WATER SAFETY PLANS FOR COMMUNITIES

Guidance for adoption of Water Safety Plans at community level

tearfund

Water Safety Plans for communities:
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Tearfund is a Christian relief and development agency building a global network of local churches to help eradicate poverty.

Tearfund has more than 30 years' experience of working with churches and church-based partner organisations to improve community hygiene and safe sanitation.

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Glossary

Biosand filter	A household based slow sand filter, designed by Dr David Manz of the University of Calgary in the 1990s, which has been shown to be effective in removing pathogens from contaminated water, rendering the filtered water safe to drink. Production of the concrete filters by local artisans is encouraged, and has led to the establishment of many self-sufficient programmes world-wide through various relief and development agencies.
Critical Control Point (CCP)	A vulnerable point in the water supply system through which contaminants could potentially enter the supply.
Disaster Management Team (DMT)	Tearfund's relief arm, in which Tearfund staff work directly in programme implementation in relief contexts.
Ecological sanitation (Ecosan)	A sanitation approach that allows human waste to decompose so that it can then be used as compost. Usually the approach involves the separation of urine and faeces, which aids decomposition of the solid matter. Since the human waste is regularly removed, the latrine pit does not need to be very deep, and so the risk of contaminating groundwater is reduced.
Facilitator, and facilitating team	The person or team who introduces and leads a community in the process of training in Water Safety Plans (WSPs), with the aim of empowering the community to create its own WSP.
Groundwater	Water held in the pore space of rock or unconsolidated deposits, or within fractures of rock, below the ground surface.
Hazard	A natural or man-made event or situation which could lead to danger, loss or injury.
Knowledge, Attitudes and Practices (KAP) survey	KAP surveys are conducted in a community usually as part of an assessment event. The survey focuses on hygiene habits and behaviours and, together with participatory techniques, serves to identify and understand the approaches of the community to these issues, and why community members may not be practising good hygiene.
Open defecation (OD)	Defecating in the open environment (whether behind a bush or building or on open ground).
Open defecation-free (ODF)	The status achieved within a community when OD is no longer practised.
Participatory Hygiene and Sanitation Transformation (PHAST)	A Participatory or Rapid Rural Assessment method of raising awareness of the links between good overall health and improved sanitation practices. The method is very interactive, using numerous tools and techniques whereby the participants work out for themselves the links to good health, and consequently change their personal hygiene practices.
Pathogen	Harmful microbial organism.
Potable water	Water that is safe to drink
Risk	The likelihood of an identified hazard to cause harm in an exposed population in a specified time frame, including the magnitude of consequences.
Sanitary survey	When visiting water supply schemes, it is usually possible to spot any faults and deficiencies that could lead to the pollution of potable water. In the context of preparing a WSP, sanitary surveying is an inspection technique that records such visible problems, enabling fieldworkers to assess the likely quality of the water relative to other sources.
Spring water source	When groundwater is released at the surface, it forms a spring. Since groundwater is usually the purest water source, a spring source is normally developed in preference to other sources where it is available.

Transect walk	The process by which community members and a facilitating team walk a route through the community and its outskirts, passing through areas and visiting locations connected with water supply use and the maintenance of safe water quality. This can include, for example, water sources, routes of water transport to homes and water points, water points (wells/tap stands/protected spring outlets), water storage areas, market areas and areas where inhabitants gather, livestock watering sites, abattoirs, drainage courses, garbage collection sites, and areas where OD is practised.
Village mapping	A process by which villagers mark the location of OD sites, dwellings, water points and key public places on a map, often on the ground, although ideally the details are then transferred to paper or a suitable display to aid future WASH planning.
WAB	WaterAid Bangladesh
WASH	The term used when water supply, sanitation and hygiene promotion are programmed together as an integrated approach. This is the preferred method of working, because of the indivisible effect of one component on the other two.
Water Safety Plan (WSP)	A risk assessment and risk management method of maintaining safe water quality, which considers the entire supply route from source to mouth.

1 Rationale and concept of a Water Safety Plan

Rationale

The Millennium Development Goal referring to water supplies (Goal 7, Target 7C)[1] stresses the need for sustainable access (*quantity*) to safe drinking water (*quality*). However, ensuring that safe water quality is maintained in community-based water supply projects is, in our experience, usually an ad hoc procedure, involving, on occasion, water quality testing events using field kits.[2] In a few cases the water testing may form part of a regular water quality monitoring regime, but even when an established regime has been set up by an implementing agency, it often fails because of a lack of consumables for the kit, or breakdown of the incubator in the kit, or simply because the operator responsible is unable to visit the community in question as a result of events such as adverse weather conditions or security issues.

There are other reasons why reliance on field-testing of water quality is inadequate to ensure safe community water supplies:

- Even if a water quality monitoring regime is adhered to, the water quality results are, by nature, historic – they will only show what contamination has already entered the water supply and, most likely, has also been consumed.
- Physical water quality testing is usually directed at the water source, eg the water flowing from a handpump or the water stored in a reservoir. Often water testing is even limited to a single pre-commissioning test, with the assumption that the sealed well (for example) will be guaranteed to deliver safe water indefinitely once it is commissioned (with the occasional ad hoc water quality check). Rarely is water testing with field kits systematically used to test water quality along the entire supply route, from the source to the point of consumption. And it is often at the point of consumption, eg in the home, that water quality is further jeopardised – for example, by unsafe storage or the lack of handwashing practice at critical times.
- Communities, even those that have set up efficient Water Users Groups, do not have the resources to operate incubator-based bacteriological water-testing equipment, such as the DelAgua or Wagtech kits. To operate these kits correctly, a regular supply chain of consumables is required, as is a reliable electricity supply.

Tearfund and its partners believe that a community water supply should be owned and managed by the user community which takes responsibility for the safety and reliability of the supply. How then can communities be empowered to effectively safeguard their water quality?

This is where Water Safety Plans (WSPs) apply. Launched by the World Health Organisation (WHO) in 2004, WSPs move away from sole reliance on end-product testing, towards a process of quality assurance and preventative risk assessment and management.

WSPs help beneficiary communities and project implementing agencies to:

- identify sources of potential contamination (the hazard)
- develop methods to control the hazard
- monitor when the supply is in compliance
- verify the effectiveness of the whole system (ie from catchment right through to the point of water use or consumption).

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1 MDG 7, Target 7C: 'To halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.'

2 Particularly for measurement of bacteriological contamination. This involves field kits with powered incubators, which measure *E-coli* concentration (a faecal indicator) in sample water.

Hence, a WSP can be termed 'a **comprehensive risk assessment and risk management approach** to ensuring the safety of a drinking-water supply that encompasses all stages in water supply, from catchment to consumer' (WHO, 2004 p48, Ref 1). The point of covering 'all stages' is fundamental to the principle of a WSP, since contamination can occur at any point: the WSP therefore not only helps prevent contamination of source waters, but it helps to prevent contamination during storage, distribution and handling. If the supply system involves treatment, such as filtration or disinfection, then the WSP will help prevent re-contamination before the water reaches the consumer. For further information, see Godfrey, 2005 (Ref 2).

The purpose of this guide to implementing Water Safety Plans

Numerous publications now exist on the formation and use of WSPs, but most of these focus on larger-scale projects run by private or public utilities, commercial enterprises and international NGOs. Tearfund's particular interest is in how WSPs can be understood and established by user communities which are faced with self-managing a water supply project to gain sustainable access to safe water quality.

The purpose of these guidelines is therefore to assist Tearfund's partners and Disaster Management Teams (DMTs) and other external agencies supporting the implementation of water supply projects, in facilitating their beneficiary communities to create **their own** WSPs.

The outcome of this guide should be twofold:

- All Tearfund DMTs and partners working in WASH are made aware of WSPs and their benefits.
- WSPs become integrated in all Tearfund's WASH programmes and **become the principle means by which every community-based water supply project is managed in order to safeguard water quality**.

As shown in these guidelines, WSPs might be introduced as a stand-alone process, or through certain appropriate entry points which are either planned for the community or have already been implemented, such as PHAST hygiene sessions or disaster risk reduction training.

The guide is written chiefly for the use of a facilitator or facilitating body (eg the hygiene promoters or community mobilisers of a DMT or partner staff) to use in training community members, and in particular, the water project accountability group (eg Water Users Committee) of the community.

In order to achieve the objective of guiding the reader in how to facilitate a community's decision to form its own WSP, the guide:

- introduces the concept of WSPs and describes the key components
- gives examples of facilitating each component
- provides two case studies of community-level formation and application of WSPs.

The two case studies come from actual examples of application by Tearfund's DMT, and they are copied in this guide to enable groups facilitating WSPs to study and consider replication, given their prevailing context. Those using these guidelines to facilitate the formation of WSPs can therefore either use the basic stages outlined in the guide to elaborate their own WSP process or adapt one of the two case studies.

Both case studies follow the basic stages outlined in this guide, but the fundamental difference between them is that the Southern Sudan process is chiefly pictorial and is suited to a mainly non-literate community. The process used in Afghanistan, however, is specifically relevant for a literate community.

2 The process of forming a Water Safety Plan

The process a community takes towards establishing and managing its own WSP can be summarised in the stages shown in Box 1 below:

BOX 1
Stages in forming a WSP

Prerequisites

- Defining and agreeing health-based targets.
- Understanding what a WSP is and what it will achieve.

