrastructure activities.
4	Social (community management)	Mitigate	Use the WASH Resilience Programme design to conduct community training and planning first (TAP), and follow with infrastructure that is designed to promote community ownership and management.
5	Economic/ Political (funding)	Mitigate	The availability of an effective enabling environment, including a CAP scheme, reduces the probability of economic or political events occurring if all procedures are followed correctly.
6	Appropriate technology	Avoidance	Following appropriate technology guidelines in either national standards or the WASH Resilience Guidelines recommended best practices, which are designed to avoid inappropriate technology choices.
7	Social (urbanization and population increase)	Mitigate	The skills around calculating demand and supply of water availability for a defined population, which are delivered through the community training process, should help mitigate changes in population in localized areas.

Health risks should be avoided and that is the principal purpose of a WASH intervention. However, it is good to propose actions for all risks whether of a high priority or not. Most risks other than health cannot be easily avoided and can only be mitigated. What Table 2.2 shows is that undertaking the programming principles of the WASH resilience approach allows for risk mitigation in a number of areas, including social and land issues, and responding to changes in population. Health and disaster risks require interventions at the community level, and deciding where and what to do first are covered in the next section, 'Using risk to support WASH programming'.

Using risk to support WASH programming

WASH systems are at risk from a number of hazards, and many risk assessments can be conducted for different geographical areas and types of hazards. However, the use of risk outlined in this document focuses on two types of risk assessment:

- using risk at the national/sub-national level to prioritize the use of resources depending on the WASH needs of the population (see Part 3), and
- using risk at the community level to determine appropriate infrastructure upgrades and management actions using the DWSSP approach (*see Part 4*).

At the national/sub-national level, one of the biggest uses of risk is deciding where and what action a programme needs to take. Developing a model to do this can become quite complicated if many factors are involved; so it is recommended to use the highest priority risks to evaluate this. In terms of WASH resilience, it is the health and disaster risks that are utilized to prioritize intervention locations and to recommend principal actions to undertake.

The reader can determine where and what WASH interventions to undertake, and determine if risk is utilized to aid this decision. These guidelines also offer a recommended method for determining interventions that can be used by organizations. This is detailed in Part 5, Toolkit 1. This method utilizes the primary health risks to determine priority location and activities, and analyses the most prominent disaster risks for a geographic area. The Risk Prioritization process includes:

1. Quantifying current health risks within a community
2. Prioritizing which communities are to undertake the intervention
3. Considering prominent disaster risk/s for which to plan for during the intervention.

At the community level, risk is used to evaluate the biggest health risks to a community from the water and sanitation systems. This includes considerations of water availability, water safety, sanitation and disaster risks. This evaluation is facilitated through the DWSSP process and is explained in detail in Part 4 of these guidelines.

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A young boy carrying a water container in Vanuatu.

Hygiene Promoters enjoy washing their hands at the Hand Washing Station set up by Save the Children at Nabasovi District School, Koro. TC Winston severely damaged their school including their generator. Save the Children provided the school with Hygiene Promotion training and a water tank to help the students continue with their education.

PART 3

WASH RESILIENCE AT NATIONAL/SUB-NATIONAL LEVEL

Purpose of Part 3

To provide knowledge and an associated implementing process at the national/sub-national level to support resilient WASH interventions in communities.

Summary

This part contains the following information:

- An overview of national/sub-national level processes that support WASH interventions
- The key elements used to incorporate resilience into WASH programming at the national/sub-national level
- A recommended implementation process at the national/sub-national level to support resilient WASH programming

Who is this for?

Beneficiaries (communities, individuals)	Civil society (NGOs, CSOs)	Government	Donors/Private sector/External agencies
Not intended for beneficiary guidance.	Very relevant for implementing partners in understanding how their work fits into national/sub-national frameworks.	Very relevant for government staff in understanding optimal conditions to support resilient WASH interventions.	Very relevant for understanding required national level processes that should be supported alongside community interventions.

National/Sub-national level processes

This part of the WASH Resilience Guidelines outlines the supporting structures and processes that provide a suitable enabling environment for successful and resilient WASH interventions. It is directed at government agencies with support from relevant external partners where appropriate, and details key factors that support an effective enabling environment for implementing resilient WASH programming. It also provides a recommended process for implementation by government partners.

Figure 3.1 National/Sub-national level process for WASH resilience

Given the ambitious targets set by SDG 6, the WASH sector must look to establish solutions to deliver at scale. This means going beyond individual projects and looking to support the strengthening of national and sub-national systems that can continue to deliver sustainable and resilient WASH solutions. There are several factors that are useful pre-requisites for strengthening the national/sub-national processes. The following recommendations are made in accordance with guidance produced by UNICEF (2016) for strengthening the WASH enabling environment.

Factors supporting a resilient enabling environment

Policy and strategy

Policy is defined as the set of procedures, rules and allocation mechanisms that provide the basis for programmes and services (UNICEF, 2016). Ensuring effective WASH policy is in place is a key measure in establishing effective WASH provision in a country. However, there is often a gap in the inclusion of disasters and processes of change within WASH policy. As was shown in MDG monitoring, progress on WASH has stalled largely due to population growth in the region and the impact of the ever-increasing number of disasters. The inclusion of resilience concepts that are mindful of disaster and climate hazards is a key step in integrating resilience at the national/sub-national level. In 2016, a review of the inclusion of DRR and CCA concepts in WASH policy was commissioned by UNICEF (Carpenter, 2017). The review highlighted that there were significant gaps around considering the existence of robust WASH policy in the region, and a lack of DRR and CCA consideration in existing documentation (see Insights 1 and a summary of this review in Part 5, Case study 3). Efforts should be made to integrate these concepts into WASH policy and strategy.

Insights 1 Policy in the Pacific (*Carpenter, 2017*)

"Policy, policy everywhere, but no one document to sync."

Document type	Fiji Islands	Kiribati	Tonga	Solomon Islands	Vanuatu
National {R}WASH Policy	2012/2016			2014	2012-2016
National {R}WASH Strategy	2012/2016			2015-2020	
School WASH Standards				2014	2014
RWASH Technical Standards				2015	Undated
National Climate Change Policy or Strategy	2012	2005/2013	2016	2012-2017	2012-2022
UNFCCC National Communications			2005		
NAPA	N/A	2007	N/A	2008	2007
NAP or JNAP or JNIP		2014-2023	2010-2015		
National Water Resources Management Policy	2016	2010	2011	2013	2008-2018
National Water Resources Legislation	2016		2012		2002/2014
National Water Resources Management Plan		2008-2018	2012-2016		
National Water Supply Policy / Plan	2007/2016	2008/2010	1963	2013	
National Water Supply Act	2007		2000		2014
Drinking Water Quality Standards					2014
National Sanitation Plan / Wastewater Policy	2016	2010/2011		2013	
National Integrated Water Policy or Strategy	2016	2008		2013	
National IWRM Implementation Plan		2008-2018		2013	
National Disaster Management Plan/Act	1995/1998	2012/1993	2007	2010	2008/2013
Drought Response Plan	2015	2011/2016			2015
National Tsunami Plan			2007		
Ministry of Health Strategic Plan or Strategy	2011-2015		2008-2012	2011-2015	2010-2016
National Sustainable Development Strategy	2009-2014	2012-2015	2015-2025	2011-2020	
National Infrastructure Investment Plan	2015-2017		2013-2023	2012	
Constitution	2013				
Outer Island Development Plans		2013+			
National Education Policy / Plan / Standards	2015	2015			
Legend					
Reviewed Document	2005				
Issue covered by a Reviewed Document	2005				
Unsecured Document	2005				
No Relevant Document Identified					

Over 80 documents were reviewed from five countries in the Pacific during a WASH resilience policy review commissioned by UNICEF Pacific. Of the rural WASH policies available, all of them referenced other CCA/DRM policies available in their countries, showing that WASH practitioners and policy makers are very aware of climate impacts on WASH provision. However, the majority of DRM policies made no mention of WASH response activities, a key response in any emergency. Continued work is required to promote the obvious emergency management benefits of increasing WASH resilience in rural communities.

Institutional arrangements (sector coordination, service delivery arrangements, regulation and accountability)

Institutional arrangements refer to those of government, civil society and the private sector. Sector coordination involves joint planning, implementation and monitoring, and proactive information sharing. A number of mechanisms for coordination of the WASH sector already exist in the Pacific, the WASH coalition and WASH cluster. These coordination mechanisms provide an excellent forum for development of effective planning, monitoring and review processes in the sector, allowing for the sharing of knowledge and promoting the inclusion of resilience in policy and interventions. In addition, this forum also promotes improved cross-sectoral/ministerial collaboration within countries, for example, between sanitation, water resources, statistics and disaster agencies, which all aid in improving the enabling environment. UNICEF has a useful tool for bottleneck analysis (UNICEF, 2013) that can be utilized to evaluate the strengths and weaknesses of an enabling environment, and to evaluate where improvements can be made. In addition, the WASH Cluster in the Pacific region has a set of guidelines (Harries, 2017) to help improve coordination and response in emergencies.

Improved coordination also provides the opportunity to improve service delivery in the sector. Service delivery arrangements respond to community needs when they arise. Having effective response mechanisms, such as organizations that can train communities on system management or conduct water quality testing, allows the sector to respond more efficiently when disasters and changes in the environment occur.

Coordinating the sector requires robust regulation and accountability mechanisms. Clear accountability and monitoring systems, conducted primarily by governments, allow measurement of service levels, use and functionality. With respect to resilience, this incorporates the tracking of meteorological data such as rainfall and weather systems. Improved regulation raises standards and capacity in the sector, leading to improved resilience. Examples of these include how service providers can operate, design standards for infrastructure, drinking water quality standards, and environmental protection.

Budgeting and finance

Budgeting for WASH involves the allocation of funding provided to the sector. This defines how much is spent and where. Allocating funds that align to specific policy outcomes help set in motion service delivery. Ensuring sufficient funding is allocated increases resilience as it provides the resources to respond to the needs of communities.

Financing is the ability to raise funds from different sources that can be aligned to WASH programming. Obtaining funds from different organizations that support WASH sector activities further increases the resilience of the sector. The renewed global focus on climate change has opened new avenues for financing that can be utilized by the WASH sector, especially as water is a primary vehicle through which people experience a changing climate, for example through drought, flooding or severe storms.

Capacity building

Although much attention is paid to increasing the capacity of beneficiaries in programming, the capacity of the WASH sector is also integral to providing sustainable services. The institutional and human capacity of governments and other sector organizations to provide WASH services is crucial to establishing resilience at the national/sub-national level. Examples include the ability to implement DWSSP, conduct regular drinking water quality testing, and design and construct WASH infrastructure that is resilient to key hazards. Regular training should be encouraged for stakeholders operating in the sector to ensure service delivery can be optimized.

Recommended national/sub-national process

The previous section highlighted some key factors to promote resilience at the national/sub-national level in order to increase the capacity of the sector to deliver sustainable and resilient WASH services. Although these mechanisms provide an element of resilience through the creation of a better functioning WASH sector, ensuring improved resilience of beneficiaries requires an appropriate method of implementation at the national/sub-national level. As such, a recommended process for government agencies is presented in Figure 3.1 to aid in guiding how WASH interventions are undertaken. This process includes:

- setting appropriate WASH targets in accordance with national country standards,
- using risk to inform where and what WASH interventions are undertaken,
- providing technical and capital assistance to communities, and
- monitoring interventions to evaluate impact and update targets as necessary.

Setting WASH Targets

Check/Establish national policy

As mentioned previously, policy is written to affect certain changes in society. WASH interacts with many departments in government and can be affected by many issues such as the economy, culture and environmental considerations including climate change. Therefore, the first step for setting targets is to become familiar with current national policies. There are usually a number of policies that must be taken into consideration. Common policy areas include rural WASH, climate change, water resources, water supply and sanitation, integrated water resources management (IWRM), disaster management, health, development and infrastructure planning, land ownership and development, and education. With so many sectors of government related to WASH interventions, it is important to read and understand the country's current standing on all these issues to make informed decisions at the national/sub-national level.

Note for implementers: Although it can seem a daunting challenge to read so much information, it is worthwhile making the effort to obtain the relevant policies in the country in which you are working. These policies will highlight the principle targets that national government is aiming to achieve for the population, and highlight key processes and technologies that are acceptable for interventions.

Where the relevant policies are not in place, it is important for government partners to engage in developing national policies required to support WASH interventions and risk management. This should include a review of existing policies, prioritization of the most essential policy needs, and endorsement at the highest possible level within the government to ensure accountability.

Set targets

After background knowledge of the national policies and standards is established, setting appropriate targets can begin. WASH interventions are conducted for many reasons; the majority are related to health improvements for the population, and increasing dignity and well-being. Whatever the rationale for the intervention, it is important to set targets, because **targets are set to monitor performance**. A well-known quote is *"If you don't know where you are heading, you will not know if you have reached your destination".*

In the context of this document, there is a minimum set of targets, measured by indicators, which should be included in order to determine the success of the interventions. These are detailed in Table 3.1, and follow recommendations from the *WHO Guidelines on Drinking Water Quality* (WHO, 2011), and targets set by SDGs. These indicators focus primarily on health targets related to incidence of water borne disease, water access and water quality. Sanitation and hygiene measures are also critical to these outcomes. When setting targets and measuring progress, it is vital to take into account the **resilience** of a community to examine how WASH services and facilities are affected both during a disaster and over the following days, weeks and months. In a serious disaster scenario where normal functioning of communities and systems has been severely disrupted, immediate response actions and indicators should follow the Sphere Standards (www.spherestandards.org) for humanitarian response scenarios. The indicators presented in this section look to improve resilience for communities before disasters occur, and also can be utilized to ensure recovery efforts build back better towards resilient WASH systems for the future. In addition, it is important to consider social, economic and cultural factors that can affect the success of rural WASH systems. These factors include the inclusion of both men and women in managing resources, and selection of the appropriate technology for a particular context.

Table 3.1 Recommended WASH indicators for WASH interventions

WASH outcome	What to measure? (Indicators)	How to measure?*	Recommended targets
Improvement in health	• Number of water-borne disease cases in the community	Conduct survey with community and provincial health officers to obtain data	Minimize if possible
Increased water availability	• Water quantity per person per day (litres/per person/ per day or L/p/d) • How many days per year are water sources functioning? (days)	Conduct survey with community water management/committee Conduct technical assessment of WASH system	• Communities: 50 L/p/d • Day schools: 5-25 L/p/d (depending on toilet type) • Boarding schools: 20-40 L/p/d (depending on toilet type) • Healthcare facilities: 5-400 L/p/d (depending on type of department) • Communities/Schools/ Healthcare facilities; Access available every day
Increased Water Access	• How long does it take for people to access water? (minutes) • Cost of water access for a family (cost/family/month) • Number of access points • Distance to access points (m)		• Communities/Households: Access on premises • Schools: Reliable water points within 30 m for staff and children, located at critical points such as in kitchen and near toilets • Healthcare facilities: Located on all wards and waiting areas

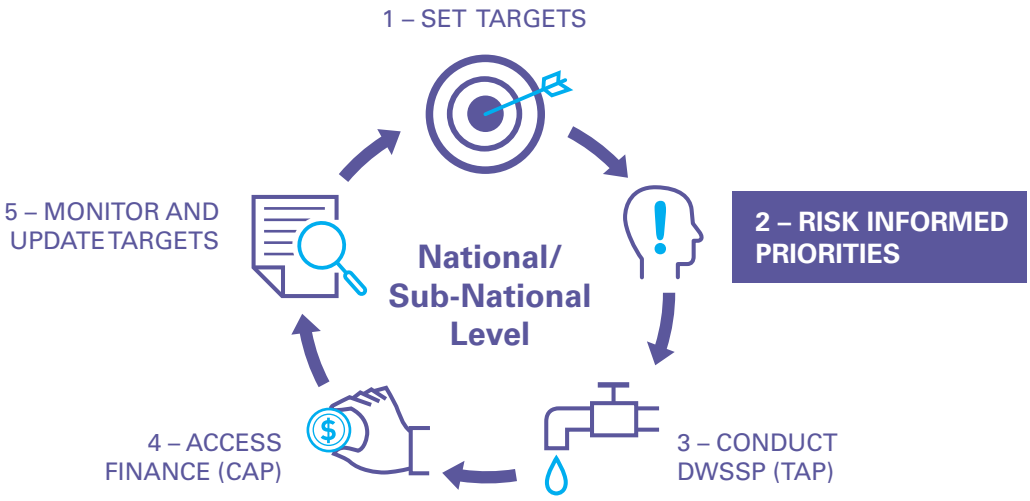
* Collection of data should take place regularly so that any pre- and post disaster parameters can be taken into account. This ensures a better understanding of a community's ability to manage and recover from disasters.

Table 3.1 Recommended WASH indicators for WASH interventions (continued)

WASH outcome	What to measure? (Indicators)	How to measure?*	Recommended targets
Improved water quality Improvement in micro-biological and chemical parameters (see guidelines by country)	• Micro-biological water parameters (E/Coli or total Coliform) • Priority chemical contamination • Turbidity and conductivity	Conduct water quality testing in accordance with country guidelines	• Less than 1 Escherichia coli/thermo-tolerant total coliforms per 100 ml • Presence of residual disinfectant • Water safety plans in place. • Priority chemicals meet recommended guidelines (WHO, 2011)
Increased sanitation availability	• Sufficient number of toilets	Conduct technical assessment of WASH system Conduct survey with community water management/committee	• Communities: 1 toilet per household • Schools: 1 toilet per 25 girls, 1 toilet + 1 urinal per 50 boys • Healthcare facilities: 1 toilet per every 20 users for inpatient setting, at least 4 toilets per outpatient setting • Separate toilets for patients and staff. All available onsite
Increased sanitation access	• No of people with access to sanitation • Distance to sanitation facility		
Improved sanitation quality	• Risk level of sanitation • Toilets provide privacy and security • Toilets are hygienic and easy to use		
Hygiene	• Number of people practicing hygiene • Number of toilets with handwashing facilities • Cleaning and maintenance routines in operation	Conduct survey with community water management/committee	Appropriate for local technical and financial conditions, safe, clean, accessible to all users including those with reduced mobility 1 handwashing facility with soap at each sanitation point and treatment area in health care facility
Appropriate technology	• Is technology functioning and performing its task	Conduct technical assessment of particular component/s	All technology functioning correctly Can be maintained and resourced by local staff
Gender	• Number of women reporting participation in WASH • Number of male and female representatives in community management structures	Conduct survey with community water management/committee	Equal representation in all organizations where possible (in some locations cultural constraints remain a major barrier to meeting this target)
Environment/ Sustainability	• Amount of time with no water/sanitation/ hygiene services due to disaster	Conduct survey with community water management/committee	Services available at all times

* Collection of data should take place regularly so that any pre- and post disaster parameters can be taken into account. This ensures a better understanding of a community's ability to manage and recover from disasters.

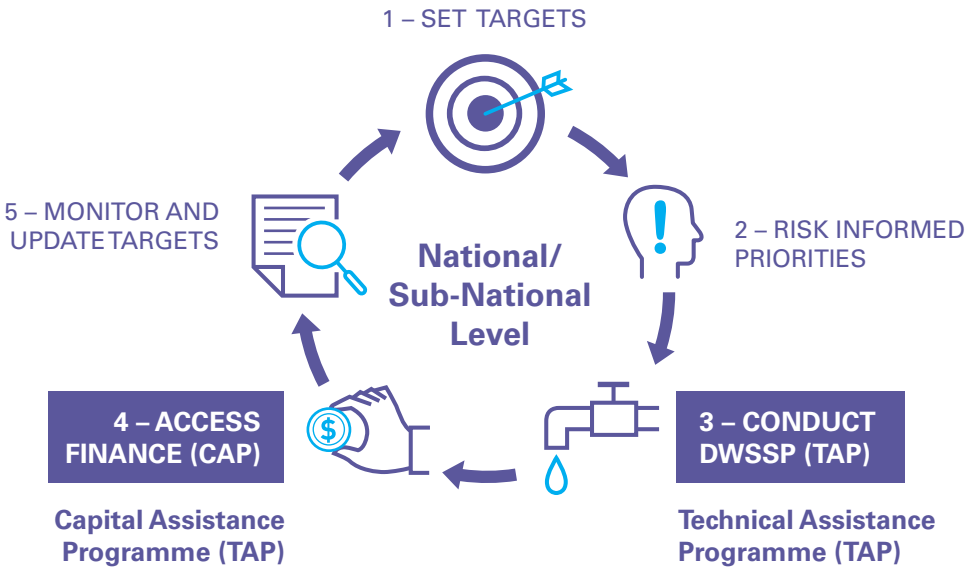
Risk-informed priorities



Setting targets, most likely on an annual basis by the relevant government ministries, provides goals and measures to aim for when coordinating/conducting WASH interventions. Using risk models to evaluate which parts of the population are most at risk of not meeting these targets provides a useful method for prioritizing how and where resources should be utilized. This is a significant benefit of using risk as part of programming, and is recommended to national/sub-national government officials as the primary means of determining where and what WASH interventions should be conducted.

Part 2 of these guidelines presents background material on understanding risk, and Part 5 provides a risk model and associated tools that can be utilized to prioritize risks. The reader is encouraged to use the model presented in Part 5 to conduct the required risk prioritization, or to develop a model more suitable to the specific needs of the local community/environment for conducting this step.

Technical Assistance Programme and Capital Assistance Programme



Once the location and relevant actions for WASH interventions have been identified through the risk-based process, it is time to start work at the community level. The WASH resilience model promotes two assistance programmes to beneficiaries to improve their WASH provision:

- Technical Assistance Programme (TAP) and
- Capital Assistance Programme (CAP).

Technical assistance should be provided from government and/or external implementing agencies to provide increased knowledge to communities about their water and waste systems, and the development of improvement and management plans through the Drinking Water Safety and Security Planning (DWSSP) method. Capital assistance is provided through finance for major system upgrades that have been identified through the DWSSP process, and are beyond the means of the community to implement. Both the TAP and CAP components are outlined below.

Technical Assistance Programme (TAP)

Providing technical assistance to community beneficiaries as a first step of engagement further promotes the principles of the WASH resilience approach. Providing an opportunity for the improvement of community management is a key step toward increasing the resilience of WASH services through the provision of DWSSP training. This training is important, as DWSSP is a facilitated planning method that includes the community from the start of the intervention. Conducting community management capacity training as a first step in the intervention provides an opportunity for the community to understand what gaps they have in their system, and highlights simple actions they can take whilst planning for infrastructure provision. The combination of these factors aims to improve local ownership, and hence improved chances of sustainability, which is key to mitigating the health risks for the community.

Note: Although ongoing surveillance is discussed later in this section, it is highly recommended that ongoing technical support is provided to communities undertaking DWSSP and making improvements to their systems. This should be planned for, and should have officers made available to support as needed.

What is the Drinking Water Safety and Security Planning (DWSSP) approach?

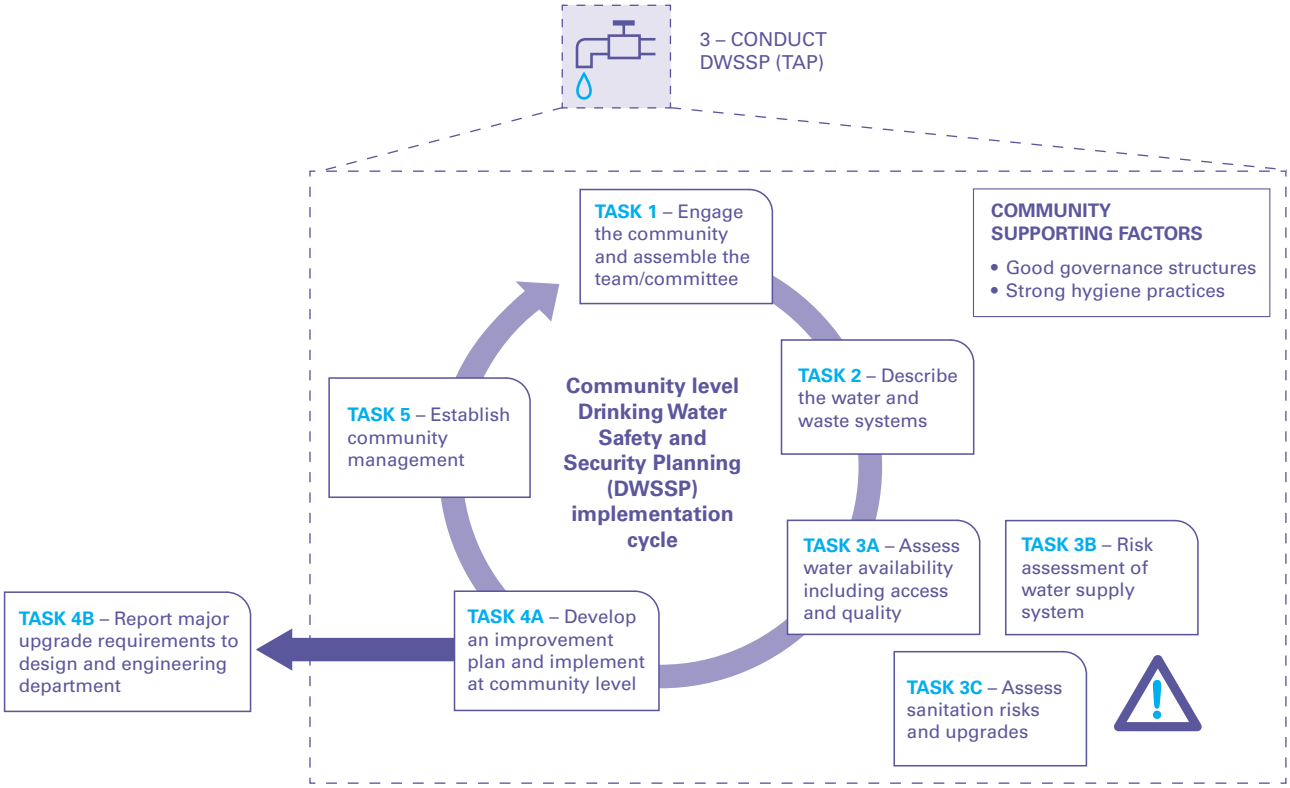
The DWSSP approach is a facilitated planning method conducted at the community level to understand required water and sanitation improvements. The three key areas of evaluation include:

- understanding current water access and availability,
- looking at the required sanitation upgrades, and
- identifying and managing risks to the water and waste systems.

The DWSSP is implemented at the community level through the cycle outlined in Figure 3.2.

Note: A detailed description of the DWSSP process, and how to implement the approach, is presented in Part 4 of these guidelines

Figure 3.2 WASH resilience implementation at the community level



Having an established facilitated planning method that references national and international standards has many benefits. First, the community can actively engage in the planning process and gain much knowledge about their system, including knowledge of water supply and demand, requirements for sanitation provision, and risks to the safety of their drinking water that can be used as a trigger for improved management. Beyond the community, adopting this planning approach across the sector as a whole also has benefits, as summarized in Table 3.2.

Table 3.2 Benefits of integrating DWSSP in the national planning cycle

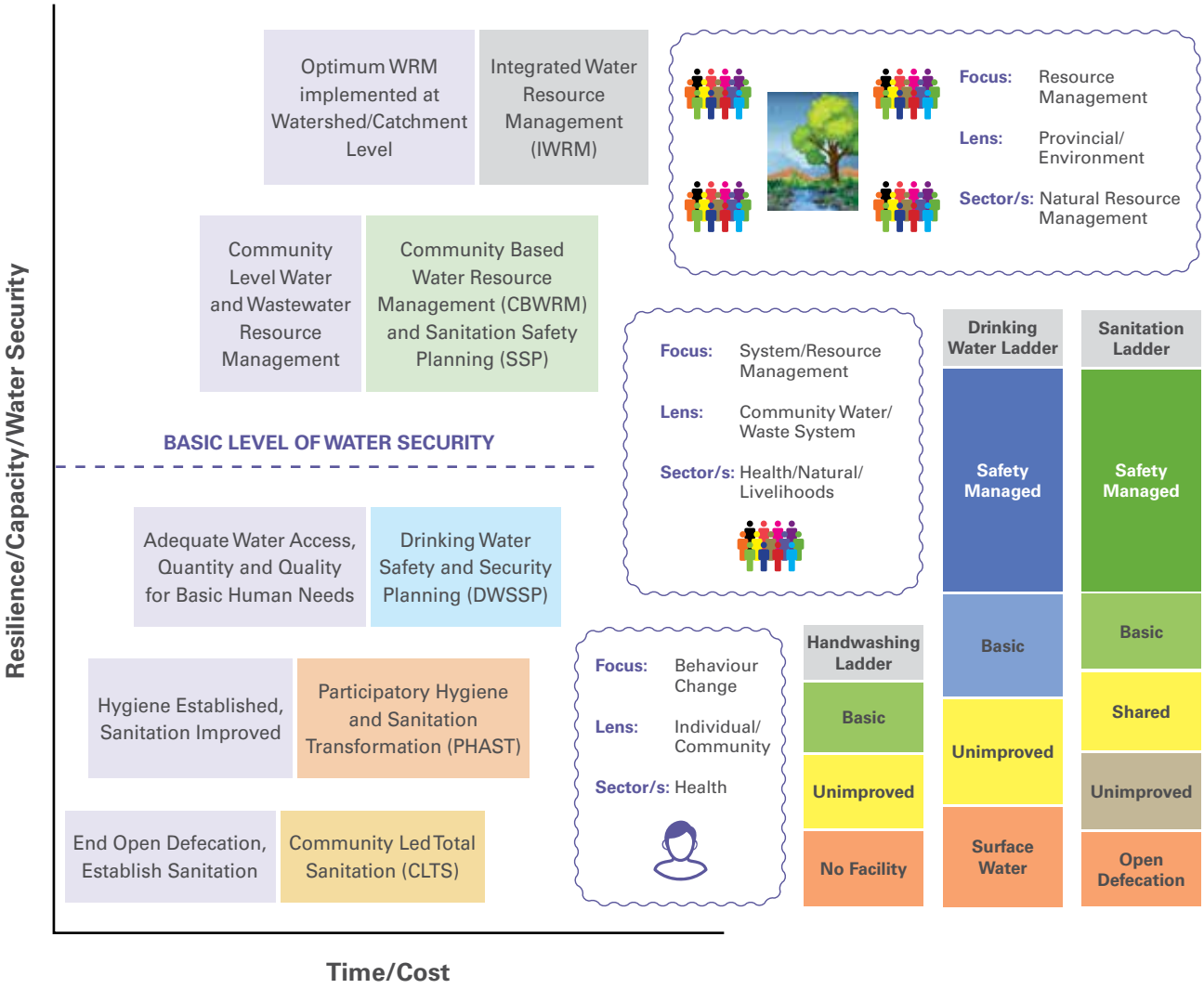
Benefits for the community	Benefits for sector planning
• Provides an understanding of community water and waste systems • Teaches the community about water supply and demand • Teaches risk management as water is typically not treated, and, therefore, managing risk is even more important • Promotes ongoing operation and maintenance by using health principles as a triggering mechanism • Informs the community on how inadequate sanitation impacts the health of the community population	• Water availability including quantity and access are planned against known standards (either national government or international standards) • Increased water provision, storage and distribution decisions are made based on assessments, not desired increases • Sanitation improvements are based on waste quantity requirements and risk assessments • Climate and water-quality risks are integrated into planning • Planning is standardized and undertaken from a community consumer perspective, and, therefore, equity is placed at the centre of planning by the community

To summarize, the DWSSP provides a standardized approach for promoting community water and waste system management, using health risks as a trigger, and a way of determining required infrastructure upgrades based on known standards. This has the dual benefit of promoting sustainability at the community level, and providing a framework for government and other implementing partners to direct resources for undertaking rural water supply and sanitation provision.

What intervention is required?

It is commonly asked where DWSSP fits into other WASH work being undertaken at the community level. DWSSP focuses on improving water and waste water system management. As a result, it is most effective when a community has pre-established sanitation and a functioning water system combined with good hygiene practices. However, the approach can be used in communities that do not have these elements in place. Figure 3.3 shows where DWSSP fits in the WASH development cycle for achieving a basic level of water security. This WASH ladder provides an overview of where DWSSP would be most effective. However, DWSSP can be used to support any community intervention, even one with limited prior knowledge and/or infrastructure.

Figure 3.3 DWSSP and the WASH development ladder to achieve basic level of water security



As a pre-requisite to conducting DWSSP, it is recommended to conduct refresher hygiene training if these practices are not established. Ideally the community should have pre-existing infrastructure, although DWSSP is a very useful tool in the design of new systems. If no sanitation system exists, then community-led total sanitation (CLTS), participatory hygiene and sanitation transformation (PHAST) or something similar can be considered as an initial intervention.

Capital Assistance Programme (CAP)

In addition to providing technical assistance to communities, it is recommended that the national enabling environment establish a mechanism for providing capital assistance to beneficiaries. A CAP helps a community improve the safety and security of its water and waste systems, and ultimately helps improve the resilience by providing financial assistance where there is a need is beyond a community's means. A completed DWSSP is a recommended method to show the requirement for such a need, and can be a pre-requisite for making an application in order to provide an aspect of quality assurance. This is encouraged as an approved DWSSP ensures that:

- The requested financial assistance addresses priority risks to providing safe and secure drinking water.
- The requested financial assistance is for a sustainable upgrade or improvement option.
- The community has done everything possible itself to address the priority risks, but still falls short of what is needed.
- The community is operating and managing its existing water supply appropriately within its means.

The setup of such a financing mechanism could be conducted by any agency that is best placed to provide such a function. Ideally the national government would provide such a provision and coordinate the required activities. However, donors and other agencies can provide the financial assistance if more suitable in a specific context. This section outlines some key considerations when setting up a CAP.

Eligibility

Although a DWSSP provides a list of requirements, additional eligibility criteria for applying to a fund should also be established. This could include many different criteria, but some important ones include:

- Is the system under consideration owned and operated by the community for the benefit of all?
- Does the community WASH setup conform with applicable laws relating to WASH within the country?
- Does the plan in the DWSSP include the continued ongoing financial and operational management of the system?
- Is the water supply only to be used for drinking and essential human needs?

This list can be expanded according to context. However, when setting up a CAP scheme, it is important to develop a set of guidelines that clearly defines who and what is eligible and not eligible to apply for financial assistance.

What can assistance be used for?

When considering eligibility criteria, it is also important to define what the financial assistance can be used for. This can be defined by the organization responsible for providing funding, and some recommended criteria for what financial assistance can be spent on includes:

- investigations, such as drought assessment or drinking water quality testing;
- construction of water or waste system components, e.g., tanks and pipes;
- purchase of essential equipment where appropriate; and
- training provision for items not included in the DWSSP training.

As mentioned, it is also recommended to define what financial assistance cannot be spent on, such as ongoing operational costs, items for individual households and salaries. It is important to spend time properly defining and documenting costs to be covered and costs not to be covered before establishing a funding source for submissions. These criteria should be appropriate for each enabling environment context.

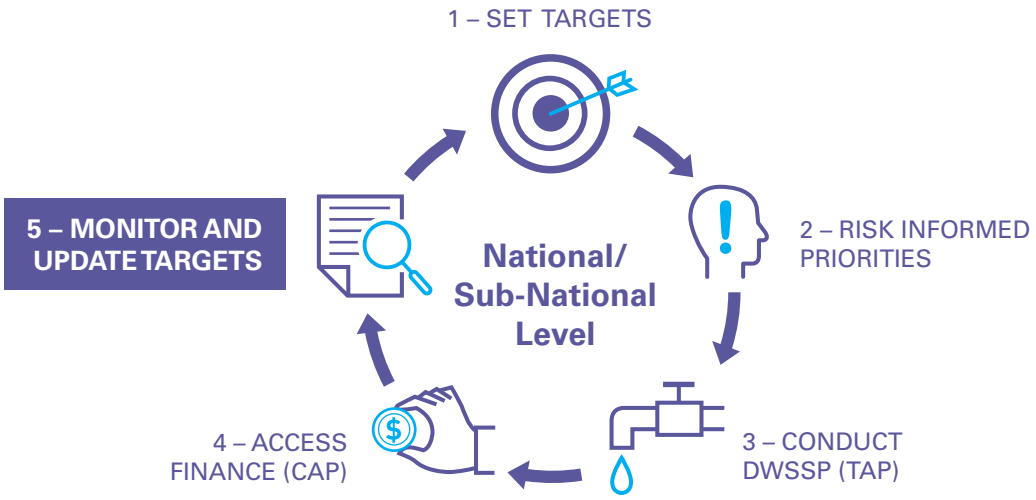
Prioritizing and processing applications

The final step is to consider the prioritizing and processing of applications for funding. The process of prioritization can be based on several factors. In these guidelines, it is recommended to follow the risk prioritization procedure outlined in Part 5 to designate who should receive funding first, based on the DWSSP that has been conducted. This is determined by risk factors associated with water security (access and availability), water safety (quality), and sanitation. The procedure provides a logical method that can aid in effectively utilizing limited resources. Other factors, such as logistics, are also important and can be weighed against the WASH risk presented.

As well as prioritizing, thought should be given to how applications are processed. An assessment committee with suitably qualified and authorized staff needs to be assembled and the associated procedures to follow to be defined. The assessment committee will need to check that all the relevant documentation is in order, provide a risk category for prioritization, and write letters informing applicants on the outcome. Reporting at regular intervals on how the funds have been allocated is also encouraged.

Monitoring and updating

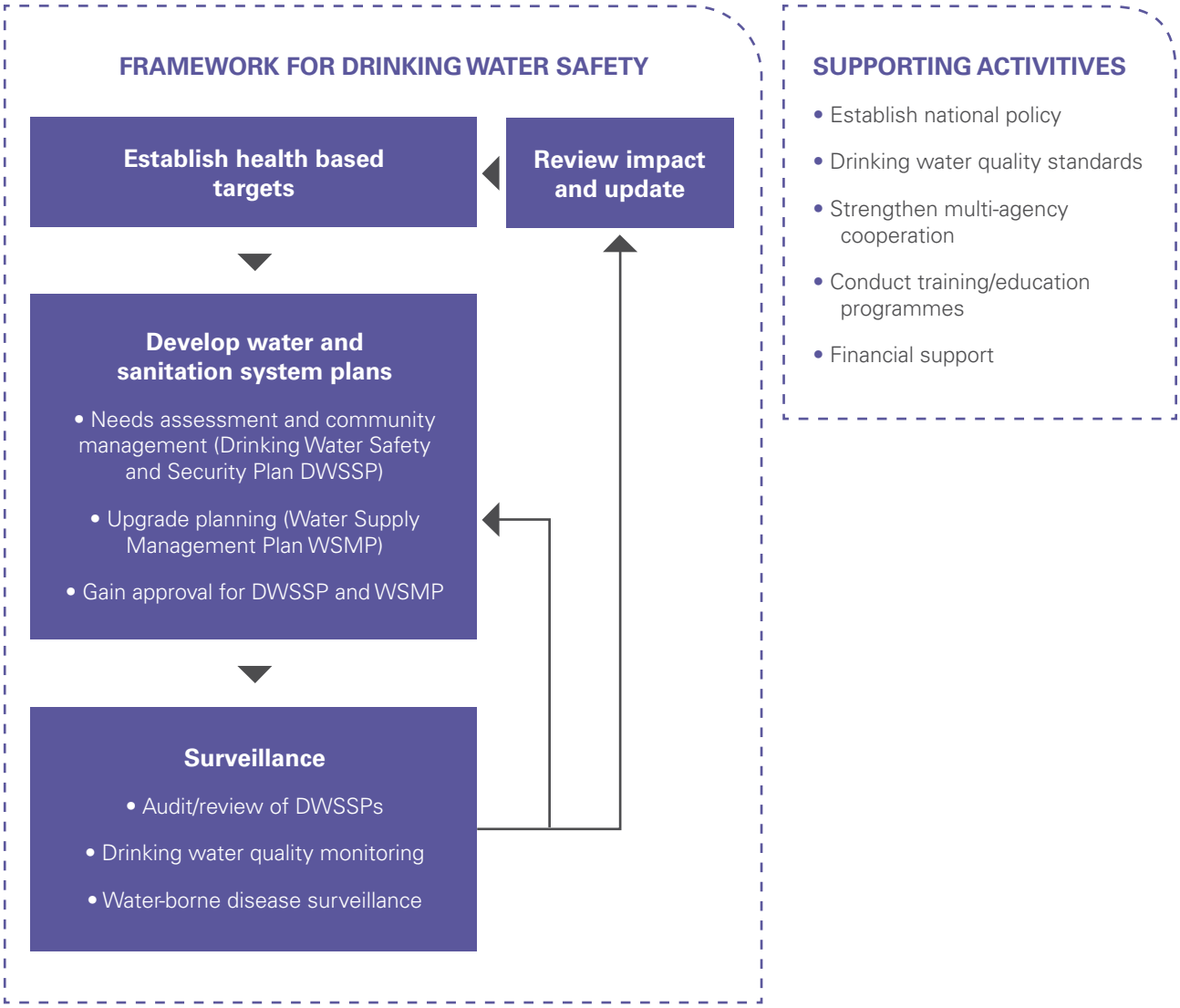
The final step in the national/sub-national process is monitoring the progress of the WASH interventions against the targets set. This information can be obtained through several processes but the most common ones are project surveillance activities and monitoring. Surveillance activities are discussed in the section following, and DWSSP project monitoring is covered in Part 4 of these guidelines.



Surveillance

Surveillance is identified by WHO as a key activity in its framework for providing safe drinking water (*see Figure 3.4*).

Figure 3.4 Framework for Drinking Water Safety (WHO, 2011)



As highlighted in Box 2, surveillance is an investigative activity undertaken to identify health risks to the public. It can also be used to verify the effectiveness of interventions being undertaken, especially in relation to the development of DWSSPs and the associated improvement activities. The principal surveillance activities to be established at the national level include waterborne disease and drinking water quality surveillance.

Box 2 Drinking water surveillance definition

"An investigative activity undertaken to identify and evaluate potential health risks associated with drinking water. Surveillance contributes to the protection of public health by promoting improvement of the quality, quantity, accessibility, coverage, affordability and continuity of drinking water supplies. The surveillance authority must have the authority to determine whether a water supplier is fulfilling its obligations." (WHO, 2011)

Waterborne disease surveillance

The relevant systems to detect, notify, record and investigate cases of waterborne disease is an essential part of the Framework for Drinking Water Safety, and a primary aim of WASH programming is to improve these statistics. This activity is usually undertaken by the national ministry of health, and if this activity is not in place, actions should be taken to try to put this in place. External assistance can be provided to help establish this. Reliable disease data is important for setting health-based targets and measuring incremental progress towards these targets.