Basic stages

1 Describing the water supply system.

2 Analysing the system through:
- identifying hazards
- assessing risk
- identifying control measures.

3 Establishing a regime of monitoring and preventative maintenance.

4 Managing the WSP and controlling incidents.

The prerequisites

'Safe water' and health-based targets

Before you can manage a water supply system to maintain safe water quality, it is imperative that the users have a clear concept of what constitutes 'safe' drinking water. If they have been exposed to drinking poor-quality water in the past, they will be aware (through hygiene promotion and education) of the consequences of drinking water that is contaminated. The users will thus aspire to achieve a particular outcome as the benefit of maintaining water quality. This outcome may be based on the incidence of diarrhoeal diseases in the community (and how healthy people generally feel, especially with regard to freedom from diarrhoea), including the more serious WASH-related diseases, such as cholera and typhoid. Essentially such information is measurable (through household surveys and health records), and it will affect outcomes such as the number of days a child misses school or an adult misses attending their place of work. In fact, improvements in these further outcomes themselves may be the ultimate perceived benefit to the community.

Hence, having a clear concept of what constitutes safe drinking water (and good hygiene practice) is in itself a prerequisite to defining a health-based target. These guidelines include some examples of exercises and sessions to raise awareness of 'safe water'. However, this can be more comprehensively achieved through acknowledged hygiene promotion tools, such as PHAST (Participatory Hygiene and Sanitation Transformation), or effective messaging projects, or hygiene promotion through various focus groups.

The exercise below will assist a community group to better understand and define 'safe water'.

EXERCISE

Picture storytelling

Ask the participants to form small groups. Give each group a set of pictures copied from the Picture Stories in Picture Set 1.

Give the groups the task, using these words:

Each group will use the pictures given to them to develop a story about your community, using only the pictures you have. Your story should have a beginning, a middle and an ending. Everyone in the group should participate in making the story.

Give the groups 15 minutes to make up their story.

When all the groups are ready, ask each group to tell its story to the other participants, using the pictures they had. To tell their story they can use a single person selected by the group or a number of persons selected by the group, or can have all participants act out their stories.

Invite the other participants to ask questions about the story and let the group answer them.

After all the stories have been told, invite the group to discuss whether the person at the end of the story was drinking clean water and why, and also what things in the story were preventing them from drinking clean water.

Adapted from DMT Southern Sudan WASH trainings, by Claire Simmons

DISCUSSION

Following the discussion in the above exercise, invite the group to discuss the issue further, thinking about the following questions:

- Do we need clean water to drink and use? Why?
- What is clean water?

Assisting the community to define health-based targets is made complex by the fact that desired targets will only partly be dependent on maintaining safe water quality. Adequate personal hygiene practice is paramount, and has more direct effect on personal health than clean water. The nutritional status of the population has a huge influence on health status, particularly on the immune system. Solid and human waste disposal and environmental pollution have strong influences. Such key interrelations must be appreciated by the community as contributing to the full benefits of health and well-being of which the maintenance of safe water quality is but one component.

- Open discussion forums are likely to be a context in which health aspirations and health-based targets can be drawn out. Discussion forums will probably be most effective within focus groups (men, women, children, and any marginalised groups), in which all sections of the community are encouraged to engage. Whatever the structure of focus groups, a concluding plenary session of all groups will be needed in order to reach final agreement on chosen health-based targets.
- Simple ranking techniques would assist in prioritising targets and health issues. Pocket charts and other Participatory Rural Appraisal techniques should be considered, so as to gain a perspective of health, and health outcome, aspirations across the community.
- Examples of health-based targets **may** include:
  - total days of diarrhoea in children under five during the last month – not more than X days
  - total days of diarrhoea experienced by all adults in a household in the last month/two months – not more than X days
  - percentage absenteeism from school each day – not greater than X per cent
  - percentage of working days missed or shortened due to diarrhoea – not greater than X per cent.

- Agreed health-based targets should be measurable and realistic, based on the community's experience or knowledge of what a well managed water supply project, with practice of improved hygiene and sanitation, can offer.
- Health-based targets will not necessarily equate to experiencing no WASH-related illness whatsoever, as the community will be aware of situations which severely challenge the maintenance of safe quality water, such as flooding or seasonal variations which may necessitate using alternative water supplies or forms of treatment. In fact, there may be times when community members are willing to compromise access to safe drinking water for the sake of time, minimum cost, or the effort spent in fetching water. In this case, the health outcome expected (health-based target) will incorporate a tolerable level of risk. This is a key part of open forum discussion with each community. The WSP will be a means of identifying and managing the risks.

NOTE: Microbial hazards and chemical hazards

In the context of community-scale water supplies, the WSP process would focus on microbial contamination, since this is by far the most common hazard, and one which is addressed through integrated WASH responses of good hygiene practice and safe sanitation interventions, as well as robust water supply management and facilities.

Chemical hazards, such as arsenic, are normally identified before the development of a community water supply. Where chemical hazards are identified, such as the presence of arsenic in groundwater in the delta regions of Bangladesh, the hazard must be incorporated into the WSP. See the example of WaterAid's WSP process in Bangladesh, Appendix A.

What is a Water Safety Plan?

Communities that have been involved in disaster risk reduction training or projects will already be acquainted with the concept of how various **hazards**[3] contaminate their water supplies, and the **risk**[4] of this taking place. They may already have taken steps to mitigate the risk of contamination of water supplies at the household level, and possibly even at a community level through collective action.

Nevertheless, many communities will not have considered a systematic, community-level procedure for safeguarding their water quality. Following the exercise on understanding safe water, the following explanation might be used in explaining the purpose of a WSP.[5]

3 *Hazard*: a natural or man-made event or situation which could lead to danger, loss or injury

4 *Risk*: likelihood of an identified hazard to cause harm in an exposed population in a specified time frame, including the magnitude of consequences

5 The term *Water Safety Plan* may not be readily understood in some contexts, particularly when translated, and a different term may be more appropriate. The overall aim here is that the community becomes aware that this process will enable it to consider the risks to its own water quality, and how to manage those risks as a community.

Suggested explanation to the community (following the discussion and exercise on safe water)

Making our Water Safety Plan

The purpose of our training sessions is to help you create a plan that you, as the community, work out to provide safe water to all your community continuously. It looks at keeping water clean from source to mouth; it looks at making water accessible; it looks at ensuring that there is sufficient water for all the community. This is the plan that we are going to develop together today.

- *We have discussed why we need clean water and what clean water is.*
- *We are going to look at what water sources we have, and the journey the water takes from source to mouth.*
- *We are going to consider how the water may become contaminated on that journey.*
- *We are going to look at how we can block some of the potential problems, including the contamination of the water.*
- *We are going to consider if we need to do some things differently.*
- *We are going to plan how we should make changes and who is going to do what, and discuss some of the problems that we might have in making these changes.*
- *We are going to develop a chart to monitor how well we are carrying out our plan. The planning poster and the monitoring chart will form our Water Safety Plan.*

Adapted from training session by Claire Simmons, Tearfund DMT Southern Sudan, July 2009

The basic stages

Stage 1 Describing the water supply system

The initial stage in the formation of the WSP is to enable the community to describe the water supply system. This process has two distinct benefits:

- It enables community members to become familiar with their water source – its physical location, what affects its yield and quality, its overall accessibility (ie thinking of accessibility not just in terms of distance but also of the time, effort and possibly cost), security issues affecting access, and the location and nature of alternative sources.
- The community water supply system, once understood, can be divided into key sections on the basis of functionality. This approach establishes the 'building blocks' of the WSP, as it enables people to understand, assess and manage the risk of contamination for each component part instead of having to consider the system in its entirety, which could be overwhelmingly complex.

Various exercises can be used to help the community get to the point of being able to describe their water supply, but two principal methods (tools), both of which it is recommended should be carried out with the target community, are transect walks and community mapping.

The transect walk

In a transect walk, community members journey through their community and the surrounding area, visiting all the water sources they use throughout the year, both for potable and domestic use and for productive use (agriculture and small-scale irrigation, livestock watering, brick-making, etc). They may also visit places that affect water use, in terms of both quality and quantity, such as bathing areas, garbage disposal areas,

places where livestock are slaughtered, water storage areas, areas where human waste is applied to land or set aside to decompose, main drainage channels, institutional latrines, and outlying household latrines. Areas where open defecation (OD) is practised should also be included in the transect walk.[6]

The overall purpose of the transect walk is for the community to identify and familiarise themselves with the various water sources, and to come to appreciate the route that the water supply takes to reach their storage containers at home. Hence it is vital that community members are free to ask questions and to make comments regarding their understanding of the water sources and what might affect them. The facilitator should particularly encourage the group to identify any problems they see that would cause the water to become contaminated (eg absent or broken fence at the source, blocked drainage channels, broken handpump, faeces on the ground near the water source, broken cement on the well-head, etc).

Following the transect walk, the community group could engage in the following exercise:

EXERCISE

Water journey (card sorting)

Print the pictures in Picture Set 2. Ask the group to lay out the pictures in order of the journey the water makes from the source to the moment when they drink it. Ask them what each picture is showing and correct them if necessary. Ask them to use only the pictures that represent the things that are most common in their community.