Water quality surveillance

Water quality surveillance provides an independent mechanism for assessment, the principle purposes of which are to validate that interventions in communities using DWSSP have improved water safety and to provide data for the risk prioritization process. This assessment is usually undertaken by the ministry of health or another national agency. Focus is primarily on microbiological contamination, E. coli in rural areas with the inclusion of free available chlorine in managed systems. Water quality surveillance is useful as an additional measure of checking that DWSSP implementation is successfully achieving its objective. Water quality surveillance that detects poor results should provide a trigger to investigate why the DWSSP or WASH intervention is not succeeding. There are some pre-requisite requirements for effective drinking water quality surveillance:

- access to laboratory/analytical facilities,
- staff who are adequately trained to undertake sampling,
- capacity to assess findings,
- capacity to report to water suppliers and communities, and
- capacity to follow-up to ensure that adequate action has been taken as a response.

If water quality surveillance is not currently being undertaken in a country, it is recommended that actions are taken to align resources to establish this activity.

Re-evaluate/Update WASH targets if required

Often results obtained do not achieve all of the project/programme aims. At this point, it is important not to be too disappointed. It is an opportunity to conduct the correct project/programme management actions in order to improve going forward. Organize a meeting with the relevant personnel to look through the results, and to acknowledge any gaps in the results. Then work to determine how the results could be improved. Perhaps the targets were too ambitious for the level of resources available, but targets can always be adapted if required, or the data can be utilized to plan effectively to obtain the necessary resources to achieve the WASH targets that have been set.

In summary

To ensure that all communities in the Pacific receive assistance in achieving water and sanitation targets, effective enabling environments and robust national/sub-national processes need to be in place. The WASH resilience approach promotes establishing key support factors, such as effective policy, sector coordination and appropriate financing; combined with an implementation process that promotes allocating resources using risk, and providing both technical and capital support to communities in order to achieve resilient WASH targets.

Aileen Tavetia, 5, plays with a coconut at the area of Vaitupu Island that was badly damaged by Cyclone Pam. The big waves destroyed Aileen's family garden, kitchen and pigsties. Vaitupu Island, Tuvalu.

Children showing off their WASH education materials after an awareness session with Medical Services Pacific WASH educator.

PART 4

WASH RESILIENCE IN COMMUNITIES

Purpose of Part 4

To provide government and NGO/CSO officers with the knowledge and skills to undertake interventions for WASH resilience at the community level.

Summary

This part contains the following information:

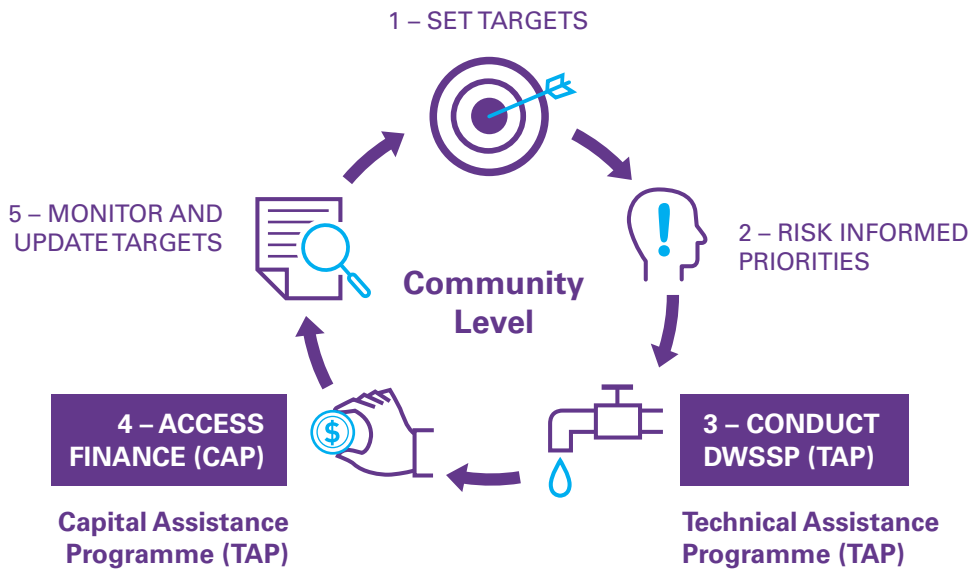
- Introduces the recommended community-level implementation process for WASH resilience and factors to support this
- How to conduct DWSSP within communities
- Recommended design and construction information for required infrastructure
- Monitoring resilient WASH interventions at the community level

Who is this for?

Beneficiaries (communities, individuals)	Civil society (NGOs, CSOs)	Government	Donors/Private sector/External agencies
Provides instructions for community management.	Provides full instructions on how to undertake resilient WASH community interventions.	**Implementing staff:** Provides full instructions for how to undertake resilient WASH community interventions. **Regulators:** Provides an understanding of community-level interventions.	Provides an overview of community-level interventions.

Community-level process for WASH resilience

Resilience at the community level is key for ensuring beneficiaries receive sustainable water and sanitation services that can adapt to shocks and processes of change. The national/sub-national-level processes support coordination and service provision to the WASH sector, but it is the infrastructure and the capacity of communities to manage their system that delivers the needed health impacts in Pacific communities. As such, this part of the guidelines covers the community-level component of the WASH resilience approach. This includes outlining factors that promote resilience in communities, provides a how-to guide for implementing DWSSP in communities, and presents recommended resilience concepts for the design and construction of WASH infrastructure. All of which combine to improve the sustainability and resilience of community WASH services.



The information in this part provides the details of TAP and CAP in the overall national/sub-national-level process. It is designed for implementers involved in the provision of technical assistance to the community, primarily via the DWSSP approach. This involves conducting technical training in the community, and the developing DWSSP plans and documents owned and enacted by the community. This is a key part of the WASH resilience approach, ensuring that communities understand that they are the managers of their water and waste systems. Conducting DWSSP in a facilitated manner at the start of any intervention is a key step to embedding sustainability early on.

The successful completion of the training and development of a DWSSP also provides a framework for the required infrastructure for communities. As mentioned earlier, this provides substantial benefit in understanding the resource requirements for the sector, and is a recommended step for the development of CAP, as outlined in Part 3.

Local factors supporting WASH resilience

The majority of WASH systems in the Pacific are isolated from government service provision and are managed by community committees. As such, the principal factors that can support resilience at the community level are associated with the current level of resources and infrastructure, the knowledge and skill level of the community members, and how the community is organized.

Strong governance structures

Strong governance structures relate to committees or groups of people that are responsible for decision-making and organization in the community. Traditionally, in the Pacific, these have included a number of committees covering key areas such as water, health and social factors. A designated WASH committee, with an appropriate gender balance (see Insights 2), that is mindful of the needs of all groups in the community should be established to improve WASH resilience at the community level. In addition, documented plans, such as a DWSSP and suitable preparedness planning improve the resilience of the community.

Insights 2 The importance of inclusion and a cautionary tale (*String et al., 2017*)

"Women lead the way"

Fiji – One DWSSP village water committee discussed the role of women on the committee: "I didn't know how much our water system would improve just by including women. It is the women that insist that we clean all of our sources. It is the women who made sure that even people on the edge of the village who did not have a water source now have a water source because we made new springs for them. I now see that it is important that we include women as equals on this committee."

"A cautionary tale"

Vanuatu – Many of the DWSSP trained communities in Vanuatu had slipped on maintaining accurate records of Water Committee membership. Furthermore, positions were frequently not filled when vacated due to the committee sense that the job of maintaining the water supply fell to the Village Plumber. Clear expectations and defined roles are important.

Community WASH knowledge and skills

WASH knowledge and skills at the household level help contribute to resilience in the community. Strong hygiene behaviours, knowledge of appropriate household treatment and storage, and operation and maintenance of community infrastructure all help improve the resilience of WASH practices and management at the community level. A primary purpose of the DWSSP intervention is to reinforce or establish these skills.

Adequate resources

Having adequate resources in place increases the resilience of communities. This can include financial, infrastructure/materials, environmental and human resources. Having funding set aside, well established infrastructure, good water resources, and community members trained to maintain the system, all help establish the resilience of the WASH system to shocks and other processes of change.

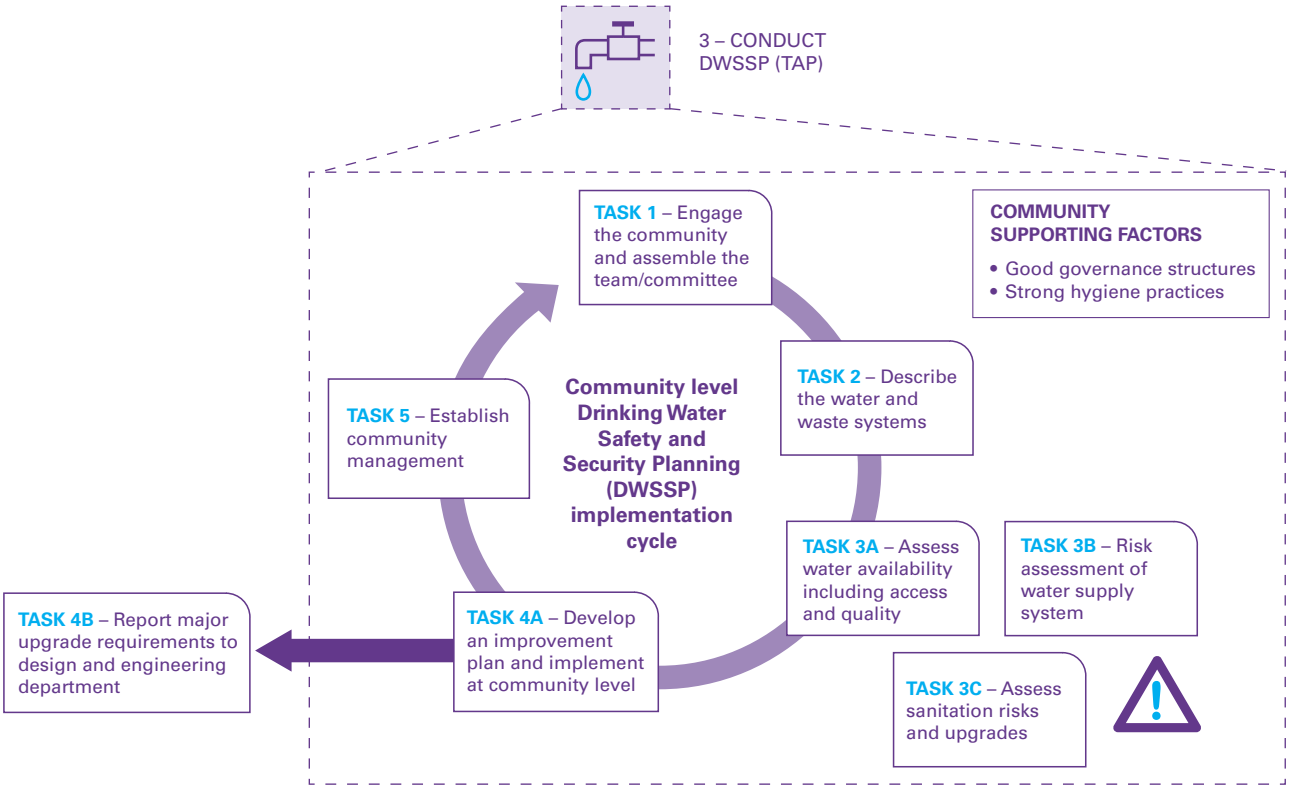
Conducting DWSSP training

Although the factors listed in previous sections provide useful existing skills and capacity for resilience, comprehensive management of the water and sanitation system, understanding of the health risks associated with this, and appropriate infrastructure are the most effective ways to provide sustainable and resilient health impacts in the community. To achieve this, community governance structures sometimes require training support to transfer the relevant knowledge and skills, and to identify what additional infrastructure is required. The WASH resilience approach recommends using the DWSSP method within target communities to achieve this. The DWSSP approach consists of five principal tasks:

- Task 1 – Engage the community and assemble a team/committee
- Task 2 – Describe the water and waste systems
- Task 3 – Conduct water and waste system assessments
- Task 4 – Develop an improvement plan and implement at the community level
- Task 5 – Establish community management.

Figure 4.1 presents the five tasks in DWSSP implementation cycle. The remainder of Part 4 explores each of these tasks in detail, outlining the implementation method to facilitators, and providing information on the development of required infrastructure associated with the DWSSP.

Figure 4.1 WASH resilience implementation cycle at the community level



In addition to establishing community management capacity, new infrastructure is often required to manage the water and sanitation risks, and this can be beyond the capacity of the community to implement. Upgrades that are beyond the means of the community should be reported to a relevant government design and engineering department or CSOs (see Task 4B in Figure 4.1). As necessary, requests for assistance can be delegated from government to external implementing organizations as required. After covering the implementation methodology for conducting DWSSP in communities, embedding resilience principles in the design, financing and construction phases is also covered in this part of the guidelines.

Pre-requisites to DWSSP training

Conducting DWSSP training is a key part of embedding WASH resilience at the community level. By training a community to understand its water and sanitation system, including what the gaps are in service provision and the relevant health risks, as well as outlining how to operate and maintain the system, key knowledge can be established that allows the community to adapt to many different situations and scenarios. This section presents the steps in the DWSSP cycle that a community can use to manage their system, and, with the support of an implementing organization, this can be used to plan for upgrading the water and waste infrastructure.

Before undertaking DWSSP training, it is important that the community is aware of and understands its engagement within the programme. It is recommended that a pre-training visit to the community is undertaken before any long-term engagement begins. This is to provide potential community participants with the context for the work to be undertaken, an overview of the programme, and an outline what requirements will be asked of them for participation. The suggested workshop agenda for a pre-training visit is presented in Table 4.1. Key topics to cover during this visit include:

- How WASH links with health – setting the scene for how WASH is key for maintaining good health
- The overall WASH resilience method – explaining how a community is selected for inclusion in the training, what the process of improving their management capacity and infrastructure is, and what will be required of them
- How to either establish or strengthen a water committee that will be the primary beneficiary from the training
- Determining whether a community wants to engage in the programme or not

Ensuring that a community understands what is expected of them, and preparing them in advance for the training by establishing a water committee can have a huge impact on the success of DWSSP. Training material to aid with this pre-visit can be found in the DWSSP implementation toolkit in Part 5 of these guidelines and online.

Table 4.1 Recommended workshop timetable for pre-training visit

Day	Session 1 (approximately 1 hour)	Session 2 (approximately 1 hour)	Session 3 (approximately 1 hour)	Session 4 (approximately 1 hour)
1	Introduction to WASH and health	Introduction to the WASH Resilience Programme	Establishing and strengthening water committees	Feedback and community agreement

Set yourself up to monitor

Once targets have been set as discussed in Part 3, it is important to set up a system to monitor the progress during work with a community. Monitoring templates can be developed to suit a variety of needs; however, it is recommended that they be designed to capture data at different points in time. When initiating WASH work within a community, the aim is to bring about a change in community life that leads to the benefits outlined. In order to understand the change, information must be monitored both before and after the intervention. This is commonly known as baselining (before) and post-intervention (after) monitoring. Setting up a monitoring template to capture this can make life much easier during the intervention. The DWSSP community monitoring form, included in the Part 5, implementation toolkit and in Figure 4.2, provides an example of setting up a template for baselining and post-intervention monitoring.

Figure 4.2 Example of baselining and post-intervention monitoring of WASH targets

Community Details (in Part 5, p 102)	
Village Name	
Address (Inv District, Province)	
No of Households	
Village Population	
Village Contact Person	

SECTION A – Drinking Water and Sanitation System

DRINKING WATER SYSTEM

1. Drinking Water Safety

Purpose – To identify if the community drinking water is safe and what changes have occurred as a result of the DWSSP intervention

Water Quality Parameter	**Baseline Date:**			**Key Actions/ Upgrades (Please List)**	**After Intervention Date:**		
	1	**2**	**3**		**1**	**2**	**3**
Conductivity (µS/cm)							
pH Value							
Thermotolerant Coliforms (# per 100mL)							
Turbidity (NTU)							
Other information							

Note: The numbers 1,2 and 3 represent different water quality samples

Recommended training schedule

After a successful pre-training visit where a community agrees to receive training support, it is time to take the relevant baseline monitoring information. Following this, DWSSP training can be scheduled at a time suitable for both parties. DWSSP training involves five tasks (as shown in Figure 4.1), which are outlined in the remainder of this section. Each of these tasks is presented in a consistent manner and includes:

- why the task is undertaken (purpose),
- key learning points for communities (how to do it), and
- overview of key implementation steps to conduct during the training.

There is a lot of information to cover in the community training and it is up to the implementing organization to determine how it would like to undertake this effort. Table 4.2 outlines a recommended training timetable that covers all five tasks in one visit. This can be shortened, lengthened or split into sessions as necessary to suit the needs of the community. The key outcomes are that the community members' knowledge of their water and sanitation systems is improved, that they understand the required management actions, and that these are documented within their DWSSP. Additional training topics, e.g., environmental health, can be included as required.

Table 4.2 Recommended workshop timetable for DWSSP training

Day	Session 1 (approximately 1 hour)	Session 2 (approximately 1 hour)	Session 3 (approximately 1 hour)	Session 4 (approximately 1 hour)
1	Introduction to DWSSP	Task 1 – Assembling the Water Safety Planning Team	Task 2 – Describing the Supply & Community Mapping	
2	Task 3A – Assess Water Availability Water Supply System		Task 3A – System Improvements for Water Availability	
3	Task 3B – Risk Management – ID Hazards and Control Measures	Task 3B – Risk Management – Assess and Prioritise Risk	Task 3B – Risk Management – Identifying Improvements and Planning	
4	Task 3C – Assess Sanitation Risks		Task 3C – System Improvements for Sanitation	Task 4 – Develop Improvement Plan
5	Task 5 – Establish Community Management		Summary and Closing of Workshop *Community Q&A*	

Note: All implementation material is located in the **DWSSP** implementation toolkit, which is available in **Toolkit 2** in Part 5 and online. In addition to the DWSSP materials, there is an additional set of tools for **WASH Safety Planning** detailed in **Toolkit 3** of Part 5. This toolkit was developed for implementation in school environments in Kiribati and provides a simpler set of tools for implementation if preferred by the implementing agency. The remaining part of this section will utilize the **DWSSP** materials to provide an overview of the process.

Box 3 Useful definitions for DWSSP:
Water security, safe water and adequate sanitation

Water security – There are many definitions of water security used globally. These can be viewed in the UN-Water global analytical brief on water security (UN-Water, 2013). However, in this manual, the definition used is in the context of a water secure community/village. A water secure village:

- has enough water quantity of good enough quality for human basic needs inclusive of sanitation and hygiene;
- collects and treats its used water to protect humans and the environment from pollution; and
- has the ability to cope with the uncertainties and risks of water-related hazards for normal operation, pre-disaster preparation and post-disaster scenarios.

Safe water – Safe drinking water is free from pathogens and elevated levels of toxic chemicals at all times.

Adequate sanitation – "The provision of facilities and services for safe management and disposal of human urine and faeces; where the system hygienically separates excreta from human contact as well as safe reuse/treatment of excreta in situ, or safe transport

Task 1 – Engage the community and assemble the team/committee

Purpose – To assemble a group of people with local knowledge and authority to manage the system, and work with the implementing organization to make improvements.

Note: If a water committee is already in place, it is still important to go through this aspect of the training, as it can highlight essential key roles that the committee needs to ensure long-term management of the system.

How to do it

A. Assemble the team

B. Establish why the team is needed, what its roles are, and be prepared to add to the team if additional key skills are needed

C. Document the team

A. Assemble the team

Assembling the team means gathering together the relevant people required for the training. Ideally, this should have been agreed during the pre-training visit. If not, spend some time with the community determining and engaging the correct people who will be available to undertake the training and will be able to take on a committee role in the future. It is highly recommended that a gender balance on the committee be established to ensure the needs of all community members are met.

B. Why do we need a team? What are its roles?

Once the team is assembled, it is important to set the context of why it is needed, and what is required.

Why do we need a team/committee?

To have a group of people with local knowledge of the system to:

- operate, monitor and maintain the system on a daily basis;
- identify the community's needs in relation to water and sanitation through the DWSSP training;
- ensure water supply needs are balanced against other priorities;
- ensure the system is managed by people with local knowledge and experience;
- provide a focal point for communication with external stakeholders, e.g., government, NGOs and CSOs;
- provide resources that can be called upon when needed;
- raise awareness within the community on issues related to water, sanitation and hygiene.

What are the key roles for the committee/community?

The main learning from Task 1 is establishing the responsibility that the water committee has in managing the water and sanitation systems within the community. This involves a number of activities/roles that are shown in Figure 4.3. Time should be taken to ensure that the committee/community understands the responsibilities it has moving forward. The general roles and responsibilities that are required include assessment and maintenance, planning of work, budgeting, and raising awareness of issues in the community.

Is this in good condition? – A water committee should be able to evaluate when action is needed. Would the water committee involved in the training take action if the water tank in Figure 4.4 was in their community?

Note: For communities with primarily household rainwater capture (RWC) and storage systems as their primary water source: In this situation, it is a good idea to run the training for the entire community rather than just for the water committee. Non-communal RWC systems are managed at the household level, which may be beyond the jurisdiction of the water committee to maintain. If this is the case, training the entire community will increase the chance that the infrastructure is maintained correctly.

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PHAST Training: Dividing community groups into separate gender groups in some PHAST training activities ensures women and men can express their opinions.

Figure 4.3 Common responsibilities for water committees

Figure 4.4 Example of infrastructure in a poor condition

C. Document your team

The final step in Task 1 is to document the team members and the role they will play in the committee. Figure 4.5 shows the section required in the DWSSP template, which is included in Part 5: Toolkit 2 – Drinking Water Safety and Security Planning (DWSSP) Implementation Tools.

Figure 4.5 Task 1 output in the DWSSP template

Drinking Water Safety and Security Plan

Section 1 – Water Commitee			
Name	**Current Role in Water Committee / Community**	**Skills Available / Interest in the Water Supply**	**Contact Details (Address/Phone/E-mail)**

Task 2 – Describe the water and waste water systems

Purpose – To describe and document the water and waste water systems in a way that provides a thorough understanding of the systems to facilitate a risk assessment, and to aid in understanding improvements required.

Note: Additional benefits include providing:

- a useful source of information for identifying hazards,
- information for planning, and
- a baseline description of the supply that allows the community to monitor changes and improvements.

How to do it

A. Understand the main parts of your water and waste systems

B. Gather additional details

C. Document your water and waste system descriptions

A. Understand the main parts of the water and waste systems

To accurately describe water and waste systems, a community needs to understand the main parts of each system.

The main parts of a community water system (*see Figure 4.6*) generally include all or some of the following:

- Catchment/source – e.g., spring, river, well, rainwater
- Treatment processes – filters or chlorination
- Storage and distribution – includes water tanks and standpipes/tapstands
- Consumers – how people store and use water in the household

Figure 4.6 Main parts of a water system

The main parts of a sanitation system (*see Figure 4.7*) include all or some of the following:

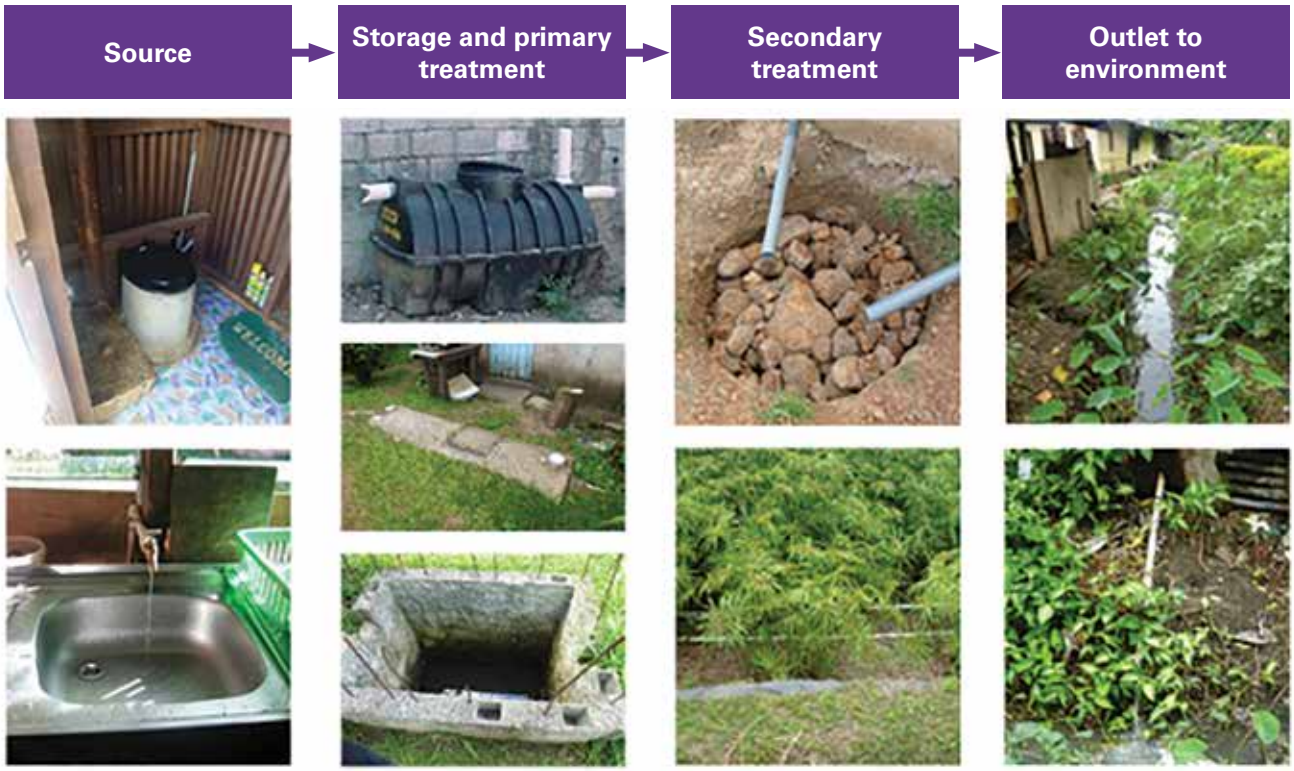
- Source – toilets
- Storage and primary treatment – e.g., pits or septic tanks
- Secondary treatment – e.g., leaching fields or wetlands
- Outlet to environment – drainage outlets

B. Gather additional details

Ensure that the following details are also considered and collected when describing the water and waste system:

- Community details
  - name of community
  - key people involved in managing the system
  - number of houses
  - any major works on the water and waste system

Figure 4.7 Main parts of a sanitation system



- List of the main parts of the water system (*see Figure 4.6*)
- List of the main parts of the sanitation system (*see Figure 4.7*)
- Key geographical features, e.g., marine areas, crop areas, high ground

C. Document your water and waste system description

There are several ways to document a water and waste system, including using a map, a flow diagram or a schematic. The most utilized method at the community level is a system map, as it allows for greater community participation. Therefore, system mapping is covered in this section, but examples of a flow diagram and schematic can be seen in Part 5, Toolkit 2 of the guidelines.

Why use a system map?

- Helps describe a community and identifies key assets (pieces of hardware)
- Shows external agencies information about the community
- Records and archives information about the water and waste systems
- Helps assist in planning for new parts of the systems
- Increases a community's understanding of its water and waste systems

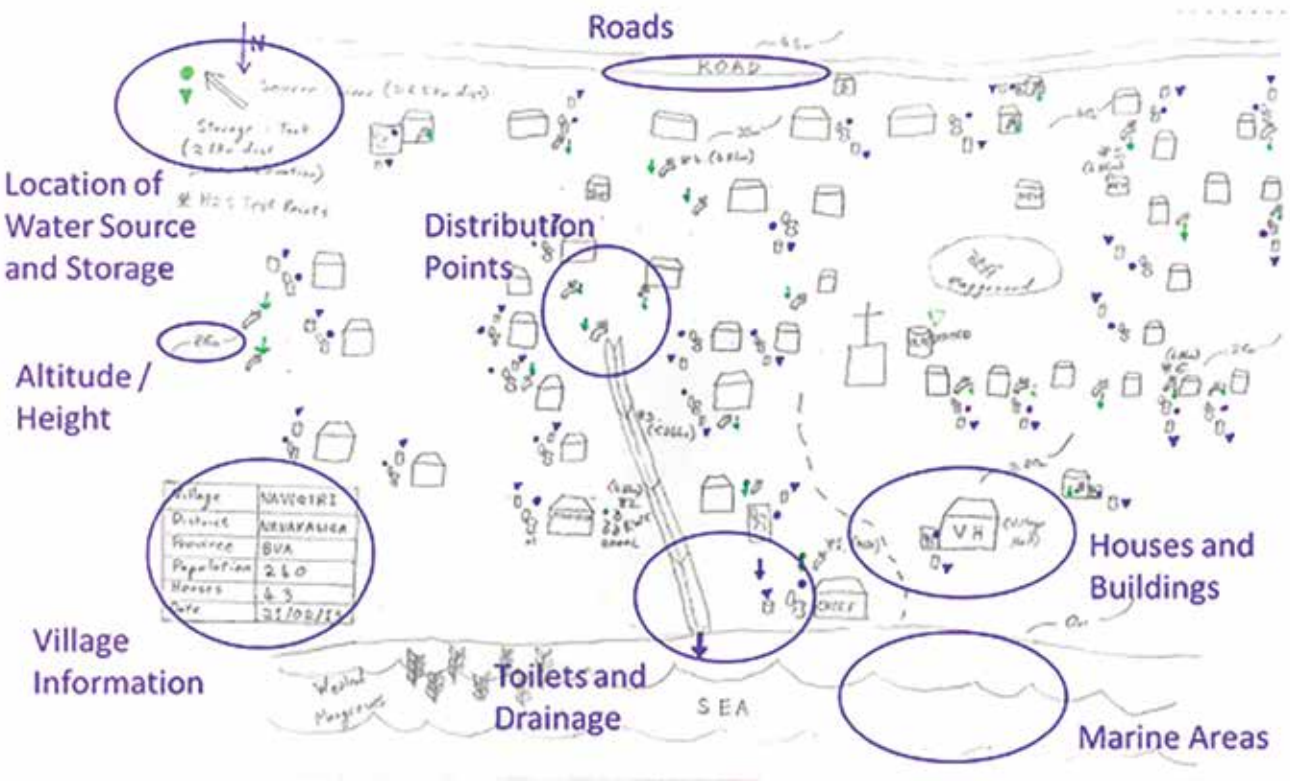
Developing a system map involves a few steps:

1. Develop your map symbols, e.g., a map key.
2. In groups (two are encouraged in order to provide improved feedback), using the symbols described, perform a transect walk making notes of the water and waste systems to generate a draft map.
3. Return to the training hall and draft a village water and waste systems map.

4. Draw in Section 2 of the DWSSP template, and complete the associated table (see Part 5, Toolkit 2).
5. Present back to the group.

An example of the desired output for Task 2 is shown in Figure 4.8.

Figure 4.8 Example water and waste systems map



Insights 3 Know your system, know what to do (*String et al., 2017*)

"Best Responders"

Fiji – During the operational research assessment, one DWSSP-trained community demonstrated to enumerators how they utilized their system map during a system inspection after Cyclone Winston to track which pipes and tap stands were damaged. As they repaired pipes, they made notes on their map, along with drawing the locations of new tap stands.

Task 3 – Conduct water and waste system assessments

This part of the DWSSP process is concerned with conducting a needs assessment to identify risks to public health, and identify the gaps between the current system and national/sub-national targets. A water secure village in the context of the WASH resilience programme is considered as the following:

- has enough water available of good enough quality for drinking and human well-being, inclusive of requirements for sanitation and hygiene;
- has the ability to cope with uncertainties and risks of water-related hazards, for normal operation, pre-disaster preparation, and post-disaster scenarios;
- collects and treats used water to protect humans and the environment from pollution.

To reach established targets in a comprehensive manner, conduct the three steps required in Task 3:

Task 3A – Assess water availability and access

Task 3B – Assess water system risks

Task 3C – Assess sanitation risks and upgrades

Task 3A – Assess water availability and access

Purpose – To assess what is needed to achieve water quantity and access requirements

How to do it

A. Water quantity – How much do you need? Establish demand

B. Water quantity – How much does the current system supply? Establish supply

C. Water access and storage requirements

D. Identify your needs and document

A. Water quantity – How much do you need? Establish demand

The first part of assessing water availability is to facilitate the demand/need of the community in terms of water quantity. This starts with looking at how a community uses water. The main uses of water within communities include: **drinking, flushing of toilets, bathing and hygiene, cleaning and cooking**. WASH resilience looks at the water requirements for drinking and human well-being. This does not include water required for growing food, which is outside the scope of these guidelines. The WHO guidelines recommend that for good health, each human being should have access to 50 litres of water every day. This can change depending on different countries, so check national standards before implementing. As we evaluate the water availability needs of a community population, a calculation for the daily needs of the community, which represents the demand, is required. This is obtained by performing the calculation shown in Figure 4.9.

Figure 4.9 How to calculate community demand

How do we calculate?

Population number

X

50 litres
(WHO recommended.
Can change by country)

=

Total number of
litres per day

B. Water quantity – How much does the current system supply? Establish supply

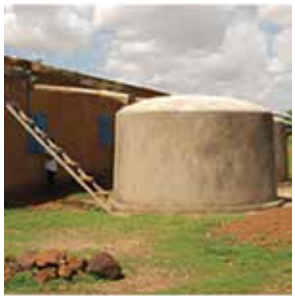
After establishing the required demand of the community, it is important to see what supply the current system provides. Before performing these calculations, it is important to outline the main sources of rural water. Figure 4.10 outlines the main sources and their relative advantages and disadvantages.

Once these sources have been documented and understood by the community, the current supply can be calculated. Calculating current supply usually falls into two categories of calculation: one is for rainwater capture (RWC) and storage, and the other is for reticulated/piped or groundwater systems. The supply for RWC is calculated against rainfall and the number of buildings collecting rainwater and roof surface area, as shown in Figure 4.11 (A). To perform this calculation, it is important to obtain data about predicted rainfall in the area/province from the relevant national agency. The second type of supply is calculated using flow rate assessments at distribution points for surface/spring and groundwater sources as shown in Figure 4.11 (B) and (C). Measurements using known volume containers and stopwatches will allow the measurement of the flow rate in litres/minute.

When considering the evaluation of flow rates in a reticulated/piped system, it is important to consider which parts of the system to measure. Rural WASH systems typically consist of a source with piping to a storage tank, then a reticulated system to distribution points (*see Figure 4.12*). When assessing minimum flow rates for this type of system, it is important to consider both the flow rates from the source to the storage, and the flow rates from the storage to the distribution points. The source generally has the option to run for 24 hours a day filling up a storage tank that can be drawn off as required. For example, if 5 litres per minute is measured from the source to the storage tank, and it can run all day, then this will supply 7,200 litres in a 24-hour (1,440 minute) period. Is this enough to provide for the demand of the community?

If the source provides enough to the storage tank, then flow rates can be considered at distribution points. Often 10 litres per minute is recommended to satisfy consumer requirements. If a consumer utilizes 50 litres of water a day, then she/he would not have to wait more than five minutes with such a flow rate, which is generally considered acceptable access to water in varying guidelines and standards of different countries.

Figure 4.10 Main water supply options with advantages and disadvantages: (A) rainwater capture and storage, (B) gravity-fed spring or surface sources, and (C) groundwater sources



A. Rainwater capture and storage

Collection of rainwater mainly on roof stuctures

Advantages:

- Cheap and easy to construct
- Low maintenance costs
- Clean if collection surfaces are well maintained

Disadvantages:

- Can be contaminated by bird droppings and unclean roofs
- Poor storage conditions can lead to breeding grounds for mosquitos

B. Gravity OR indirect gravity-fed system

(usually from surface or spring source/s)

From either **spring or surface (e.g. river)** source

Advantages:

- Use of gravity means no pumps are required
- Low maintenance costs
- Consistent level of supply

Disadvantages:

- High construction costs due to long piping and difficult terrain
- Supply can dry up in drought periods

C. Groundwater

From either a **hand-dug well** or **borehole**

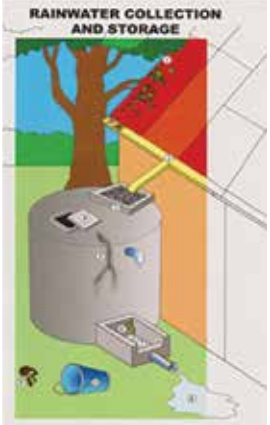
Advantages:

- Cheap materials can be used
- Communities can build themselves
- Generally good yields where available

Disadvantages:

- Can be time consuming to construct and could collapse if not supported
- Unless capped or protected can be vulnerable to contamination

Figure 4.11 How to calculate current water supply: (A) rainwater capture and storage, (B) gravity-fed spring or surface sources, and (C) groundwater sources (Part 5, section 3B, p. 107)



A. Rainwater capture

Supply =

Number of buildings collecting x

Roof area of building (m^2) x

Rainfall per year (2 m in Fiji)

= Supply per year (m^3)

x 1000 = **Supply (litres)**

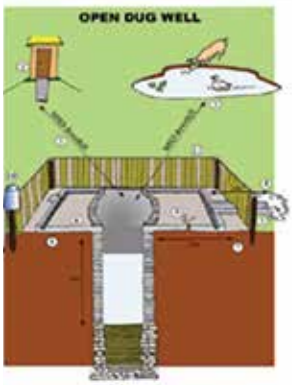
B. Surface/Spring water

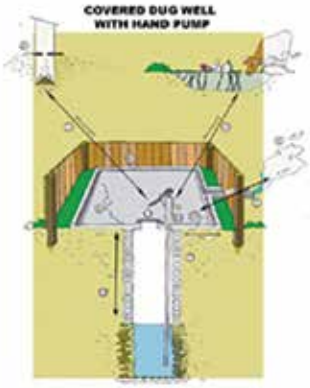
Supply = Usually high

Check by measuring flow rate at distribution point, known volume container and stopwatch

Minimum =
6 litres per minute

Good =
>10 litres per minute





C. Groundwater

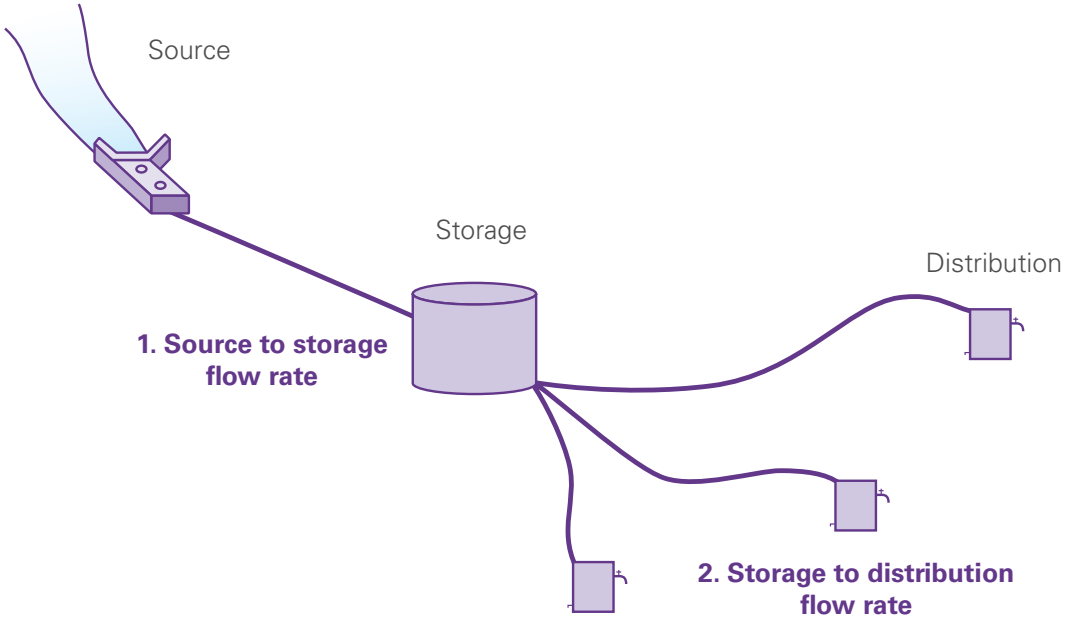
Supply = Usually medium

Check by measuring flow rate at distribution point, known volume container and stopwatch

Minimum =
6 litres per minute

Good =
>10 litres per minute

Figure 4.12 Flow rates in reticulated/piped water systems



Insights 4 Pinpoint the problem (*String et al., 2017*)

"Know your numbers to know what you need"

Vanuatu

One DWSSP-trained village shared the proposal documents that they were using to lobby the local government for funds to construct a larger catchment reservoir. The proposal was based on population growth and demand calculations that indicated the per person water quantity was below guidelines.

Another village that was not trained to use the DWSSP process had been attempting to fundraise to purchase larger storage reservoirs. Conducting quick calculations from the DWSSP templates with the survey team, it was discovered that the source flow rate and storage tanks were large enough to supply the water demands of the community. Upon further investigation, it was determined that the flow rate from the storage tank to the distribution point was too low due to insufficient head pressure. Conducting DWSSP with the community would have identified this issue and led to a different conclusion of what was needed to address the supply shortage.

A third example is from a DWSSP-trained village that used the flow rate calculations and demand requirements to remove five tap stands that had been added ad hoc to their distribution system. After those tap stands were removed, the pressure at the remaining tap stands increased the flow rates, which made system useable again.

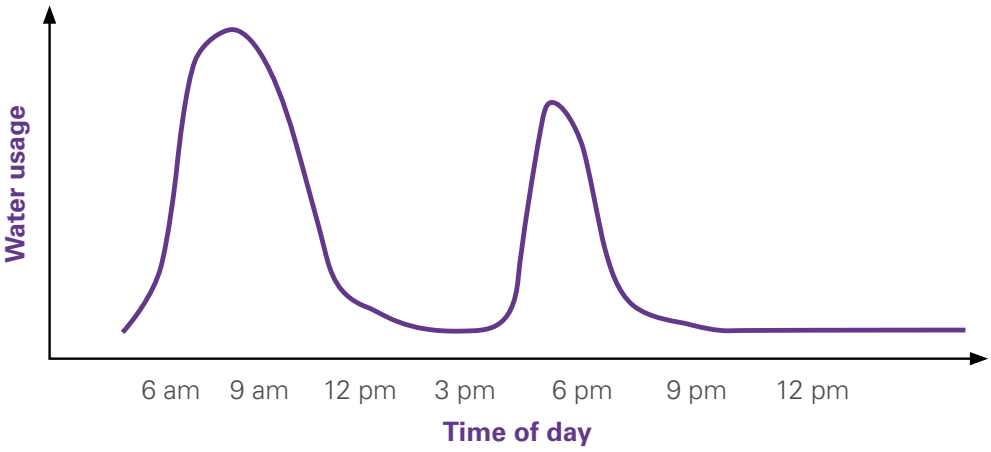
C. Water access and storage requirements

In addition to the water quantity provision from the relevant sources, an adequate amount of storage is required for every community, which is commonly defined as 24-hours' worth of demand. Water storage is recommended for two principle reasons:

- to provide a short- to medium-term backup in case of supply failure, and
- to smooth out the usage of the community over a 24-hour period.