- *Are there any stages the water travels through that aren't shown in the pictures?*
- *Is there more than one journey?*
- *Is the journey the same in the rainy season and the dry season?*

If there are pictures left over, ask the group if the leftover stages are ever used in their community.

- *Where might they be used?*

Stick the pictures on the wall/paper in the order that they are placed by the group.

Adapted from DMT Southern Sudan WASH trainings, by Claire Simmons

Community mapping

The community mapping exercise serves to transfer what inhabitants know about the water sources to a visual display (ideally on paper, although mapping done on the ground using local materials can be transferred to paper later). The finished map serves as a point of discussion as community members refer to water sources and the interaction which they understand takes place between water sources and other features in the village.

The following exercise for mapping water sources has been used by Tearfund's DMT in Southern Sudan:

6 A transect walk which specifically focuses on identifying areas of open defecation is an integral part of the Community-Led Total Sanitation (CLTS) process. If CLTS has taken place earlier in the project community, the transect walk should include the CLTS route.

EXERCISE

Guided tour

Ask the group to get into smaller groups. Provide each group with a large piece of paper and a marker pen. Give the groups the task using these words (allow 30 minutes):

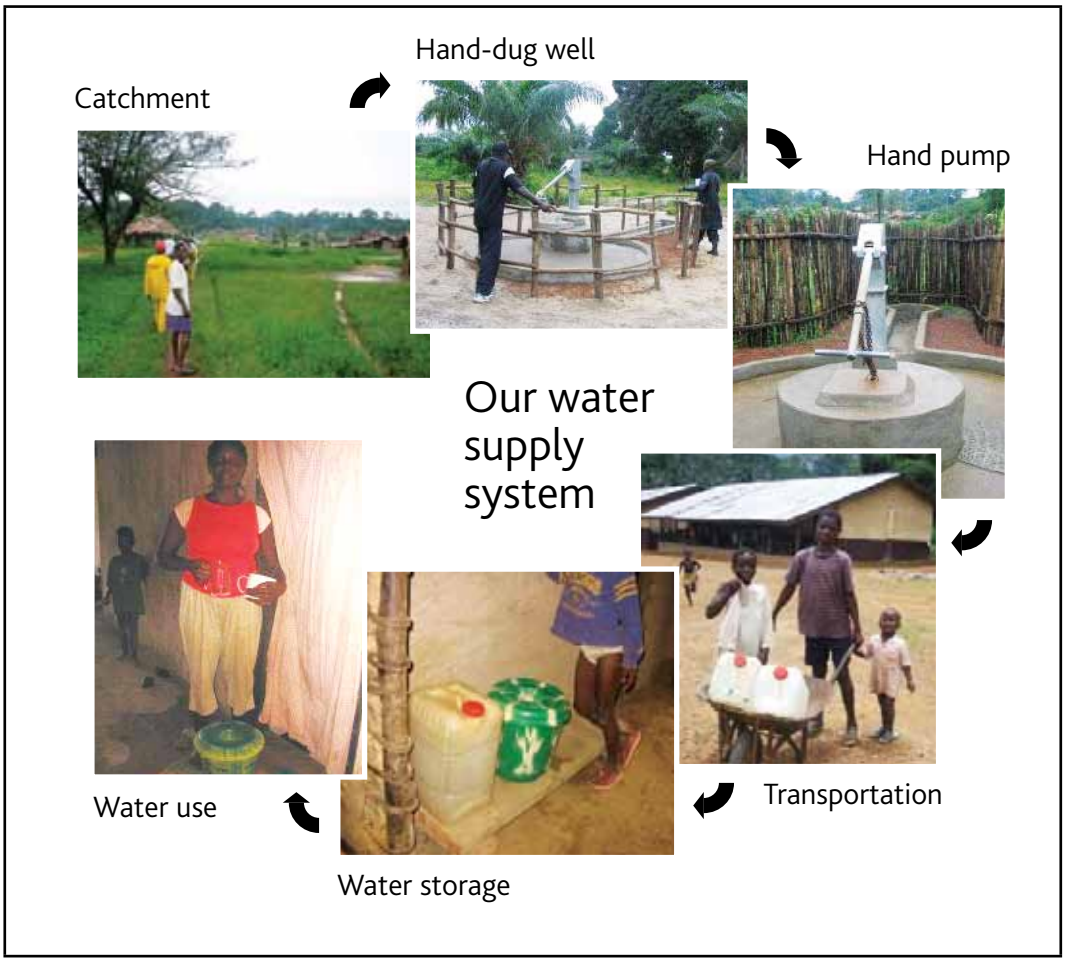
Make a map of your community showing boundaries, roads and paths, main buildings such as schools, churches, health facilities, all different water sources (including seasonal water sources), latrines and defecation areas, and rubbish sites.

When the map is completed, ask each group to nominate one person to be the 'tour guide' of their community. Ask the tour guide to stand at the front and provide a guided tour around the community. Allow other groups to ask questions about the community, especially about the water and sanitation aspects. Ask the tour guide to point out the water and sanitation arrangements they are proud of. Ask the tour guide to point out any common problems or difficulties with water, sanitation and hygiene they have in their community in reference to the map. (Allow 15 minutes.)

Adapted from DMT Southern Sudan WASH trainings, by Claire Simmons

Information obtained through the transect walk and community mapping is used to form a brief description of the community's water supply system (or route), or systems. The system can be illustrated through drawings, photographs, symbols, or even a flow diagram for more literate communities. The example below uses photographs for a handpump-based system.

BOX 2
Example of a description of a water supply system using photographs



In a community session it may be more practical to use line drawings. The drawings can be very simple, so that they may be easily replicated on cards or flip charts. For example:

BOX 3
Example of a description of a water supply system using line drawings

Abstracting water at a hand-dug well

Transporting water

Stage 2 Analysing the water supply system

IDENTIFYING HAZARDS

The exercises done with the community so far have given participants the chance to become familiar with their water supply system and to record a physical description. The community must now identify and understand how contaminants can enter the supply. The following two activities will help participants gain this understanding. The exercises will assist the facilitator or trainer to ensure that hazards are not seen purely as fixed or consistent with a particular system, affecting mainly physical parameters, but that hazards have social and time-affected dimensions:

- Besides identifying hazards affecting hardware, WSPs are concerned with social and behavioural risks. The effects of gender, vulnerable groups, children, conflict, security and, in particular, poor hygiene practices should therefore be discussed.
- The community should be aware of both existing and potential hazards, including seasonal or event-related hazards (eg flooding). As the community assimilates what can happen to their water supply, some members may helpfully be able to relate to things that happened in the past which affected their water quality.

EXERCISE

Spot-the-problem pictures

Print the pictures in Picture Set 3. Distribute the pictures to various small groups. Ask each group to spot the problems in each picture, if there are any problems. The problems should be things that stop them getting clean drinking water.

Ask each group to feed back to the rest of the large group what the problems are that they have spotted. Allow the other participants to add any problems that they spot. Do the other participants agree with the problems spotted?

EXERCISE

Problem areas

Print the pictures in Picture Set 4. Hold up each picture and ask the group what it is showing. Refer the group to the Water Journey that they have made. Provide the group with the pictures and some blue-tack or tape and give the group the task using these words:

Stick the pictures on the Water Journey diagram at the place where each picture happens and is a problem that would stop you getting clean drinking water. Only use the pictures of things that you think happen in your community.

Spend some time discussing with the group why each of the pictures they have put up is a problem. If they have not used all the pictures, ask them if the leftover pictures are not problems for them and why not. Ask the group if there are any other problems they have that are not in the pictures. Check with the group that they are happy that all the problems concerning getting clean water at each stage of the Water Journey are stuck up on the diagram. Allow the group to rearrange or add any pictures. Ask the group what they have learnt from this exercise.

Sanitary survey

At this point it is worth mentioning another useful means of identifying hazards to water supplies which has already been in use for many years, and which many development workers in WASH may be familiar with – the sanitary survey. Sanitary surveying is an inspection technique that records visible faults and deficiencies that could lead to the pollution of potable water. It is based on physical observation and measurement, typically at the water source or intake, at any treatment works incorporated in the system, and within the distribution system (storage tanks, delivery pipes and taps).[7]

Historically, sanitary surveys have been mainly geared to being carried out by sanitary inspectors, who have at least a basic knowledge and understanding of water supply technology, public health principles, and water supply operations and management. Consequently, perhaps the main difference between a sanitary survey and a WSP is that the former is not inherently devised for community self-monitoring and community-based risk management: it chiefly informs the community from an expert perspective. A sanitary survey is also unlikely to raise socio-cultural and behavioural issues that affect water quality in the way that a WSP should.

Nevertheless, certain simplified formats for sanitary surveys, such as the pictorial format suggested by Smith and Shaw (WEDC) shown in Box 4 below, may be very appropriate for community use in respect of identifying hazards and monitoring potential risks to safe water quality. If such simplified tools are already in use by local water and sanitation authorities or community accountability groups, then it would be advantageous to incorporate their use into the overall community-formed WSP.

7 During a sanitary survey, certain insanitary situations that could increase the risk of illness are identified as 'sanitary risk factors' (eg open defecation in proximity to a surface water source). Usually a set number of risk factors are considered for each system (typically ten), and these may be scored according to the degree of risk. Totalling these scores at the end of a sanitary survey will help inspectors to recommend, for example, any treatment needs, or the development of one water source rather than another, or to help determine the cause of an epidemic, etc.