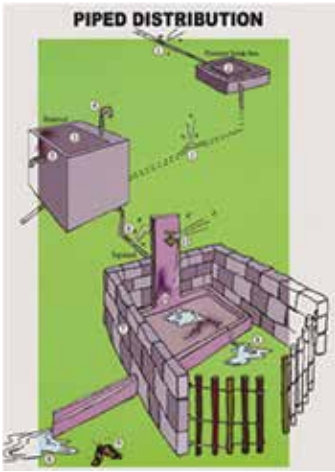
Figure 4.13 explains the second reason by showing a typical water demand curve over the course of 24 hours. Communities usually use more water in the morning and around evening meals, as shown in the curve. Having 24 hours of storage allows for fluctuations in demand over the course of a day, and provides a reserve for when the water supply is affected.

Figure 4.13 Water usage curve



To complete the understanding of the supply system, the community requires documentation of the water access, i.e., how water is distributed. Common standards aim to have water points within 200 metres of dwellings (no more than a two- to three-minute walk), and ideally should have no more than five households sharing one access point (*see Figure 4.14*). New indicators for the SDGs highlight that all households should have access to water on premises. This should be an aim of the interventions, but the viability of the system to achieve this must also be considered.

Figure 4.14 What water access/distribution points are needed?



What do we currently have? – Distribution

Requirements

Are within 200 m of dwellings
(approximately 2-3 minutes walk)

No more than 5 households sharing 1 access/
distribution point

D. Identify your needs and document

The last step is to identify the system needs to meet the appropriate water availability requirements, and to document them within the DWSSP. This is performed against national/sub-national targets within the DWSSP. If communities need more water provision, they should discuss this with the facilitators. Figure 4.15 shows Section 3A of the DWSSP template, and provides a framework for performing the assessment.

Figure 4.15 Section 3A of the DWSSP template: Water access and availability

Section 3A –Assessment (Water Access/Availability)				
Water Availability				
Number of People in Community **3A**	Estimated Daily Usage (litres per day) [3B = 3A* N litres/day] **3B (Select value for N)**	Storage Required (litres) [3C = 3B] **3C**	Estimated Usage by Population per year (litres per year) [3D = 3A*N l/day *365] **3D**	a
Water Quantity – Piped Supply System or Groundwater Source Is the supply in **2B/2G** enough to meet demand **3B**? Yes ❑ No ❑ **If NO, look to improve the system design to increase flow (Please tick)** Is this source available at all times during the year? Yes ❑ No ❑ **If NO, develop/strengthen Additional Water Source/s (Please tick)** *Water Quantity – Rainwater Capture* ***(ONLY ANSWER IF RWC IS ONLY WATER SOURCE)*** Is the supply in **2E** enough to meet demand **3D**? Yes ❑ No ❑ **If NO, develop Additional Water Source/s (Please tick)** ❑				b
Water Storage – Piped Supply System Is the current storage **2H** enough to meet the required storage amount 3C? Yes ❑ No ❑ **(If NO, add More Storage)** How much extra Storage is required? litres Number of tanks required [*Storage Required / 5000 OR 10000*] tanks				c
Water Quantity – Distribution Points Are flow rates more than 6 litres/min at the tapstand/s? Yes ❑ No ❑ **If NO, look to improve the system design to increase distribution flow (Please tick)** ❑ **REMEMBER: Doing this can change pressures and flows in the system. It is important to get some technical assistance when planning to change flows in the distribution system.**				d
Water Access (Only Upgrade if enough water is supplied by the system)				
Water Access Do more than 5 households share 1 distribution point? Yes ❑ No ❑ Are any distribution points more than 200m away (2-3mins walk)? Yes ❑ No ❑ **If YES to either question, then you need extra distribution points (Please Tick)** ❑ **REMEMBER: Doing this can change pressures and flows in the system. It is important to get some technical assistance when planning to increase the distribution system.**				e
How many extra points are required? ..... **PLEASE MARK ON COMMUNITY MAP**				

Perform the following steps (see the template for Section 3A shown in Figure 4.15) to identify the improvements required:

- **a** Calculate the community's required demand as shown in row "a" in Section 3A. This should be done with knowledge of national standards
- **b** Answer questions around water availability. Is the water supply currently meeting the required demand? See row "b" in Section 3A.
- **c** Document if additional storage is required in accordance with the standards presented in row "c" of Section 3A.
- **d** Answer questions around water availability at distribution points in row "d' of Section 3A. Is the flow sufficient to allow users to gather the required water in a reasonable period of time?
- **e** Answer the questions around water access in row "e" of Section 3A. If any households are more than 200 metres away from a water distribution point, or if more than five households are sharing one distribution point, it is recommended to improve the number or position of access points. These requirements can vary according to country.

Note: Always remember to consider the impact on the flow and pressure of this action within a reticulated system. An engineer should review any upgrades of this kind.

Task 3B – Assess water system risks

Purpose – To conduct a systematic assessment of the water system to understand the safety of the water, the risks to the drinking water supply and what improvements are required.

How to do it

A. Conduct drinking water quality testing

B. Conduct risk assessment for water supply

A. Conduct drinking water quality testing

Prior to conducting a risk assessment on the water supply system, obtaining information about the quality of the drinking water is recommended. This testing can include the parameters laid out in the monitoring plan as part of the intervention, but as a minimum should include the main water quality considerations: E. coli to indicate bacteria contamination, turbidity, conductivity and pH (*see Figure 4.16*).

Figure 4.16 Section 3B of the DWSSP template: Water quality results

These principal parameters provide a good overview of the acute/immediate health risk of consuming the water. The most important of these is E. coli, which provides an indication of faecal contamination in the water, and represents the likelihood of humans getting ill as a result of consumption. International guidelines state that no E. coli should be present in a 100 ml sample of drinking water, and this should be the aim for in all interventions. WHO states that any test that shows more than 100 E. coli per 100 ml of water sample indicates a high risk to human health. The areas of the graphs where results can be placed in Section 3B of the DWSSP indicate the risk level of the water quality result by colour coding for the different parameters.

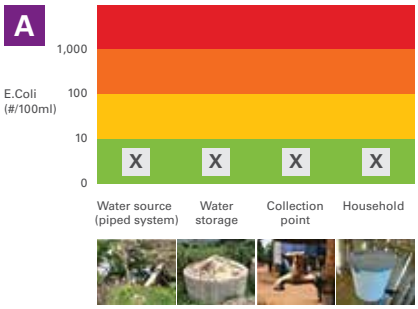
There are a number of methods available that provide results for bacterial contamination, but the gold standard at the time of writing is membrane filtration (see Figure 4.17). This method involves drawing a sample of water through a filter that captures any bacteria particle present in the water. The bacteria is then grown in optimum conditions and counted to establish the amount present in the water sample. At present, this is the most accurate method of understanding bacterial contamination in water, and is promoted as the test of choice where possible.

Figure 4.17 Membrane filtration for bacterial water quality testing

In addition to the testing method, it is also important to utilize the most appropriate sample method to ensure a full picture of the water supply is established from the source through to consumption. As explained earlier in this section, the principal parts of a water system include the source, storage areas, distribution points, and storage in the household. It is recommended that multiple distribution and household samples are taken, with one each for the source and storage. However, this can be adapted depending on time and resources available. At a minimum, two samples should be taken from distribution points and households, as these are the points at which water is primarily consumed.

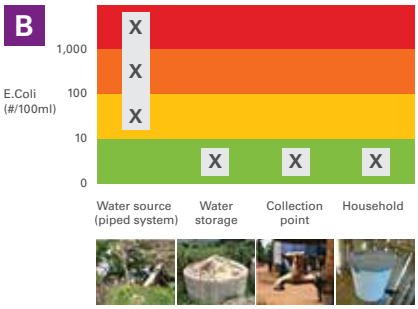
Once testing is completed and recorded in Section 3B (*see Figure 4.16*) of the DWSSP, the results can be analysed to establish the appropriate water actions. *Note: numerical data can be written in the appendix section of the DWSSP template.* These results link to the risk assessment procedure presented next, which identifies what could be causing contamination in the supply. The focus of the risk assessment and the appropriate actions required depend on the results of the tests. A number of scenarios are recommended depending on the test results, and materials are available in Part 5 of these guidelines to help with this. Figure 4.18 shows an example of these tools and the recommended actions depending on where contamination is present in the water system.

Figure 4.18 Example of recommended water safety actions depending on water quality results



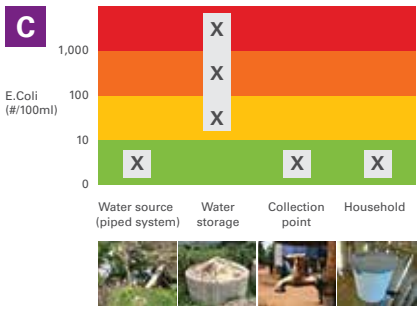
ACTIONS
1. Implement any necessary WSP actions to keep contamination low.

WHY?
Acceptable quality source that does not get contaminated through to consumption.



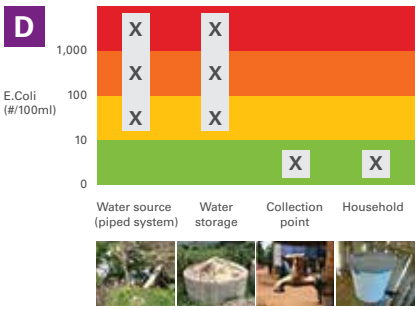
ACTIONS
1. Implement water source WSP actions to try to improve.
2. Ensure household water storage and safe storage actions are prepared in case quality deteriorates at collection point or household.
3. Implement any other necessary WSP actions.

WHY?
Contaminated source where bacteria has died in storage, or water is treated prior to storage. No further contamination.



ACTIONS
1. Implement water storage WSP actions.
2. Implement all other necessary WSP actions.

WHY?
Acceptable quality source contaminated in storage tank. Treated before collection point with no further contamination.



ACTIONS
1. Implement water source and storage WSP actions.
2. Implement all other necessary WSP actions.

WHY?
Contaminated source treated before collection point. Stays safe in the home.

Insights 5 What is Safe? (*String et al., 2017*)

"What is safe?"

Fiji – Water samples taken at the point of user collection (i.e., tapstand) from 45 DWSSP communities and 26 control communities fell into the 'High Action Priority' category, predominantly as a result of elevated E. coli levels.

Vanuatu – Water samples taken at the point of user collection (i.e., tapstand) from 25 DWSSP communities and 34 control communities fell into the 'High Action Priority' category, predominantly as a result of receiving an intermediate risk score during the sanitary survey.

Treated water was not prevalent during the survey in either Fiji or Vanuatu. Respondents from DWSSP communities in both countries indicated boiling as the water treatment method of choice.

Respondents surveyed in DWSSP-trained communities and control communities in both Fiji and Vanuatu believed that water was safe to drink when it was 'clear' and not safe to drink when it looked dirty.

Useful learning

To reduce potential household recontamination of drinking water, storage containers were covered in the majority of households in DWSSP communities in Fiji (95 per cent) and Vanuatu (85 per cent).

Vanuatu – More respondents in DWSSP-trained communities (70 per cent) believed you could get sick from water than in control communities (47 per cent).

Note: Water quality testing and treatment are an important part of ensuring safe water. Programming has shown that applying DWSSP actions helps greatly with behaviour change and managing risks associated with maintenance and water availability; however, water safety still requires treatment to be part of the plan.

B. Conduct risk assessment for water supply

Using the information from the drinking water quality tests provides a guide as to where to focus the risk assessment activities for the water supply. As mentioned in Part 2, the risk management process incorporates three main steps: identification of risk, assessment and prioritization of risk, and planning and actions to minimize risk. Conducting this at the community level can be a challenge; therefore, these guidelines present a facilitated process that is integrated into the DWSSP template and implementation toolkit (*see Part 5, Toolkit 2*). The process of performing the risk assessment is shown in Figure 4.19. The full template for all parts of the water system is integrated into the DWSSP template.

Figure 4.19 DWSSP community risk assessment procedure

A **Surface Water Source and Abstraction**
Negative Impact/s:

B

Bacterial Contamination ■ Chemical Contamination ★ Aesthetic (Taste/Colour which prevents consumption) ▲ Lack of Water Availability

Event / Cause	Risk Factor/s	Current Control Measure/s	Risk	Improvement/s
Bacteria enters water supply C ■	Toilets upstream/within 30m ❑ Human houses upstream ❑ Animal access to source ❑ Farming activities nearby ❑ Source inlet area is dirty/polluted ❑ Bathing/Laundry performed at source ❑ Other (Please list) D	Fencing around source ❑ Appropriate screening and filter on source infrastructure ❑ Household water treatment and storage (HWTS) ❑ Other (Please list) E	*High* ❑ **(Action Needed Now)** *Medium* ❑ (Upgrades Needed) *Low* ❑ (No Action Required) F	Move toilet/s ❑ Move source inlet ❑ Install screen and filtration ❑ Clean source area ❑ Build fence around source ❑ Prevent human activities at source ❑ Other (Please list) G
Chemicals enter water supply ★	Use of pesticides in area ❑ Waste water discharge in area ❑ Algae present at source ❑ Mining in area ❑ Naturally occurring high levels ❑ Other (Please list)	Appropriate water treatment ❑ Waste water discharges are managed ❑ Other (Please list)	*High* ❑ *Medium* ❑ *Low* ❑	Move source ❑ Remove chemical source/s ❑ Install treatment ❑ Other (Please list)

A. Identify the area of your system
B. Understand what can go wrong
C. List the events that could lead to this
D. For each event, identify the risk factors
E. Then identify the CURRENT control measures
F. Evaluate the risk of the event occurring
G. Plan to minimise the event occurring

A Identify the area of your system

The risk assessment must be performed for the entirety of the drinking water system. This includes all the parts that were listed in Task 2: Describe the water and sanitation systems. Unfortunately, water can be contaminated at every step of delivery from the source all the way through to how it is stored and used by consumers in the household. The first step of any risk assessment is to choose the part of the water system that is to be evaluated first. Steps B-G in Figure 4.19 will be completed many times to include all the different parts of the system.

B Understand what can go wrong

The next step is to understand what can go wrong in each part of the system. This is commonly known as a hazard, as it represents the way in which aspects of drinking water can cause harm to humans. Although risk assessments can be complex, the ways humans can be harmed by drinking water are simple. Either they do not have enough water available to maintain health, or they consume drinking water that is contaminated. These main problems are detailed in Figure 4.20.

Figure 4.20 Negative consequences of the drinking water system on human health

There are four main problems we encounter with the provision of drinking water:
What are they?

Bacteria contamination

Chemical contamination

No water available

Aesthetic (unpleasant to drink)

C List the events that could lead to this

Once it is understood what can go wrong, the types of events that can lead to this can be examined. These vary considerably in scope depending on the different parts of the system. Common events that can occur to cause problems in the drinking water supply include bacteria entering the water, usually from poor sanitation or animals; chemicals from groundwater contamination or local farming; dirt entering the water from landslides; and water not being available due to drought, damage to infrastructure or other disaster events (*see Figure 4.21*). Use the DWSSP template to provide guidance in understanding what events can happen.

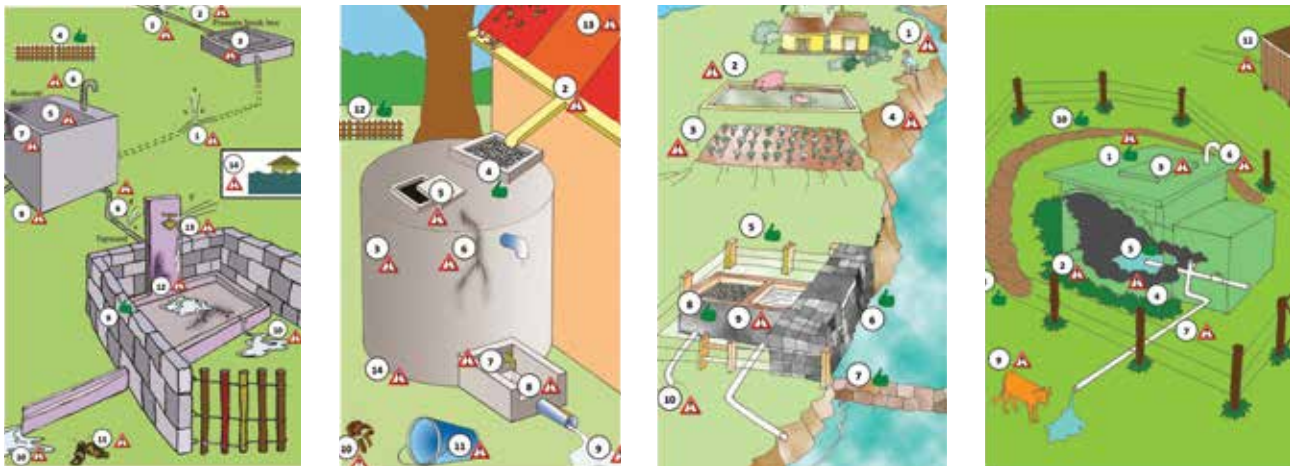
Figure 4.21 Negative consequences for drinking water

The main events that cause problems include:				
Bacteria enters drinking water supply	■			
Chemicals enter drinking water supply		★		
Dirt/soil/solids enter the drinking water supply	■	★	▲	💧
Drinking water supply flow is uncontrolled				💧
Disaster or climate change effects include:				
• Drought • Flooding (fresh or salt water) • Storm damage • Earthquake	■	★	▲	💧

D For each event, identify risk factors

For each different type of event, there are different risk factors that can increase the likelihood of the event happening. For example, there is more chance of bacteria occurring in the water if the source is near toilets or a river, or if animals have access to a water source. There are many different risk factors for different events and different parts of the system. Using sanitary surveys (see Figure 4.22 and included in the DWSSP implementation toolkit) can be a systematic way of identifying risk factors for each part of the system.

Figure 4.22 Method of risk factor identification from the DWSSP implementation toolkit



PIPED DISTRIBUTION | RAINWATER COLLECTION AND STORAGE | SURFACE SOURCE AND ABSTRACTION | PROTECTED SPRING SOURCE

E Identify your CURRENT control measures

Similar to risk factors, there are many control measures (or barriers) that can help reduce the likelihood of hazardous events occurring. It is important to list the CURRENT control measures that are in place, not what measures could be used for improvement, as only when the current state of the system is understood can the current level of risk be evaluated. Current control measures can be identified and listed in the sanitary surveys.

F Evaluate the risk of the event occurring

Once the risk factors and the current control measures are identified, the current level of risk to the supply can be evaluated. While organizations are free to use any method of risk evaluation, it is important to be mindful that normally the simpler methods are better received at the community level. At a minimum, evaluate risk at three levels: high, medium and low. These three categories can then easily differentiate whether a risk needs acting on immediately, can be acted on in the future, or if something only needs to be monitored periodically (no action needed at the current time). Figure 4.23 highlights the three basic levels of risk.

Figure 4.23 Levels of risk for drinking water supply

We have three levels of risk

	What this means	Action needed
HIGH	The system is **not secure** and the chances of contamination are high	Upgrades needed **now**
MEDIUM	The system has some protection but still could get contaminated	Upgrades are needed but not immediately
LOW	The system is well protected with a low chance of contamination	No action required but must be monitored

A simplified method for classifying risk is shown in Figure 4.24 to aid facilitators if required.

Figure 4.24 Simplified classification of risk for drinking water supply

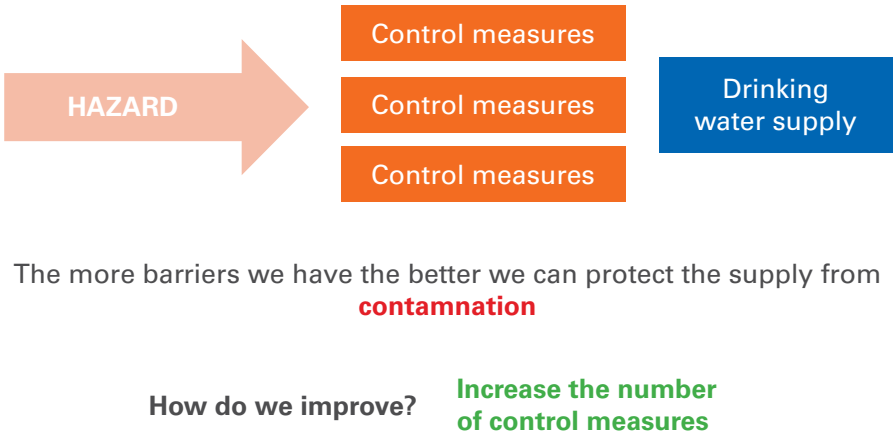
How do we calculate our level of risk?

HIGH	Hazard Hazard	Hazards present		~~Control measures~~ ~~Control measures~~	No control measures
MEDIUM	Hazard Hazard	Hazards present	**AND**	Control measures Control measures	Control measures present
	~~Hazard~~ ~~Hazard~~	No hazards	**AND**	~~Control measures~~ ~~Control measures~~	No control measures
LOW	~~Hazard~~ ~~Hazard~~	No hazards		Control measures Control measures	Control measures present

G Plan to minimize the event occurring

Once risk levels are established, it is time to start planning what improvements are needed to reduce the risks. Improvements are about taking away risk factors and increasing the number of control measures (*see Figure 4.25*). It is recommended that improvement planning is performed for all high- and medium-level risks. There are decision-making tools in the DWSSP implementation toolkit to assist with this.

Figure 4.25 How to reduce risk in the drinking water supply



The three main control measures (barriers) for reducing drinking water contamination are:

1. Preventing contaminants entering the source water
2. Treating the water
3. Preventing recontamination.

Control measures are a key part of DWSSP, as contamination of drinking water is one of the main health consequences. However, events leading to a reduction in water availability, and mitigating disaster effects are also important to consider. The assessment must be thorough and using the tools in the DWSSP implementation kit ensures that all parts of the system are covered.

Remember, once steps B-G from Figure 4.19 have been completed for one part of the system, this needs to be repeated for all parts of the drinking water system, including the source, any treatment, and storage and distribution at the community level as well as how it is stored in the household level.

Task 3C – Assess sanitation risks and upgrades

Purpose – To assess the improvements required for achieving adequate sanitation.

How to do it

A. Understand and facilitate why we need sanitation

B. Provide an overview toilet types and understand what adequate sanitation is

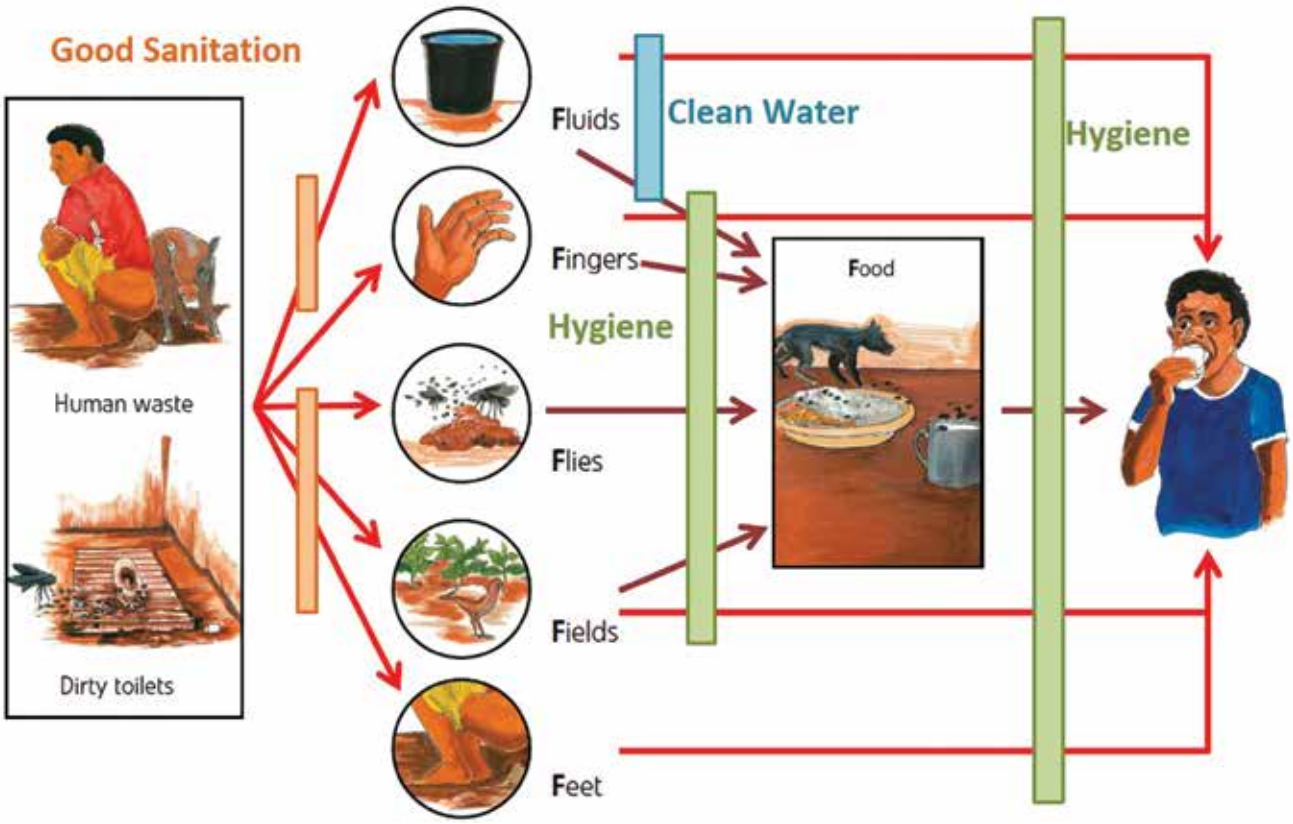
C. Assess CURRENT sanitation risks

D. Identify the sanitation needs and document these

A. Understand and facilitate why we need sanitation

The first step in assessing the sanitation requirements with the community is to briefly recap the importance of sanitation, and the key parts of sanitation that reduce health risk. Sanitation is often seen as the first defence in the WASH process, as adequate sanitation and good hygiene behaviours can often prevent contamination of water. The diagram in Figure 4.26 references the six vectors of disease transmission: fluids, fingers, flies, fields, feet and food (commonly known the 6Fs), and highlights the principal barriers to disease transmission that are implemented through successful WASH interventions.

Figure 4.26 The importance of sanitation and hygiene: The 6F diagram



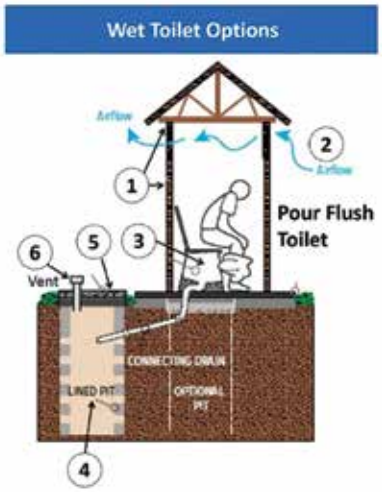
To achieve the barriers from sanitation, it is important to understand what is meant by adequate sanitation, and what parts of the system help reduce health risks. Figure 4.27 provides an overview of what is meant by adequate sanitation, and provides several key requirements to achieve this. These include having adequate shelter and ventilation so people want to use the facility, as opposed to defecating in the open; having a clean pan area where humans make contact with the sanitation facility; ensuring that waste is stored and treated adequately; and having a handwashing facility available to promote one of the most important hygiene actions. Going through these requirements with the community sets the context for assessing the sanitation system.

B. Toilet types and requirements

In addition to outlining adequate sanitation, it is important to review the different toilet types and their relevant advantages in the community. The two principal types of toilets are dry and wet (*see Figure 4.28*). Highlighting the pros and cons of each is essential before upgrade planning is undertaken.

Aside from the standard of each toilet, it is important to consider how much sanitation is required. This can change in different countries but most will promote having one toilet per household and this should be, at a maximum, within a two to three-minute walk from the dwelling (*see Figure 4.29*). Ideally the sanitation should be on premises, which is highlighted in the SDGs.

Figure 4.27 Overview of adequate sanitation

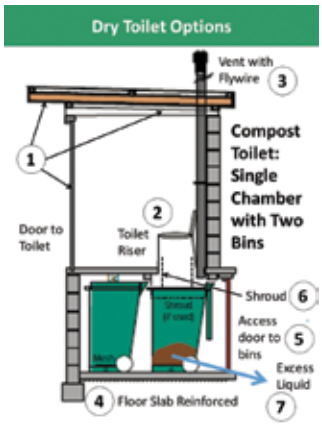


1. Good shelter structure
2. Good ventilation
3. Clean toilet pan

4-6. Waste is **stored or disposed** of safely

7. Hand washing is available

Figure 4.28 Common toilet types

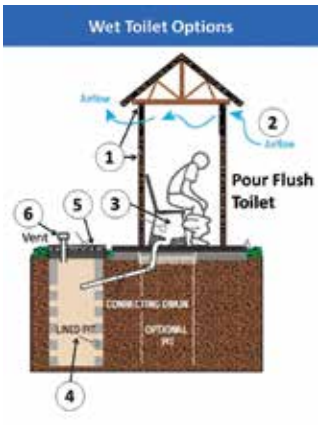


Dry types

Compost toilets or pit latrnes

No water used

Good for saving water in village but needs maintenance



Wet types

Pour flush toilets or flush toilets

Water used

Easier to clean/maintain but does require water

Figure 4.29 Requirements for sanitation service provision

Toilets – How many are required?

Requirements

Are within 200 m of dwellings

Household to toilet ratio = 1:1

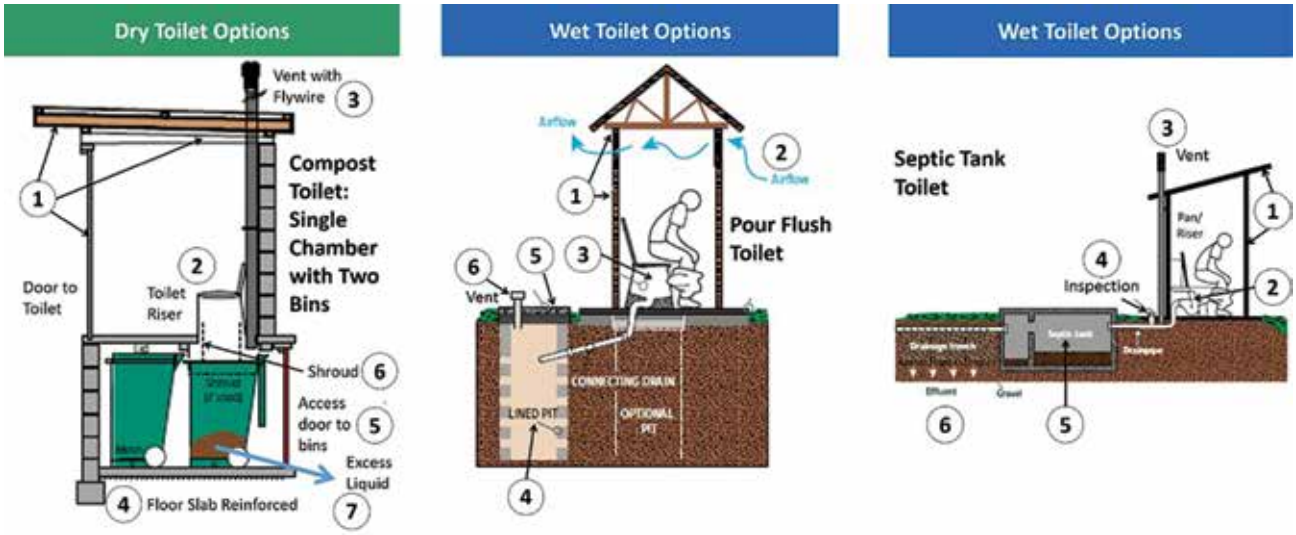
C. Assess CURRENT sanitation risks

Once an understanding of the background to sanitation is complete, the assessment of the CURRENT sanitation can begin. This consists of two parts:

1. Identifying how many toilets are present in the community
2. Undertaking a risk assessment of the current sanitation system.

The risk assessment should be performed by assessing each toilet structure in the community. Toilet sanitary surveys are available in the DWSSP implementation toolkit to assist in performing the assessment (*see Figure 4.30*).

Figure 4.30 Toilet sanitary surveys



D. Identify the sanitation needs and document

The final part of the sanitation assessment is to identify the sanitation needs and document these in Section 3C of the DWSSP template (*see Figure 4.31*).

Figure 4.31 Section 3C of the DWSSP template: Sanitation assessment template

Section 3C – Assessment (Sanitation System)		
Toilet Sanitary Survey Result How many toilets need **replacing**? …… How many toilets need **upgrading**? ……		
Replace/Install New Toilets		
Are you replacing or installing new toilets? (Please tick) Yes ❑ No ❑		
Toilet Options (Please indicate the type and amount of toilets required)		
VIP Toilet ❑ Number Required ……	Pour Flush Toilet ❑ Number Required ……	Septic Tank Toilet ❑ Number Required …… Has soil permeability test been performed? Yes ❑ No ❑
Upgrade Existing Toilets		
Do existing toilets require upgrading? (Please tick) Yes ❑ No ❑ What toilet type/s do you want to upgrade? (Please tick all relevant ones) VIP Toilet ❑ Pour Flush Toilet ❑ Septic Tank Toilet ❑		
VIP Toilet – Number requiring upgrade …… Number requiring repairs to structure …….. Number requiring vent in super structure …….. Number requiring a vent with flywire …….. Number requiring upgrade of slab/riser …….. Number that would require lining of pit …….. Number requiring collection pit at adequate depth ……..		
Pour Flush Toilet – Number requiring upgrade …… Number requiring repairs to structure …….. Number requiring venting in the super structure …….. Number requiring upgrade of slab/riser …….. Number of collection pits requiring a cover for access …….. Number of collection pits requiring a vent …….. Number that would require lining of pit ……..		
Septic Tank Toilet – Number requiring upgrade …… Number requiring repairs to structure …….. Number requiring vents …….. Number with drainpipes requiring a vent …….. Number with drainpipes requiring inspection access …….. Number requiring a new septic tank …….. Number requiring a drainage trench ……..		

a

b

c

a **How many toilets need installing/replacing and upgrading.** First, identify how many extra toilets are required from the results of the toilet sanitary surveys, and how many need improving. New toilets are required if there are insufficient numbers of them in the community for the population size, and upgrades are needed if inadequacies are identified in the sanitary survey.

b **List the number of new toilets required.** When new toilets are required, a decision needs to be made on the type. The most appropriate toilet type is dependent upon conditions within the community. This takes into consideration aspects such as water availability and the water table to determine whether dry or wet toilets should be considered. Use the decision-making tool in the implementation toolkit to help make the correct decision for the community.

c **List upgrades on existing sanitation.** The last step is to decide on how to improve the current sanitation to meet adequate sanitation standards. The sanitary survey helps to identify the gaps that will reduce the risks to health from the sanitation system. Go through the results from all the sanitary surveys systematically and make a list of all upgrades required. There is a sanitary survey answer sheet in the toolkit to help keep track of results; this combined with the community map can make the exercise much easier to undertake. Also be aware that if significant upgrades are required for a particular part of a sanitation system, such as relining a pit, very often this is easier to achieve through the construction of a new toilet. Use case-specific judgement to determine the best way forward.

Insights 6 Ready, Steady, ACTION (*UNICEF Pacific WASH Field Note 2016*)

After a year of DWSSP implementation in Fiji, a monitoring mission identified community-led action in four communities with important successes that could be replicated elsewhere in the country:

- All four communities had regular water committee meetings and presented on water issues at village meetings.
- One community had implemented a water resource management system using valve keys in the community.
- One community had commenced the building of two new toilets to replace an older set that presented a water-related hazard. This construction was a result of their own initiative triggered by the DWSSP process, and did not require any additional resources
- One community had built four new standpipes connecting four houses.
- Two communities were regularly cleaning their water tanks.
- Two communities have taken steps to protect their water sources.

Task 4 – Develop an improvement plan

Purpose – To document the improvement plan (plan of action) to address the areas requiring improvement that were identified during Task 3.

How to do it

A. List all identified needs from Tasks 3A, 3B and 3C

B. Decide what can be undertaken by the community, and what needs external support

C. Prioritize the improvements

D. Document in the improvement plan

A. List all identified needs from Tasks 3A, 3B and 3C
B. Decide what can be undertaken by the community, and what needs external support
C. Prioritize the improvements

The initial step is to list all the identified needs from Tasks 3A, 3B and 3C. This can be quite a few, so the list should be a draft to make notes as required. After this, it is important to decide what from this list can be done by the community, and what will need external support. Improvements generally fall into two categories: management actions e.g., clean roof etc., which would be undertaken by the water committee; and upgrades to the infrastructure, which may require external help. Communities can handle some building improvements, but if major upgrades to the system are required, they will need outside technical and financial assistance to achieve them. Once separated into what the community can and cannot do, the needs can be prioritized. This can be achieved through community discussion; however, it is recommended that low levels of water availability and/or high contamination risks are the first priorities.

D. Document the improvement plan

The final part of improvement planning is to document the improvements in the DWSSP template (*see Figure 4.32*). What the next steps are, who will be responsible, and how to pay for the plan require further discussion. As implementation of the plan proceeds, it is important to document when an improvement is completed (implemented).

Figure 4.32 Section 4 of the DWSSP template: Improvement Plan template

Section 4 – Improvement plan					
Improvement required	Activities required	Who	When	Cost	Status (tick when complete)
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐

Note: This is the step where the implementing partner needs to make a note of the improvements they will need to assist with, as shown by Task 4B in the DWSSP diagram (*see Figure 4.39*).

Task 5 – Establish community management

Purpose – To establish management practices to improve system maintenance and resilience in the community.

How to do it

A. Outline principal community management requirements

a. Provide training to the community on the correct use of the systems

b. Monitor the systems (using water and sanitary surveys)

c. Systems maintenance

d. Organize budgets for the systems

e. Know what to do in an emergency

B. Document required actions in DWSSP template

C. Wrap up and evaluate the training

A. Outline principal community management requirements

After performing the assessment and identifying improvement actions, an important task is to establish ongoing community management with new-found knowledge. Improvements are normally one-off tasks required to improve the systems, management is about keeping the systems safe and the community resilient over a long period of time. The first step in this management task is to outline the requirements of the community water/WASH committee.

a. Provide training to the community on the correct use of the systems

The first step in keeping the water and waste systems safe and secure is to ensure the community understands how to operate them correctly. For water supply, this involves reinforcing the correct behaviours of users to ensure water is not wasted, and prevent contamination in the household. A system can be capable of providing sufficient water for a community, but this can be wasted if a tap is left on overnight. Also, clean water can be provided at a distribution point but can be contaminated in the house if not stored correctly. Figure 4.33 shows the common behaviours required of the community members. It is an important responsibility of a water/WASH committee to reinforce these behaviours on a regular basis.

Figure 4.33 Community awareness and training requirements

Household Water Treatment

Water Resource Management

Safe Storage and Handling

Best Practice Hygiene

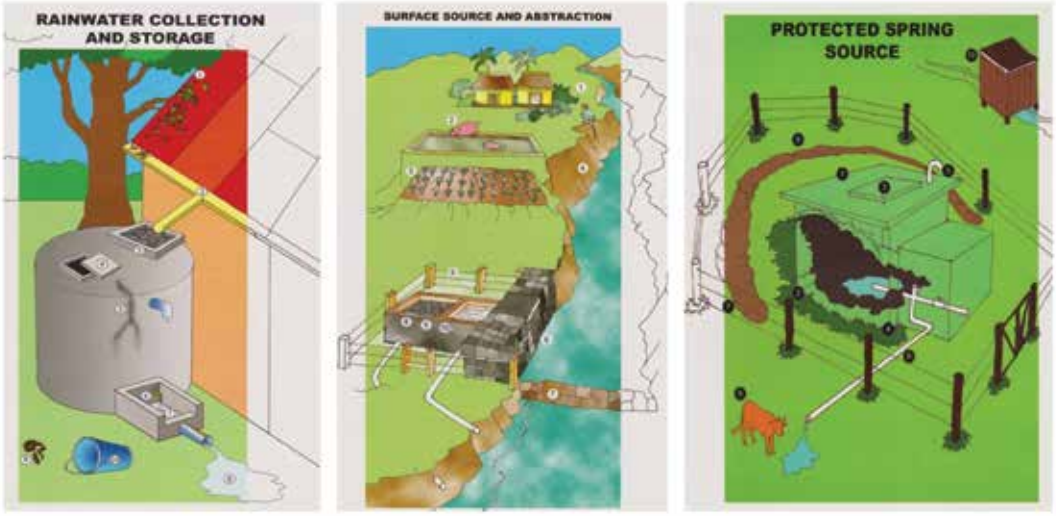
b. Monitor/inspect the systems (using sanitary surveys)

Monitoring/inspection – Check the systems to see if control measures are in place and still working.

After outlining training and awareness responsibilities, the focus shifts to the physical aspects of the water and waste systems. As shown by the assessment process in Task 3, there are many ways that problems can affect a water and sanitation systems. Although these have been identified and prioritized during the DWSSP training, the status of the systems can change over time. As such, it is vital that they are checked on a regular basis. The water/WASH committee is the best placed to perform this task on a regular basis. It is suggested that the committee conduct sanitary surveys every month to monitor the health of the water supply system (*see Figure 4.34).*

Figure 4.34 System monitoring/inspection

Use Sanitary Surveys to monitor your system



Consistent Monitoring helps **lower risk of contamination**

c. System maintenance

After establishing a regular monitoring/inspection schedule, it is important to develop the next requirement of the committee, and that is the capacity to undertake maintenance. Monitoring/inspection checks control measures and barriers are in place, and maintenance is the action to keep the systems functioning (*see Figure 4.35*).

Figure 4.35 Importance of maintaining the system

We **MAINTAIN** to keep the system and control measures functioning

After reinforcing how important maintenance is to keeping the system functioning, it is time to develop the community's plan to achieve this. This is a relatively simple exercise, especially if the appropriate maintenance materials are available to hand out from the DWSSP implementation toolkit (*see Part 5, Toolkit 2*). This provides a list of recommended operation, monitoring and maintenance (OM&M) actions for all parts of common rural water systems. This list can be used to follow the planning method shown in Figure 4.36. Different parts of the system require OM&M actions at varying frequencies: some are daily, weekly, monthly or annually. The OM&M schedule in Section 5 of the DWSSP template can be used to record this.

Figure 4.36 How to plan and implement operation, monitoring and maintenance

How do we plan operation and maintenance?

1. Identify parts of the system the water commitee are responsible for
2. Identify monitoring and maintenance actions to be undertaken

d. Organize budgets for the system

In addition to training, monitoring and maintenance, the water/WASH committee will also have to consider how to handle budgets to both improve and keep the system functioning correctly. Different aspects of budgeting that a committee needs to consider include capital and improvement costs, replacement costs, and general OM&M costs (*see Figure 4.37*). It is good to list approximate budgets required for all these aspects of system management to be used for reference in the future.

Figure 4.37 Budget requirements of water/WASH committees

We need to budget properly for **sustainability**

Key parts of the **budget** are:

Capital cost

5 – 10 years

Replacement/upgrade cost

Operation and maintenance cost

Training cost

e. Know what to do in an emergency

The better a community understands and manages its water and waste systems, the more it increases resilience to a number of situations. This is especially true within an emergency or disaster scenario. A significant number of rural communities in the Pacific are located outside of government-serviced areas, and, therefore, when disasters strike, it can be a significant period of time before assistance arrives. To improve the resilience of communities, it is recommended that plans be developed for water/WASH committee actions leading up to and during an emergency. During a disaster, a water/WASH committee has three main responsibilities:

- providing enough safe water, which includes storing before a disaster strikes and understanding how to treat it;
- dedicating safe sanitation areas; and
- promoting good hygiene throughout the disaster phase (*see Figure 4.38*).

Figure 4.38 Key requirements of water/WASH committees in emergencies

A Water Committee has three main responsibilities in a disaster:

1. WATER – Provide enough safe water

2. SANITATION – Ensure excreta is disposed of safely

3. HYGIENE – Ensure good hygiene is maintained

Use a discussion session with the community to go through the management requirements. Additional materials available in the DWSSP implementation toolkit provide good guidance, especially in relation to handling emergencies.

B. Document actions

Once all the management steps have been discussed and agreed, the final step is to document the actions in Section 5 of the DWSSP template. This documentation can be referred to going forward by both the community and the implementing organization(s) for monitoring purposes.

C. Wrap up and evaluate the training

Once training is complete, it is good practice to have a wrap-up session with the community to review what was learned. Many organizations have their own procedures and methods for this, and, as such, no specific guidance is listed here. If you wish to evaluate the training, an evaluation sheet is available in the DWSSP implementation toolkit.

Insights 7 Training is just the beginning (*String et al., 2017*)

"Training leads to action"

Fiji – One village in Fiji created a Facebook page for their water committee. Whenever they conduct an inspection of their pipes and source cleaning, they upload before and after photos for other members of the village to see. This helps to hold the committee accountable for their work, but also engages the village further on caring about their water supply.

Vanuatu – Three DWSSP-trained villages established an apprenticeship scheme for their Village Plumber. Plumbers are elected every two years, but the former Village Plumber stays on and trains the new Village Plumber for up to 6 months.

Vanuatu – In DWSSP-trained communities, 73 per cent of households paid a water fee, ranging from USD 0.09 to USD 7.17 (median USD 0.90) per month.

Fiji – When community members were polled about the actions of their water/WASH committees, statistically significantly more responders in DWSSP-trained villages than in control villages indicated:

1. The role of the water committee was to "Repair and maintain the water system" (42% DWSSP / 24% Control / p=0.029).
2. The role of the water committee was to "Educate the village on water management practices" (24% DWSSP / 8% Control / p=0.010).
3. The primary way that households would communicate with the Water Committee was to "Discuss issues at a village meeting" (63% DWSSP / 46% Control / p=0.048).

Vanuatu - When community members were polled about the actions of their water committees, significantly more responders in DWSSP-trained villages than in control villages indicated:

1. The primary way to communicate with the committee was to: "Report directly to the Water Committee during a Committee meeting" (53 per cent in DWSSP-trained communities /24 per cent in control communities / p=0.009).

However, significantly more responders in control communities than DWSSP-trained communities indicated:

1. The primary way to communicate with the Water committee was to: "Report directly to the Chairman of the Water Committee when there was a problem" (15 per cent in DWSSP-trained communities/39 per cent in control communities/ p=0.008).

Conducting DWSSP training helps to clarify water governance in communities.

Major upgrades to the system

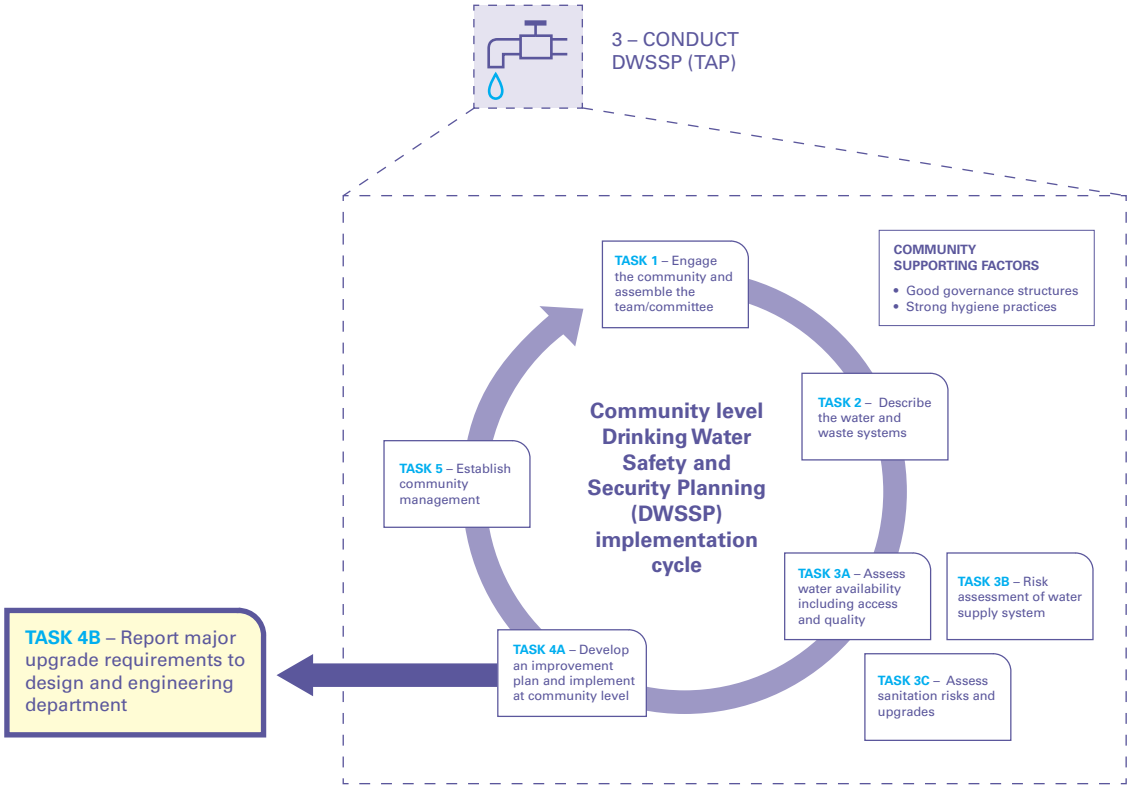
Upon completion of the training intervention, the community will now have developed a DWSSP that they can use to manage their system, and use as a guideline for planning the required infrastructure upgrades to their system.

Note: It is recommended that the original DWSSP developed during the training remains with the community if possible. This helps to establish ownership of the system through the intervention, an essential component of the WASH resilience approach.

Infrastructure design

In many circumstances, improvements and upgrades are necessary that are beyond the capacity of the community to deliver, and these will need to be undertaken by the implementing partner(s). In these cases, Task 4B is undertaken (*see Figure 4.39 highlight*). This task involves the design, financing and construction of the required infrastructure, as detailed in Section 4 of the DWSSP template. The first part of this process is undertaking infrastructure design, which is detailed in this section.

Figure 4.39 DWSSP implementation diagram highlighting major system upgrades



Resilience in the design phase

As mentioned, the concept of resilience is broad and requires integration into the national/sub-national system, community capacity and physical infrastructure. This section outlines recommendations for incorporating resilience in the design and construction of water and sanitation systems. This is not a detailed how-to guide on construction, but instead suggests how best to design and construct to mitigate the effects of well-known risks to the system. These recommendations are detailed in Table 4.3, which lists key design factors, along with notes on structures and materials, and some best practices for construction and installation.

Note: These suggestions should be combined with national standards surrounding the appropriate infrastructure, as standards have been developed with knowledge of the local sector and its ability to maintain certain systems.

Table 4.3 Recommendations for integrating resilience in the design and construction phase

Natural disaster	Infrastructure design		Construction and installation
	Design factors and location/condition	Structure and materials	
Earthquake	• If possible avoid known fault zones • Build on consolidated soil with adequate load-bearing capacity • Avoid building on highly saturated soil	Use structures and materials that better resist earthquakes: • Use steel structures rather than concrete • Flexible pipe materials (e.g., polyethylene [PE], polyvinyl chloride [PVC]) • Flexible connections between components • Place heavy structures on concrete bases	Construct and install to increase resistance to earthquakes: • Ensure dams can resist earthquake • Reinforce wells and lining where possible • Make round pits for latrines and adequately line
Tsunami	• Avoid areas close to low lying coast line • Mangrove forests, coral reefs and rocks can reduce the impact of large waves • Install structures on soils with adequate load-bearing capacities	• Use flexible materials where possible (e.g., PE, steel, PVC), over rigid materials (e.g., concrete, cast iron, brick) • Use flexible connections between components	Construct/install to increase resilience to tsunami: • Install covers on wells and reservoirs • Construct in resistant materials • Adequately reinforce and brace structures • Allow for cleaning in case of contamination • Install slab around latrine pit • Make round pits for latrines and adequately line
Volcano	• If possible avoid areas close to potentially active volcano eruption or its effects (e.g., lava, ash rains, mudflows and landslides) • Install on soils with adequate load-bearing capacity	N/A	• Build covers on wells, reservoirs or tanks adequately to exclude ash • Protect/bury pipes • Ensure system can be cleaned out in case of entry of ash in system
Landslide	• If possible avoid the following areas: below slopes with unconsolidated soils, near natural drainage channels, below deforested areas • Try to build retention structures (e.g., walls near key infrastructure	• Use materials that can operate with the effects of some mass movement (e.g., galvanized iron and PE pipe)	• Bridge pipes over zones at risk, or alternatively lay pipes in solid rock • Install pipe anchors near areas at risk • Ensure proper backfilling and compacting of trenches • Remove loose rocks and debris that could damage infrastructure in the area

Table 4.3 Recommendations for integrating resilience in the design and construction phase (continued)

Natural disaster	Infrastructure design		Construction and installation
	Design factors and location/condition	Structure and materials	
Subsidence	• Avoid areas where subsidence is very noticeable • Install structures on soils with adequate load-bearing capacity	• Use flexible materials where possible (e.g., PE, steel, PVC) • Use high-quality materials	• Reinforce structures • Make round pits for latrines and adequately line
Flooding	• Avoid low-lying areas and natural drainage paths • Avoid where possible areas close to low-lying coastline • Avoid placing infrastructure on the outer bends of rivers	• Use materials that resist the effects of flooding (e.g., concrete structures with solid foundations)	• Bridge pipes over natural drainage channels, or dig into trenches • Install pipe anchors • Build covers on wells and reservoirs etc. • Reinforce structures • Raise structures at least 0.3m above known maximum flood levels • Maintain pressure in reticulated systems to avoid water ingress • Ensure presence of proper sanitary seals in wells and boreholes • Build impermeable slabs around wells and boreholes • Make round pits in latrines and line to avoid risk of collapse • Install slabs around latrine pit
Cyclone/ Storm	• Avoid higher areas, ridges, flat terrain, open ground • Check for loose debris around the area that could damage infrastructure	• Utilize concrete over wooden structures	• Build covers in resistant materials and with locks • Ensure adequate bracing of structures • Anchor structures (e.g., reservoirs etc.) • Ensure roofing material is adequately attached • Secure and reinforce doors
High temperatures	• Water demand will be higher, ensure adequate capacity in the system	• Use materials that can resist the effects of heat	• Ensure wells, reservoirs and tanks can be covered to reduce evaporation • Ensure good ventilation of structures • Shade infrastructure where possible • Painting structures in light colours reflects heat

Table 4.3 Recommendations for integrating resilience in the design and construction phase (continued)

Natural disaster	Infrastructure design		Construction and installation
	Design factors and location/condition	Structure and materials	
Drought	• Choose locations for structures that reduce the impact of drought (e.g., place wells and boreholes in areas where groundwater level is relatively high) • Be aware of placement of groundwater near coastal areas • Maximize water-use efficiency (e.g., repair major leaks, re-use waste water etc.) • Increase storage capacity • Implement secondary water sources • Be prepared for changes in water quality	N/A	• Ensure wells, reservoirs and tanks can be covered to reduce evaporation • Ensure all existing water sources are functioning to full capacity, and repair where required

In addition to the best practice design outlined above, it is important to consider some additional generic factors associated with resilience when designing the appropriate infrastructure.

- **Other considerations**
  - Always protect the most critical parts of the system. Ensure you can disconnect different parts so that damage can be limited during disaster events.
  - Use locally available products and skill-sets where you can. This provides a much greater chance of rebuilding quickly after a disaster.
  - Focus on ease of maintenance where possible.

Create your engineering report

The final aspect of the infrastructure design phase is the development of an engineering report to be used in conjunction with the DWSSP to access financing. Many organizations have their own templates for such reports, however, if one is not available to you, a template is available within the DWSSP implementation toolkit online. At a minimum, it is recommended that the following items are included in an engineering report:

- current water and sanitation systems
- scope of work – what will it do?
- current versus future systems
- risks
- schedule
- bill of materials

Access financing

The funding setup within WASH resilience is characterized in two separate phases:

1. Technical assistance programmes (TAPs) support communities, and provide training and facilitation of DWSSP.
2. For additional infrastructure, capital assistance programmes (CAP) support costs that are outside of the community's capabilities to deliver. New forms of climate finance can be a good option for countries looking to support WASH programmes.

Part 3 of these guidelines outlined both the TAP and CAP methods. If a CAP is available in the project that you are undertaking, obtain the guidelines for application to apply to the programme. If there is no CAP available, it is recommended to try to obtain funding from other sources. Where the funding comes from is not as important as recognizing the fact that a community will probably need external resources for major upgrades. This should be considered in advance of an intervention to ensure that expectations raised during the DWSSP process can be met.

Note: Even if not applying to a national CAP process, it is recommended that agencies follow the principles that are outlined in Part 3, and create the required documentation to ensure that other funding agencies are aware of the proposed works.

Construction

Upon accessing finance and procurement of materials, the next step of the WASH resilience implementation is infrastructure construction. Similar to the infrastructure design, this section of the guidelines recommends best practice guidance, which is incorporated in Table 4.3.

Note: No construction work should be started without knowledge and endorsement of the relevant government department. Check national/sub-national guidelines for this before commencing any construction work in communities.

Wrap up and check construction

Upon completion of the construction activities it is important to wrap up in a manner appropriate to the community. Part of this is includes updating their DWSSP to reflect that improvements have been completed. In addition, it is important to perform a construction monitoring exercise to ensure that what has been built matches the design. If the construction activities do not reflect the resilience designed into the infrastructure, then potential benefits to the community are lost.

Monitoring

After conducting the improvements (interventions), it is time to monitor and update to show progress against targets that have been set. Many organizations have standard monitoring procedures that they are encouraged to follow. However, if your programme does not have an established process, then the WASH resilience guidelines recommend the following steps.

Conduct your monitoring to compare with the original baseline document

The first step of this process is to conduct a monitoring visit using the same baselining method and template that was developed during the pre-training visit. It is important to conduct the post-intervention monitoring in a way that is directly comparable to the base data. It is this direct comparison that gives an accurate indicator of the success of the WASH engagement (*see Figure 4.40*).

Figure 4.40 Post-intervention monitoring

SECTION A – Drinking Water and Sanitation System							
DRINKING WATER SYSTEM							
1. Drinking Water Safety							
Purpose – To identify if the community drinking water is safe and what changes have occurred as a result of the DWSSP intervention							
Water Quality Parameter	**Baseline Date:**			**Key Actions/ Upgrades (Please List)**	**After Intervention Date:**		
	1	**2**	**3**		**1**	**2**	**3**
Conductivity (µS/cm)							
pH Value							

Update the stakeholders and programme

After completing the monitoring and appropriate reporting, it is important to update all stakeholders. This is often done through donor reporting to account for financing, but it should also include all the relevant stakeholders. If the government holds a local database on water quality or waste system improvements, it is important to update records to allow for better coordination and use of resources in the sector. Consider which stakeholders need to know about the results, and how information can be best integrated into their systems.

In summary

Ensuring community capacity is a significant factor in providing resilient WASH services, especially to rural populations in the Pacific. The WASH resilience approach promotes TAP and CAP processes to achieve this by conducting facilitated DWSSP training with communities to establish management for WASH systems and an understanding of required infrastructure. Embedding this management capacity, supported by correct infrastructure to meets targets, provides a big step towards resilient WASH.

A young boy emptying his water bottles into a container, Fiji.

Girls at school washing hands: Specifically targeting girls with a menstrual hygiene management program through schools like Divine Primary School on Tanna Island, Vanuatu is a key element of CARE's gender transformative WASH approach.

PART 5

Tools and case studies

Purpose of Part 5

To provide tools and case study examples to assist with implementation.

Summary

This part contains the following information:

- National/sub-national risk prioritization procedure for WASH interventions
- DWSSP implementation materials referenced in Part 4
- Case study examples for WASH resilience

Who is this for?

Beneficiaries (communities, individuals)	Civil society (NGOs, CSOs)	Government	Donors/Private sector/External agencies
Community management tools, intended for beneficiary use.	Implementation tools, essential reading. Case studies provide good examples.	Implementation tools for using risk to prioritize at national/ sub-national level, essential reading.	Useful overview of implementation tools and case studies to support the approach.

Toolkit 1

National/Sub-national WASH Risk Prioritization Process

CONTENTS

What do we use risk for? – Risk prioritization

Risk can be used to decide where and what action a programme needs to take. Developing a model to do this can become complicated if many factors are involved, therefore, it is recommended to use the highest priority risks to evaluate this. For WASH Resilience the health and disaster risks are used to prioritize intervention locations and to recommend principal actions to undertake. Organizations can utilize risk in their own way to determine where and what WASH intervention they would like to undertake, and these guidelines also offer a recommended method for use in organizations. Table 5.1 A-E presents a Risk Prioritization Process that uses primary health risks to determine priority locations and activities, and analyses the most prominent disaster risks for an area that should be taken into account.

The Risk Prioritization Process includes three steps:

Step 1: Quantify current health risks within a community

Step 2: Prioritize health risks to determine which communities need to undertake an intervention

Step 3: Consider prominent disaster risk/s to plan for during the intervention.

Step 1 Quantify health risks

Step 1 begins the process by evaluating the current Water Availability (Security) Risk within a community *(see Table 5.1A)*.

Table 5.1A Risk Prioritization Process – Calculate Water Availability Risk

RISK PRIORITIZATION PROCESS			
Step 1 – Quantify health risks			
LEVEL 1 Water Availability (Security) Risk	**LOW**	**MEDIUM**	**HIGH**
Method of calculation			
Primary water source risk (security) *(select only **one** from the list)*			**Score**
Desalination			0
Deep groundwater (more than 10 metres deep)			5
River/Lake in isolated area			5
Stream/Spring or shallow groundwater in isolated area			10
Dug well			15
River/Lake with several settlements using same water source for water supply			15
Stream/Spring or shallow groundwater (less than 10 metres deep) with several settlements using the same source for water supply			20
Community rainwater			20
No community water source			20
(Maximum = 20)			Score A
Method of calculation (continued)			
Stored water risk (security) *(Select **as many as relevant** from the list)*			**Score**
Storage tank in poor condition, significant leaks			5
Storage tank volume <15 litres per person per day (l/person/day)			10
(Maximum = 15)			Score B
Preventative measures in place (security) *(Select **as many as relevant** from the list)*			**Score**
Alternate/Secondary water source available			10
Community drought management plan in place			10
(Maximum = 20)			Score C
Calculate the **overall score** = (Score A) + (Score B) – (Score C)			
Quantify your **Water Availability Risk**			
Security Overall Risk Score			
Score<10 **LOW**	**10<Score<20** **MEDIUM**	**20<Score** **HIGH**	

Once the Water Availability Risk in a community has been established, it is time to look at the Water Safety Risk. This is best performed through a combination of water quality testing and surveying *(see Table 5.1B)*.

Table 5.1B Risk Prioritization Process – Calculate Water Safety Risk

Step 1 – Quantify health risks (continued)

LEVEL 2 Water Quality (Safety) Risk	**NO/LOW**	**MED-HIGH**	**VERY HIGH**

Method of calculation

A. Test water quality from your primary water source

Perform microbiological analysis of a primary water source sample to find E.coli per 100 ml. Obtain category of water risk from result in accordance with WHO guidelines, see table below.

CATEGORY	E.coil (CFU/100ml)	RISK
A	0	Meets WHO/FDWS guidelines
B	1-10	LOW-INTERMEDIATE
C	10-100	INTERMEDIATE-HIGH
D	100-1,000	HIGH
E	>1,000	VERY HIGH (Gross Pollution)

B. Conduct a sanitary survey of the primary water source/water collection point

Sanitary surveys can be obtained from Toolkit 2 – DWSSP Implementation Tools. Perform a survey on the water sample collection point and record your score in accordance with the guidelines.

C. Combine findings to determine the overall Water Safety Risk

Use the cross tabulation method below to find the health risk for water safety

Sanitary survey risk score →

E.coli Category ↑	0	1	2	3	4	5	6	7	8	9
E										
D										
C										
B										
A										

Very high risk: Urgent action

Low risk: Low action priority

Intermediate to high risk: Higher action priority

No risk

Security Overall Risk Score

NO/LOW	MED-HIGH	VERY HIGH

After considering Water Safety Risk, it is now time to evaluate the Sanitation and Hygiene Risk within a community. This is detailed in Table 5.1C.

Table 5.1C Risk Prioritization Process – Calculate Sanitation and Hygiene Risk

Step 1 – Quantify health risks (continued)			
LEVEL 3 Sanitation and Hygiene Risk	**LOW**	**MEDIUM**	**HIGH**
Method of calculation			
Amount of sanitation in the community *(select **one** from the list)*			**Score**
100% of community households have sanitation facilities			0
Between 50% and 100% of community households have sanitation facilities			10
Less than 50% of community households have sanitation facilities			20
No sanitation/Open defecation			30
(Maximum = 30)			Score D
Condition of sanitation in the community *(Select **one** from the list)* **IF no sanitation/open defecation then move straight to preventative measures**			**Score**
Sanitation in good condition			0
Sanitation in average condition			10
Sanitation in poor condition			20
(Maximum = 20)			Score E
Preventative measures in place (security) *(Select **as many as relevant** from the list)*			**Score**
Hygiene/WASH training in the last two years			5
Trained committee/health person in community			5
Handwashing facilities at all toilets			10
(Maximum = 20)			Score F
Calculate the **overall score** = (Score D) + (Score E) – (Score F)			
Quantify your **Sanitation and Hygiene Risk**			
Overall Risk Score			
Score<10 **LOW**	**10<Score<20** **MEDIUM**	**20<Score** **HIGH**	

Step 2 Prioritize health risks by communities

Once all three levels of immediate health risks (Water Availablity Risk, Water Quality Risk, and Sanitation and Hygience Risk) have been evaluated/quantified, it is time to prioritize which communities have the highest priority in terms of action required. Table 5.1D shows the varying combinations of Health Risk within this framework, and recommended actions for each priority level. Ranking communities in this order provides an indication of where and what should be done during the intervention.

Note: It is understood that logistics and other considerations may also influence where and how work is performed. Still it is good to perform this analysis as it can prepare for challenges that can arise during an intervention.

Table 5.1D Risk Prioritization Process – Prioritize communities and decide intervention

RISK PRIORITIZATION PROCESS

Step 2 – Prioritize health risks

Priority	Scores for Levels			Recommended actions
1	1	2	3	Highest priority. Perform hygiene training and implement full DWSSP.
2	1	2	3	High priority. Focus on water availablity and treatment.
3	1	2	3	High priority. Focus on water availability and improving sanitation and hygiene facilities and practices.
4	1	2	3	High priority. Focus on water safety and how sanitation is impacting this.
5	1	2	3	High priority. Focus on water availablity and treatment.
6	1	2	3	High priority. Focus on increasing water availibility and improving sanitation and hygiene facilities and practices.
7	1	2	3	High priority. Focus on water safety and how sanitation is impacting this.
8	1	2	3	High priority. Focus on increasing water availability.
9	1	2	3	High priority. Find cause of water contamination and consider treatment.
10	1	2	3	Medium-High priority. Focus on improving sanitation and hygiene facilities and practices.
11	1	2	3	Medium-High priority. Focus on increasing water availability.
12	1	2	3	Medium-High priority. Focus on increasing water availability.
13	1	2	3	Medium-High priority. Find cause of water contamination and consider treatment.
14	1	2	3	Medium priority. Focus on improving sanitation and hygiene facilities and practices.
15	1	2	3	Medium priority. Find cause of water contamination and consider treatment.

Step 2 – Prioritize health risks (communities)				
Priority	**Scores for Levels**			**Recommended actions**
16	1	2	3	Medium priority. Focus on improving sanitation and hygiene facilities and practices.
17	1	2	3	Medium priority. Focus on increasing water availability.
18	1	2	3	Medium priority. Find cause of water contamination and consider treatment.
19	1	2	3	Medium priority. Focus on improving sanitation and hygiene facilities and practices.
20	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
21	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
22	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
23	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
24	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
25	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
26	1	2	3	Low-Medium priority. General DWSSP intervention to find WASH gaps.
27	1	2	3	Low priority. Reinforce messages.

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Officer registering Program Beneficiaries.

Step 3 Consider most likely disaster risk/s

Once communities have been ranked by priority level, and the areas of focus have been established, the final step is to consider the most likely disaster risk/s that could occur in the area of the intervention. This will not affect the order or what is done in the communities, but should be considered when conducting WASH activities. Table 5.1E shows a simple way of quantifying which disaster has had the most impact in the areas where work is being conducted. This should be noted and considered when conducting the DWSSP intervention in the community.

Table 5.1E Risk Prioritization Process – Consider most likely disaster risk/s

RISK PRIORITIZATION PROCESS

Step 3 – Consider most likely disaster risk/s

A. List the most common disasters that have impacted the community, district/province you are working in

The most common disasters for consideration include cyclone, drought, earthquake, flooding and volcanic eruption.

B. Calculate the recurrence interval for each disaster

Recurrence interval = (n+1)/m

where n = number of years on record OR period defined,e.g.,last 10 years

m = number of recorded occurences of the event being considered

Sources of data: There are many different ways this data can be collected, i.e., through discussion with communities, or government records etc. In addition, it can be complicated to define what a recorded disaster is, therefore it is recommended to consult with local government officials on recorded disasters in a province/designated government area. Try to use as many years' records as possible. But remember, that this exercise is to mainly understand which disaster risks are most prominent to the community. It is likely that the community will already have a good understanding of what this is, and the DWSSP implementation toolkit can be used to help assist them with this (see below).

C. Document and remember for intervention

Document which are the most frequent disasters for the community/province, and make a note to focus on these risks during the DWSSP intervention.

Note: The DWSSP implementation toolkit has specific risk checklists for the various disaster hazards and what are the most appropriate actions to be taken from a WASH perspective.

In summary, using risk to inform programming consists of many steps. First, it is important to identify and list as many as possible risks that can affect what is trying to be achieved. Prioritizing these and looking at how to deal with them provides useful feedback on the programme/intervention design. Finally, the highest priority risks can be taken and, using a method of analysis, can guide the programme in knowing where and what to do, and in what order to undertake an intervention.

A young baby holds onto a UNICEF produced flyer that promotes handwashing and good hygiene.

Toolkit 2

Drinking Water Safety and Security Planning (DWSSP) Implementation Tools

CONTENTS

Examples of system description methods

Example of flow diagram for system description

Table 5.2A Example system flow diagram

Catchment and intake:

Water source – Surface stream to RAM pump header tank (elevation – 334 m)

Delivery to **RAM pump** (elevation – 331 m) through 1¼ inch galvanized iron pipe. Pump head of 3 m.

Treatment:

No treatment installed on this system

Storage and distribution:

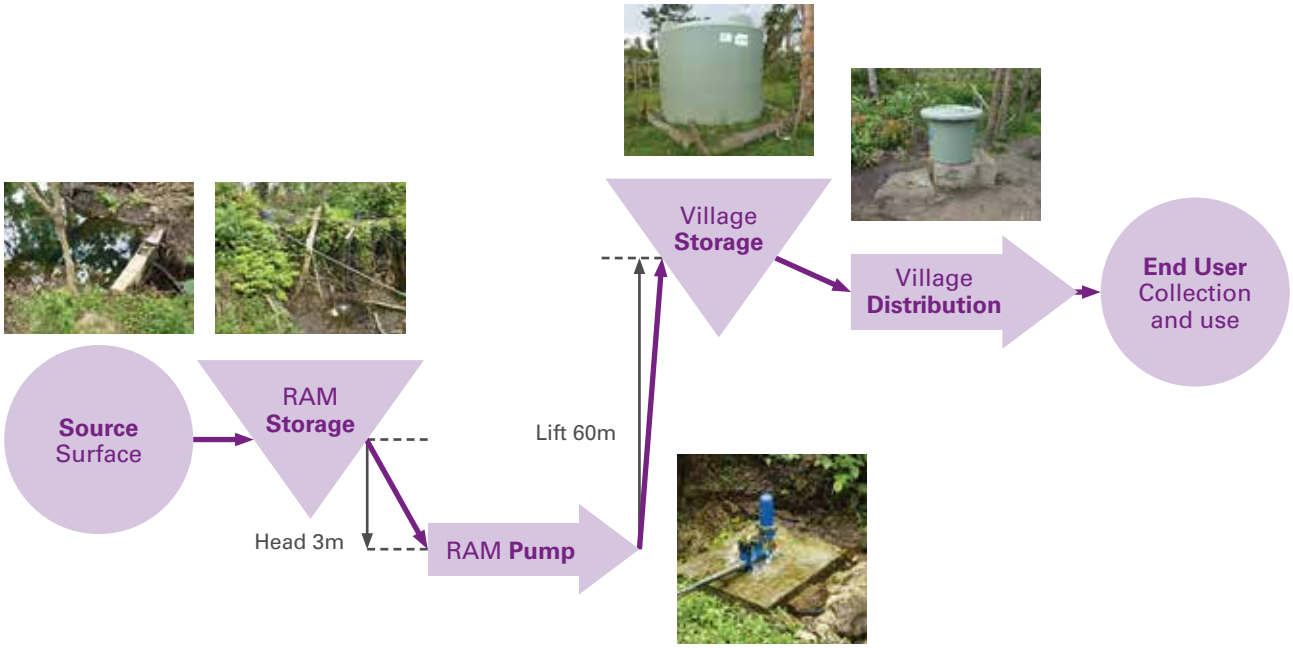
Centralized water storage – 1×10,000 litre tank, (Elevation 391 m). RAM lift of 60 m. Measured flow rate to storage 2.4 litres/minute.

Water distribution – 5 x standpipes in community with 200 litres of storage at each distribution point.

Total available storage = 11,000 litres

Example of schematic for system description

Table 5.2B Example system schematic



Community Drinking Water Safety and Security Plan (DWSSP)

Community Details		
Village Name		
Area/Province		
GPS Coordinates	Lat:	Long:
No. of Households		
Village Population		
Village Contact Person		
Revision	No:	Date:

Section 1 – Water Committee

Name	Current Role in Water Committee/Community	Skills Available/Interest in the Water Supply	Contact Details (Address/Phone/E-mail)

Section 2 – Description of Current Supply

System Map/Flow Diagram

Please draw a map/flow diagram of the current water and waste system

If map is attached separately, please tick here ☐

Section 2 – Description of Current Supply

Existing Water Supply

Piped Supply (River/Spring) ☐	Rainwater Capture ☐		Groundwater ☐	Water Storage ☐	Water Distribution ☐
Measured Flow from Source (litres/min) **2A**	Number of Buildings Collecting **2C**	Average Roof Area (m^2) **2D**	Measured Flow (litres/min) **2F**	Amount Available (litres) **2H**	Number of Distribution Points
Supply per day (litres/day) **2B = 2Ax1440 mins**	Supply per year (litres per year) **2E = 2Cx2Dx0.7xAv_Rainfall_per_year x1000** 0.7 is efficiency factor x1000 to convert m^3 to litres		Supply per day (litres/day) **2G = 2FxMinutes Used/Day**		Measured Flow (litres/min)
Water Quality Result	Water Quality Result		Water Quality Result	Water Quality Result	Water Quality Result

Uses of the system
Drinking ☐ Food Preparation ☐ Hand Washing ☐ Bathing ☐ Toilets ☐
Other (Please explain) ☐ .....

Treatment Methods
Filtration ☐ Chlorine ☐ UV Light ☐
Other (Please explain) ☐ .....

Existing Waste System

Number of Rubbish Pits

Type of Toilets	**Number of Each Type**
VIP (pit and bush)	
Septic Tank	
Pour-Flush	
Other (Please list)	

Section 3A –Assessment (Water Access/Availability)

Water Availability

Number of People in Community **3A**	Estimated Daily Usage (litres per day) [3B = 3A* N litres/day] **3B (Select value for N)**	Storage Required (litres) [3C = 3B] **3C**	Estimated Usage by Population per year (litres per year) [3D = 3A*N l/day *365] **3D**

Water Quantity – Piped Supply System or Groundwater Source
Is the supply in **2B/2G** enough to meet demand **3B**? Yes ☐ No ☐

If NO, look to improve the system design to increase flow (Please tick) ☐
Is this source available at all times during the year? Yes ☐ No ☐

If NO, develop/strengthen Additional Water Source/s (Please tick) ☐

Water Quantity – Rainwater Capture **(ONLY ANSWER IF RWC IS ONLY WATER SOURCE)**
Is the supply in 2E enough to meet demand 3D? Yes ☐ No ☐

If NO, develop Additional Water Source/s (Please tick) ☐

Water Storage – Piped Supply System
Is the current storage **2H** enough to meet the required storage amount **3C**?
Yes ☐ No ☐ **(If NO, add More Storage)**

How much extra Storage is required? litres

Number of tanks required [(Storage Required)/(5000 OR 10000)] tanks

Water Quantity – Distribution Points
Are flow rates more than 6 litres/min at the tapstand/s? Yes ☐ No ☐

If NO, look to improve the system design to increase distribution flow (Please tick) ☐
REMEMBER: Doing this can change pressures and flows in the system. It is important to get some technical assistance when planning to change flows in the distribution system.

Water Access (Only Upgrade if enough water is supplied by the system)

Water Access
Do more than 5 households share 1 distribution point? Yes ☐ No ☐
Are any distribution points more than 200m away (2-3mins walk)? Yes ☐ No ☐

If YES to either question, then you need extra distribution points (Please Tick) ☐
REMEMBER: Doing this can change pressures and flows in the system. It is important to get some technical assistance when planning to increase the distribution system.

How many extra points are required? ..... **PLEASE MARK ON COMMUNITY MAP**

Community Drought Risk and Preparedness			
Risk Factors	**Mitigation Measures**	**Risk**	**Improvements**
Significant dry periods >3months ☐ Variation in source water level/s ☐ Significant leaks in system ☐ Other (Please list)	High storage capacity ☐ Multiple water sources ☐ Water resource management (WRM) undertaken ☐ HWTS prepared ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Fix/optimise system ☐ Increase storage ☐ Develop additional source ☐ Implement WRM ☐ Prepare HWTS ☐ Other (Please list)
Community Flood Risk and Preparedness			
Risk Factors	**Mitigation Measures**	**Risk**	**Improvements**
Significant periods of heavy rain causing unusable dirty river, spring or well water ☐ Damage to intake, pipes, tanks ☐ Other (Please list)	High storage capacity ☐ Multiple water sources ☐ Good spring or well-head protection ☐ Water resource management (WRM) undertaken ☐ HWTS prepared ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Fix/optimise system ☐ Increase storage ☐ Develop additional source ☐ Implement WRM ☐ Prepare HWTS ☐ Other (Please list)

Section 3B – Assessment (Water Safety)

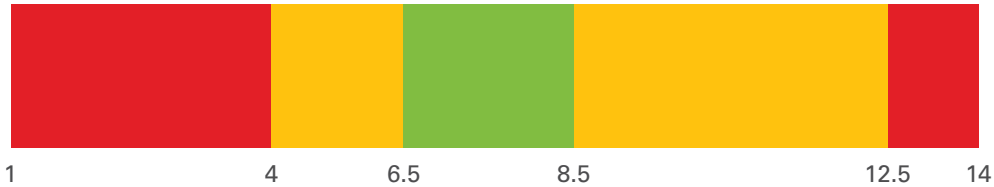
Water Quality Results

E.Coli Results

Turbidity Results

Conductivity Results

pH Results



Water Safety Plan – Risk Assessment				
Water Source – Surface Water Source		Do you use a Surface Water Source? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Human houses upstream ☐ Farm animals nearby/upstream ☐ Crop farming nearby/upstream ☐ Toilet within 30m ☐ Other (Please list)	Fencing around source ☐ Intake screen present ☐ Gravel or Sand Filter ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Establish a water protection zone ☐ Build Fence ☐ Install screen ☐ Install Filter ☐ Move Source ☐ Move Toilet ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Use of pesticides in area ☐ Waste water discharge in area ☐ Algae present at source ☐ Other (Please list)	Gravel or Sand Filter ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Establish a water protection zone ☐ Install Filter ☐ Move Source ☐ Other or Temporary Improvements (Please list)
Bad Colour or Taste	Soil Erosion at source ☐ Other (Please list)	Gravel or Sand Filter ☐ Storage and settlement tanks ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install Filter ☐ Install Storage ☐ Other or Temporary Improvements (Please list)
Bad Flow or Pressure	High pressure in taps ☐ Significant leaks in pipes ☐ Other (Please list)	Minimum Head Device ☐ Pressure Box ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install Head Device ☐ Install Pressure Box ☐ Other or Temporary Improvements (Please list)

Water Source – Surface Water Source		Do you use a Spring Source? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Animals can access source ☐ Spring box/cover is dirty ☐ Silt/soil/dirt near source ☐ Surface water can flow into spring water ☐ Toilet within 30m ☐ Other (Please list)	Spring box and cover ☐ Fencing around source ☐ Air vent (Clean) ☐ Diversion ditch ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Establish a water protection zone ☐ Build Fence ☐ Build spring box ☐ Install/Clean cover, vent ☐ Dig diversion ditch ☐ Move Toilet ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Use of pesticides in area ☐ Waste water discharge in area ☐ Algae present at source ☐ Other (Please list)	Gravel or Sand Filter ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Establish a water protection zone ☐ Install Filter ☐ Move Source ☐ Other or Temporary Improvements (Please list)
Bad Colour or Taste	Silt/soil/dirt near source ☐ Other (Please list)	Gravel or Sand Filter ☐ Storage and settlement tanks ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install Filter ☐ Install Storage ☐ Other or Temporary Improvements (Please list)
Bad Flow or Pressure	High pressure in taps ☐ Significant leaks in pipes ☐ Overflow water at source ☐ Other (Please list)	Overflow pipe (clean) ☐ Pressure Box ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install Head Device ☐ Install Pressure Box ☐ Other or Temporary Improvements (Please list)

Water Source – Rainwater Capture		Do you use a Rainwater Capture? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Roof is dirty ☐ Gutters are dirty ☐ Open access to tank ☐ Tank is cracked ☐ Tap is leaking ☐ Water collection area is dirty / standing water ☐ Pollution (e.g. trees, Excreta etc) near system ☐ Collection bucket dirty ☐ Other (Please list)	Tank cover in place ☐ Tank inlet has mesh/ sieve ☐ First flush filter ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Clean roof/ gutters ☐ Install covers on tank ☐ Install inlet mesh/ sieve ☐ Install first flush filter ☐ Repair cracks ☐ Repair/replace tap ☐ Add drainage/ clean collection area ☐ Remove pollution ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Roof is corroded/rust ☐ Other (Please list)	First flush Filter ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install Filter ☐ Repair/replace/ paint roof ☐ Other or Temporary Improvements (Please list)

Water Source – Groundwater		Do you use a Groundwater Source? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Toilet within 10m of well ☐ Toilets above well height ☐ Other pollution within 10m of well e.g. rubbish ☐ Standing water within 2m of well ☐ Broken drainage channel ☐ Surface water can enter from broken wall ☐ Cracks in concrete wall ☐ Collection bucket dirty ☐ Other (Please list)	Fence around well ☐ Well is sealed to 3m depth ☐ Drainage channel installed ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Establish a water protection zone ☐ Move toilets ☐ Build fence around well ☐ Repair/Install concrete ☐ Line well to 3m depth ☐ Repair well wall ☐ Clean well area ☐ Remove pollution ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Use of pesticides in area ☐ Waste water discharge in area ☐ Other (Please list)	Water treatment system ☐ Established water protection zone ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Establish a water protection zone ☐ Install Treatment ☐ Move Source ☐ Other or Temporary Improvements (Please list)

Water Pump		Does your system have a water pump? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Toilet near pump ☐ Animals can access pump ☐ Pump is dirty ☐ Surface water can access the pump ☐ Standing water in pump area ☐ Other (Please list)	Protective structure for pump ☐ Fence around pump ☐ Adequate drainage around pump ☐ Established protection zone ☐ Diversion ditch ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Establish protection zone ☐ Clean pump and area ☐ Build protective structure ☐ Build fence ☐ Move toilet ☐ Dig diversion ditch ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Pipes are corroded ☐ Other (Please list)	Plastic piping (where appropriate) ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Replace corroded pipe ☐ Other or Temporary Improvements (Please list)
Damaged Pump	Exposed location ☐ Debris loose/ overhanging ☐ Other (Please list)	Protective structure for pump ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Remove debris ☐ Build protective structure ☐ Other or Temporary Improvements (Please list)

Water Source – Storage Reservoir		Do you use Water Storage? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Open access to tank ☐ Vents/screens are dirty ☐ Tank is cracked ☐ Pipes are leaking ☐ Dirty inside tank ☐ Other (Please list)	Tank cover in place ☐ Tank inlet has mesh/ sieve ☐ Tank has air vent ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Install covers on tank ☐ Install inlet mesh/ sieve ☐ Install air vent ☐ Repair cracks ☐ Repair/replace pipes ☐ Clean tank ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Pipes are corroded ☐ Other (Please list)	Treatment Filter ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Replace corroded pipe ☐ Install Filter ☐ Other or Temporary Improvements (Please list)
Bad Flow or Pressure	High pressure in taps ☐ Low pressure in taps ☐ Significant leaks in pipes ☐ Other (Please list)	Overflow pipe (clean) ☐ Float valve ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Install overflow pipe ☐ Install float valve ☐ Other or Temporary Improvements (Please list)

Water Distribution – Stand Pipes		Do you use a Stand Pipes? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Leaks in surrounding pipes ☐ Animals access to area ☐ Standing water in collection area ☐ Rubbish/pollution near tap stand ☐ Tap stand is cracked ☐ Taps are leaking ☐ Other (Please list)	Fence around stand pipe ☐ Drainage area/ channel ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Build fence/s ☐ Install drainage ☐ Repair/replace pipe/s ☐ Repair/replace pipe stand/s ☐ Repair/replace tap/s ☐ Clean collection area/s ☐ Other or Temporary Improvements (Please list)
Chemicals in Water	Pipes are corroded ☐ Other (Please list)	Plastic piping ☐ Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Replace corroded pipe/s ☐ Other or Temporary Improvements (Please list)

Water Consumers – Households		Was this assessed during the visit? (Please Tick) Yes ☐ No ☐		
Hazard	Contamination Source (Tick if present)	Current Control Measures (Tick if present)	Risk	Improvements Required
Bacteria in Water	Non-covered storage ☐ Containers are dirty ☐ Household Rainwater ☐ Dirty buckets for collection ☐ Other (Please list)	HH Chlorine tablets ☐ UV treatment ☐ Boil water ☐ Sealed storage containers ☐ First Flush on Rainwater ☐ Other (Please list)	**High** ☐ (Action Needed Now) **Medium** ☐ (Upgrades Needed) **Low** ☐ (No Action Required)	Obtain sealed storage containers Clean/disinfect storage containers and buckets Begin boiling water Begin UV treatment Install first flush Obtain chlorine tablets Other or Temporary Improvements (Please list)
Chemicals in Water	House pipes/storage is corroded ☐ Other (Please list)	Treatment to remove chemicals Other (Please list)	**High** ☐ **Medium** ☐ **Low** ☐	Replace corroded pipe ☐ Install Treatment ☐ Other or Temporary Improvements (Please list)

Section 3C – Assessment (Sanitation System)

Toilet Sanitary Survey Result

How many toilets need **replacing**? .....