BOX 4
An example of an illustrated sanitary survey form

Taken from WEDC Technical Brief No 50, *Sanitary Surveying* (Ref 4). By kind permission of Practical Action Publishing

Sanitary-survey form for assessment of risks for contamination of a hand-dug well

A. General information

Location of hand-dug well:

Village: .....

Location within village: .....

Identification reference: .....

Date of visit: .....

Was a water sample taken? Yes / No

Sample reference .....

Total score of risks .....

Sanitary risk score:

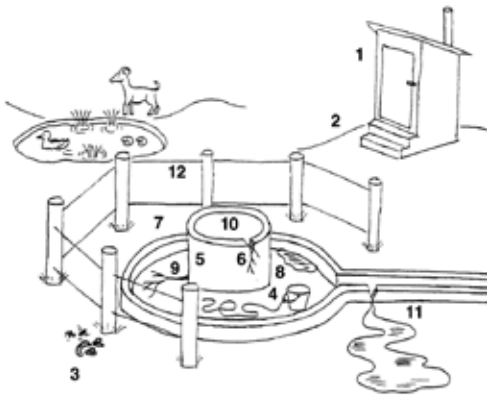
9, 10 , 11, 12 = very high
6, 7, 8 = high
3, 4, 5 = moderate
0, 1, 2 = low

Signatures

Community representative: .....

Inspector: .....

B. Identification of sanitary-risk factors	Yes	No
1. Is there a latrine within 10m of the well?	❑	❑
2. Is the nearest latrine on higher ground than the well?	❑	❑
3. Is there any other source of pollution (e.g. animal excreta, rubbish) within 10m of the well?	❑	❑
4. Are the rope and bucket exposed to contamination?	❑	❑
5. Is the height of the headwall (parapet) around the well inadequate?	❑	❑
6. Is the headwall (parapet) around the well cracked or broken?	❑	❑
7. Is the concrete apron around the well less than 1m wide?	❑	❑
8. Is there poor drainage, allowing stagnant water within 2m of the well?	❑	❑
9. Is the concrete apron around the well cracked?	❑	❑
10. Are the walls of the well (well-lining) inadequately sealed?	❑	❑
11. Is the drainage channel cracked or broken, allowing ponding?	❑	❑
12. Is the fencing around the well inadequate to keep animals away?	❑	❑



ASSESSING RISK

In terms of a community-designed and managed format for WSPs, the key issue of risk assessment is to understand the risk in question and the effect it would have on water quality. The two activities detailed above – 'Spot-the-problem pictures' and 'Problem areas' – will already have stimulated the community to consider risks to their water supply quality, and even measures they can take to mitigate those risks.

Risk assessment should enable the users or operators of a water supply to identify the greatest risks to water contamination. Some authorities, particularly those applying WSPs to large-scale government or agency-run water supply schemes, place importance on quantifying risk in order to identify priority areas (for example, by considering numerical categories of *likelihood of occurrence*, and multiplying this by a numerical category of *consequence* to give a quantifiable measure of risk). However, at community level, where several people will be involved in monitoring the system and implementing the WSP, quantifying risk introduces an unhelpful degree of subjective judgment in managing the system and the responsibilities accorded to every monitor and user. Hence the recommended process discussed in this guide does not incorporate scoring risks.

Nevertheless, it is pertinent to assist the community in identifying particular 'weak spots' in their system, to which it can give particular focus when it comes to monitoring and preventative maintenance. A term used by some agencies and academic institutes working in WSPs is a *critical control point* (CCP), which is a vulnerable point in the water supply system through which contaminants could potentially enter the supply. A regime of water quality testing, including bacteriological testing, will be routinely carried out at CCPs.

Thus, while not actually quantifying risk, a procedure in which key risks (ie equivalent to the concept of CCPs) can be identified is seen as the purpose of this stage of WSP formation. Perhaps *risk prioritisation* is a more applicable term to use in this community-level WSP process.

Referring to the 'Problem areas' activity above, the facilitator should ask the community participants how they would prioritise any particular problems, and why they would do so. Agreement on the prioritisation of

particularly problematic or vulnerable areas should be sought, and the specific pictures to which they relate can be circled with a red marker pen.

IDENTIFYING CONTROL MEASURES

Having identified the nature and the location of the hazards which can threaten the water quality of the system, and understanding the risk of this occurring, the community is now ready to be guided into planning solutions to mitigate the risk of contamination.

As in previous stages, the idea of presenting and distributing pictures which illustrate potential solutions is recommended. The exercise below utilises this concept, and asks the community to categorise their solutions as measures that they perceive as being difficult or easy to do, or in between.

EXERCISE

Picture sorting

Print out the pictures in Picture Set 5 and give various pictures to small groups. Explain that in each picture there are things that help keep the water clean. Ask the group to come to the flip chart and circle all the good things for keeping the water clean that they can see in the picture or circle all the good things for keeping the water clean that they can see on their piece of paper.

Discuss with the group what good things they have identified. Have the pictures in Picture Set 6 ready and cut out, and ask the group to pick out the good practice as they did in pictures from Picture Set 5, and then to stick them on the flip chart. Discuss with the group any practices that they have missed and whether these are helpful in keeping the water source clean.

EXERCISE

Effective solutions

Draw the chart below on flip chart paper with just the symbols as below, and explain the chart and what the symbols mean.

Give the group the task with the following words:

Remove the good actions that we have stuck up on the chart for our community's primary water sources. We are going to divide the good actions into what is easy to do, okay to do, and hard to do.

Explain the chart: the first column has the choice 'easy to do', the second has the choice 'in between', and the third has the choice 'hard to do'. Would this solution or action to block problems be easy to do, in between, or hard to do? Place each solution for blocking the problem in the appropriate cell.

When the group has completed the task, explain that we will concentrate on the things that are easy to do and okay to do rather than those things that are difficult for us to do.

In some settings, it may be appropriate to further divide the chart of effective solutions by specifying if the actions suggested by the community are 'very effective', 'not very effective', or 'quite effective'. The solutions that have been judged as 'not very effective' or 'hard to do' (or both) are then dismissed by the facilitator, who then continues the exercise focusing on the unshaded boxes shown in the bottom chart.

CHART 1
Chart to classify and record the solutions to prevent water contamination

Optional column ▼	(Easy to do)	(In between)	(Hard to do)
✔✔✔ (Very effective)			
✔ (Quite effective)			
✘ (Not very effective)			

	(Easy to do)	(In between)	(Hard to do)
✔✔✔ (Very effective)			
✔ (Quite effective)			
✘ (Not very effective)			

Stage 3 Establishing a regime of monitoring and preventative maintenance

Monitoring is the crux of the WSP – it becomes the ongoing focal activity which the community undertakes to maintain its water quality. Hence both the procedure and the document format of the monitoring process must be clear, practical and easily understandable. Therefore the community must be guided in drawing up a design and format which they own, and which they can later adapt by themselves if they wish.

Monitoring and preventative maintenance have been grouped together so as to cause simple, preventative action to be carried out as routinely as observation and checking. This approach not only minimises delay by avoiding the need to introduce another stage of management, but also enhances the concept of responsibility – the person who monitors a particular component of the water supply system is the same person who learns how best to maintain it, and who learns what the signs are that their maintenance is effective or not.

Explanation of the monitoring and preventative maintenance procedure follows on from the previous exercise of identifying what activities can be done to protect the water supply in the various stages of the system. Before suggesting a monitoring and maintenance format, it is important to say that Tearfund's Disaster Management Teams in Southern Sudan and in Afghanistan have found it extremely useful to link the concept of a monitoring process with the question of 'Who does what?'. This raises awareness of the

responsibility incumbent on the community as a whole, and on specific members too. Monitoring then becomes personal and social, and it is typically at this stage that community ownership is perceived.

In addition, the advantage of working from a 'Who does what?' standpoint is that it becomes natural and straightforward to consider the role of men, women and children in maintaining a safe water supply system. Hence, a gender-sensitive and inclusive monitoring and maintenance procedure can be drawn up. While it is sensible to enable the key village accountability group (such as the Water Users Committee or the Community Development Committee) to hold ultimate responsibility for the management of the WSP, numerous community members can have a responsible role to play. 'Gender role analysis' is one of the exercises cited in the example of WSP formation in Southern Sudan (Case study 1).

The exercise below illustrates a way to help participants consider how previously identified tasks for maintaining water quality can be divided among men and women.

EXERCISE

Gender role analysis

Print the pictures in Picture Set 7 and Picture Set 6. Explain the pictures. Give the group the task using these words:

You will see that I have pictures of a man, a woman, and a man and a woman together. You have also been given the pictures we have looked at for what we need to do to protect our water sources and to protect our water during transportation and at point of use. Discuss in your group who would normally do each task. I will put these pictures in different locations around our area here. When you agree in your group who does each task, put the task drawing underneath the drawing of the man, woman or couple based on what you decide. The drawing of the man and woman together means that both sexes perform the task.