How many toilets need **upgrading**? .....

Replace/Install New Toilets

Are you replacing or installing new toilets? (Please tick) Yes ☐ No ☐

Toilet Options (Please indicate the type and amount of toilets required)

VIP Toilet	Pour Flush Toilet	Septic Tank Toilet
☐	☐	☐
Number Required	Number Required	Number Required
.....	.....	.....
		Has soil permeability test been performed?
		Yes ☐ No ☐

Upgrade Existing Toilets

Do existing toilets require upgrading? (Please tick) Yes ☐ No ☐

What toilet type/s do you want to upgrade? (Please tick all relevant ones)
VIP Toilet ☐ Pour Flush Toilet ☐ Septic Tank Toilet ☐

VIP Toilet – Number requiring upgrade .....

Number requiring repairs to structure .....
Number requiring vent in super structure .....
Number requiring a vent with flywire .....
Number requiring upgrade of slab/riser .....
Number that would require lining of pit .....
Number requiring collection pit at adequate depth .....

Pour Flush Toilet – Number requiring upgrade .....

Number requiring repairs to structure .....
Number requiring venting in the super structure .....
Number requiring upgrade of slab/riser .....
Number of collection pits requiring a cover for access .....
Number of collection pits requiring a vent .....
Number that would require lining of pit .....

Septic Tank Toilet – Number requiring upgrade .....

Number requiring repairs to structure .....
Number requiring vents .....
Number with drainpipes requiring a vent .....
Number with drainpipes requiring inspection access .....
Number requiring a new septic tank .....
Number requiring a drainage trench .....

Section 4 – Improvement Plan

Problem/Hazard	Improvement Required	Who	Timeframe	Cost	Status (Tick when complete)
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐
					Implemented ☐

Section 5 – Community Management

Monitoring Schedule

System Component (Tick if present)	**What?**	**How Often?**	**Who?**
5A Primary Water Source ☐ Type			
5B Secondary Water Source ☐ Type			
5C Water Storage ☐ Type			
5D Water Treatment ☐ Type			
5E Water Distribution ☐ Type			
5F Primary Toilet Type ☐ Type			
5G Secondary Toilet Type ☐ Type			

Maintenance – What actions are needed if something is broken?			
Activity	**How Often?**	**Who?**	**What is needed?**

Emergency – What will you do in an emergency?			
Activity	**How Often?**	**Who?**	**What is needed?**

Appendix 1

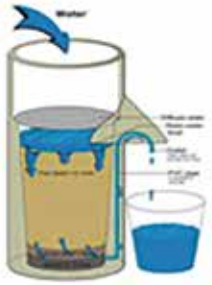
Water Quality Results									
System Part									
Position and Time									
Temp (°C)									
pH									
TDS (mg/L)									
Conductivity (µs/cm)									
Turbidity (NTU)									
Res Chlorine [if used] (mg/L)									
E.Coli (#/100ml)									
Total Coli (#/100ml)									

System components

Parts of the supply – Water system

Catchment / Source → Treatment → Storage and Distribution → Consumer






Parts of the supply – Waste system

Source → Storage and Primary Treatment → Secondary Treatment → Outlet to Environment









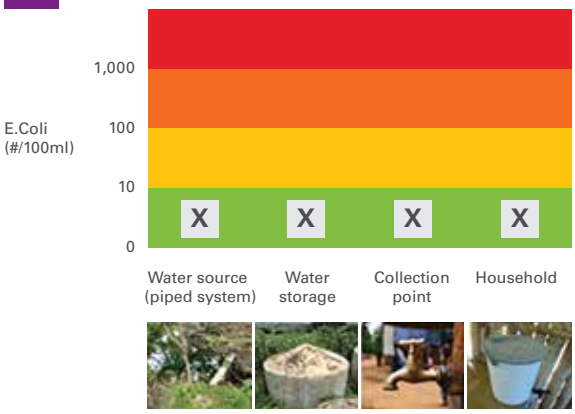
School children washing their hands at the handwashing station.

Water quantity calculation table

Flow Rate Calculator (litres/min)	Container Size (litres)	0.5	0.6	1	1.5	2	2.5	3	4	5	6	7	8	9	10
Time Taken to Fill															
5 seconds		6.0	7.2	12.0	18.0	24.0	30.0	36.0	48.0	60.0	72.0	84.0	96.0	108.0	120.0
10 seconds		3.0	3.6	6.0	9.0	12.0	15.0	18.0	24.0	30.0	36.0	42.0	48.0	54.0	60.0
15 seconds		2.0	2.4	4.0	6.0	8.0	10.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0
20 seconds		1.5	1.8	3.0	4.5	6.0	7.5	90	12.0	15.0	18.0	21.0	24.0	27.0	30.0
25 seconds		1.2	1.4	2.4	3.6	4.8	6.0	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0
30 seconds		1.0	1.2	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
35 seconds		0.9	1.0	1.7	2.6	3.4	4.3	5.1	6.9	8.6	10.3	12.0	13.7	15.4	17.1
40 seconds		0.8	0.9	1.5	2.3	3.0	3.8	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0
45 seconds		0.7	0.8	1.3	2.0	2.7	3.3	4.0	5.3	6.7	8.0	9.3	10.7	12.0	13.3
50 seconds		0.6	0.7	1.2	1.8	2.4	3.0	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0
55 seconds		0.5	0.7	1.1	1.6	2.2	2.7	3.3	4.4	5.5	6.5	7.6	8.7	9.8	10.9
1 minute		0.5	0.6	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
1 minute 10 seconds		0.4	0.5	0.9	1.3	1.7	2.1	2.6	3.4	4.3	5.1	6.0	6.9	7.7	8.6
1 minute 20 seconds		0.4	0.5	0.8	1.1	1.5	1.9	2.3	3.0	3.8	4.5	5.3	6.0	6.8	7.5
1 minute 30 seconds		0.3	0.4	0.7	1.0	1.3	1.7	2.0	2.7	3.3	4.0	4.7	5.3	6.0	6.7
1 minute 40 seconds		0.3	0.4	0.6	0.9	1.2	1.5	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0
1 minute 50 seconds		0.3	0.3	0.5	0.8	1.1	1.4	1.6	2.2	2.7	3.3	3.8	4.4	4.9	5.5
2 minute		0.3	0.3	0.5	0.8	1.0	1.3	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
2 minute 10 seconds		0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.8	2.3	2.8	3.2	3.7	4.2	4.6
2 minute 20 seconds		0.2	0.3	0.4	0.6	0.9	1.1	1.3	1.7	2.1	2.6	3.0	3.4	3.9	4.3
2 minute 30 seconds		0.2	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0
2 minute 40 seconds		0.2	0.2	0.4	0.6	0.8	0.9	1.1	1.5	1.9	2.3	2.6	3.0	3.4	3.8
2 minute 50 seconds		0.2	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5
3 minute		0.2	0.2	0.3	0.5	0.7	0.8	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3

Water Safety Actions

A



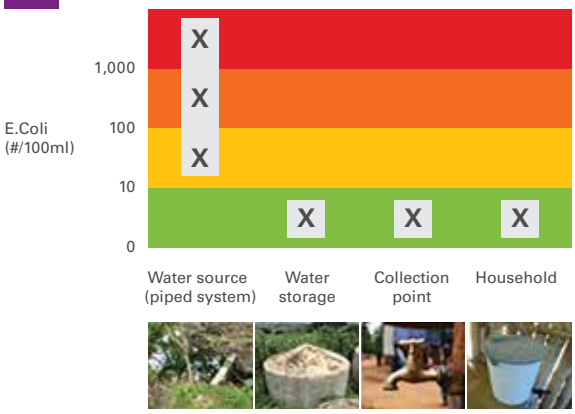
WHY?

Acceptable quality source that does not got contaminated through to consumption.

ACTIONS

1. Implement any necessary WSP actions to keep contamination low.

B



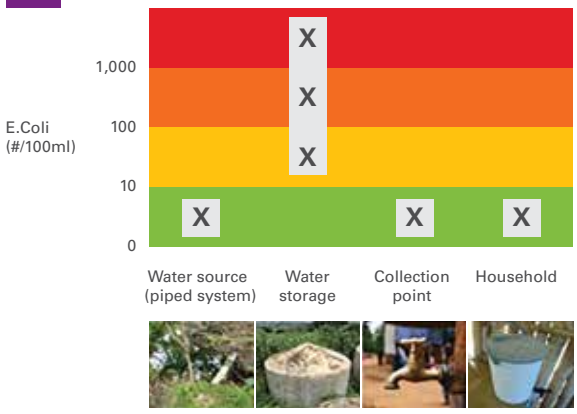
WHY?

Contaminated source where bacteria has died in storage, or water is treated prior to storage. No further contamination.

ACTIONS

1. Implement water source WSP actions to try and improve.
2. Ensure household water storage and safe storage actions are prepared in case quality deteriorates at collection point or household.
3. Implement any other necessary WSP actions.

C



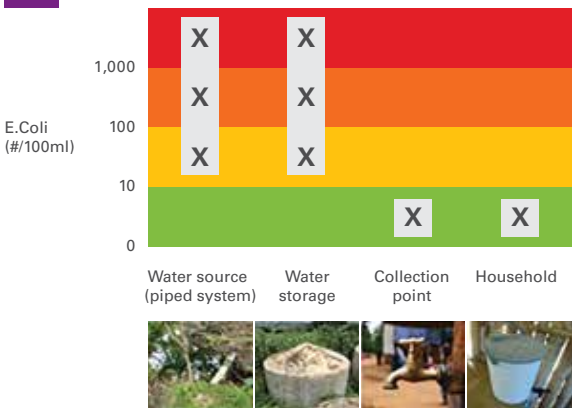
WHY?

Acceptable quality source contaminated in storage tank. Treated before collection point with no further contamination.

ACTIONS

1. Implement water storage WSP actions.
2. Implement all other necessary WSP actions.

D



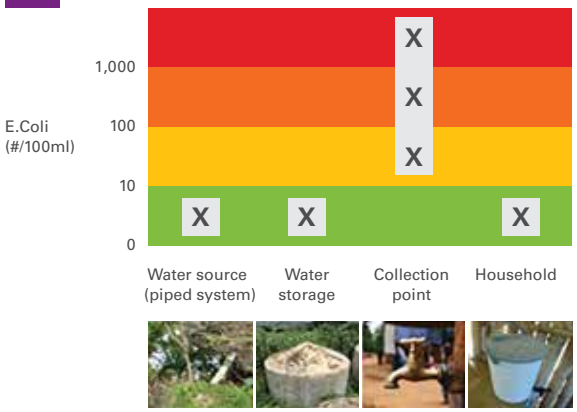
WHY?

Contaminated source treated before collection point. Stays safe in the home.

ACTIONS

1. Implement water source and storage WSP actions.
2. Implement all other necessary WSP actions.

E



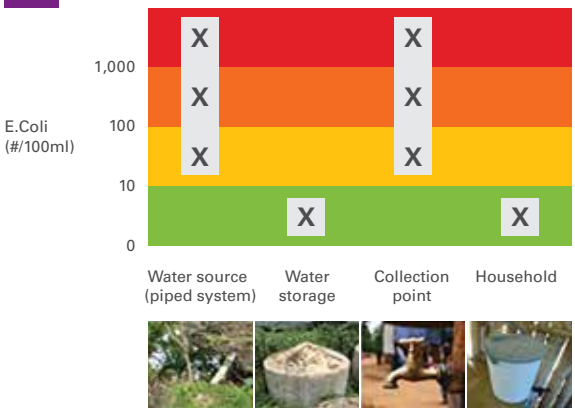
WHY?

Acceptable quality source contaminated at collection points. Treated at the household.

ACTIONS

1. Implement collection point WSP actions.
2. Reinforce household water treatment and safe storage actions.
3. Implement all other necessary WSP actions.

F



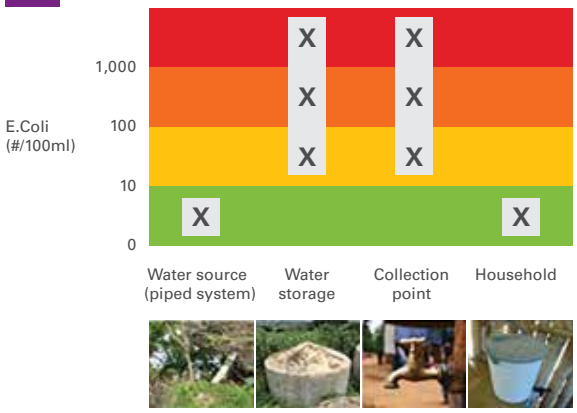
WHY?

Contaminated source where bacteria has died in storage, or water is treated prior to storage. Re-contaminated at collection point, but treated at HH.

ACTIONS

1. Implement collection point WSP actions.
2. Ensure household water storage and safe storage actions are prepared.
3. Implement water source WSP actions.
4. Implement any other necessary WSP actions.

G



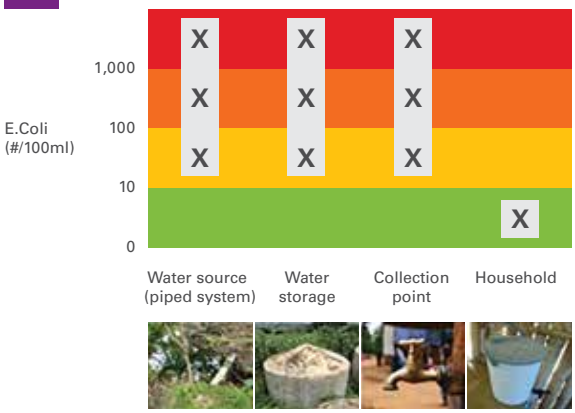
WHY?

Acceptable quality source contaminated in storage tank and collection point. Treated in the household.

ACTIONS

1. Implement water source and collection point WSP actions.
2. Reinforce householdtreatment and safe storage WSP actions.
3. Implement all other necessary WSP actions.

H



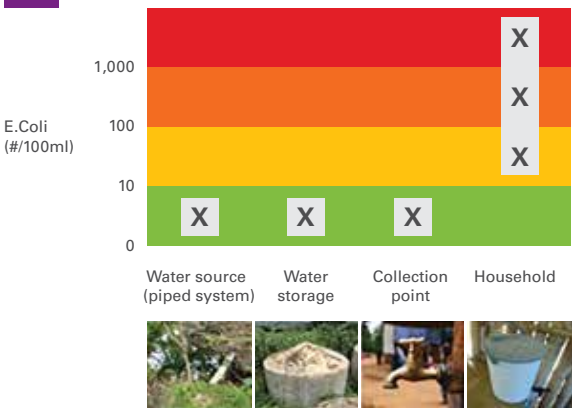
WHY?

Contaminated source remains contaminated up to collection point. Treated in the household.

ACTIONS

1. Implement water source, storage and collection point WSP actions.
2. Reinforce household treatment and safe storage WSP actions.

I



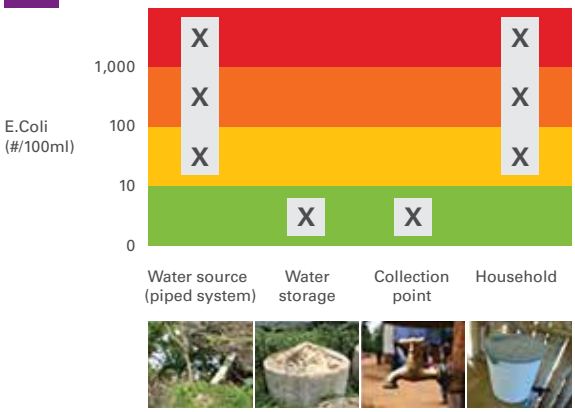
WHY?

Clean water delivered but then contaminated in the household.

ACTIONS

1. Implement household water treatment and safe storage actions.
2. Implement all other necessary WSP actions.

J



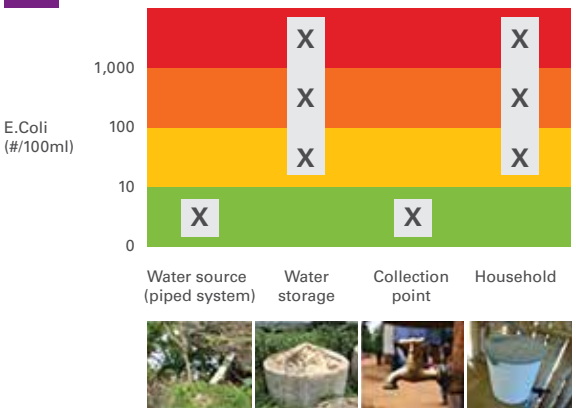
WHY?

Contaminated source where bacteria has died in storage. Re-contaminated in the Household.

ACTIONS

1. Implement household water treatment and safe storage actions.
2. Implement water source WSP actions.
3. Implement all other necessary WSP actions.

K



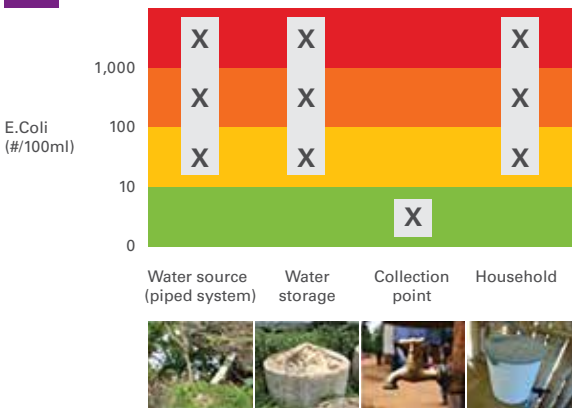
WHY?

Clean water source contaminated in water storage and Household.

ACTIONS

1. Implement household water treatment and safe storage actions.
2. Implement water source WSP actions.
3. Implement all other necessary WSP actions.

L



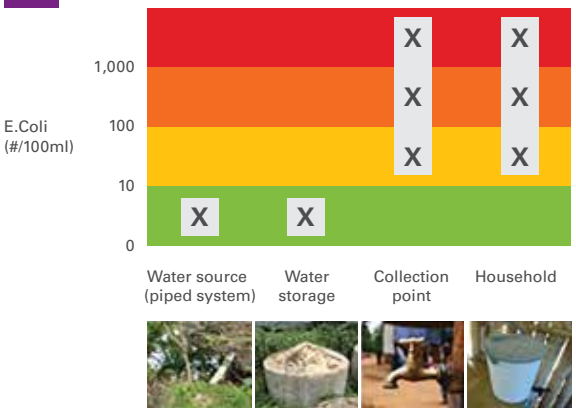
WHY?

Contaminated source treated before collection point. Re-contaminated in the Household.

ACTIONS

1. Implement household water treatment and safe storage actions.
2. Implement water source and storage WSP actions.
3. Implement all other necessary WSP actions.

M



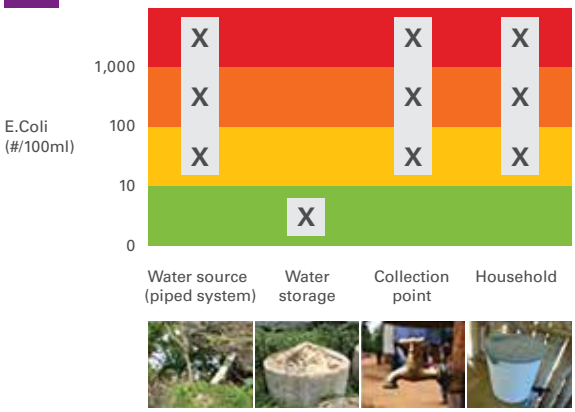
WHY?

Acceptable quality source contaminated at collection points. Not treated at the household.

ACTIONS

1. Implement household water treatment and safe storage actions.
2. Implement collection point WSP actions.
3. Implement all other necessary WSP actions.

N



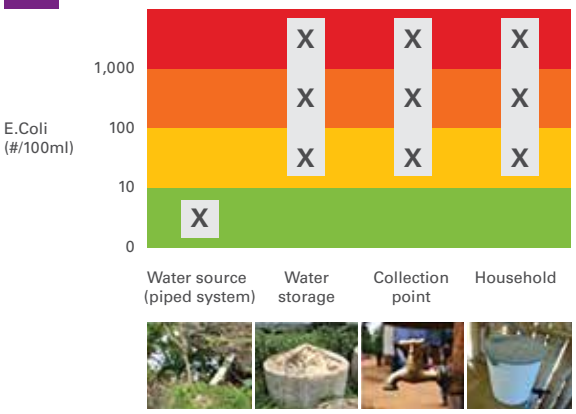
WHY?

Contaminated source where bacteria has died in storage, or water is treated prior to storage. Re-contaminated at collection point; not treated at HH.

ACTIONS

1. Implement household water storage and safe storage actions.
2. Implement collection point WSP actions.
3. Implement water source WSP actions
4. Implement any other necessary WSP actions.

O



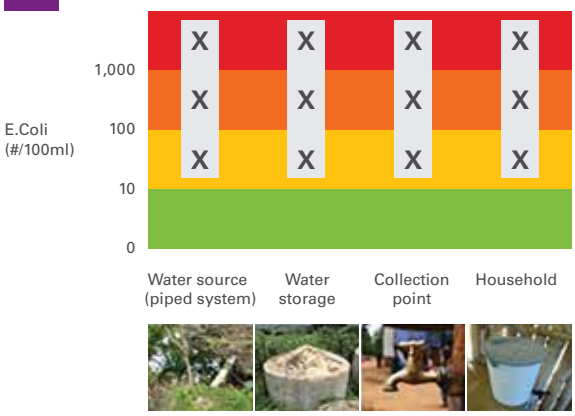
WHY?

Acceptable quality source contaminated in storage tank and collection point. Not treated in the household.

ACTIONS

1. Implement household treatment and safe storage WSP actions.
2. Implement water storage and collection point WSP actions.
3. Implement all other necessary WSP actions.

P



WHY?

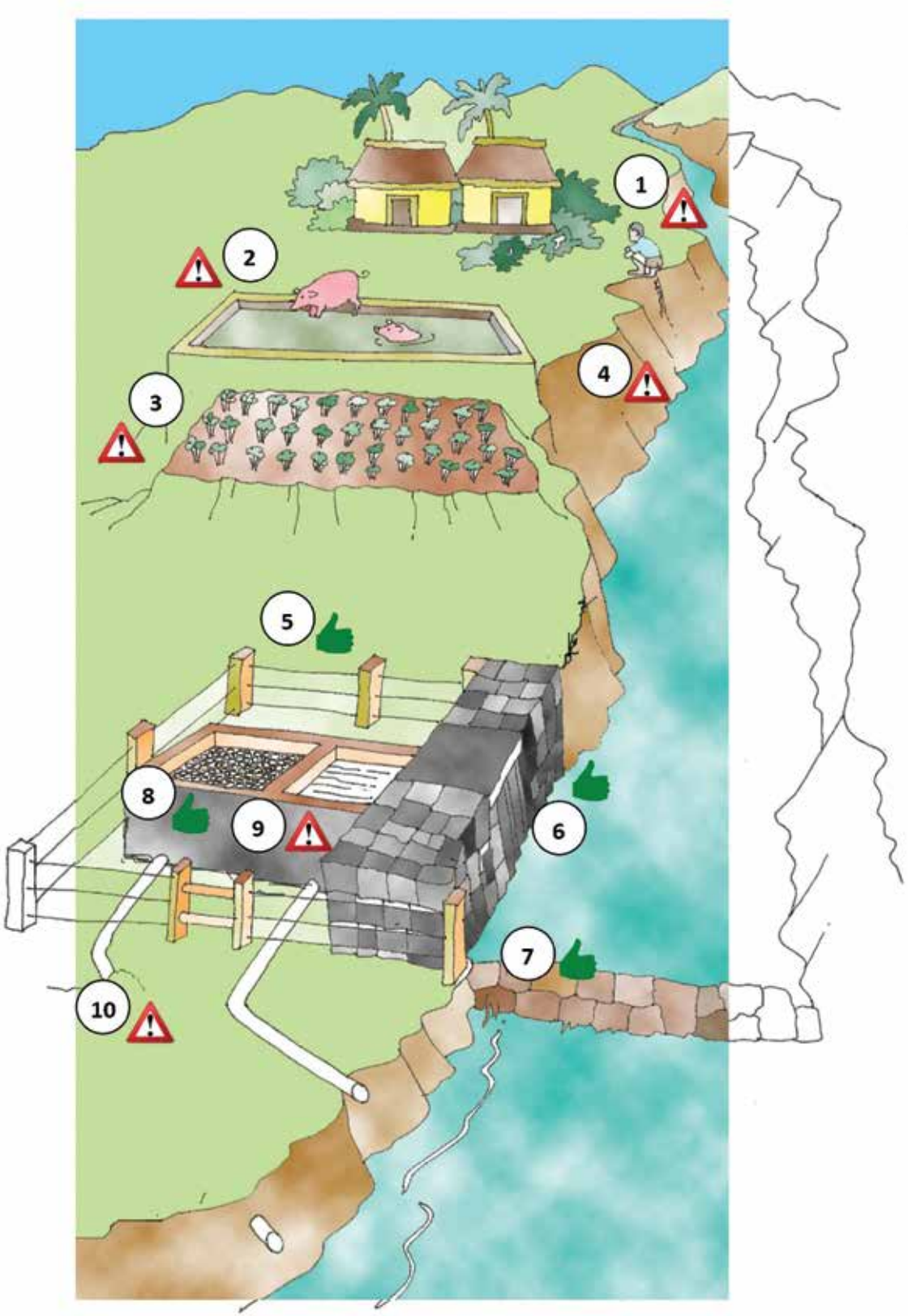
Contaminated source remains contaminated up to consumer. No household treated.

ACTIONS

1. Implement household treatment and safe storage WSP actions.
2. Implement full WSP actions across the whole system.

Sanitary surveys and answer sheet

SURFACE SOURCE AND ABSTRACTION



SURFACE SOURCE AND ABSTRACTION

Risk Assessment Questions

Risk = ⚠ **Control Measure** = 👍

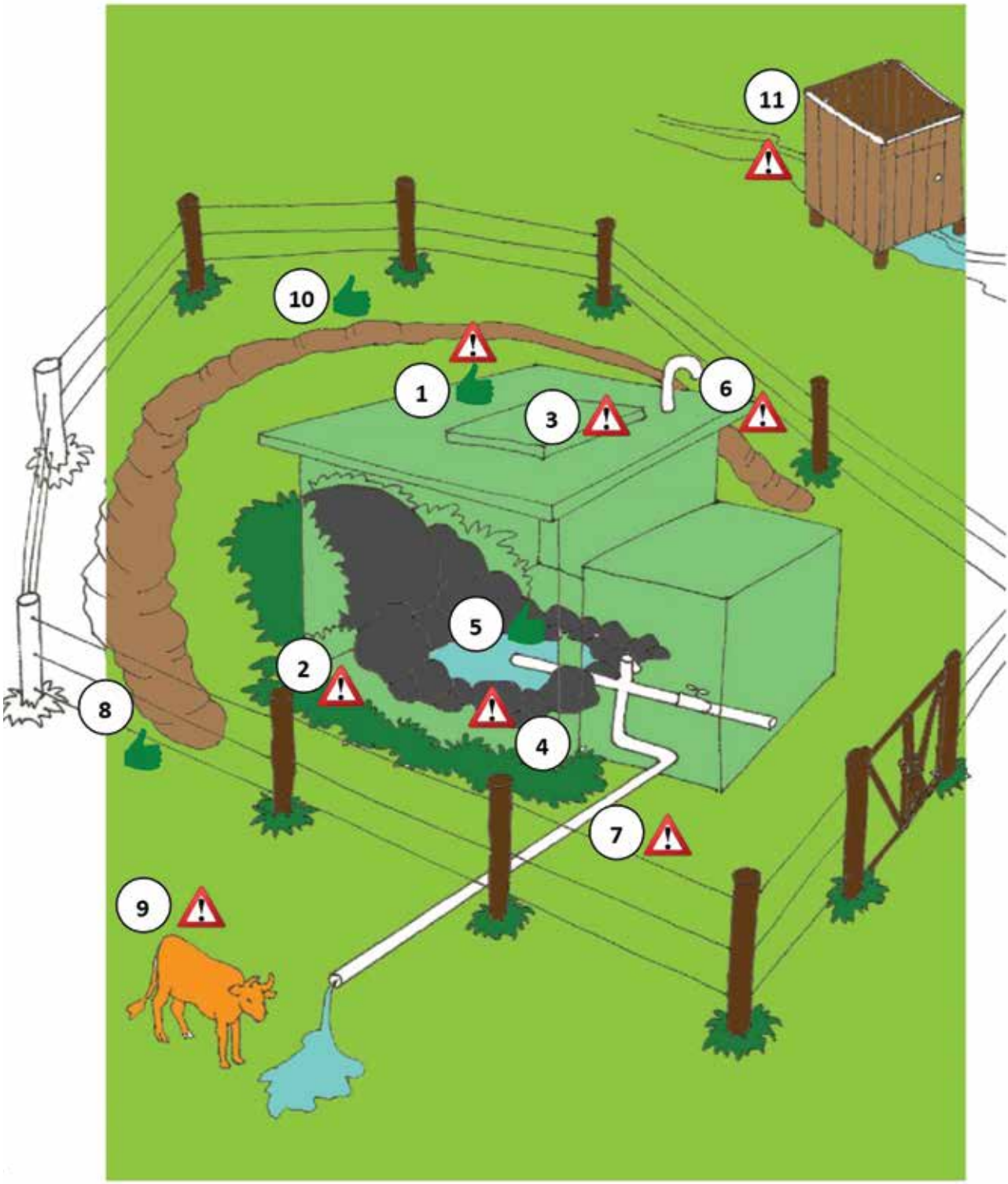
⚠ 1.	**HUMAN WASTE** - Are there any human houses/toilets/ activities upstream, polluting the source?	Y/N
⚠ 2.	**ANIMAL WASTE** - Are there any farm animals upstream, polluting the source?	Y/N
⚠ 3.	**FARMING WASTE/OTHER POLLUTION** - Is there any crop production/industrial pollution/waste water discharges upstream? Any algae present at source?	Y/N
⚠ 4.	**DIRT/DEBRIS** - Is there a risk of landslide/mudflow (causing deforestation)/soil erosion in the catchment area?	Y/N
👍 5.	**FENCING** - Is the intake installation unfenced?	Y/N
👍 6.	**INLET SCREEN** - Is the intake unscreened?	Y/N
👍 7.	**DAM** - Does the abstraction point lack a minimum head device (e.g. dam)?	Y/N
👍 8.	**WATER TREATMENT** - Does the system **not** have any method of water treatment? Household Water Treatment and Storage (HWTS) is a good and valid method.	Y/N
⚠ 9.	**INTAKE BROKEN/DIRTY** - Is the abstraction structure dirty or leaking?	Y/N
⚠ 10.	**HIGH/LOW PRESSURE IN PIPES** - Is the flow uncontrolled?	Y/N

Total score of risk: ...../10

Contamination Risk Score: 9-10 = Very High; 6-8 = High;
3-5 = Intermediate; 0-2 = Low

REMEMBER TO CHECK THE CLIMATE AND DISASTER RISK SURVEY

PROTECTED SPRING SOURCE



PROTECTED SPRING SOURCE

Risk Assessment Questions

Risk = ⚠ Control Measure = 👍

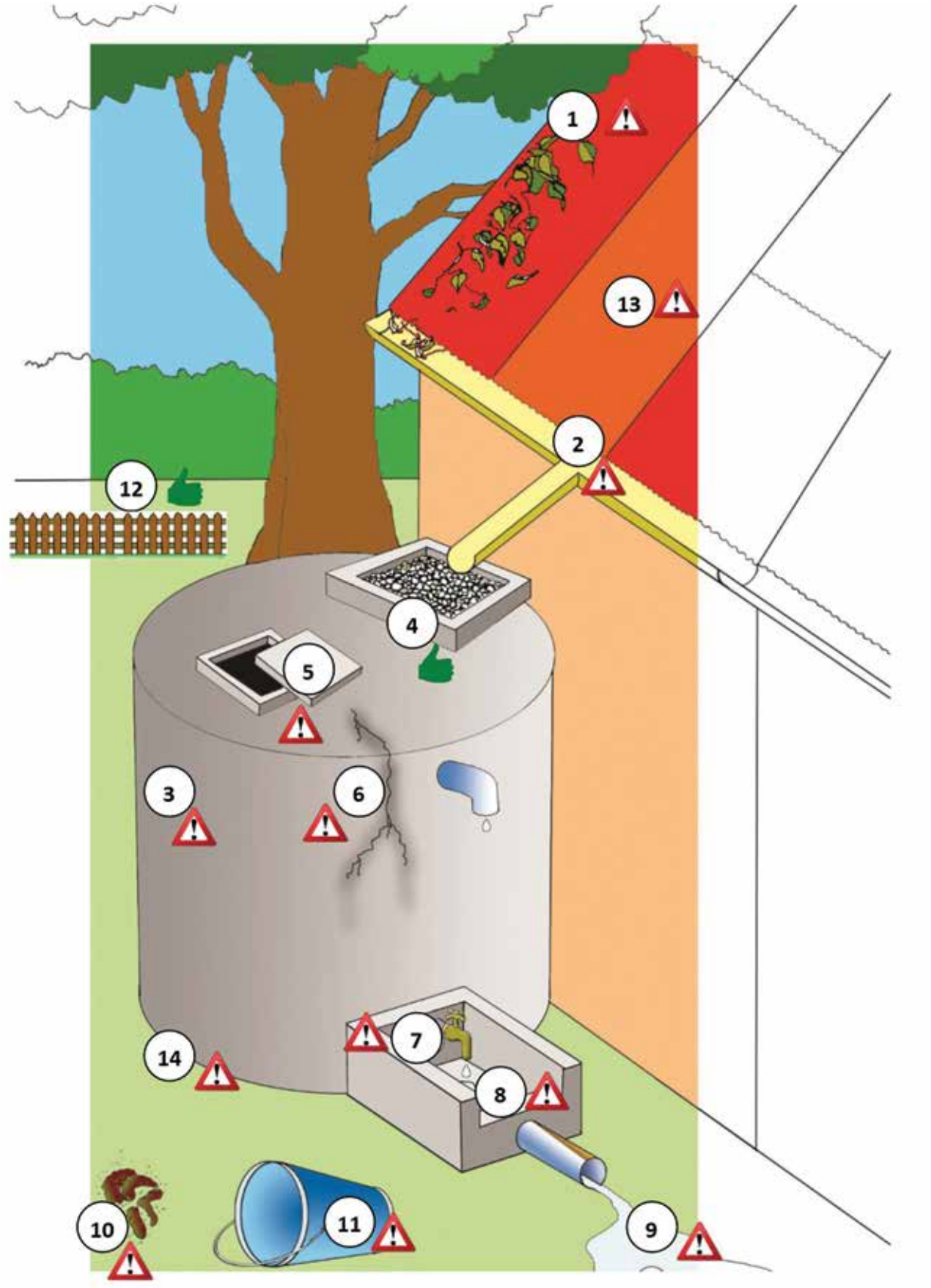
⚠ 1.	**SURFACE WATER CONTAMINATION / SPRING BOX (Clean with cover, min head device, overflow, and wash out valve)** - Is the spring source **unprotected** by stone or concrete wall, or spring box and therefore open to surface contamination?	Y/N
⚠ 2.	**SURFACE WATER CONTAMINATION / LEAKAGE** - Is the stonewall protecting the spring source faulty?	Y/N
⚠ 3.	**DIRT/DEBRIS** - If spring box is present, is the cover dirty ?	Y/N
⚠ 4.	**DIRT/DEBRIS** - Does the spring box contain contaminating silt or animals?	Y/N
👍 5.	**SCREEN/MESH** - Is the outlet pipe **un**screened/**un**meshed?	Y/N
⚠ 6.	**DIRT/DEBRIS** - If there is an air vent in the stone wall, is it unclean or unsanitary?	Y/N
⚠ 7.	**DIRT/DEBRIS / OVERFLOW** - If there is an overflow pipe, is it unclean or unsanitary?	Y/N
👍 8.	**FENCING** - Is the area around the spring unfenced?	Y/N
⚠ 9.	**ANIMAL WASTE** - Can animals have access to within 10m of the spring source?	Y/N
👍 10.	**DIVERSION DITCH** - Does the spring lack a surface water diversion ditch above it?	Y/N
⚠ 11.	**HUMAN WASTE** - Are there any toilets uphill of the spring?	Y/N
⚠ 12.	**FARMING WASTE/OTHER POLLUTION** - Is there any crop production/industrial pollution/waste water discharges upstream? Any algae present at source?	Y/N

Total score of risk: ...../12

Contamination Risk Score: 10-12 = Very High; 6-9 = High;
3-5 = Intermediate; 0-2 = Low

REMEMBER TO CHECK THE CLIMATE AND DISASTER RISK SURVEY

RAINWATER COLLECTION AND STORAGE



RAINWATER COLLECTION AND STORAGE

Risk Assessment Questions

Risk = ⚠ Control Measure = 👍

⚠ 1. **WASTE/DIRT/DEBRIS** - Is there any visible contamination of the roof catchments area (plants, dirt, or excreta)? Y/N

⚠ 2. **WASTE/DIRT/DEBRIS** - Are the guttering channels that collect water dirty? Y/N

⚠ 3. **WASTE/DIRT/DEBRIS** - Is the inside of the rainwater collection tank dirty or filled with dirt and debris? Y/N

👍 4. **INLET MESH** - Does the tank inlet not have any mesh sieve or fine gravel? Y/N

⚠ 5. **WASTE/DIRT/DEBRIS** - Is there any other point of entry to the tank that is not properly covered? Y/N

⚠ 6. **SURFACE WATER INGRESS** - Are there any cracks on the walls or top of the tank that could let water in? Y/N

⚠ 7. **WASTE/DIRT/DEBRIS, WATER LOSS** - Is the tap leaking/faulty? Y/N

⚠ 8. **WASTE/DIRT/DEBRIS** - Is the concrete floor under the tap dirty? Y/N

⚠ 9. **ANIMAL ACCESS** - Is the water collection area inadequately drained? Y/N

⚠ 10. **WASTE/DIRT/DEBRIS** - Is there any source of pollution around the tank or water collection area (e.g. excreta, trees, debris)? Y/N

⚠ 11. **WASTE/DIRT/DEBRIS** - Is a bucket in use and left in a place where it may become contaminated? Y/N

👍 12. **FENCING** - Is the area around the tank unfenced? Y/N

⚠ 13. **WATER LOSS/DROUGHT** - Is the rainwater collection system leaking or damaged so that water is not being collected? Y/N

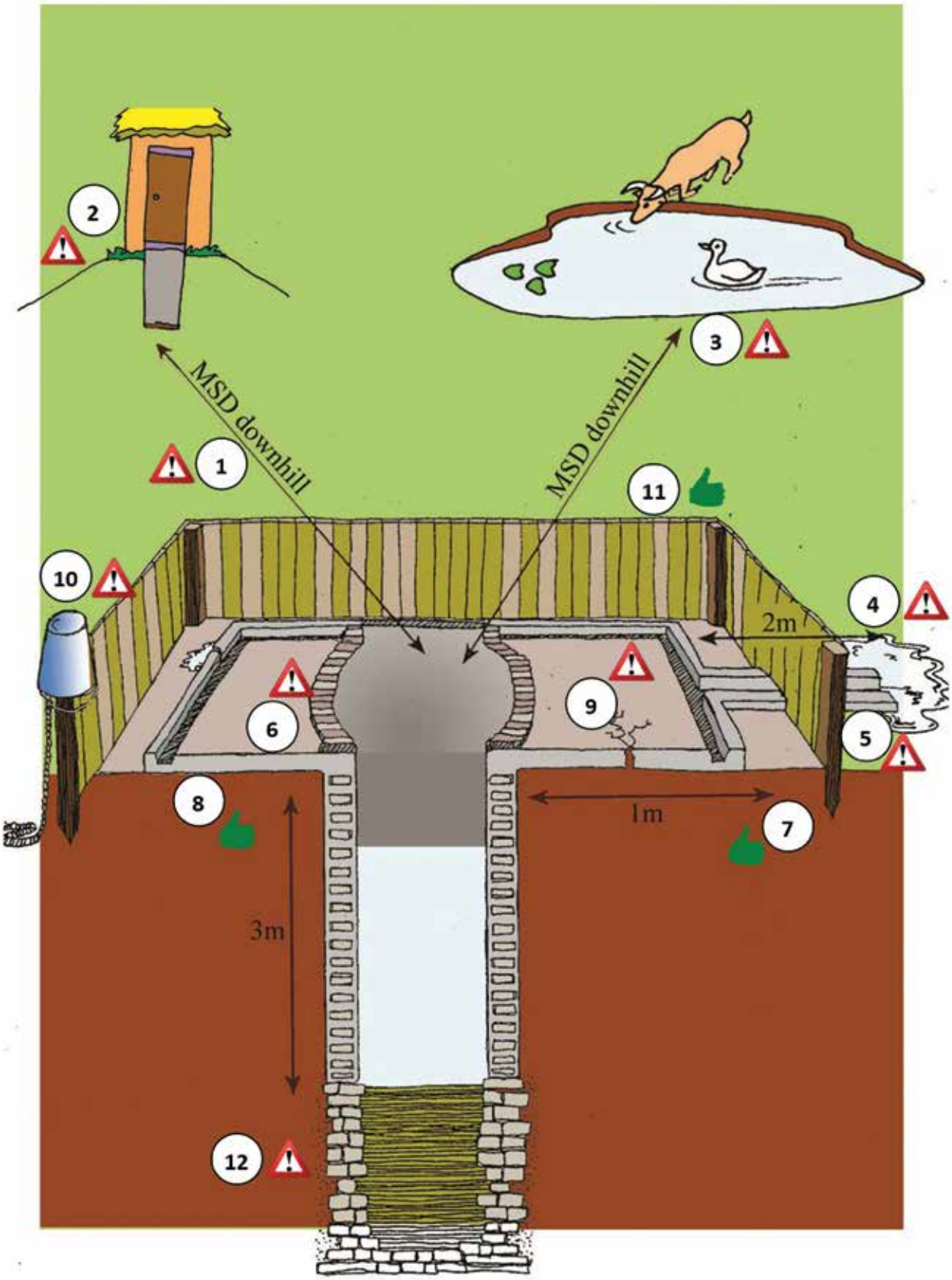
⚠ 14. **FLOOD/DAMAGE** - Is the tank foundation soil with no anchors? Is tank below the flood water level? Y/N

Total score of risk: ...../14

Contamination Risk Score: 11-14 = Very High; 8-10 = High;
3-7 = Intermediate; 0-2 = Low

REMEMBER TO CHECK THE CLIMATE AND DISASTER RISK SURVEY

OPEN DUG WELL



MSD = Minimum Safe Distance

OPEN DUG WELL

Risk Assessment Questions

Risk = ⚠ **Control Measure** = 👍

⚠ 1. **HUMAN WASTE** - Is there a toilet within 10m of the well? Y/N

⚠ 2. **HUMAN WASTE** - Is the nearest toilet on higher ground than the well? Y/N

⚠ 3. **ANIMAL WASTE/DIRT/DEBRIS** - Is there any other source of pollution (e.g. animal excreta, rubbish) within 10m of the well? Y/N

⚠ 4. **ANIMAL ACCESS** - Is the drainage poor, causing non-movement water within 2m of the well? Y/N

⚠ 5. **SURFACE WATER INGRESS** - Is there a faulty drainage channel? Is it broken, permitting ponding? Y/N

⚠ 6. **SURFACE WATER INGRESS** - Is the wall (parapet) around the well cracked, or too low, allowing surface water to enter? Y/N

👍 **THINK ABOUT FLOOD LEVELS TOO** Y/N

7. **CONCRETE APRON** - Is the concrete floor less than 1m wide around the well? Y/N

👍 8. **SEALED WELL LINING** - Are the walls of the well inadequately sealed at any point for 3m below ground? Y/N

⚠ 9. **SURFACE WATER INGRESS** - Are there any cracks in the concrete floor around the well, which could permit water to enter the well? Y/N

⚠ 10. **WASTE/DIRT/DEBRIS** - Are the rope and bucket left in such a position that they may become contaminated? Y/N

👍 11. **FENCING** - Does the installation require fencing? Y/N

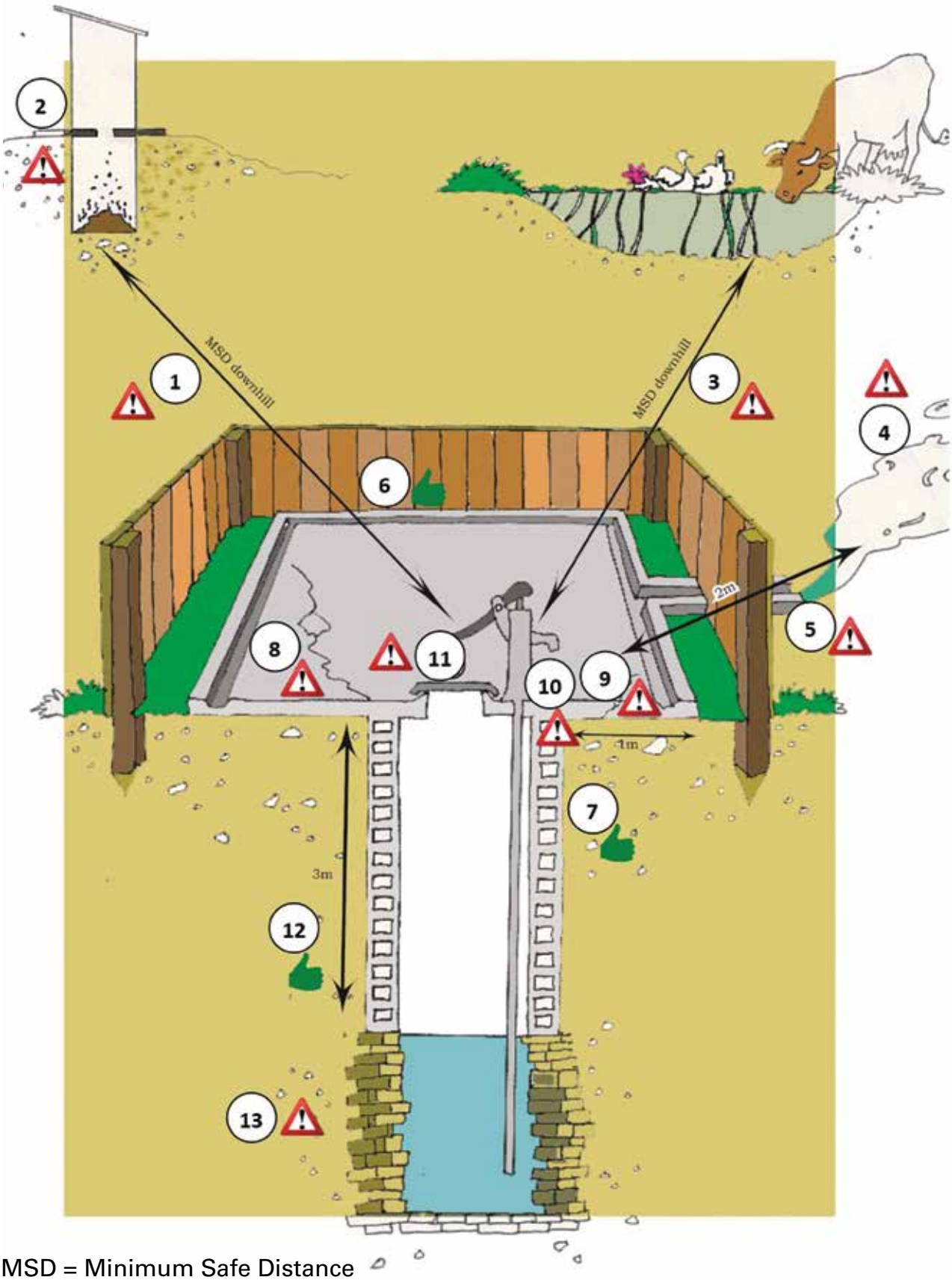
⚠ 12. **LACK OF WATER/DROUGHT** - The well is located where the water table is low?

Total score of risk: ...../12

Contamination Risk Score: 10-12 = Very High; 6-9 = High; 3-5 = Intermediate; 0-2 = Low

REMEMBER TO CHECK THE CLIMATE AND DISASTER RISK SURVEY

COVERED DUG WELL WITH HANDPUMP



MSD = Minimum Safe Distance

COVERED DUG WELL WITH HANDPUMP

Risk Assessment Questions

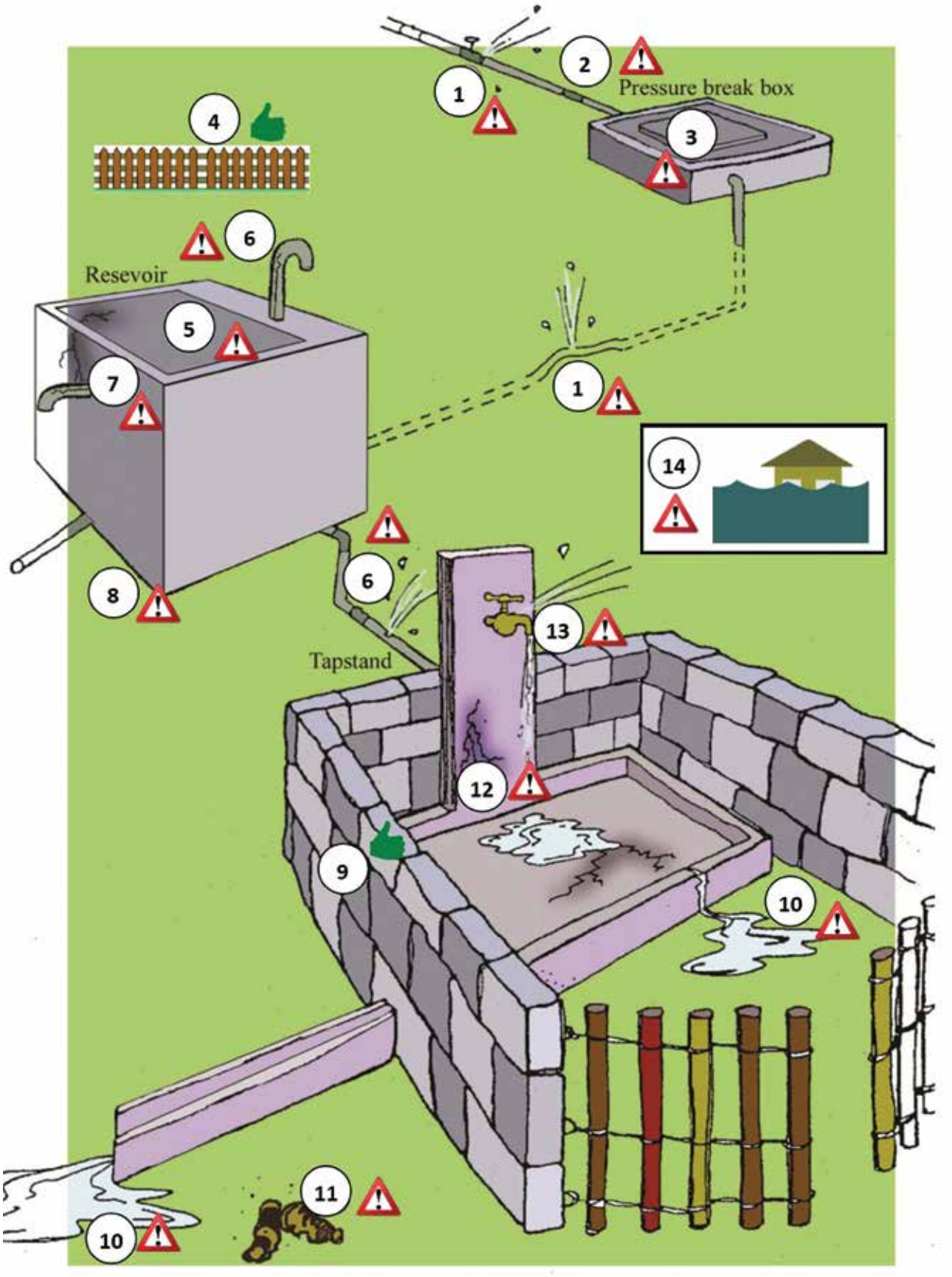
Risk = ⚠ Control Measure = 👍

⚠ 1.	**HUMAN WASTE** - Is there a toilet within 10m of the well?	Y/N
⚠ 2.	**HUMAN WASTE** - Is the nearest toilet on higher ground than the well?	Y/N
⚠ 3.	**ANIMAL WASTE/DIRT/DEBRIS** - Is there any other source of pollution (e.g. animal excreta, rubbish) within 10m of the well?	Y/N
⚠ 4.	**ANIMAL ACCESS** - Is the drainage poor, causing non-movement water within 2m of the well?	Y/N
⚠ 5.	**SURFACE WATER INGRESS** - Is there a faulty drainage channel? Is it broken, permitting ponding?	Y/N
👍 6.	**FENCING** - Is the wall or fencing around the well inadequate, allowing animals in?	Y/N
👍 7.	**CONCRETE APRON** - Is the concrete floor less than 1m wide around the well?	Y/N
⚠ 8.	**ANIMAL ACCESS** - Is there ponding on the concrete floor around the hand pump?	Y/N
⚠ 9.	**SURFACE WATER INGRESS** - Are there any cracks in the concrete floor around the well, which could permit water to enter the well? **THINK ABOUT FLOOD EVENT**	Y/N
⚠ 10.	**SURFACE WATER INGRESS** - Is the hand pump loose where it is attached to the base allowing water to enter the casing or pipes?	Y/N
⚠ 11.	**WASTE/DIRT/DEBRIS** - Is the cover of the well unsanitary?	Y/N
👍 12.	**SEALED WELL LINING** - Are the walls of the well inadequately sealed at any point for 3m below ground?	Y/N
⚠ 13.	**LACK OF WATER/DROUGHT** - The well is located where the water table is low?	Y/N

Total score of risk: ...../13

Contamination Risk Score: 10-13 = Very High; 6-9 = High;
3-5 = Intermediate; 0-2 = Low ***CHECK CCA/DRR SURVEY***

PIPED DISTRIBUTION



PIPED DISTRIBUTION

Risk Assessment Questions

Risk = ⚠ Control Measure = 👍

Piping within the system

⚠ 1. **WASTE/DIRT INGRESS, WATER LOSS** - Is there any point of leakage between source and reservoir? Y/N

⚠ 2. **WATER LOSS** - Is piping exposed and could be damaged? Y/N

⚠ 3. **WATER LOSS**- Is head loss greater than 50m in system? Y/N

If there is a reservoir/storage tank:

👍 4. **FENCE** - Is the area around the tank unfenced (or fencing incomplete)? Y/N

⚠ 5. **WASTE/DIRT INGRESS**- Is the inspection cover/tank dirty? Y/N

⚠ 6. **WASTE/DIRT INGRESS** - Are any air vents dirty? Y/N

⚠ 7. **SURFACE WATER INGRESS** - Is the reservoir cracked or leaking? Y/N

⚠ 8. **FLOOD/DAMAGE** - Is the tank foundation soil with no anchors? Is tank below the flood water level? Y/N

If there is a distribution system with tap stands:

👍 9. **FENCE** - Is the area around the tap stand unfenced (or fencing incomplete)? Y/N

⚠ 10. **ANIMAL ACCESS** - Does water accumulate near the tap stand (requires improved drainage channel)? Y/N

⚠ 11. **HUMAN WASTE** - Is there human excreta within 10m of the tap stand? Y/N

⚠ 12. **SURFACE WATER INGRESS** - Is the tap stand cracked or eroded? Y/N

⚠ 13. **ANIMAL ACCESS, WATER LOSS** - Does the tap leak? Y/N

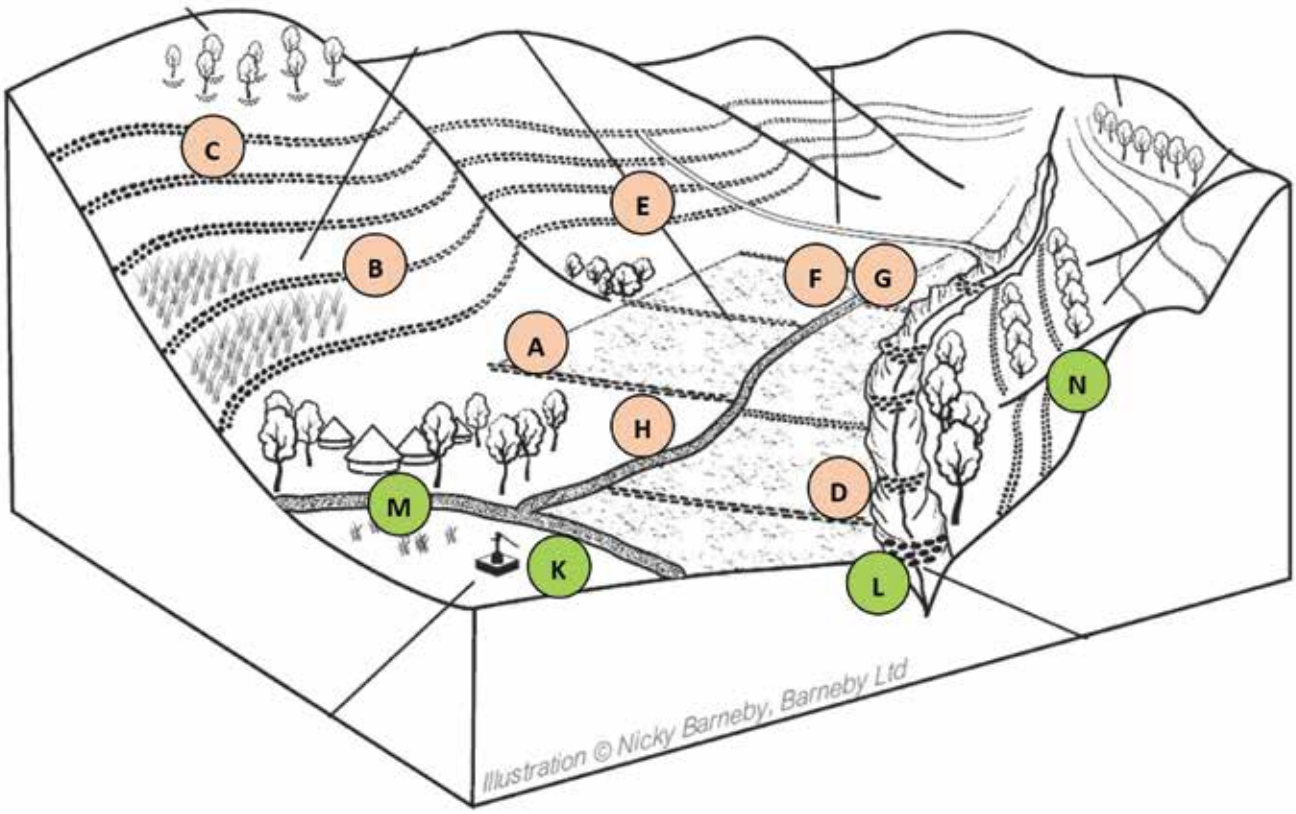
⚠ 14. **FLOOD/DAMAGE** - Are any parts of the system located below a flood level on poor structures and unsecured? Y/N

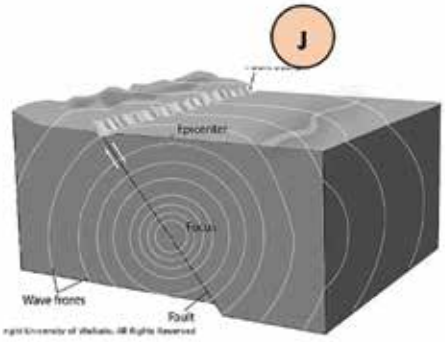
Total score of risk: ...../14

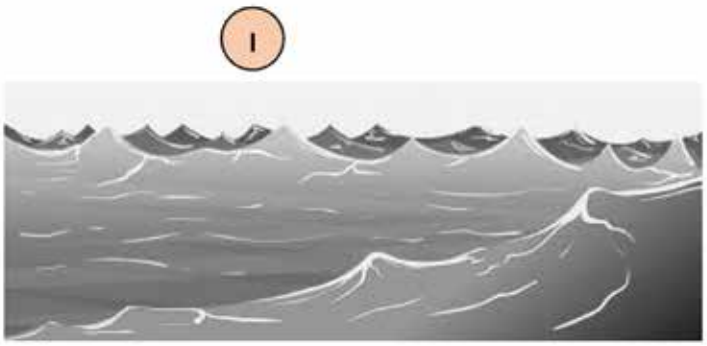
Contamination Risk Score: 11-14 = Very High; 8-10 = High;
3-7 = Intermediate; 0-2 = Low

REMEMBER TO CHECK THE CLIMATE AND DISASTER RISK SURVEY

CLIMATE AND DISASTER RISKS







CLIMATE AND DISASTER RISKS

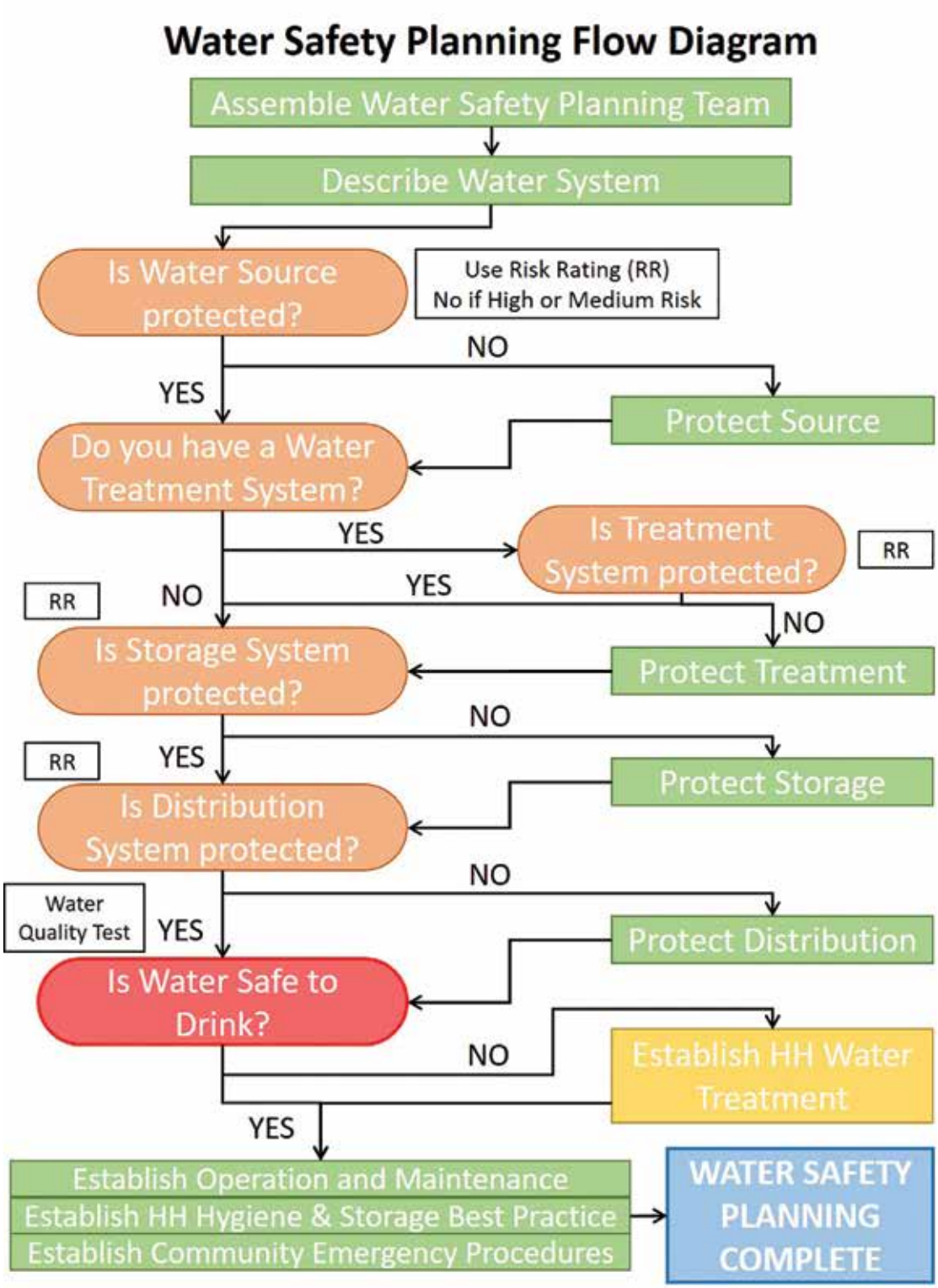
Risk Assessment Questions **Risk = ⚠** **Control Measure = 👍**

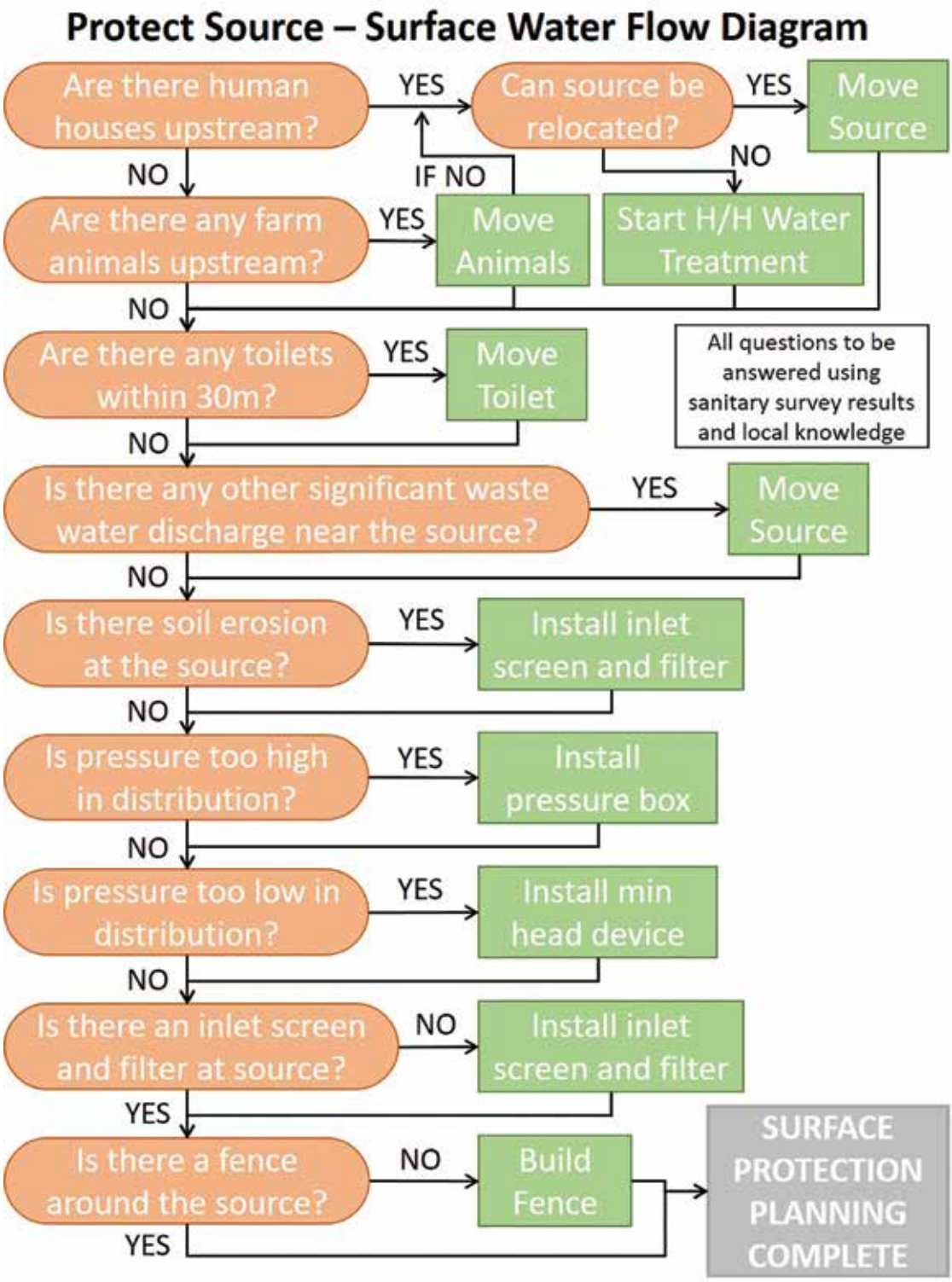
⚠	A.	**LANDSLIDE/FLOODING** - Is water system component located at the bottom of a gradient/slope?	Y/N
⚠	B.	**LANDSLIDE** - Is the soil unconsolidated/loose on the gradient/slope?	Y/N
⚠	C.	**LANDSLIDE/FLOODING** - Is there significant deforestation in the area?	Y/N
⚠	D.	**SUBSIDENCE** - Is water system component located near a gully or significantly eroded earth?	Y/N
⚠	E.	**FLOODING** - Is there large amounts of surface water run-off in the area?	Y/N
⚠	F.	**FLOODING** - Is water system component located in a low lying flood area or near a river?	Y/N
⚠	G.	**FLOODING** - Is water system component located in an area with low permeability soil (test)?	Y/N
⚠	H.	**STORM DAMAGE** - Is water system component in an exposed location, susceptible to strong winds? Is there any loose debris located in the area?	Y/N
⚠	I.	**TSUNAMI/KING TIDE** - Is water system component located near the shoreline?	Y/N
⚠	J.	**EARTHQUAKE** - Is water system located in an earthquake zone?	Y/N
👍	K.	**MATERIALS** - Is water system component **not** made from strong materials (e.g. concrete)?	Y/N
👍	L.	**DRAINAGE** - Is drainage around the system **inadequate** and/surface runoff is **not** managed?	Y/N
👍	M.	**PROTECTIVE STRUCTURE/S** - There is **no** protective structure/s around the system component?	Y/N
👍	N.	**SOIL MANAGEMENT** - There is **no** land/soil management (e.g. terracing) on surrounding slopes?	Y/N

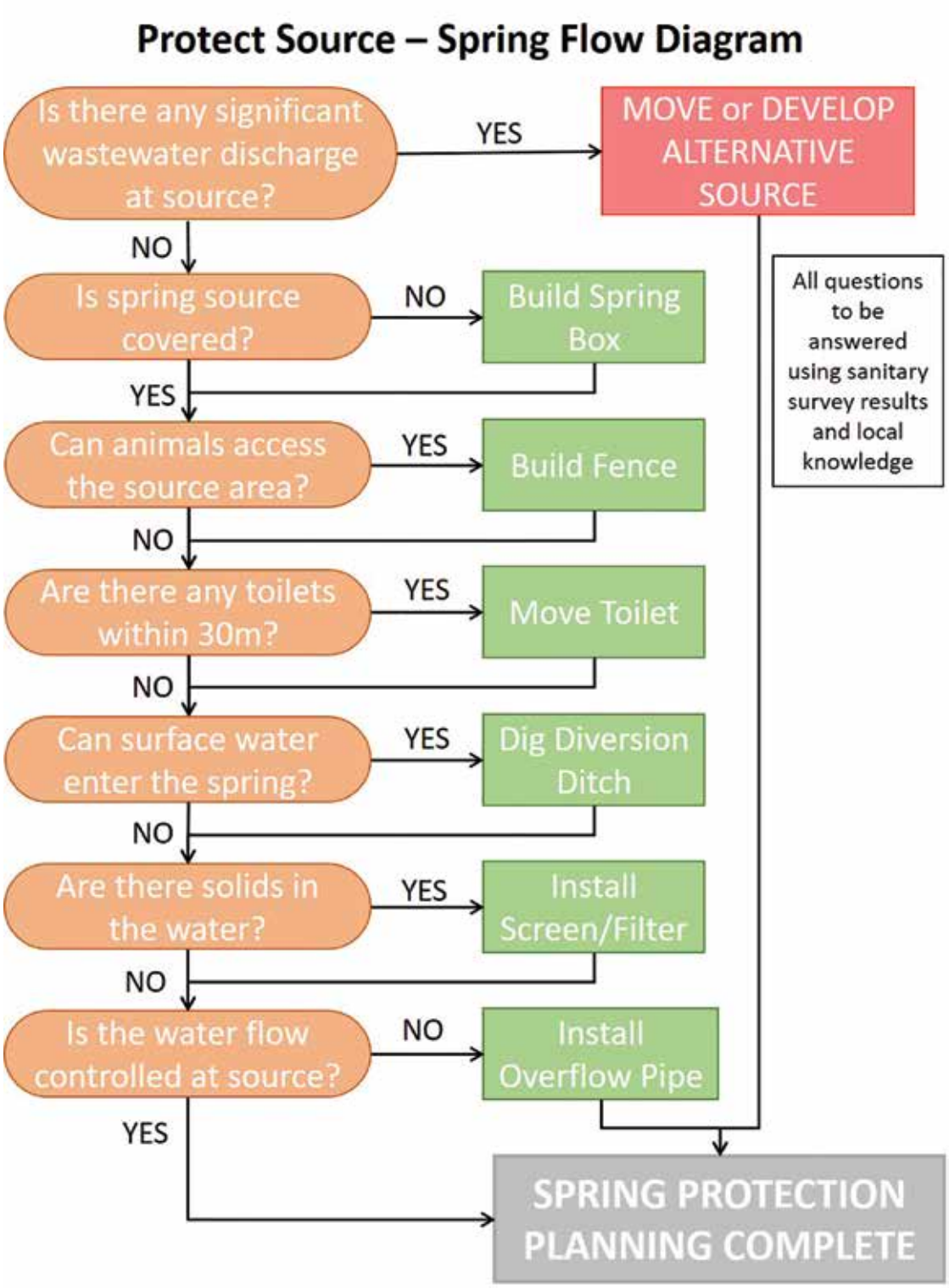
Total score of risk: ...../14

Contamination Risk Score: 10-14 = Very High; 7-10 = High; 4-7 = Intermediate; 0-3 = Low

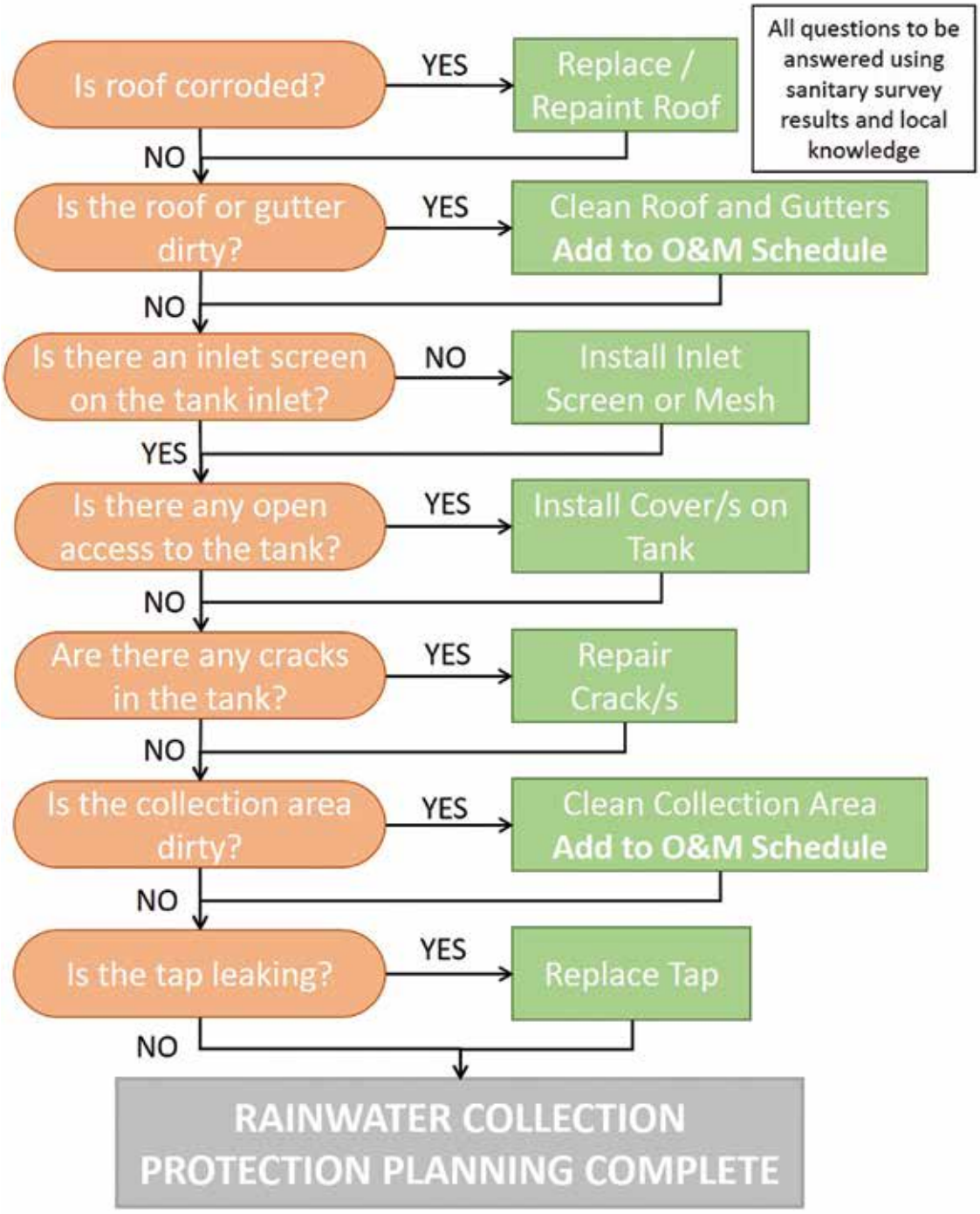
Water safety flow diagrams

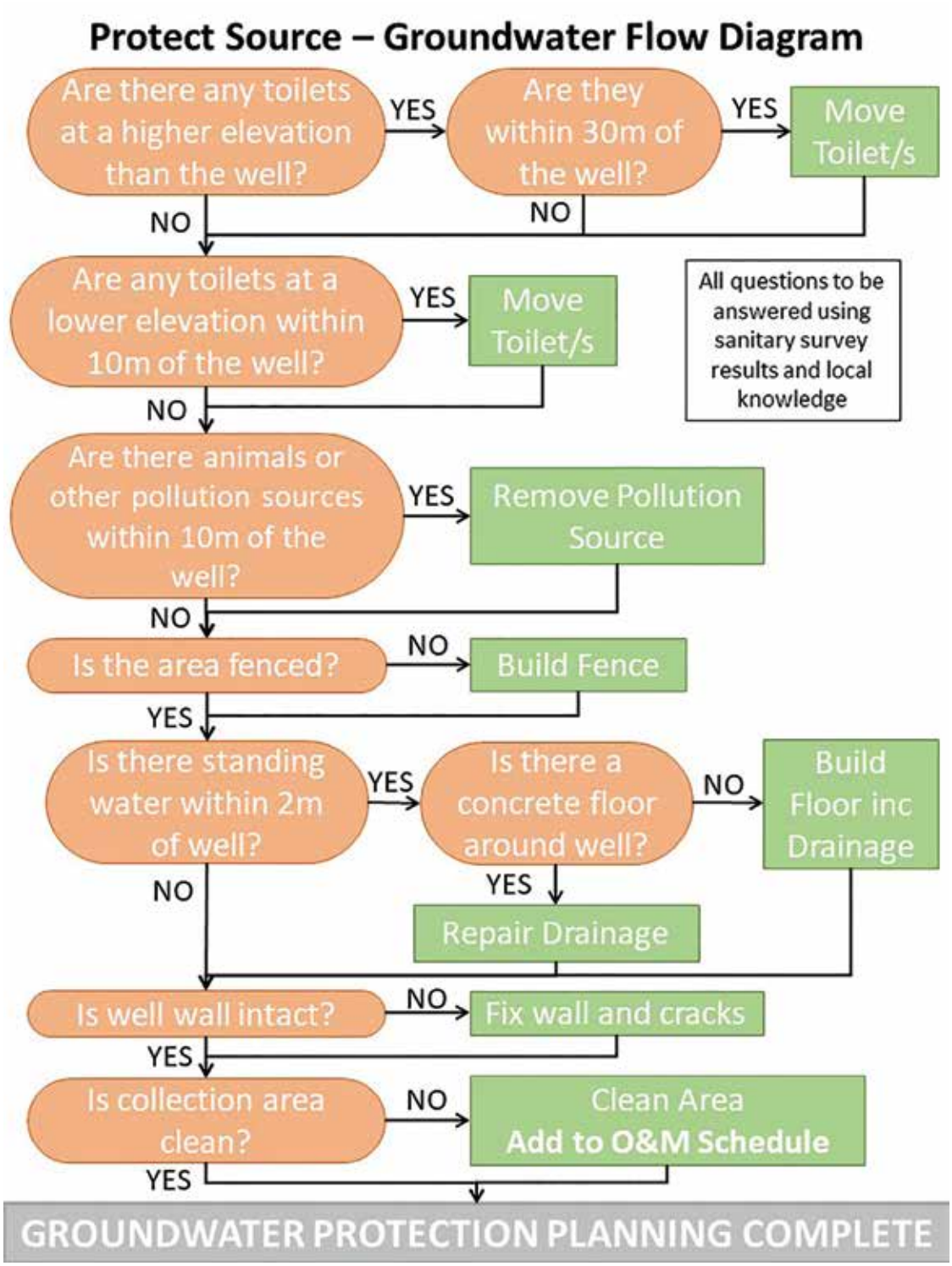


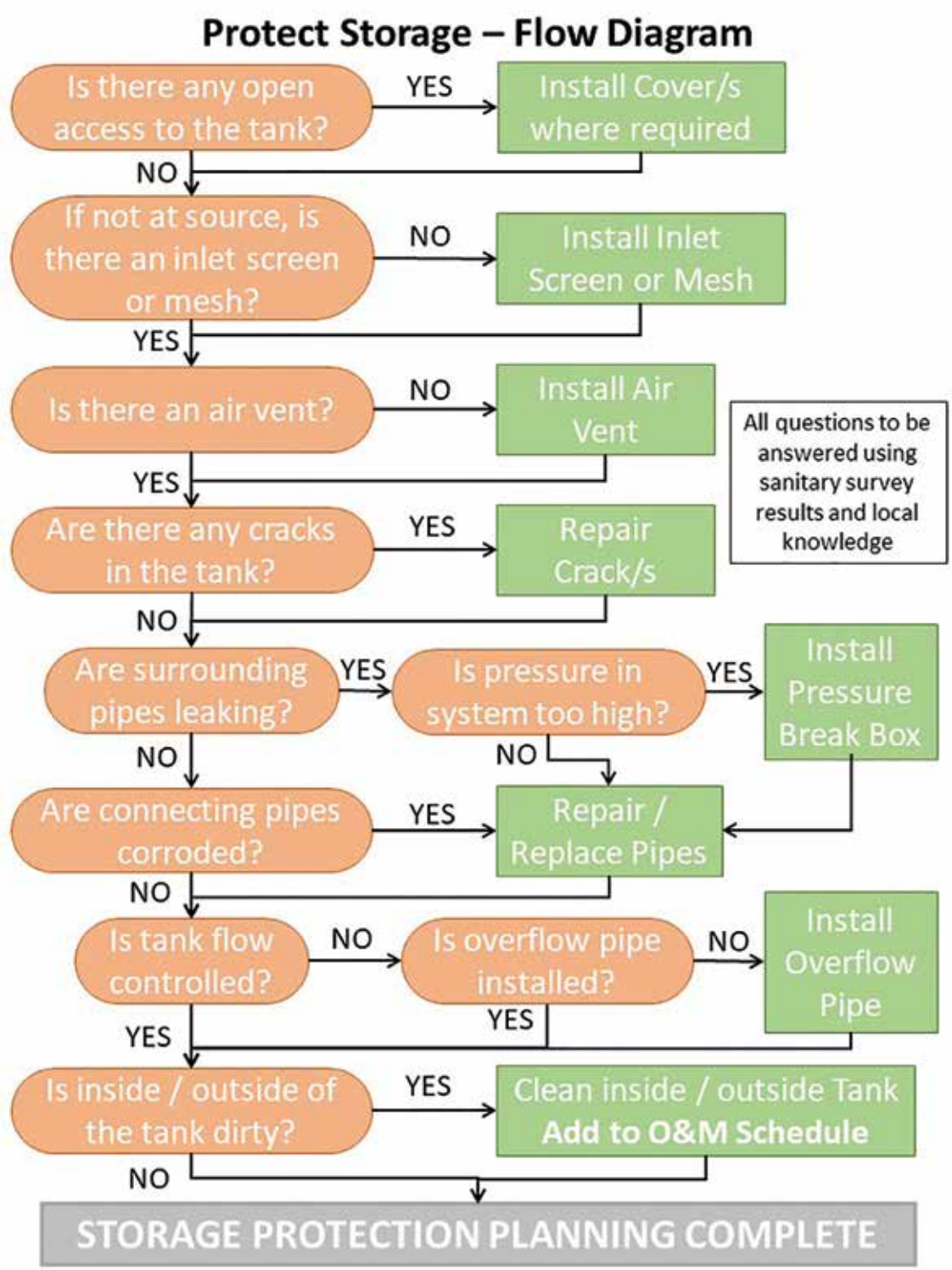

Protect Source – Surface Water Flow Diagram
Are there human houses upstream?
YES
Can source be relocated?
YES
Move Source
NO
IF NO
NO
Are there any farm animals upstream?
YES
Move Animals
Start H/H Water Treatment
NO
Are there any toilets within 30m?
YES
Move Toilet
All questions to be answered using sanitary survey results and local knowledge
NO
Is there any other significant waste water discharge near the source?
YES
Move Source
NO
Is there soil erosion at the source?
YES
Install inlet screen and filter
NO
Is pressure too high in distribution?
YES
Install pressure box
NO
Is pressure too low in distribution?
YES
Install min head device
NO
Is there an inlet screen and filter at source?
NO
Install inlet screen and filter
YES
Is there a fence around the source?
NO
Build Fence
YES
SURFACE PROTECTION PLANNING COMPLETE