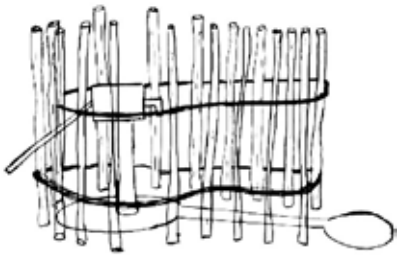
Facilitate a group discussion on who does what tasks, the workloads of men and women, the advantages and disadvantages of changing tasks done by men and women, and the potential for changing the tasks done by men or women. Explain too that if, for example, the woman is the one to look after the water in the home, then monitoring what happens to water in other people's homes is probably best done by a woman. This exercise therefore helps them to decide responsibilities in their action and monitoring plans.

SUMMARY CHARTS FOR COMMUNITY MONITORING AND PREVENTATIVE MAINTENANCE

Various formats can be conceived for monitoring and preventative maintenance. Following the process described above for classifying and recording solutions to prevent water contamination, Tearfund's Southern Sudan team have utilised Format A below, in which the group being trained decide **who** in the community will be responsible for taking each action that they have identified. The name of the person is then written beneath the specific action-picture. The group also decide **when** that action will be carried out (taking account of the gender roles agreed earlier), and this too is written on the picture.

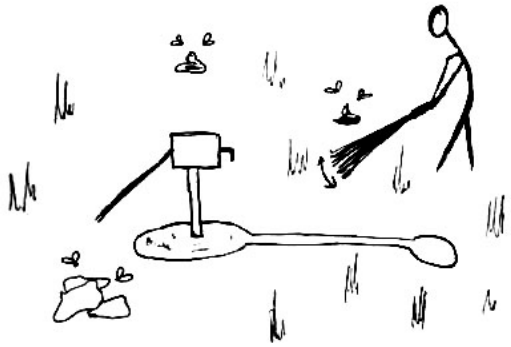
A tabular format for recording monitoring and maintenance activities which is suitable for literate communities is Format B, below, which stems from the World Health Organisation. Tearfund's Afghanistan team have used a simplified version of this monitoring chart – see Case study 2. Note that in this culture it is unacceptable to convene men and women in the same meeting, so two separate monitoring and maintenance forms have been constructed.

FORMAT A
Format used by Tearfund's DMT in Southern Sudan



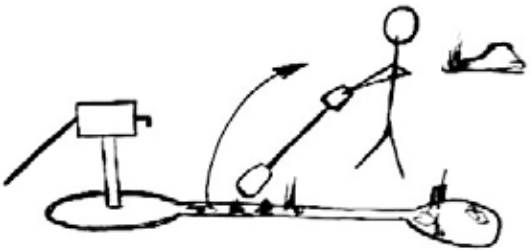
1 x week
Joseph Aken

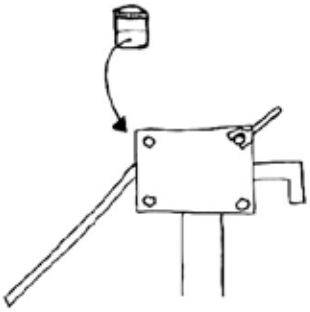
2 x week
William Machol



Every weekday
Sarah Ajwong

2 x month
Isaah Garang





1 x week
Joseph Garang

FORMAT B
Format based on that used by World Health Organisation

Hazard	Current control measures	Critical limits	Monitoring	Recommended further action
Pollution of ground-water with faecal matter	Provide good drainage around borehole; establish and train water users committees and pump attendants and design water source to be more than 30m away from OD area or latrine; ensure borehole located in area that can normally be accessed even during flooding	Diversion ditches: are flowing to within 100mm of ground level; have significant amounts of rubbish in them; show signs of wear or walls collapsing	**What:** Well inspection **When:** Weekly **Who:** Pump attendant	Clear out ditch; enlarge ditch; if significant collapsing occurs, have water users committee endorse cement-lining
Drought, causing borehole to dry up	Provide rainwater harvesting systems that can store water through some parts of the drought. Tanks marked with levels indicating estimated weekly water use according to household size	Rainwater storage tanks contain sufficient drinking water until rainy season	**What:** Inspect water level in rainwater tanks **When:** Weekly **Who:** Households	Households report low quantities to Water Users Committee
No water output from handpump	Water committees established and trained together with handpump mechanics to fix broken handpumps; support of local government to store the parts; standard Indian Mark II pumps supplied and installed to good quality standard.	Handpump must be working in optimal order (ie full expected flow); Pump attendant has essential parts (pump seals, foot valve, spare nuts and bolts, grease) in store	**What:** Check pump output **When:** Daily **Who:** Pump attendant	Purchase additional spares; call government technician/ partner/DM Team for more serious maintenance issues
Pollution of ground-water with faecal matter from livestock	Water committees established with roles of completing boreholes with fencing and managing boreholes	Fences and hedges must be unbroken, and entry points must be closed at end of water abstraction period	**What:** Check fencing **When:** Daily **Who:** Pump attendant	Repair fences or hedging; remove faecal matter deposited by livestock, and sweep well-head area

Other ideas might include formats based on tick-boxes or check-sheets on agreed set actions (which might be either written or drawn), with open fields for dates and names to be recorded.

Stage 4 Managing the Water Safety Plan and controlling incidents

To date, Tearfund's operational teams in Southern Sudan have gained the most experience within the organisation of applying WSPs at community level. However, the work is still in its early stages, and there has not yet been extensive experience of monitoring within the WSPs that have been established, nor of supporting water users committees to follow their agreed action plan. This is very much work in progress for Tearfund.

Among other relief and development agencies supporting water supply systems, WaterAid, and particularly WaterAid Bangladesh (WAB), has the most substantial experience to date in community-level application of WSPs, following comprehensive piloting of WSPs and subsequent scaling-up in 2006/2007. The aims and

results of WAB's piloting of WSPs, including key features of the methodology used in establishing WSPs, are detailed in Appendix A.

In rural areas, the occurrence of diarrhoeal disease has been reduced remarkably after the introduction of WSPs in WAB's pilot areas. The overall rate of incidence of diarrhoeal diseases (or any kind of water-borne disease in the three months before the survey took place) in the rural communities has been reduced from 29 per cent in WAB's baseline survey to only four per cent in the final survey. The impact was even more pronounced in urban areas.

In both the urban and the rural contexts, the largest achievements were observed in the cleanliness of source surroundings. Water points with suitable platforms and proper drainage were also commonly achieved.

The results are significant and impressive, but follow-up of community action plans is seen as crucial to maximising the impact of WSPs, and to enabling the WSPs to be developed further.

FOLLOW-UP OF COMMUNITY ACTION PLANS FOR WSPS

In the WAB process, Community Action Plans (CAPs), which are drawn up by each community-based organisation (CBO), are the context in which WSPs are drawn up and implemented. This is done with the help of the facilitating partner (WAB in this case).

It is vital that comprehensive follow-up by a facilitating partner is carried out to ensure that the implementation of the WSP has not stalled, and that the agreed monitoring and preventative maintenance have become incorporated into the daily routines of those to whom the tasks were assigned. A key indicator of progress might be whether or not the community has developed the original WSP in any way, to make it more understandable, eg monitoring and preventative maintenance regimes simplified or made more practical and achievable. Perhaps tasks have been subdivided, or rotas expanded to share the burden of time and responsibility. Is the monitoring and maintenance data being collected and coordinated by the accountability group (water users group, or equivalent)? Have any potential contamination incidents occurred, and how were they handled?

The action plan should include community self-evaluation events, for example, a household survey or 'Knowledge, Attitudes, and Practices' (KAP) survey, ideally on a regular basis (not less than six months, at least in the first year after the WSP has been drawn up). This will allow all stakeholders to see for themselves the impact of the WSP. Of course, the community accountability group and, ideally, additional community members too, need training in conducting household surveys, but the facilitating partner should accompany the community as it conducts its first survey, and as it then analyses its results and makes any changes to the water supply facilities, sanitation facilities and hygiene promotion efforts as a result of the survey.

3 Case studies of facilitating Water Safety Plans

Thus far these guidelines have elaborated the concept of WSPs, along with their intended aims and benefits, and have described the stages in assisting a user community to create its own WSPs.

The following two case studies come from actual examples of application by Tearfund's DMT, and they are copied here to enable groups facilitating WSPs to study and consider replication, given their prevailing context. Hence, those using these guidelines to facilitate formation of WSPs can either use the basic stages outlined in the guidelines to elaborate their own WSP process, or adapt one of the two following case studies.

Both case studies follow the basic stages outlined in these guidelines, but the fundamental difference between them is that the Southern Sudan process is chiefly pictorial and is suited to a mainly non-literate community. The process used in Afghanistan, however, is specifically relevant for a literate community.

Case study 1 Process for a non-literate (or low literacy level) community: Southern Sudan

Most of the facilitation exercises to help a community (or specifically a community user group, eg a WASH Committee) create its own WSP that have been used in these guidelines have been taken from the work done by Tearfund in Southern Sudan. The methodology of this tool is based on the same sequencing of themes as used in the PHAST (Participatory Hygiene and Sanitation Transformation) tool for enabling a community to make the links between good health and well-being, and improved sanitation and hygiene practice.[8] Hence the format given here is particularly appropriate for communities that are planning to engage in the PHAST process, or have done so in the past. It is also useful to communities that have been exposed to other methods of hygiene promotion or perhaps have had only limited exposure to guidance on improved hygiene. Either way, the Southern Sudan tool is most applicable for communities with low levels of literacy.