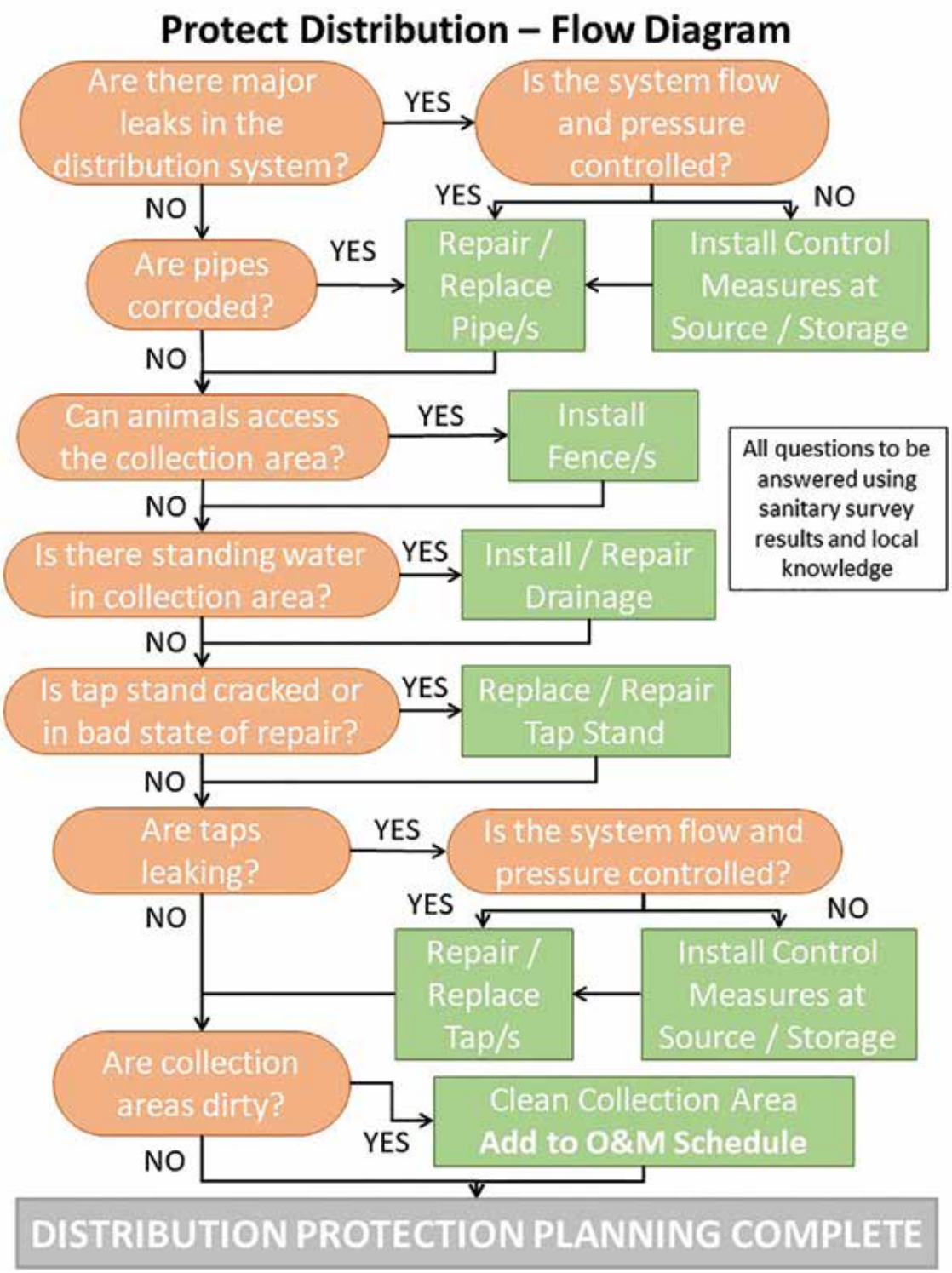

Protect Source – Spring Flow Diagram
Is there any significant wastewater discharge at source?
YES
MOVE or DEVELOP ALTERNATIVE SOURCE
NO
Is spring source covered?
NO
Build Spring Box
YES
Can animals access the source area?
YES
Build Fence
NO
Are there any toilets within 30m?
YES
Move Toilet
NO
Can surface water enter the spring?
YES
Dig Diversion Ditch
NO
Are there solids in the water?
YES
Install Screen/Filter
NO
Is the water flow controlled at source?
NO
Install Overflow Pipe
YES
All questions to be answered using sanitary survey results and local knowledge
SPRING PROTECTION PLANNING COMPLETE

Protect Source – Rainwater Capture Flow Diagram



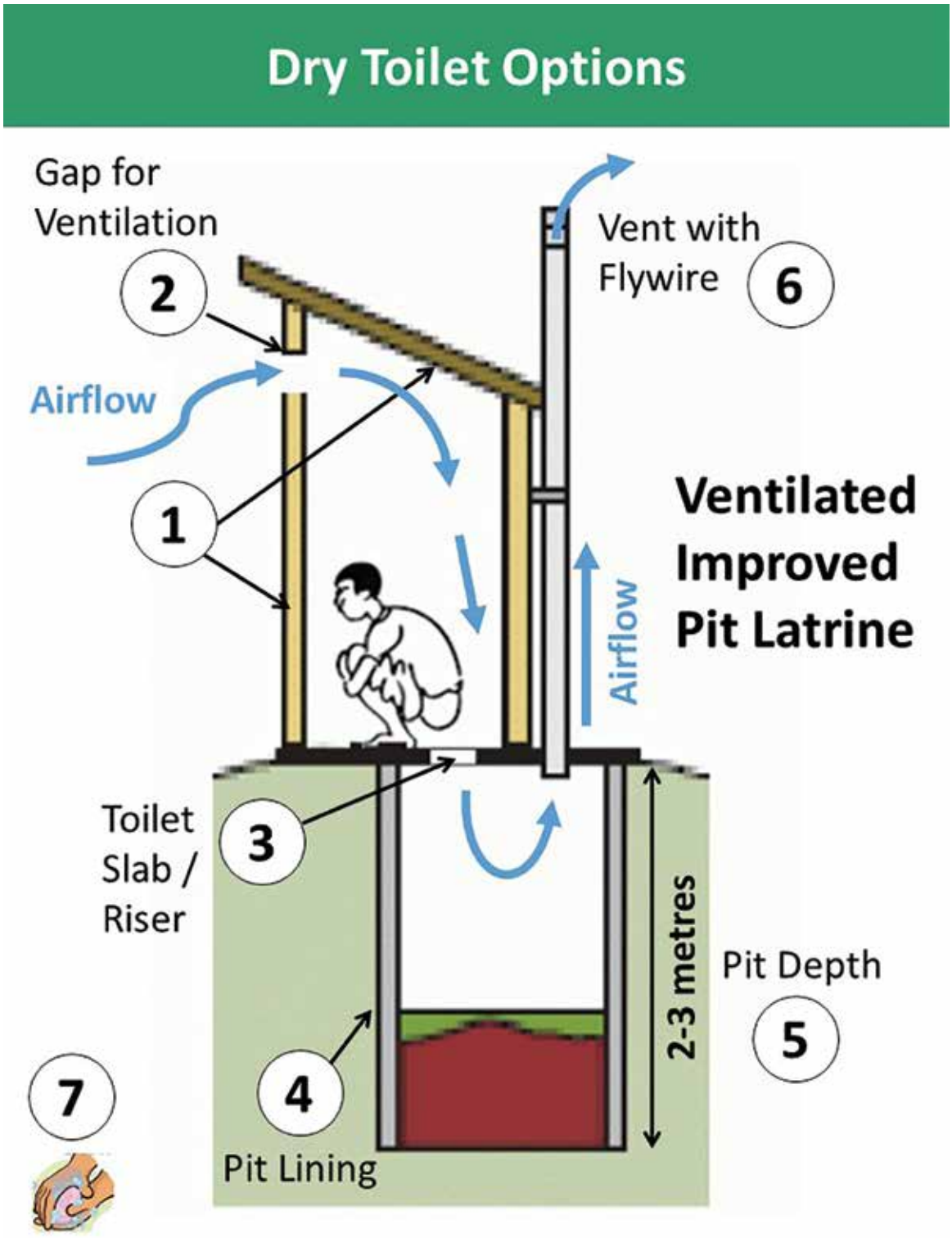

Protect Source – Groundwater Flow Diagram
Are there any toilets at a higher elevation than the well?
YES
Are they within 30m of the well?
YES
Move Toilet/s
NO
NO
Are any toilets at a lower elevation within 10m of the well?
YES
Move Toilet/s
All questions to be answered using sanitary survey results and local knowledge
NO
Are there animals or other pollution sources within 10m of the well?
YES
Remove Pollution Source
NO
Is the area fenced?
NO
Build Fence
YES
Is there standing water within 2m of well?
YES
Is there a concrete floor around well?
NO
Build Floor inc Drainage
NO
YES
Repair Drainage
Is well wall intact?
NO
Fix wall and cracks
YES
Is collection area clean?
NO
Clean Area
Add to O&M Schedule
YES
GROUNDWATER PROTECTION PLANNING COMPLETE


Protect Storage – Flow Diagram
Is there any open access to the tank?
YES
Install Cover/s where required
NO
If not at source, is there an inlet screen or mesh?
NO
Install Inlet Screen or Mesh
YES
Is there an air vent?
NO
Install Air Vent
YES
Are there any cracks in the tank?
YES
Repair Crack/s
NO
All questions to be answered using sanitary survey results and local knowledge
Are surrounding pipes leaking?
YES
Is pressure in system too high?
YES
Install Pressure Break Box
NO
NO
Are connecting pipes corroded?
YES
Repair / Replace Pipes
NO
Is tank flow controlled?
NO
Is overflow pipe installed?
NO
Install Overflow Pipe
YES
YES
Is inside / outside of the tank dirty?
YES
Clean inside / outside Tank
Add to O&M Schedule
NO
STORAGE PROTECTION PLANNING COMPLETE


Protect Distribution – Flow Diagram
Are there major leaks in the distribution system?
YES
Is the system flow and pressure controlled?
YES
NO
Repair / Replace Pipe/s
Install Control Measures at Source / Storage
NO
Are pipes corroded?
YES
NO
Can animals access the collection area?
YES
Install Fence/s
NO
All questions to be answered using sanitary survey results and local knowledge
Is there standing water in collection area?
YES
Install / Repair Drainage
NO
Is tap stand cracked or in bad state of repair?
YES
Replace / Repair Tap Stand
NO
Are taps leaking?
YES
Is the system flow and pressure controlled?
YES
NO
Repair / Replace Tap/s
Install Control Measures at Source / Storage
NO
Are collection areas dirty?
YES
Clean Collection Area
Add to O&M Schedule
NO
DISTRIBUTION PROTECTION PLANNING COMPLETE

A young woman washing the dishes during the recovery from Tropical Cyclone Pam in Vanuatu.

Toilet Sanitary Surveys

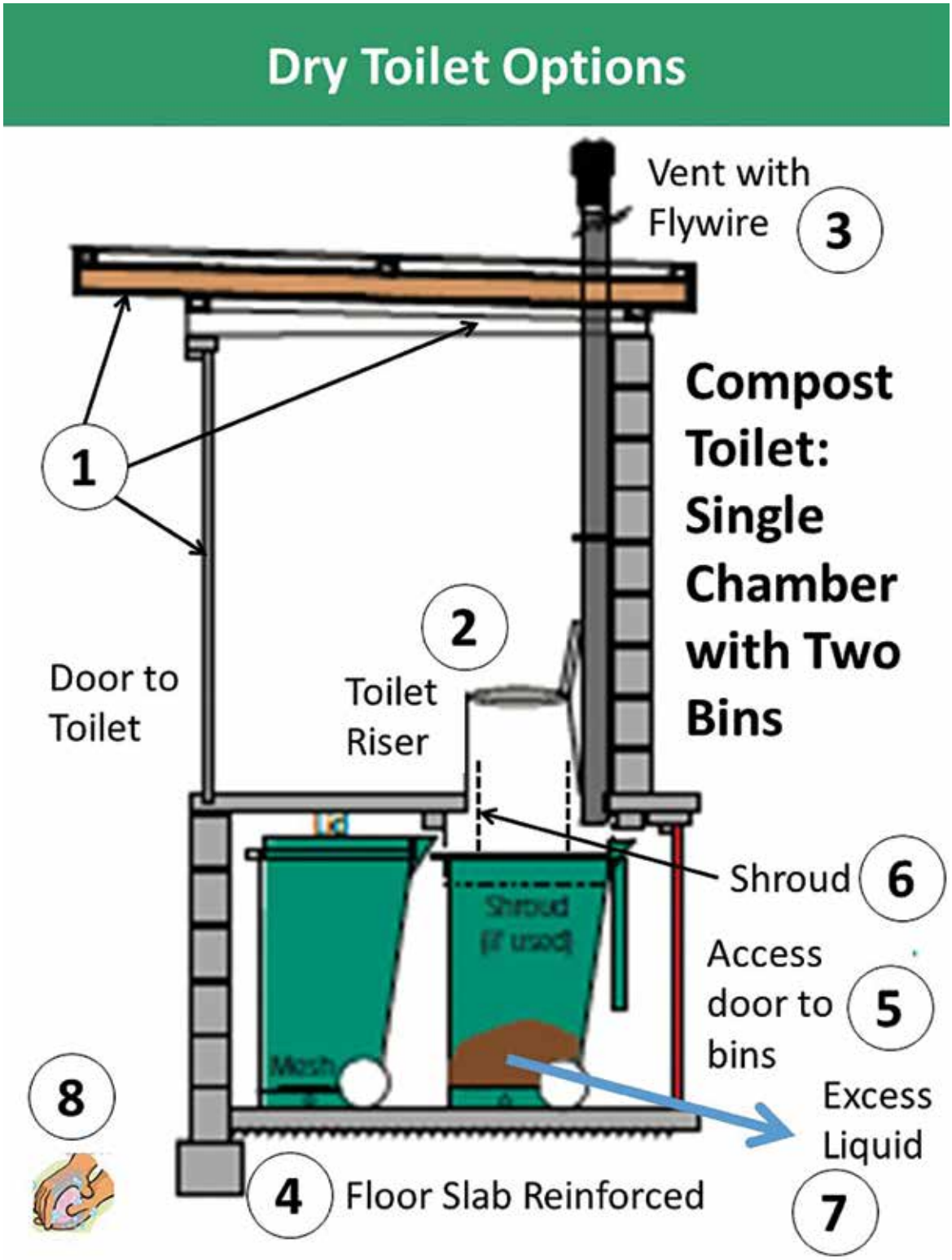


Specific Information for Risk Assessment

1. Is the superstructure is poor condition? Y/N
2. Does the toilet require venting in the superstructure to provide adequate airflow? Y/N
3. Is the condition or cleanliness of the toilet slab/riser poor? Y/N
4. The collection pit is not lined? Y/N
5. The collection pit is not an adequate depth? Y/N
6. Does the collection pit require a vent with flywire? Y/N
7. The toilet **DOES NOT** have a facility to wash hands? Y/N

Total score of risks

0 – No Action
1-5 – Upgrade Toilet
6-7 – Replace Toilet

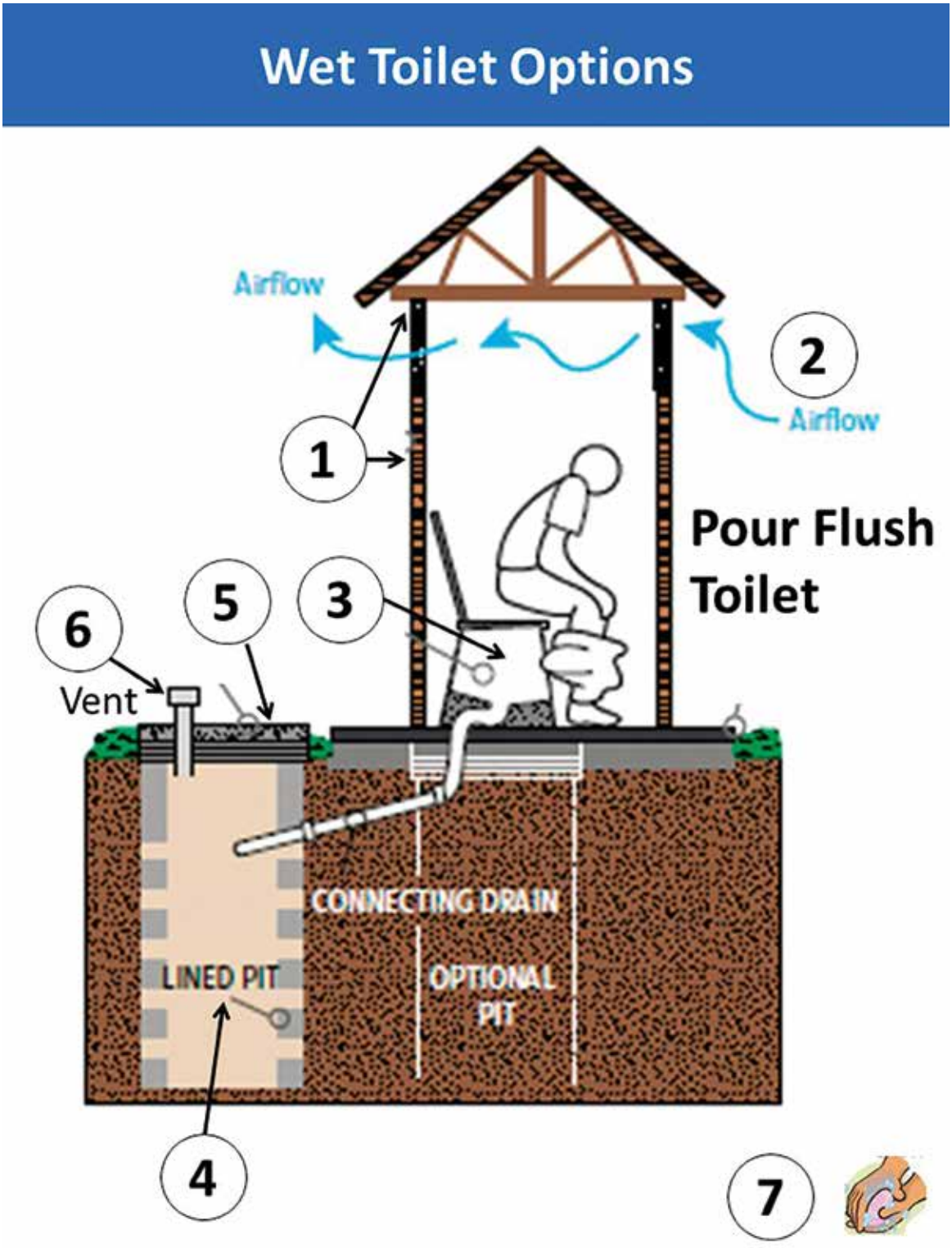

Dry Toilet Options
Vent with Flywire
3
Compost Toilet: Single Chamber with Two Bins
1
2
Door to Toilet
Toilet Riser
Shroud
6
Shroud (if used)
Access door to bins
5
Mesh
8
Excess Liquid
4
Floor Slab Reinforced
7

Specific Information for Risk Assessment

1. Is the superstructure is poor condition? Y/N
2. Is the condition or cleanliness of the toilet riser/pan poor? Y/N
3. Does the toilet require a vent with flywire? Y/N
4. Is the toilet floor slab not reinforced? Y/N
5. Access to bin collection is inadequate? Y/N
6. Does the toilet require a shroud between the riser and the bin collection? Y/N
7. Does the toilet require a soakage trench for excess fluid collection and treatment? Y/N
8. The toilet **DOES NOT** have a facility to wash hands? Y/N

Total score of risks

0 – No Action
1-6 – Upgrade Toilet
7-8 – Replace Toilet


Wet Toilet Options
Airflow
Airflow
1
2
3
4
5
6
7
Pour Flush Toilet
Vent
CONNECTING DRAIN
LINED PIT
OPTIONAL PIT

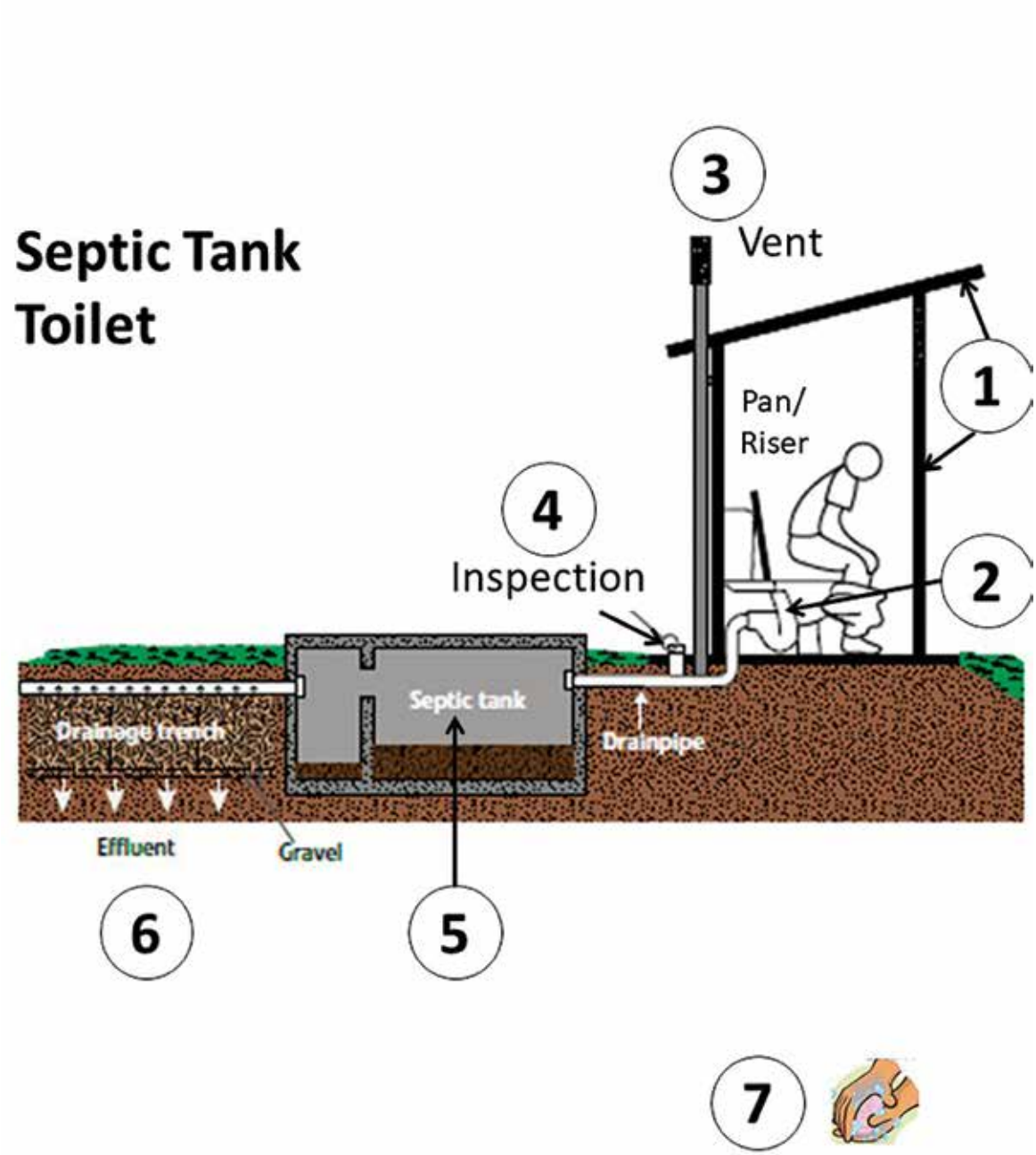
Specific Information for Risk Assessment

1. Is the superstructure is poor condition? Y/N
2. Does the toilet require venting in the superstructure to provide adequate airflow? Y/N
3. Is the condition or cleanliness of the toilet riser/pan poor? Y/N
4. The collection pit is not lined? Y/N
5. Does the collection pit require a cover for access? Y/N
6. Does the collection pit require a vent? Y/N
7. The toilet **DOES NOT** have a facility to wash hands? Y/N

Total score of risks

0 – No Action
1-5 – Upgrade Toilet
6-7 – Replace Toilet

Wet Toilet Options



Specific Information for Risk Assessment

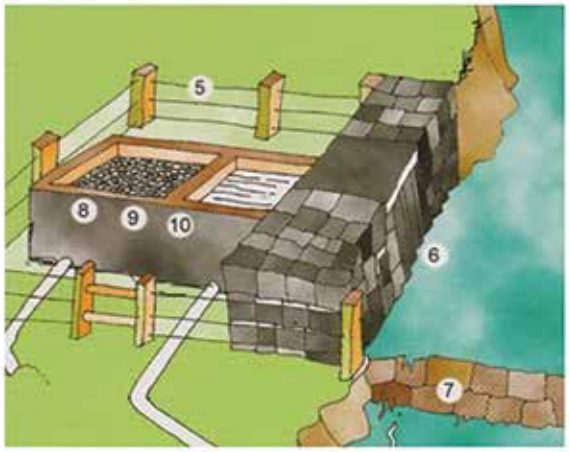
1. Is the superstructure is poor condition? Y/N
2. Is the condition or cleanliness of the toilet riser/pan poor? Y/N
3. Does the drainpipe require a vent? Y/N
4. Does the drainpipe require inspection access? Y/N
5. The septic tank is broken or not in operation Y/N
6. The toilet requires a drainage trench? Y/N
7. The toilet **DOES NOT** have a facility to wash hands? Y/N

Total score of risks

0 – No Action
1-5 – Upgrade Toilet
6-7 – Replace Toilet

Maintenance Tools

Surface Water Source

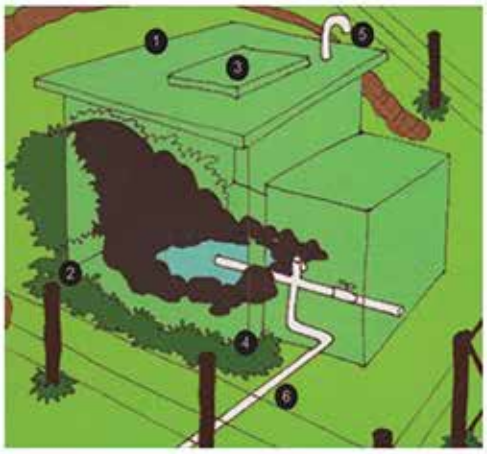


EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed

EVERY 3 MONTHS	
Clean Inlet Canal and screens	• Ensure debris is cleared • Ensure pipe is not blocked • Ensure screen is cleared of debris

WHEN BROKEN	
Repair Fence	• No animals can enter
Repair Erosion Damage	• Ensure dam/intake won't collapse
Repair Cracks in Concrete/Dam	• Fix concrete cracks

Spring Water Source

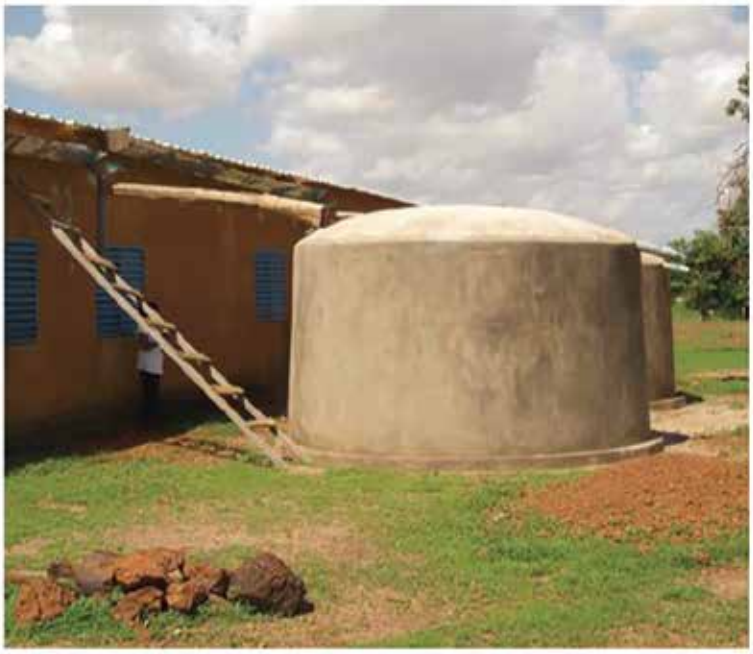


EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed

EVERY 6 MONTHS	
Clean Spring Area	• Leaves and soil are cleared • Rubbish is collected • All pipes are cleaned

WHEN BROKEN	
Repair Fence	• No animals can enter
Repair Cracks in Spring Box	• Fix concrete cracks

Rainwater Capture



EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed
Clean tap collection area	• Ensure grass is cleared • Ensure rubbish is removed • Disinfect tap

EVERY STORM	
Divert first flush (if system has one)	• After heavy rain drain foul flush • Replace cap after draining

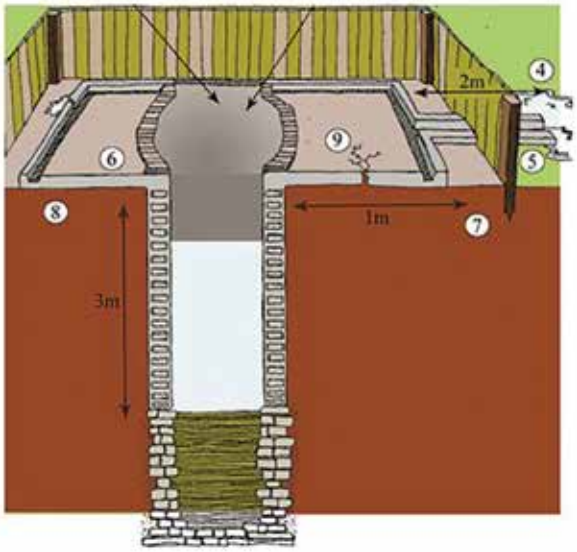
Rainwater Capture

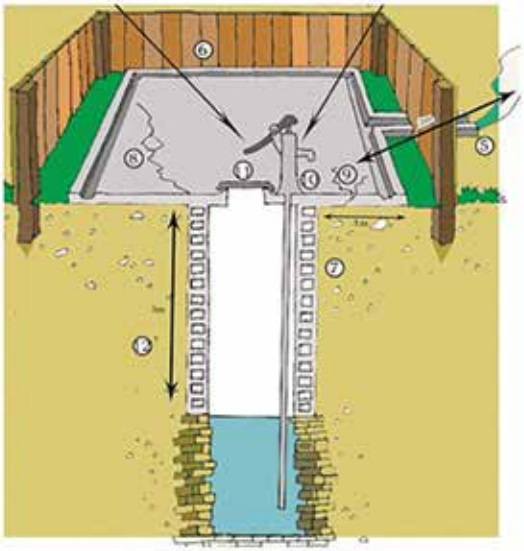
EVERY 6 MONTHS	
Clean and Disinfect Reservoir	• Follow procedure below
Clean roof and gutters	• Ensure that no dirt/rubbish/animal droppings is on the roof or in the guttering
WHEN BROKEN	
Repair/Replace Roof	• Ensure no rust is present • Ensure roof is clean • Ensure roof is not leaking • Ensure guttering is intact
Repair Tap	• Ensure tap is not leaking
Repair Reservoir	• Ensure no cracks in reservoir wall • Ensure no leaks

Cleaning Procedure for Reservoir

1. Drain any water in the tank to the level at the tap. Transfer water to a clean, contaminant-free storage or temporary vessel.
2. If available, add **no more than ½ a bottle** of bleach to the remaining water in the tank. The ratio of bleach to water should be around 1 part bleach to 50 parts water.
3. Climb inside the tank. Using a brush thoroughly scrub the bottom and sides of the tank.
4. Remove the remaining water and bleach solution.
5. Refill the tank with water and leave overnight before use.

Open Dug Well / Hand Pump





EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed
Clean apron collection area	• Ensure rubbish is removed • Ensure drainage is clear • Scrub concrete apron • Wash water collection e.g. bucket and/or hand pump

WHEN BROKEN	
Repair Hand pump	• Ensure water flows again
Repair/Replace Cover	• Ensure open well is covered
Repair Apron	• Ensure no cracks in apron

Open Dug Well / Hand Pump

AFTER EMERGENCY – FLOODING OR TIDAL SURGE	
Clean and Rehabilitate Well	• See instructions below
Repair Delivery	• See items on previous page

Cleaning and Rehabilitation Procedure for Well

1. Repair or replace the pumping mechanism if damaged. This will allow the draining of polluted water from the well.
2. Remove debris and polluted water from the well. **SIMPLY DRAIN THIS AWAY, DO NOT DRINK.**
3. Re-seal the top of the well, to stop more surface water entering, using a simple clay sanitary seal.
4. Reconstruct the concrete apron and well head.
5. Follow the instructions below for relevant cleaning procedure.

IF WELL HAS BEEN FLOODED WITH FRESHWATER DISINFECT THE WELL:

A. Disinfect the well with a chlorine solution. The ratio of bleach to water should be around 1 part bleach to 50 parts water.
B. Dewater the well and allow it to refill naturally.
C. Repeat part B until the taste of chlorine in the water has diminished.

IF WELL HAS BEEN FLOODED WITH SEAWATER:

I. Allow for natural cleaning over time. Taste the water to check for salinity. **USE THE WATER FOR WASHING AND CLEANING ONLY.** Identify alternative drinking source during this time.
II. Disinfect the well as stated in steps A-C.

Water Storage

EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed

EVERY MONTH	
Open and Close all valves	• Make sure all valves operate to allow or stop water flow
Check all grates / screens / filters are in place	• To ensure no dirt or rubbish enters the reservoir • To make sure piping is not blocked

Water Storage

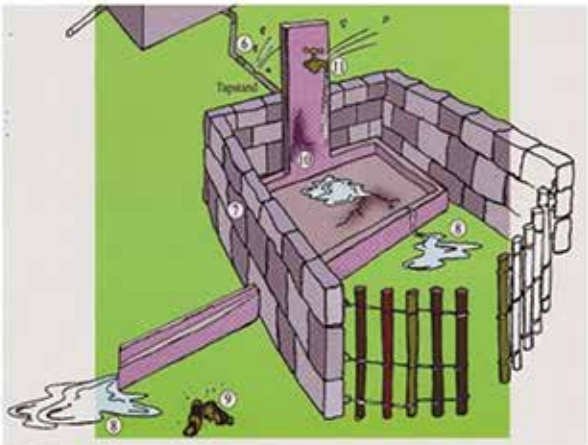
EVERY 6 MONTHS	
Clean and Disinfect Reservoir	• Follow procedure below

WHEN BROKEN	
Repair Fence	• No animals can enter
Repair Taps/Valves	• Ensure no leaks are present
Repair inlet screen/cover	• Ensure the tank is not open to the environment
Repair Cracks in Tank	• Ensure no water is leaking

Cleaning Procedure for Reservoir

1. Drain any water in the tank to the level of the outflow pipe. Transfer water to a clean, contaminant-free storage or temporary tank where possible.
2. If available, add **no more than ½ a bottle** of bleach to the remaining water in the tank. The ratio of bleach to water should be around 1 part bleach to 50 parts water.
3. Climb inside the tank. Using a brush thoroughly scrub the bottom and sides of the tank.
4. Remove the remaining water and bleach solution.
5. Refill the tank with water and leave overnight before use.

Piped Distribution



EVERY MONTH	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed

EVERY MONTH	
Clean Collection Area	• Ensure Collection area is clear of dirt, rubbish and animal excreta • Ensure taps and piping is clean

WHEN BROKEN	
Repair Fence	• No animals can enter
Repair Drainage area	• Fix cracks and ensure water can drain away without pooling
Repair Taps	• Ensure no water is leaking
Repair piping	• Ensure no water is leaking

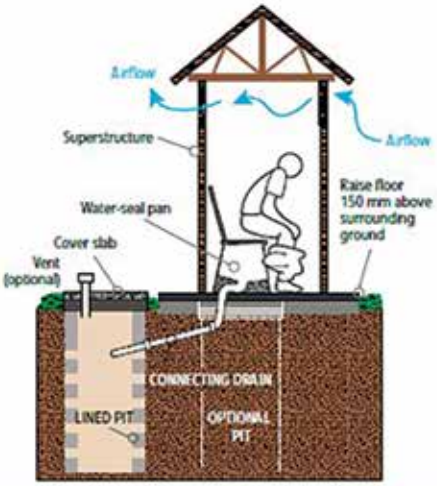
Piped Distribution

AFTER EMERGENCY – FLOODING OR TIDAL SURGE	
Rehabilitate Supply	• See instructions below
Repair System	• See items on previous page

Rehabilitation Procedure for Piped Distribution

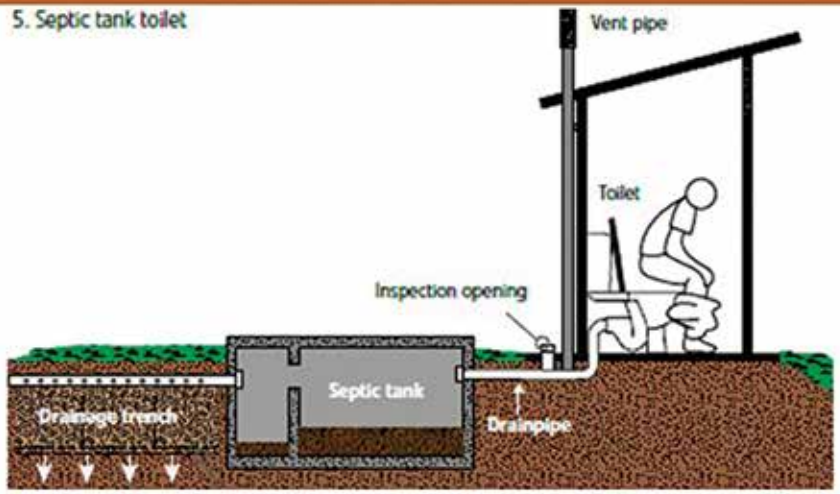
1. Assess the system and identify which part/s are leaking.
2. **Make sure the community has adequate amounts of water stored, and/or an alternative source of water.** Shut off the system.
3. Repair the breakages or leaks using whichever method is available.
4. Restart the system and check for remaining leakages.
5. Flush out the system to remove any dirt or sediment that may have entered. Do this by running the taps in the distribution for around 30-60 minutes.