The full WSP course used in Southern Sudan, consisting of six distinct steps, can be found on the CD attached to the inside back cover of this book. The course utilises six different picture sets for use in the exercises. Each of the pictures in the sets needs to be printed and cut out individually.

The method developed in the Southern Sudan programme has been used in a number of communities to create a WSP with the WASH committees. As it is in the early stages, however, to date there has not been extensive work on the monitoring side of the WSP nor on supporting the committees to follow the plan they agreed.

Even so, there have been some early indications of success with a number of WASH committees. For example, through discussions and observations in many communities in Aweil East County, the WASH committees are cleaning the area around their improved water sources on a regular basis, are responding to repair needs more quickly, and are discussing home water hygiene issues with their wider community (Ref 6). A recent survey (Ref 7) in the same area indicated improvements a few months after completing WSPs. Most noticeably, particular improvements were made in knowledge of hygiene issues and particularly the link between sanitation and clean water, with a 27 per cent increase in the number of people washing their hands after going to the toilet and a 76 per cent increase in the number of household latrines constructed and used. In addition, more people are collecting water from a safer water source (89 per cent increase in the number of people collecting from a borehole rather than an unprotected well).

Although these improvements cannot be solely attributed to the development of the WSP, the increase in understanding of clean water from source to mouth through the development of the WSP and regular action by the WASH committees are clear indications of success.

8 The stages recognised in PHAST, and mirrored in this WSP-formation tool, are 1: Problem Identification, 2: Problem Analysis, 3: Planning Solutions, 4: Selecting Options, 5: Planning for New Facilities and Behaviour Change, 6: Planning for Monitoring and Evaluation.

Case study 2 Process for a literate community: Afghanistan

As with the Southern Sudan team's approach, the WSP process used by Tearfund's team in Afghanistan utilises the concept of the water supply system essentially comprising a three-link chain of source, transportation, and storage and consumption. The format, however, is much shorter and much more wordy than the Sudan approach. For the sake of simplification, the tabular form for the monitoring and action (see examples below) omits the 'control measures' column: the control measure is instead incorporated under 'What' is monitored.

The WSP sessions are strictly divided between men's and women's groups, hence separate monitoring and action charts are produced for each sex.

Khowaja Mirkhil village WSP action plan (men)

Date:	5/1/2010	**Facilities in the village…**	
Village:	Khowaja Mirkhil	**Clinic:**	Nil
District:	Hese-awal Kohistan	**School:**	Nil
Province:	Kapisa	**Mosque:**	3
Population:	120 households	**Council (official):**	2 (1 man; 1 woman)
Water-table for borehole:	72m	**Council (unofficial):**	1 man (village elder) – active

Hazard	Critical limits	Monitoring	Recommended further action
Dumping of children's faeces in streams	Any observed dumping of faeces in the stream	**What:** Raise awareness for women: stop dumping children's faeces in the stream **When:** Friday congregational prayers and social gatherings When there is a hygiene promotion session **Who:** Mosque preachers Council members Community health workers, water groups, government, NGOs	Elders have to be authorised by CDCs (Community Development Councils) to follow up and enforce this
Agricultural water overflows back to the stream (fertiliser may be washed into the main stream)	Concentration of fertiliser waste in the stream water	**What:** Increase the depth of canals Control backflow or overflow from the field to the canals and then to the main stream **When:** Cultivation season **Who:** Each farmer, community leaders	Safe water source (borehole). CDCs to discuss with the government to find solution for this problem
Location of latrines close to the water source in the upstream villages	Observed location of latrines that continue to be used	**What:** Change the location of the latrines or construct sanitary latrine **When:** Meeting is organised by the CDCs with the upstream community as soon as possible **Who:** Village elders and CDCs	This has been done in the past, so government enforcement should be there. CDCs need to advocate for the change

NOTE: The stream as source of the water reaching this village is already contaminated because of latrines of the upstream villages built close to the water source. Further, the reason behind proposing the construction of a borehole is that there are about 40 days in a year's time (around March) when there is no water in the source and the villagers fetch water from other villages about seven kilometres away.

Sarband-e-Payeen village WSP action plan (men)

Date:	5/1/2010	**Facilities in the village…**	
Village:	Khowaja Mirkhil	**Clinic:**	Nil
District:	Hese-dowom Kohistan	**School:**	Nil
Province:	Kapisa	**Mosque:**	3
Population:	250 households	**Council (official):**	8 (4 men; 4 women)
Water-table for borehole:	32m	**Council (unofficial):**	Nil

Hazard	Critical limits	Monitoring	Recommended further action
Unsuitable pots for fetching and storage containers	Storage/ consumption	**What:** Provision of suitable pots **When:** As soon as possible **Who:** Heads of the households	
Young children fetching water	Young children observed fetching water at water point	**What:** Raising awareness of hygiene education in the community **When:** Before or after cultivation season **Who:** Water group members/community health workers/NGOs	CDCs have to insure that the water group and community health workers are actively raising such awareness
Little/no knowledge of importance of proper storage and consumption of water	Dirty or uncovered storage at point of use	**What:** Raising awareness of hygiene education in the community **When:** Before or after cultivation season (separate sessions for men, women and children) **Who:** Water group members/community health workers/NGOs	Provision of storage containers and mugs

NOTE: CLTS process has been done in this village by Tearfund, and the village is almost ODF. Two hundred biosand filters have been also distributed by Tearfund in this village.

Kaasaaba village WSP action plan (women)

Date:	5/1/2010	**Facilities in the village…**	
Village:	Kaasaaba	**Clinic:**	Nil
District:	Hese-awal Kohistan	**School:**	Nil
Province:	Kapisa	**Mosque:**	3
Population:	130 households	**Council (official):**	2 (1 woman; 1 man)
Water-table for borehole:	73m	**Council (unofficial):**	1

Hazard	Critical limits	Monitoring	Recommended further action
Source water (stream) reaching this village contaminated already by human and animal waste from upstream villages	The source	**What:** Advocate for relocating the latrines in the upstream villages through local government/radio/council and elders Stop deliberate dumping of waste in the stream **When:** Meeting has to be done as soon as possible **Who:** CDCs / government bodies (RRDs) and community elders	Advocacy has been done via local government and elders, but has not caused any promising positive outcome Free distribution of biosand filters to the households
Unsuitable pots for fetching and storage	Condition and type of pots and containers	**What:** Provision of suitable pots and containers **When:** As soon as possible **Who:** Heads of the families	
Young children (boys and girls) fetching water	At fetching, storage and point of use	**What:** Raising awareness of hygienic handling of water from source to point of use **When:** Before or after cultivation season (separate sessions for men, women and children) **Who:** Community hygiene promoters, water groups, government and NGOs	Allow women/children to participate in hygiene promotion sessions Awareness-raising through media

Note: CLTS process has been done in this village by Tearfund, and the village is about to be declared ODF. One hundred biosand filters have been also distributed by Tearfund in this village.

References

1 WHO, 2004: *Guidelines for Drinking Water Quality*, Geneva, Switzerland

2 *Water Quality and Water Safety Plans*, Sam Godfrey, WELL Factsheet, May 2005 http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/Water%20quality.htm

3 WHO/SDE/WSH/05.06 (2005), *Water Safety Plans: Managing drinking-water quality from catchment to consumer*, Davison A et al. http://www.who.int/water_sanitation_health/dwq/wsp170805.pdf

4 WEDC Technical Brief No 50, *Sanitary Surveying*, Michael Smith and Rod Shaw http://www.lboro.ac.uk/well/resources/technical-briefs/50-sanitary-surveying.pdf

5 WaterAid Bangladesh, *Water Safety Plan pilot project, Completion Report*, April 2007, Water Safety Plan and Community Water Resource Management Cell (WSP&CWRM Cell)

6 Tearfund internal CIDA HAPS evaluation report, March 2010

7 Tearfund internal KAP survey, Omdurman, DMT Southern Sudan, November 2009

Picture sets on the accompanying CD

Picture Set 1 Pictures to accompany the 'What is safe water?' exercise

Picture Set 2 Pictures to accompany the 'Water journey' exercise (the transect walk)

Picture Set 3 Pictures to accompany the 'Spot the problem' exercise

Picture Set 4 Pictures to accompany the exercise on identifying 'Problem areas'

Picture Set 5 Pictures to accompany the 'Picture sorting' exercise

Picture Set 6 Pictures to accompany the 'Picture sorting' exercise

Picture Set 7 Pictures to accompany the 'Gender analysis' exercise

These picture sets contain a selection of line drawings and photographs useful for the exercises to which they are connected, but the variety of pictures may be limited. It is therefore suggested that the facilitator or facilitating team may wish to use additonal drawings and photographs in the exercises. Appropriate additional illustrations will be found in the Tools section of the South Sudan case study on the accompanying CD, since most of the exercises used in the case study mirror those produced in these guidelines. The WASH Visual Aids Library, produced as part of the Global WASH Cluster Hygiene Promotion Project, also contains numerous helpful illustrations. This resource is free to download at: http://ceecis.org/washtraining/index.html

APPENDIX A The impact of managing Water Safety Plans: the example of WaterAid Bangladesh

Aims and objectives of Water Safety Plan pilot study

Before large-scale implementation, WaterAid Bangladesh (WAB) piloted Water Safety Plans (WSPs) in 21 locations: ten in urban and 11 in rural contexts. Piloting began in June 2006 and ended in March 2007.

The objective of the pilot was to ensure preventative maintenance is carried out for all community water supply systems supported under WaterAid's Advancing Sustainable Environmental Health (ASEH) project, by:

- preventing contamination of the water source
- treating water to reduce/remove contamination to an acceptable limit (based on national water quality targets)
- preventing contamination/recontamination during collection, transportation, storage and handling of drinking water.

The WSP piloting aimed to achieve the following targets:

- Increased number of functional water supply options (facilities).
- Increased number of water options with suitable platforms.
- Increased number of water options with proper drainage facilities.
- Increased number of water options with safe water (chemically and microbiologically).
- Improved cleanliness of source surroundings.
- Prevention of recontamination of water.
- Improved operation and maintenance capacity of the caretakers and CBOs.
- Improved water hygiene behaviour from collection to consumption.

A key consideration is that in addition to microbial risks, the safety of drinking water in Bangladesh is threatened by chemical contamination. The principal risk is from arsenic, which is common in groundwater: up to 25–30 million people are at risk from arsenic in drinking water, as determined by the Bangladesh national standard of 0.5mg/litre.

Before the pilot study was implemented, a baseline survey on water quality and hygiene practice was carried out to collect field information on the pre-WSP situation. Training, tools and questionnaires were developed by WAB's WSP team. The pilot study also incorporated a water quality protocol to help verify the actual water quality results.

Main components in implementing the WSPs

TRAINING OF CARETAKERS

Caretakers are the keystone in the community (with reference to WSP), carrying out essential hardware-related WSP activities, and as a result are given specific guidance and training to develop their capacity. Emphasis was given to the caretakers' selection process.

Criteria for caretaker selection

- Should preferably be one of the water point users
- Should preferably be selected from poorer and disadvantaged group
- Should have the physical ability to repair and maintain water option
- Must be willing to receive training
- Must be accepted by the respective communities
- Should be enthusiastic to work on WSP
- Should have a basic level of facilitation and have strong communication skills
- Must be literate (at least able to read and write) and technically-minded
- Should be married (if female).

WAB, in consultation with its WASH partner organisations who implemented the pilot study, developed a list of criteria on the basis of which field-level staff selected caretakers from each of the water points under the WSP. The criteria can be seen in the box above. For single tube-well systems, one caretaker was selected, while for other, more complex systems, two to four caretakers were assigned.

Initially the caretakers received a two-day training through which they enhanced their knowledge of safe water, causes and routes of contamination, and technology assessments, and gained skills in how to check for contamination and how to repair and maintain the technologies. The training was organised in the community near the water points and took a very practical format using demonstrations to explain concepts as opposed to a theoretical classroom-based style.

The WSP pilot trained a total of 1,412 caretakers, whose main responsibilities were to establish a practice of continuous monitoring and preventative maintenance. The training aided the caretakers in understanding their water options and possible pathways to contamination.

During the piloting phase, caretakers identified water options that had:

- no or cracked platform
- no or broken drainage
- broken/missing parts
- latrines in close proximity (within 30 feet)
- dirty surroundings, stagnant water and other hazards such as animals/animal faeces in close proximity.

After identifying the hazards and possible routes in the system, the caretakers were responsible for taking corrective action and improving the situation.

HYGIENE PROMOTION SESSIONS

Frontline staff initially carried out regular activities which included community situation analysis (CSA) and risk prioritisation. Hygiene sessions were facilitated by partner organisation frontline staff and attended by CBOs, caretakers and community members, and covered key WSP-related hygiene messages on the prevention of contamination and recontamination of drinking water at source and during collection, transportation and storage.

Tools and techniques were developed by WAB to visualise the contamination risks and facilitate the sessions. These were inserted and mainstreamed into a flash card pack previously prepared and in wide use among WAB partners. In addition to the group hygiene sessions, staff visited households for personal counselling and reinforcement of messages.

The additional tools portray the following hygiene messages:

- Do not scoop water with the hand.
- Use safe water if priming is needed.
- Keep the containers always covered.
- Use safe water for soaking *panta* (rice used in Bengali national dish).
- Keep water out of reach of pets.
- Ensure water is stored in a place which is raised from the ground.

Photo: WaterAid, Bangladesh

MEETINGS OF COMMUNITY BASED ORGANISATIONS (CBOS)

CBOs normally play an important role in implementing the WAB water supply projects. On the basis of the community situation analysis, CBOs prepare a Community Action Plan (CAP) which they implement with technical support from the partner organisation.

HARDWARE SUPPORT

WSP piloting included households belonging to identified categories of 'hardcore' poor (chronic poor), poor and non-poor economic groups. WAB therefore, in line with ASEH programme activities, allocated resources on the basis of economic status. All groups received hygiene promotional training, for which the non-poor and poor took initiative to implement changes, where appropriate. Those in the hardcore poor category were offered financial and technical support to install and renovate water options.

Water quality parameters measured in WaterAid's WSP piloting study

Initially, five key water quality parameters were selected to be tested during the pilot survey. The parameters were:

- pH
- turbidity
- Thermo-Tolerant Coliform (TTC)
- arsenic
- chloride

Later, chloride testing was excluded, as WAB could not supply the required number of testing kits. All other parameters were tested by portable field test kits supplied by WaterAid:

- TTC was measured at the source and household using a portable incubator (Potatest brand of Wagtech) supplied by WAB.
- PH and turbidity are good indicators to measure physical properties of water; heavily turbid waters can affect the secondary treatment (interfering with disinfection processes in the drinking water system) and the sustainability of technologies. The pH and turbidity of the water points were measured at the water source using a pocket pH meter and calibrated tube respectively.
- Arsenic was measured at the source using the HACH EZ test kit.

Key results of the WSP pilot study

The following table shows the significant improvements (SI) achieved through the caretakers during the pilot study period:

Improvements at water supply options (facilities)

SI	Indicator	Baseline Urban	Baseline Rural	Completion Urban	Completion Rural	Achievement Urban	Achievement Rural
1	Increased number of functional water options	93	985	107	1,150	14 (15.0%)	165 (16.7%)
2	Increased number of water options with suitable platform	101	512	124	806	23 (22.7%)	294 (57.4%)
3	Increased number of water options with proper drainage facilities	105	517	125	858	20 (19.0%)	341 (65.9%)
4	Increased number of water options with safe water (chemically and microbiologically)	104	625	104	858	0	233 (37.2%)
5	Improved cleanliness of source surroundings	99	340	129	842	30 (30.3%)	502 (147.6%)

The table illustrates that in both the urban and the rural contexts, the largest achievements were observed in the cleanliness of source surroundings. Water options with suitable platforms and proper drainage were ranked the next largest achievements, and all improvements were more substantial in the rural context.

WATER QUALITY

In assessing microbial water quality, the following risk categories laid out by the Department for Public Health Engineering, Dhaka, Bangladesh, in its Water Quality Monitoring and Surveillance Protocol (DPHE, 2005) were used:

Water quality categories

TTC cfu/100ml	Water quality category
0	No risk – conformity with standard
1-10	Low risk – water safety can be considered
11-100	Medium risk – water cannot be considered safe
>100	High risk – water is unsafe

At the beginning of the pilot project it was observed that only 34 per cent of the water points were completely TTC-free and only 25 per cent were within the low-risk category. At the end of the project the number of contamination-free water points had increased to 73 per cent, while 23 per cent of water points remained in the low-risk category. (The water points that remain within the low-risk category can be considered to be safe according to WHO risk classification.) This means that as a result of introducing WSPs, 96 per cent of the water points could be considered safe by the end of the pilot study.

The extent of arsenic pollution had not been severe in the pilot areas, although the number of arsenic-contaminated water points was reduced through WSP implementation. During the baseline survey five per cent of water points were found to be in excess of Bangladeshi standards for arsenic. This was reduced to three per cent in the final survey. The increased provision of safe water points, the sealing of contaminated

wells and, above all, increased level of awareness, made it possible to reduce the proportion of arsenic-unsafe water points.

OBSERVATIONS

Dividing results between the rural and urban contexts, the following was observed:

Rural

- The final survey revealed that overall sanitary conditions of the water points had been improved considerably. The baseline survey shows that approximately 23.4 per cent of water points were in the high-risk category. This fell to 2.4 per cent in the final survey. Large increases were also seen in the number of water points in the no-risk and low-risk categories. Similar reductions were also seen in the medium-risk category.
- Within the rural household context, the microbial water quality survey revealed that the overall water quality condition of the household water usage and storage system has been improved to some extent. During the baseline survey approximately 32 per cent of samples were in the no-risk to low-risk category, and this was improved greatly, with the final survey showing 84 per cent of samples within this category.
- Improvements have also been observed in latrine usage. Only 58 per cent of respondents used sanitary latrines before the intervention, but the final survey identified that 91 per cent of respondents used hygienic latrines. Only eight per cent use unhygienic latrines and very few practise open defecation.
- Remarkable improvements have been observed in hygiene behaviour over the pilot; particularly in respect to handwashing. The baseline survey identifies that 80 per cent of the community washed their hands with ash, soap or soil; of these only 37 per cent used soap. During the final survey it was observed that 93 per cent of the community washed their hands properly, with a large proportion (78 per cent) using soap.
- The occurrence of diarrhoeal disease has been reduced remarkably since the introduction of WSP in the pilot areas. The overall rate of incidence of diarrhoeal diseases (or any kind of water-borne disease in the three months before the survey took place) in the rural communities has been reduced from 29 per cent in the baseline survey to only four per cent in the final survey.