Pour Flush Toilet



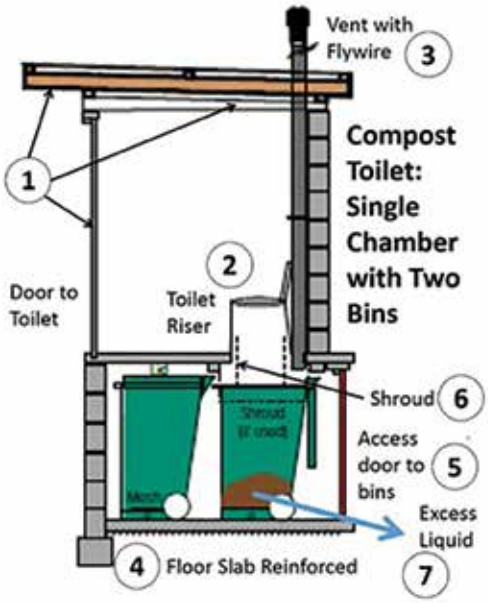
EVERY 3 MONTHS	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed
EVERY WEEK	
Clean/Disinfect Toilet	• Check system isn't blocked • Clean pan, seat and floor
WHEN BROKEN	
Repair Pan/Seat	• Ensure no cracks or leaks
Repair Piping	• Ensure no waste water leakage
Repair Structure	• Ensure structure is safe & private
WHEN FULL	
Close/Empty Pit	• Ensure full pit **does not** overflow

Flush Toilet with Septic Tank



EVERY 3 MONTHS	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed
EVERY WEEK	
Clean/Disinfect Toilet	• Check system isn't blocked • Clean pan, seat and floor
WHEN BROKEN	
Repair Pan/Seat	• Ensure no cracks or leaks
Repair Piping	• Ensure no waste water leakage
Repair Structure	• Ensure structure is safe & private
EVERY 1 TO 5 YEARS / IF TANK IS FULL	
Empty tank to safe environment	• Ensure full tank **does not** overflow

Compost Toilet



EVERY 3 MONTHS	
PERFORM SANITARY SURVEY	• Complete risk score • New risks are fixed

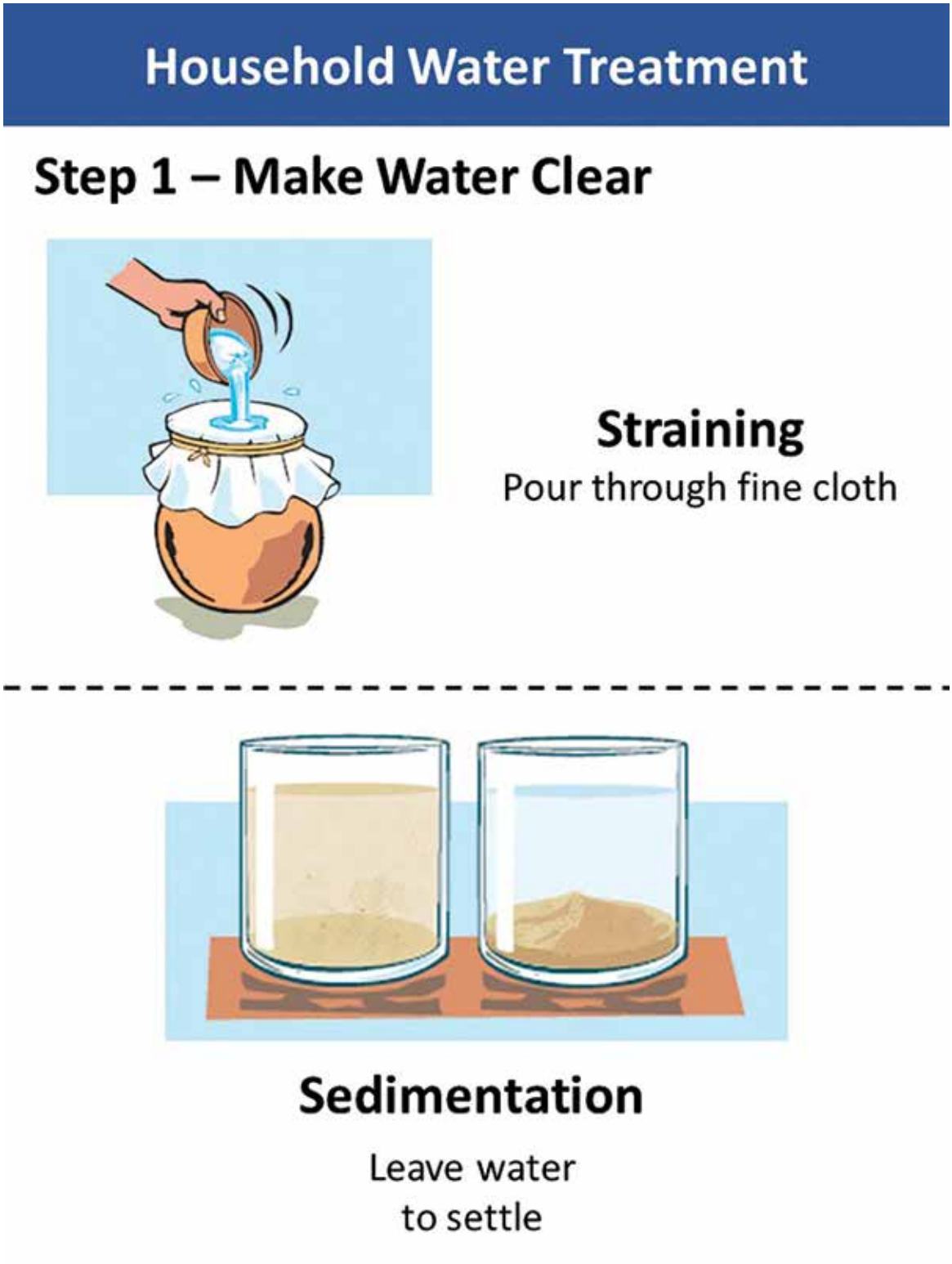
AFTER EVERY USE	
Add ashes or other organic material	• Ensure material is available • Ensure a good mix of wet and dry waste

EVERY WEEK	
Clean/Disinfect Toilet	• Check system isn't blocked • Clean pan, seat and floor

Compost Toilet

WHEN BROKEN	
Repair Pan/Seat	• Ensure no cracks or leaks
Repair Piping	• Ensure no waste water leakage
Repair Structure	• Ensure structure is safe & private

WHEN VAULT/BIN IS FULL	
Switch to new vault/bin	• Ensure full vault/bin **does not** overflow
Store composted waste and use as fertiliser	• Ensure composted waste is used on soil and does not endanger fresh water sources



Source: Household water treatment and safe storage in emergencies, IFRC, 2008

Household Water Treatment

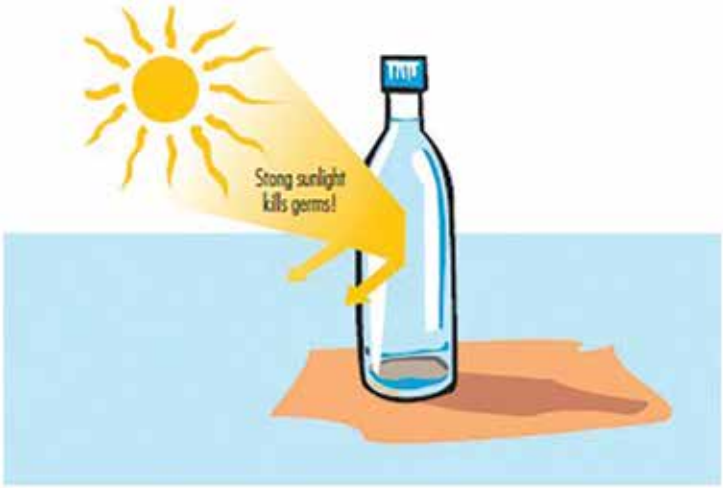
Step 2 – Disinfection

Boiling

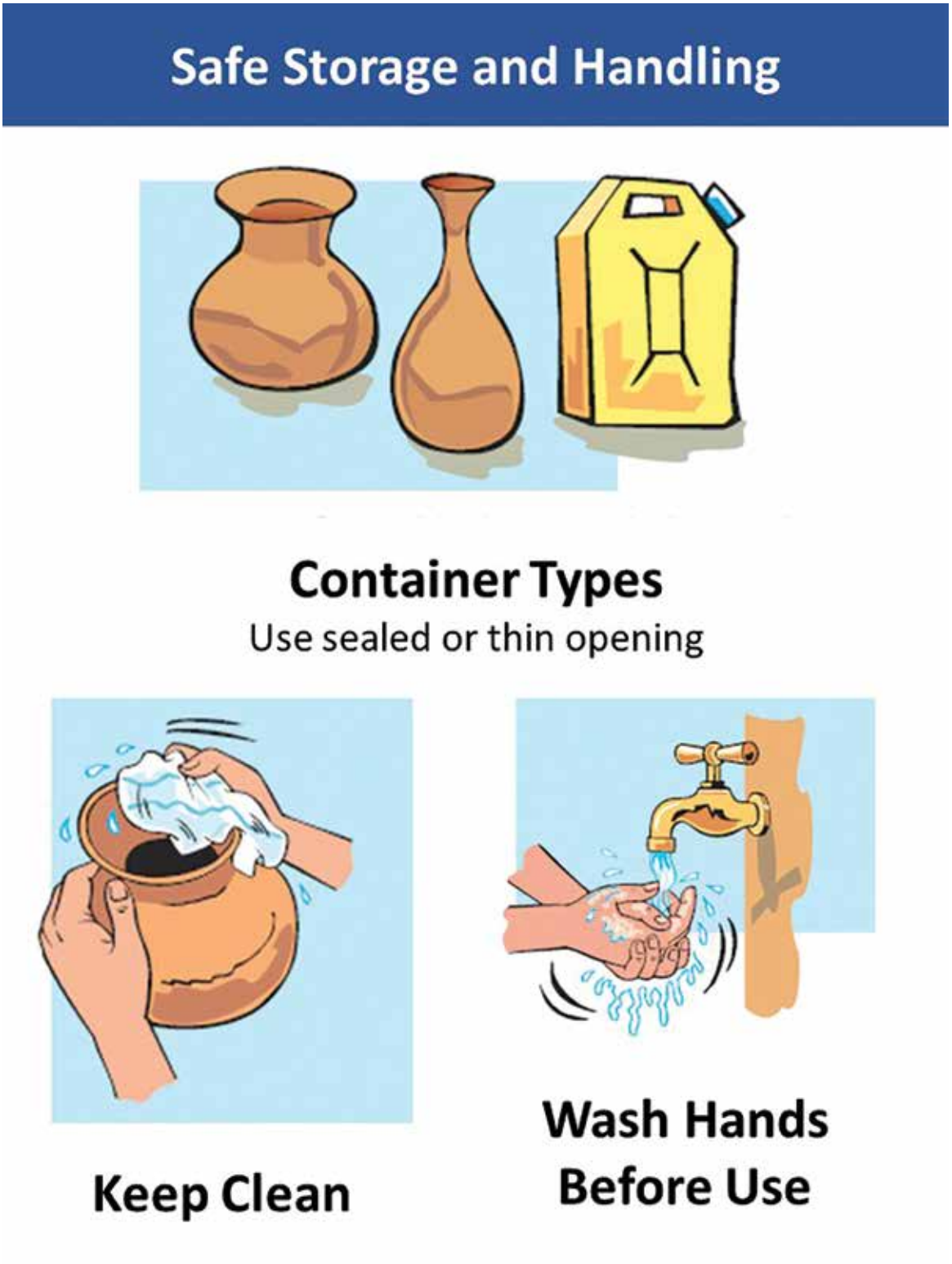
Must be bubbling for at least **1 minute**

Solar Disinfection

In clear bottle in the sun for at least **5 hours**



Source: Household water treatment and safe storage in emergencies, IFRC, 2008



Source: Household water treatment and safe storage in emergencies, IFRC, 2008

Wise Water Use

Turn Off Taps After Use

Report Problems to Water Committee

Do not pollute your water

BEFORE EMERGENCY – PREPARATION

A Water Committee has 3 main responsibilities in a disaster:

1. **WATER – Provide enough safe water**
2. **SANITATION – Ensure excreta is disposed of safely**
3. **HYGIENE – Good hygiene is maintained**

WHEN YOU FIRST HEAR THAT A NATURAL DISASTER IS GOING TO HAPPEN – PREPARE

WATER

1. Store enough water in house (approx. 100l/p)
Aim to use <15l/p/d in short term

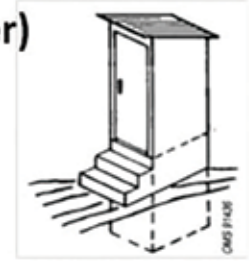
2. Ensure the ability to boil water

3. Secure your water system:

- Close valves
- Secure covers
- Turn off taps
- Tie down/ remove gutters

SANITATION

1. Designate community sanitation areas (should be on high ground above flood water)



2. Seal septic tanks and clean (remove waste) from toilet pits where possible PREVENT POLLUTING FLOOD WATER

HYGIENE

1. Reinforce hygiene messages to community

2. Ensure hygiene materials are available

AFTER EMERGENCY – RECOVER

ONCE THE DISASTER HAS PASSED AND IT IS SAFE TO DO SO – RESPOND AND RECOVER

WATER

1. Restore water flow / quantity from system
   - See instructions in "Piped Distribution"
   - Re-Connect gutters

ENSURE PEOPLE BOIL WATER UNTIL SYSTEM HAS BEEN CHECKED AND REPAIRED IN 2.

2. Perform Sanitary Survey of System – Clean and Repair Source
3. Repair other parts of the system

SANITATION

1. Community ONLY TO USE toilets that are not flooded or are in safe designated area

PRIORITY IS THAT EXCRETA IS DISPOSED OF SAFELY

2. Perform Sanitary Survey of Toilets – Establish which are safe to use and which need repair
3. Keep CLEANING working toilets
4. Repair Toilets and Sanitation

HYGIENE

1. Continue to reinforce hygiene messages to community

IF YOU HAVE NO WATER OR YOU THINK YOUR WATER IS VERY UNSAFE CONTACT THE GOVERNMENT IMMEDIATELY

Toolkit 3

WASH Safety Planning Implementation Tools

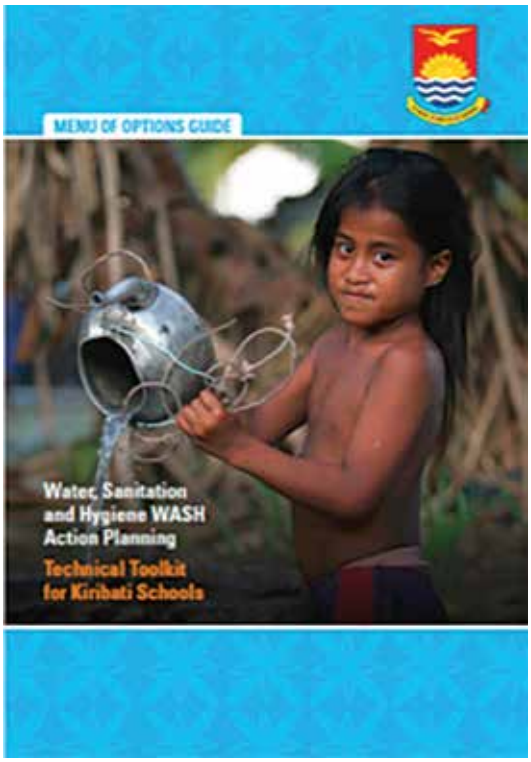
"2015 - WASH Safety Planning Framework - ESR" (20 pages)

Water, Sanitation and Hygiene WASH Action Planning Framework: Technical Toolkit for Kiribati Schools, 2015

https://unicefpacific.akvoapp.org/media/db/project/3814/document/WASH%20KM%20Framework.pdf

"2015 - WASH Safety Planning Menu of Options - ESR" (26 pages)

Water, Sanitation and Hygiene WASH Action Planning Menu of Options: Technical Toolkit for Kiribati Schools, 2015

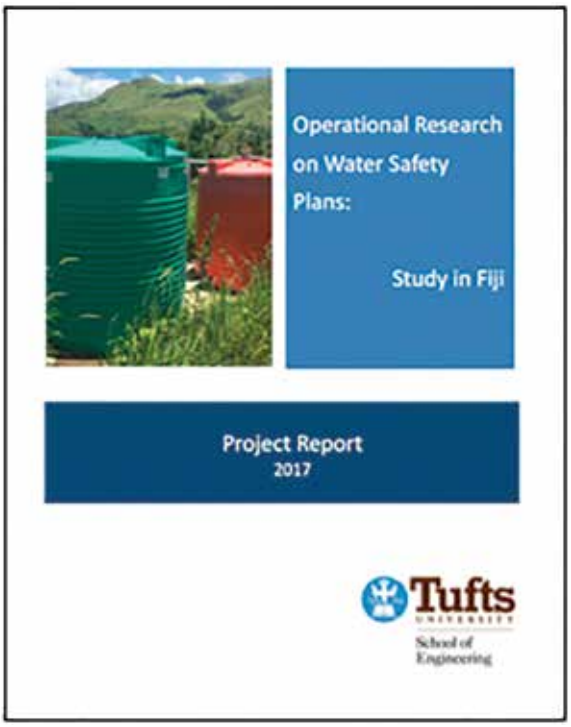


Case Study 1

DWSSP Operational Research on Water Safety Plans, 2016/17

"2017 - Operational research on WSP Fiji – Tufts" (42 pages)

Operational Research on Water Safety Plans: Study in Fiji, Project Report 2017, Tufts University, School of Engineering, 2017 (42 pages).

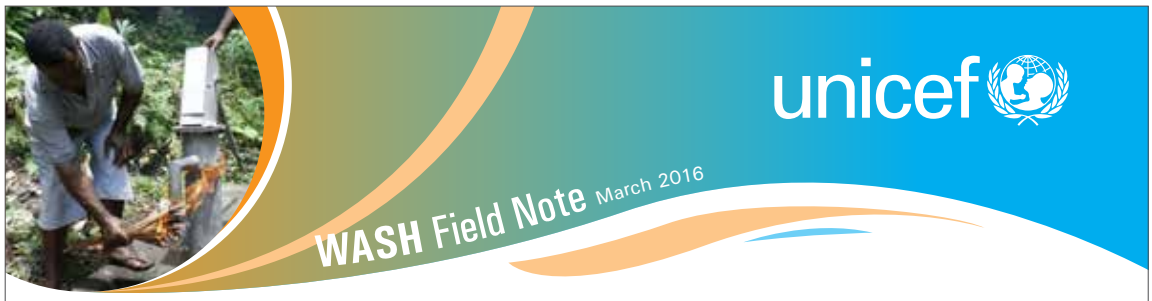


"2017 - Operational research on WSP Vanuatu – Tufts" (41 pages)

Operational Research on Water Safety Plans: Study in Vanuatu, Project Report 2017, Tufts University, School of Engineering, 2017 (41 pages).

Case Study 2

WASH Field Note March 2016: Community Drinking Water Safety and Security Planning in Pacific Island Countries, (UNICEF 2016)



Community Drinking Water Safety and Security Planning in Pacific Island Countries

INTRODUCTION

The sixth Global Goal for Sustainable Development (SDG 6) expresses the desire for holistic water, sanitation and hygiene (WASH) solutions via interventions that provide sustainable access to safe water and sanitation. The concept of ***water safety***, specifically mentioned in Target 6.1, requires that a sufficient quantity of adequate quality water be delivered near the home. The Joint Monitoring Programme defines safe water as free from pathogens or elevated levels of chemical toxins. To reach this target, rural communities require sound management of hazards that could contaminate water, since drinking water is not usually treated.

Pacific Island Countries[1] face special challenges in achieving the standards set by the SDG WASH targets, as a result of their small size and unique geography. Their difficulty in WASH service delivery is often exacerbated by population growth, urbanisation, changing land-use patterns, frequent natural hazards, and increasing impacts of climate variability and change. According to the Asian Development Bank (2012) over 80% of the total population lives in rural areas, reflecting the relatively low urbanization rates and the higher populations of the Melanesian countries of Papua New Guinea, Fiji, Solomon Islands and Vanuatu. These demographics mean that the majority of households manage their own water and sanitation infrastructure in communities that are beyond the jurisdiction of government utilities. This, combined with varying capacity in the WASH sector to safely manage the system and a lack of standardized approaches for service delivery, often means that communities use different planning and training methods. The result is huge variability in the provision of reliable WASH infrastructure and limited sustainability of services. For instance, a recent analysis of the capacity and performance of water supply committees in Vanuatu's largest province showed that only 35% of community water supplies are managed by an active committee. These committees had received sporadic trainings, and ▸

KEY POINTS

- ***In Vanuatu and Fiji, the Drinking Water Safety and Security Planning (DWSSP) approach has been used to strengthen the management and resilience of water supplies in rural communities, and is a useful method towards achieving water safety in line with Sustainable Development Goal 6.***
- ***The Water Safety aspect of DWSSP increases management capacity, with Water Security Planning used to ensure new water supply systems are better aligned to community needs, national standards and improved efficiency of donor funding.***
- ***Strengthened community management has been achieved through the development of a number of participatory tools with support from UNICEF Office for Pacific Island Countries; these tools assist communities to undertake their own planning activities through a guided approach to identifying, assessing, prioritizing and treating risks.***

1 Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

- only 3% of committees were collecting fees for operation and maintenance when surveyed[2].

In addition to the capacity constraints in providing well-designed WASH services that meet sector standards and promote community management, it is likely that climate change will increase the frequency and severity of natural hazards in the region (IPCC, 2007). The vulnerability of Small Island Developing States led Pacific leaders to develop coping and adaptation strategies under a specific theme of 'Island Vulnerability' in the Pacific Regional Action Plan on Sustainable Water Management (SOPAC, 2002). Building resilience to climate variability and reducing disaster risk adds an increasing complexity and burden to rural community WASH programmes, where already fragile infrastructure can be further compromised by frequent hazard events.

In Vanuatu and Fiji, Drinking Water Safety[3] and Security Planning (DWSSP) is an entry point to improve the standard of planning WASH interventions. DWSSP has a specific focus on community engagement to strengthen the village management of water supply and sanitation. The DWSSP process used in Fiji and Vanuatu increases resilience to climate variability and extreme events by strengthening management and operation and maintenance (O&M) rather than focusing on infrastructure provision and reducing risks from multiple hazards.

INTERVENTION AND ACTIVITY UNDERTAKEN

Pacific Island Countries have a history of highly subsidized community infrastructure provision. The focus on infrastructure, with little priority given to training and engagement at the village level, has resulted in a lack of will and capacity for community management. Lack of sustainable O&M of community-owned infrastructure has decreased community resilience.

For remote island communities, climate change may result in more frequent and intense extreme events. Community capacity for management – the key to resilience and long-term coping mechanisms - will be more important than ever. Communities and households must have the skills and resources to establish, operate and maintain appropriate water and sanitation facilities, while also maintaining safe drinking water and hygiene practices in homes, schools, and health facilities.

Achieving the targets for SDG 6 in rural settings and, in parallel increasing resilience, requires strong village water committees that can effectively manage robust and appropriate infrastructure. This is best encompassed in the concept of water security (see Box 1) and these principles provide the core of the DWSSP approach.

The framework for the Pacific DWSSP programme combines the concepts of water security and the well-established World Health Organization (WHO) method of Water Safety Planning (WSP) to provide a holistic and systemized method of delivering water supplies to communities, see Figure 1. The approach is in line with the Strategic Framework for WASH and Climate Resilient Development (GWP-UNICEF, 2014)[4].

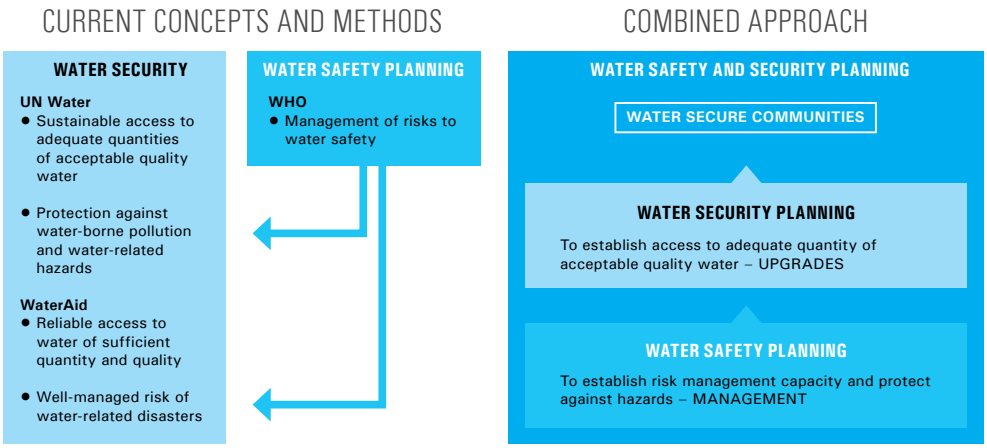
Box 1: Defining Water Security

A feasibility study reported very high phone The Fiji and Vanuatu programmes defined a water-secure village as one that:

- Has enough water quantity of good enough quality for human basic needs inclusive of sanitation and hygiene for each household;
- Collects and treats used water to protect human and environmental health;
- Has the ability to identify, reduce, and cope with the risks of water-related hazards, during normal operation, pre-disaster preparation, and post-disaster recovery.

2 September 2014 analysis of data collected by the Ministry of Lands and Natural Resources, Department of Geology, Mines, and Water Resources, in SHEFA province.
3 In the Pacific, the term "drinking water safety" is frequently used to distinguish the topic from water safety programmes that teach children to swim to reduce risk of drowning.
4 Specifically, the Framework underpins the programming and implementation of WASH services, with a focus on the sustainability of WASH outcomes despite the onset of climate change. Climate resilient development encompasses current climate variability as well as long term change as they impact on the programming, planning, design, building and operation of WASH services.

Figure 1 - Combined Drinking Water Safety and Security Planning (DWSSP) Approach Utilised in Fiji and Vanuatu



The concepts of water safety and security encompass many, constantly evolving topics, which can make it difficult for communities to understand, let alone implement, in their day-to-day management. Communities can feel overwhelmed by the pressures from donors and government to improve sustainability and resilience, and as a result many times undertake no management activities at all. The DWSSP programme has been designed to overcome these challenges through three key areas of focus:

1. Focus on the capacity building of village committees rather than the type of water system that they use: promoting the importance of O&M through a risk management approach, and staging their training and development.
2. Making community members the centre of their own planning, with guidance provided where necessary to ensure that they succeed and that their actions are aligned with improving their water security.
3. Continual assessment of village management capacity to ensure it achieves certain benchmarks, with support where necessary, before building new infrastructure is undertaken.

1 Focus 1 – Building towards better community management

To promote capacity building, the focus and timing of engagement with communities is especially important. The DWSSP programme is implemented through a series of workshops at the community level (See Figure 2).

First, facilitators engage communities in improving the safety of their current water systems by preparing Drinking Water Safety Plans (DWSPs). This has the immediate benefit of improving water supply while building a solid foundation for future infrastructure improvements by identifying, prioritizing, and treating existing risks. The capacity of the village water committee to implement the DWSP is then assessed using a monitoring and evaluation tool. If the committee has made improvements to reduce risks to water supply and is undertaking a number of agreed management activities, the facilitators will provide additional support to develop an investment plan to achieve water security. The holistic DWSSP approach is the combination of developing management through safety planning, and planning required infrastructure upgrades against water security standards.

In Fiji, the CSO Partners in Community Development Fiji (PCDF) have facilitated these workshops, while in Vanuatu they are led by senior staff from the Department of Geology, Mines and Water Resources (DGMWR). The workshops are a significant investment in community management capacity, with the ultimate goal being sustainable, active village water committees.

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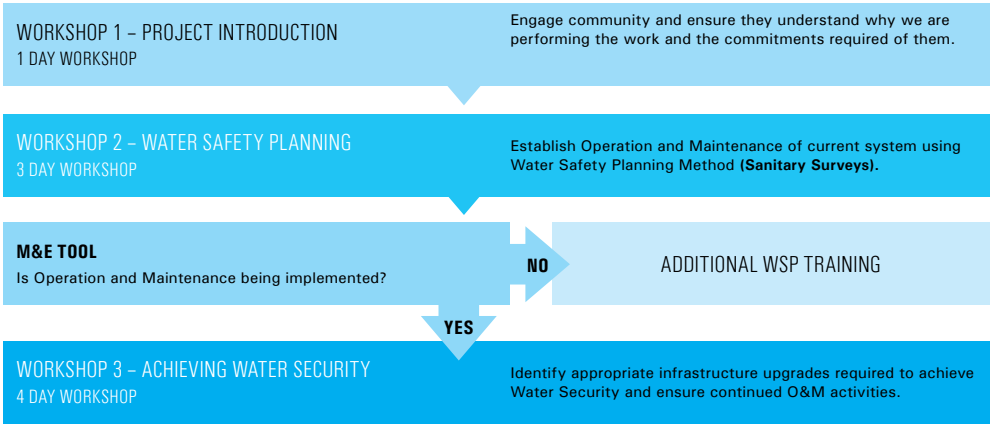
Figure 2 - Phased Approach to Project Delivery

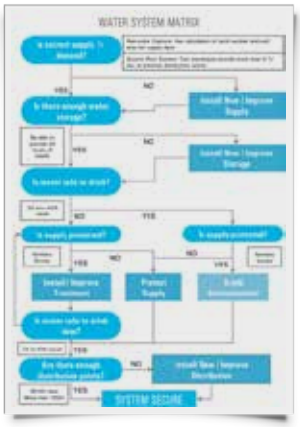


2 Focus 2 – Guided Tools and Approaches

Guided tools and templates ensure that communities can plan by themselves and will be successful in their approaches. The UNICEF Pacific programme has invested heavily in designing tools such as decision flow diagrams and easy to use templates, such as those shown in Figure 3. These enable village committees to create their own planning documents without heavy facilitation by programme staff. In Fiji and Vanuatu, the programmes and their tools were developed in collaboration with WHO and built upon their standard WSP approach and templates. The benefit of the new tools, when compared to existing templates, is the detailed guided approach to identifying, assessing, prioritizing, and treating risks, which are often the most challenging aspects for communities. The tools used sanitary surveys and guidance developed by the regional NGO, Live and Learn, from their toolkit, *'Keeping your drinking water safe'*.

Once the plans are prepared, the physical document itself stays with the village water committee for implementation. Only scanned copies are taken by the implementing partner to further promote ownership in the community. During the preparation of the plans, communities develop budgets to ensure that they can pay for their own system running costs.

Figure 3 - Example Tools Used for Community Planning



3 Focus 3 – Accountability and Incentivising

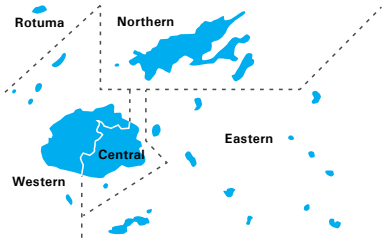
After Workshop 2, using water safety principles to promote community management, programme staff use a monitoring tool to assess the performance of the village water committee. The monitoring tool aims to verify whether the committee has implemented the plan and taken action to reduce the highest risks to water supply. If the committee has not made any progress, then further training assistance in this area is offered. If communities can show that they are managing their own water supply and have reduced their highest risks, they can progress to further planning activities aiming to achieve the water security standard outlined in Box 1.

During this last round of community interaction, Workshop 3, programme staff work with the community to develop a plan for upgrading their water supply and sanitation infrastructure to meet national standards for improved water supply and basic sanitation. Another set of decision tools and guided templates have been developed for this purpose, resulting in a water security upgrade plan. As part of their commitment to the community, programme staff assist in mobilising funding for implementation.

In Fiji, PCDF has developed materials for emergency preparedness and response that the village water committee can use prior to cyclone season or after a drought warning to remind households of measures to protect themselves. These materials can be posted on a village notice board or used as reminders during village meetings.

Programme Sites

This DWSSP approach was initially developed and implemented by PCDF in Fiji, with support from Australia and in collaboration with WHO. The programme that was implemented from 2013 to 2014 is focused on achieving water safety and security at seven sites across two districts (Navakasiga District, Bua Province, and Mataso District, Ra Province). An additional 15 sites have been selected for further implementation in 2016.



Divisions	Districts
1. Central	1. Nausori
	2. Suva
2. Eastern	1. Eastern
3. Northern	1. Cakaudrove
	2. Macuata-Bua
4. Western	1. Ba-Tavua
	2. Lautoka-Yasawa
	3. Nadroga-Navosa
	4. Ba

Building on the successes of the programme in Fiji, UNICEF is supporting replication of the approach at 14 sites across 6 provinces in Vanuatu (2012-2015). Ten of these sites were selected through the Community Resilience and Coping with Climate Change and Natural Disasters in Vanuatu project, funded by the UN Trust Fund for Human Security and jointly implemented by UNICEF, United Nations Development Programme (UNDP), and Food and Agricultural Organisation (FAO).

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OUTCOME

After a year of implementation in Fiji, a recent monitoring mission identified community-led action in 4 communities with important successes that could be replicated elsewhere in the country:

- All 4 communities had regular water committee meetings and presented on water issues at village meetings;
- 1 community had implemented a Water Resource Management system using valve keys in the community;
- 1 community had commenced the build of 2 new toilets replacing an older set that was presenting a water related hazard; this construction was a result of their own initiative triggered by the DWSSP process, and did not request any additional resources;
- 1 community had built 4 new stand pipes connecting 4 houses;
- 2 communities were regularly cleaning their water tanks;
- 2 communities have taken steps to protect their water source.

A comprehensive set of materials has been developed to facilitate the DWSSP process and is available via dropbox. Please contact the authors for more information.

In Vanuatu, the DGMWR is focusing on building capacity on the DWSSP approach to be used at sites supported by UNICEF and WHO. Communities set to receive new water supply systems will work first to develop DWSPs to justify the new investments.

Implementation of community management and properly planned water and sanitation infrastructure has primarily been the responsibility of NGOs. However, political will can be a major driver in improving uptake. The Government of Fiji approved the Rural Water and Sanitation Policy and Guidelines in 2012, providing a framework to improve planning, management and collaboration for rural water infrastructure. This now provides an official approval mechanism that ensures that approach such as DWSSP are implemented in WASH programmes, and align well with SDG 6. In Vanuatu, the Department of Geology, Mines, and Water Resources adopted the water safety planning concept for their peri-urban water supply schemes but not rural settings. In alignment with the Vanuatu National Water Strategy (2008), DGMWR now promotes DWSSPs in selected communities to increase their overall resilience, which is very timely in the aftermath of Tropical Cyclone Pam (March 2015).

LESSONS LEARNED

Improving community level resilience requires community commitment and hard work. The key lesson learned in this programme is that a guided approach to completing DWSSPs empowers communities, which, together with a results-based performance monitoring and accountability, will improve outcomes.

Village water committees may need significant guidance in their planning activities, either through a skilled expert facilitator or through sample tools and templates. As facilitators develop their skills, templates have been developed and successfully applied at the community level. However, these tools must also be accompanied by critical thinking to identify risks. The tools developed guide the community to reduce all risks associated with the supply, but with experience, communities and facilitators should use the tools for guidance and be able to modify and critically analyse risks on their own.

Overall, facilitators need better knowledge and experience in water treatment systems (e.g. rapid sand filters or sedimentation tanks) and more household water treatment options to complement village improvements to water safety. Verification of progress through water quality monitoring, sanitary surveys and displaying information at health clinics is critical to show the overall impact. Building on successful mobilisation of communities through the DWSSP process will provide a basis for further community work in, for example, disaster preparedness, hygiene promotion or upgrading sanitation facilities.

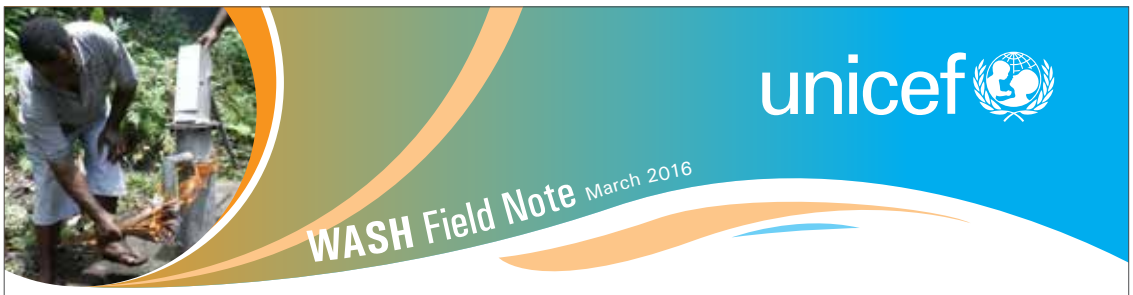
NEXT STEPS

Once communities prove their management ability, WASH infrastructure can be sustainably upgraded. This sequencing is thought to significantly improve the sustainability, and hence resilience, of WASH interventions in the rural environment. In Fiji, PCDF currently provides funding for improvements to reduce the risk associated with the community's Drinking Water Safety and Security Plan. Communities can also seek funding from different sources using these plans, knowing they align well with national planning processes.

In Vanuatu, the DWSSP programme is in early stages. With support from New Zealand, the government and UNICEF will institutionalise the approach as a key strategy for engaging communities and improving resilience of water supplies. UNICEF will provide additional training on the programme tools for all Provincial Water Officers and other WASH sector partners, including NGOs and Community-Based Organisations.

At the national level, the Government of Vanuatu aims to establish a system for collecting and maintaining records of community DWSSPs and corresponding infrastructure requests. One proposed way of doing so is to digitize the planning templates and make them available to all partners via the mobile data collection system used by the government to collect and monitor WASH sector data. As the community develops their DWSSPs, the same information could be filled out by programme staff using tablets. The information would be stored in a central repository so that all partners have access to information on water systems in villages across the country. If this can be done, the government, donors, and NGO partners plan to develop a procedure for reviewing infrastructure requests and allocating resources on the basis of this information.

For more than a decade, WHO and NGO pilot programmes across the region have demonstrated the potential for drinking water safety planning to improve community and household drinking water quality and risk management capacity. With these new materials, which incorporate water security concepts and help to standardise and improve sector planning, there is potential to upscale this approach to provide significant benefit in the region. Coinciding with the launch of the new SDG framework focussing on improving water safety, combined with access and availability as outlined in Goal 6, the DWSSP approach provides an already established method to engage in this new, exciting agenda.



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CONTACT

Marc Overmars, WASH Specialist, UNICEF Office for Pacific Islands Countries.

AUTHORS

This field note has been developed by the WASH team of UNICEF Pacific: Marc Overmars (Pacific), Brooke Yamakoshi (Pacific), Andrew Dow (Vanuatu) and Roger Singleton (Fiji).

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PHOTO CREDITS

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Case Study 3

Summary of Pacific Rural WASH Resilience Policy Review (Carpenter 2017)

CCA/DRM Policy Review

In 2016, research began for the Pacific Rural WASH Policy Review (Carpenter 2017) to investigate the WASH, DRM and CCA policy and legislation in Pacific island countries. The aim of the review was to identify improvements and good practices to increase resilience in the WASH sector. The review included five countries: Fiji, Kiribati, Solomon Islands, Tonga and Vanuatu. The desk-based process captured more than 360 documents, with over 80 undergoing a detailed review. This research examined results from three perspectives; the inclusion of WASH in DRM policies, the inclusion of WASH in CCA policies, and the inclusion of CCA and DRM principles in WASH policy. General recommendations for the WASH sector were also included.

When considering the inclusion of WASH in DRM policy, the first part of the review, most of the countries focused on the development and strengthening of emergency response and recovery mechanisms. While these mechanisms are good for supporting rural communities in times of disaster, they are not sector specific and do not prioritize WASH. Most of the DRM frameworks coordinate and implement only at the national level, due to capacity restrictions at the provincial and community levels. This provides an opening for models such as Drinking Water Safety and Security Planning (DWSSP), see Part 4, as mechanisms to strengthen management at decentralized levels, particularly at the community level. Drought is the highest priority for WASH within DRM frameworks, with recent drought periods in Pacific island countries further fuelled by El Niño demonstrating the benefit of investing at community level.

The second part of the review considers the inclusion of WASH in CCA policy frameworks. All the country frameworks examined are non-sector specific, and are intended to develop appropriate CCA strategies including mainstreaming CCA into sectoral policies, planning, building code, data collection and sharing, and education and communication. All policies recognize the WASH sector as a priority area to mitigate effects, although this is usually prioritized after food security and agriculture. Most CCA frameworks commence with national-level assessments to guide implementation planning, but also recognize minimal capacity at provincial and community levels, and note the importance of building risk and adaptation capacity at these levels. The use of DWSSP at community level is entirely consistent with CCA principals.

The third part of the review looks at the inclusion of CCA and DRM principles in WASH policy. The first striking outcome is that only two of the countries, Fiji and Solomon Islands, have rural WASH policies. Fiji's policy does not mention CCA in any capacity. It was highlighted that the Solomon Island RWASH policy that includes CCA and DRM could be a very good model for the region. Natural hazards and WASH resilience responses are recognized in policies that can contribute to DRM, but this is not stated as a specific WASH objective. All countries recognize the requirement to strengthen provincial and community capacity. Again, DWSSP is a useful strategy to address this.

Considering these conclusions there were a number of recommendations made:

1. WASH needs to be included in DRM frameworks, along with indicators, as it increases community resilience to all disasters.
2. Joint National Actions Plans (JNAPs) provide improved coordination, cooperation and efficiency of managing hazards and risks. Given the technical, human and financial resource constraints in all countries, this approach should be introduced to all countries.
3. Both CCA and DRM require provincial, island and community-scale hazard mapping, risk assessment and risk reduction. However, the capacity shortfall at these levels prevents this. There needs to be a substantial investment in risk reduction/resilience capacity building at sub-national levels. This investment should use/build on the existing robust DRM institutional arrangements.
4. WASH resilience provides an entry point to introduce hazard mapping, risk assessment and risk reduction at sub-national levels. More specifically, DWSSP provides a tangible single priority issue and goal for communities to work towards – supported by island and provincial capacity – to increase their resilience.
5. This community resilience approach can be expanded to other issues – specifically food security.
6. There are obvious links between DWSSP, watershed and aquifer management, land management, water demand and food security. This also extends – but less explicitly – to energy security (wood fuels).
7. Drought preparedness and response plans should use DWSSP approaches and include explicit consideration of future risks when investing in water resource monitoring, increasing water storage and reducing water demand.
8. Countries without explicit rural WASH policies or sub-policies need to develop them and include CCA, DRR and DRM explicitly within them, using DWSSP.
9. Countries without sanitation policies need to develop them or include them in existing policies. They need to explicitly include reference to the impacts climate change on sanitation, and the role sanitation plays in contributing to WASH resilience and drought vulnerability in particular.
10. The community-focussed resilience investment (see 3 and 4 above) is essential to deliver resilient sustainable WASH even without CCA and DRM concerns, and therefore, WASH must focus on building capacity at the sub-national level – logically in conjunction with CCA and DRM.
11. WASH specific CCA and DRM options are understood but must be brought together in a coherent and logical risk-based risk reduction methodology – DWSSP. This needs to be included in all WASH policies, strategies, standards and procedures.
12. WASH resilience should also be pursued through non-WASH specific routes including IWRM, watershed management, and community, island and province resilience planning.

This review provides great insight into the current gaps in policy and implementation methods within the Pacific region. It clearly recognizes that risk approaches are required at many levels for effective implementation. DWSSP is recommended as a technique for provincial and community implementation.

A young man carrying supplies off a boat to be delivered to communities after Tropical Cyclone Winston in Fiji.

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ACRONYMS AND ABBREVIATIONS

CAP	Capital Assistance Programme
CCA	climate change adaptation
CLTS	community-led total sanitation
CSO	civil society organization
DRM	disaster risk management
DRR	disaster risk Reduction
DWQ	drinking water quality
DWSSP	drinking water safety and security planning
FIB	Faecal Indicator Bacteria
GWP	Global Water Partnership
IWRM	integrated water resource management
MDGs	Millennium Development Goals
NGO	non-governmental organization
NTU	nephelometric turbidity units
OM&M	operation, monitoring and maintenance
PHAST	participatory hygiene and sanitation transformation
PMBOK	Project Management Body of Knowledge
RWASH	rural WASH (see WASH below)
RWC	rainwater capture
SDGs	Sustainable Development Goals
SOPAC	Pacific Islands Applied Geoscience Commission
SSP	sanitation safety planning
TAP	Technical Assistance Programme
ToC	theory of change
UNICEF	United Nations International Children's Fund
UNISDR	United Nations Office for Disaster Risk Reduction
WASH	water, sanitation and hygiene
WHO	World Health Organization

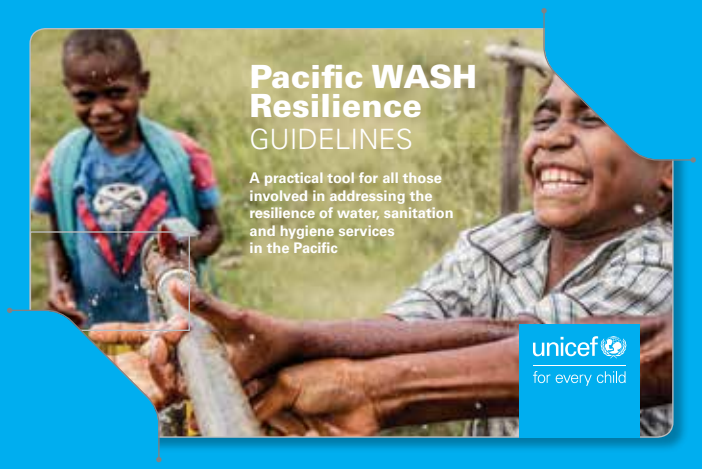
LIST OF BOXES, FIGURES, INSIGHTS AND TABLES

Boxes

Figures

Insights

Tables



This USB contains supporting materials including toolkits and case studies.

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UNICEF Office for Pacific Island Countries

3rd Floor, FDB Building
360 Victoria Parade
Suva, Fiji