Urban

- Faecal Coliform (at levels above Bangladeshi Standards (BDS)) was identified in 32 per cent of urban water points in the baseline survey. The final survey revealed only two per cent of water points remaining which exceeded BDS.
- The sanitary inspection risk scores for the urban water points show that 51.6 per cent are in the no-risk to low-risk category in the baseline survey. The final survey shows that 100 per cent of samples are within the no-risk to low-risk category.
- Improvements were observed in the level of perception of safe water and safe water sources. The baseline survey identified that 14 per cent of respondents recognised pond and river water as a safe water source. This figure was reduced to three per cent in the final survey.
- Improvements have been made with respect to the location and type of latrines used by the community under survey. Unhygienic latrines were used by 56 per cent of the community in the baseline survey, compared with only 25 per cent in the final survey.
- During the baseline survey it was identified that 67 per cent of the community washed their hands with ash, soap or soil (63 per cent used soap). During the intervention, large improvements were made and the final survey identified that 95 per cent of people were washing their hands with soap.
- The overall number of incidences of diarrhoeal disease (or any kind of water-borne disease in the three months before the survey took place) has been reduced from 35 per cent in the baseline survey to only three per cent in the final survey.

Key conclusion regarding WAB's adoption of WSPs

Initially the WSP was designed to be a separate element which was inserted into ASEH activities. CBOs and caretakers would receive WSP training in addition to the regular ASEH training. However, during the pilot it was observed that WSP was in fact in line with regular ASEH activities and could easily be merged and carried out by staff without creating an extra burden. New flashcards slotted in with regular hygiene messages, and caretaker training sessions, hygiene promotion sessions and CBO orientation have been modified so that WSP issues are covered as standard. Partner organisations no longer require a separate WSP team, and those which have established this or have outsourced activities use this as a training resource for CBOs and caretakers. WSP is therefore mainstreamed into the ASEH programme activities and not treated as a separate entity.

APPENDIX B A two-day schedule for facilitating Water Safety Plans

Workshop held in Nyanzale, North Kivu, Democratic Republic of Congo, 6–10 December, 2010

AIM OF TRAINING: To facilitate a process of community-based Water Safety Plans whereby beneficiary communities of the new water supply projects are assisted to form their own management system to maintain safe water quality. In the process, Tearfund and partner staff are trained in the use of WSPs and facilitation of their formation with community groups.

Pre-workshop preparation

Activity	Expected outcome	Materials needed
• Ensure community participants are aware and ready to attend for the specified two days. Explain the overall purpose of the training, and what it will involve. Emphasise that this is in preparation for the community to manage its own system. • Ensure all necessary Tearfund and partner staff available. • Invite village health worker(s) and government. reps. • Ensure venue is available. • Confirm arrangements for lunch and refreshments. • Illustrations prepared (printed, cut out, and clearly labelled for immediate access during sessions). Facilitator will come with marker pens, all illustrations from Picture Sets, Blue-tac, and small digital camera to record all outputs. Team should supply plenty of flip-chart paper and easel. • Facilitator and translator discuss key words/ phrases. • Prior to departing for the field, facilitator briefs accompanying team on the process, what to watch out for, particular roles, and generally how each person may help in the session. • Facilitator and Hygiene Promoter, in particular, need to discuss health-based targets and consequential outcomes that community participants may choose to consider as the aim of their WSP.	Team prepared and community aware of expectations of the next two days.	

Day 1 of workshop

	Activity	Expected outcome	Materials needed
Activity 1: plenary	**Introductions**		
Activity 2: plenary	**'What we are here to do…'** 'Preparing for your management / care of your own system, ie community are owners, not Tearfund. We will help you to create a plan to do this which will involve many people in the community, not just yourselves (ie not just the Water Users Committee).' What the two days will involve – activities together and in small groups, and (today) walking to the source and all parts of the new system.	Community participants aware of purpose and duration of training, and committed to attend until complete.	• Flip chart and markers • Blue-tac
Activity 3: groups	**Exploring 'What is safe water?'** – Picture storytelling excercise (page 7). Ask groups to base the storytelling on obtaining their water before the current project (ie now!).	Groups familiarise with burden of fetching water, illnesses they perceive associated with bad water, threats to personal security, impact on overall well-being.	• Illustrations from Picture Set 1, and Step1/Level1/No.1 and other sources • Flip chart and markers
Activity 4: groups	**Defining a health-based target, and/or consequential outcomes** – open discussion. Ensure that these targets and outcomes are understood to be affected by good hygiene and sanitation practices, and not just water quality.	Desired health-based targets and targets for consequential outcomes defined/agreed. Community should now have a perceived goal for maintaining safe water quality.	• Flip chart and markers for recording the agreed targets
Activity 5: plenary	**What is a WSP?** Use Box on page 9. Any queries or concerns?	Participants aware of what the output of the two days will be: a management plan for maintaining safe water quality (=WSP).	
Activity 6: plenary	**Transect walk** to all parts of gravity-fed system (GFS), including source/catchment. Throughout the walk (and process generally) we will emphasise the three basic components to the system: Source, Transport, and Point of Use (or 'Home'). Walking, stopping, discussing: 'What do we see…?' (ToT team should be making notes, particularly questions and observations of community participants).	Community participants are able to describe their new water supply system and its various components. They will be acquainted with the concept of the three main components – Source, Transport and PoU.	*(Walk should end up back at venue. This may be a good time to break for lunch.)*
Activity 7: groups	**Community mapping** (excercise 'Guided tour' on page 11). The group may be too large to draw one single map, hence draw two or three maps in smaller groups. However, these maps ought then to be collated into a single map, showing all key features. Participants should elect a community member (with drawing ability) to do this.	Community participants transfer what they know about water sources and other features along supply route, to a visual display. Vital to record outputs (photos, notes) and encourage safe-keeping of the charts/drawings made by the community	• Several sheets of flip-chart taped together.
Activity 8: plenary	**Water journey** Based on Box, page 10. Community participants insert illustrations they have each picked up in a series which represents the journey the water from their new GFS will take from source to mouth. Are participants aware of any steps (stages of the journey) the water travels through that are not represented in the pictures?	Consolidating the points made in the transect walk, and recording the full route taken for water to reach consumers in this new GFS system.	• Illustrations from Picture Set 2, and Step2/Level1/No.1 and other sources • Camera to photograph journey
	(Back at team base) – de-briefing with team, and reviewing next day's planned activities.	Review of DAY 2 schedule as necessary.	• Flip chart and markers

Day 2 of workshop

	Activity	Expected outcome	Materials needed
Activity 9: groups	The recent exercises have given participants the chance to become familiar with their water supply system and to record a physical description. Now it is time for the community to identify and understand how contaminants can enter the supply. Identifying hazards: **Spot-the-problem pictures** (exercise, page 12).	Familiarisation with potential contamination hazards within the community, and other issues affecting the route.	• Illustrations from Picture Set 3, and Step2/Level1/No.3 and other sources
Activity 10: groups	**Problem areas** (exercise, page 13).	Links to the above exercise, with similar outcome.	• Illustrations from Picture Set 4, and Step2/Level1/No.2 and other sources
Activity 11: groups	Having identified the nature and location of hazards, participants can now be guided into planning solutions to mitigate the risk of contamination. Identifying control measures: **Picture sorting** (exercise, page 15).	Solutions to mitigate risk of contamination identified.	• Illustrations from Picture Sets 5 and 6 and Step3/Level1/No.1 and other sources
Activity 12: plenary	Effective solutions (exercise, page 15).	The most effective of the solutions have now been identified and recorded.	• Effective solutions chart must be pre-drawn on flip-chart paper (2 or 3 sheets taped)
Activity 13: plenary	**Monitoring and preventative maintenance** (see Box, page 17, and section 'Establishing a regime of monitoring and preventative maintenance'). Based on the question, 'Who does what?', and involving gender sensitisation for appropriate roles of monitoring and preventative maintenance.	Participants aware that all community members (men and women, and even older children) have a role to play in maintaining safe water quality.	• Illustrations from Picture Sets 6 and 7 and other sources
Activity 14: plenary	**Roles and responsibilities defined and assigned.** Once the exercise is explained, the community participants should be left to discuss and draw up the monitoring and preventative maintenance plan, and then present it to the facilitators when complete.	Monitoring and preventative maintenance chart drawn up: community now has a reference of who will do what, and how frequently, for monitoring/maintaining the system.	
Activity 15: plenary	**Managing the WSP** – follow-up with Tearfund team. The Tearfund team and Community will agree on follow-up of WSP, including: • training of roles that require training input (eg repairing leaking taps or pipes) • checking the turbidity of the water – use of H2S vials for bacteriological analysis • monitoring health-based targets/indictors of consequential outcomes, eg assisting community health workers or volunteers to conduct HH and KAP surveys, and to analyse the data to affirm that targets are being achieved • set a date for self-evaluation of the WSP (eg 3–6 months from now).	**All** stakeholders agree (and have recorded) a plan for follow-up and implementation of the WSP.	• Record all decisions on flip-chart
	(Back at team base) – de-briefing with team, discussing replication of process for remaining spring protection communities.		

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