ADOPTION OF COMMUNITY-LED TOTAL SANITATION

Guidance for programming of CLTS in Tearfund-supported projects

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Tearfund is a Christian relief and development agency building a global network of local churches to help eradicate poverty.

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Contents

1 Introduction

Community-Led Total Sanitation (CLTS) has become a widely popular demand-led approach to improving access to safe sanitation, through raising awareness of the harm caused by open defecation (OD). The concept of the CLTS process is to enable communities to decide and achieve their own sanitation solutions once they have become committed to improving their **collective** sanitation practices. Within Tearfund, all Disaster Management Team (DMT) country programmes are implementing CLTS to some extent, or are planning to implement the process. DMT Afghanistan has seen particular success, with ten project communities having committed themselves to Open Defecation Free (ODF) status in the first year of programming CLTS.

By its very nature, in terms of NGO involvement, CLTS is a 'hands-off' approach to sanitation improvement at community level. To supply a single recommended latrine design to a community would potentially scuttle the process entirely, and many community members would probably revert to OD because they may not understand the need for a certain design, or they may not be able to afford to build it even if they agree with it. The added bonuses of CLTS include the innovative designs and ideas that community members come up with, usually based on extensive use of local materials. The process is essentially a social one, and families often begin their post-CLTS sanitation commitment by sharing resources/latrines. Moreover, the community is empowered to analyse and address its own priority issues without being dependent on external services. Natural leaders usually emerge from the CLTS process, and a community is often enthused to go on to address other felt needs.

Commendable as this process may be, however, key concerns have arisen around the outputs of CLTS. Two particular physical concerns involve the effects on water quality (particularly the potential contamination of groundwater) and the quality of structures, since there is no set design of sanitation solution involved.

Another key challenge to sustainable and effective outputs from the CLTS process involves the question of equitable improvements within a community: how might very poor people, or particularly vulnerable groups such as people with disabilities, realise improvements to their own sanitation facilities?

This document tries to capture some of the salient points of learning in Tearfund's early experience of CLTS, chiefly through its DMT. Out of these experiences, and through considering the experiences of other agencies and institutions which have implemented CLTS,[1] guidelines are drafted to assist Tearfund partners and DMT in robust programming of CLTS, particularly in addressing the issues of environmentally and physically safe sanitation systems, and the issue of achieving safe sanitation systems equitably throughout a community following a CLTS campaign. The formal publications that exist on CLTS allude to these issues, but provide little specific advice on them for robust programming.

The guidelines will assist Tearfund's partners and DM Teams facilitating CLTS to incorporate checks and safeguards which will enable sanitation systems to be built which are structurally sound, and culturally and environmentally appropriate, minimising the risk of contamination of water supplies. The guidelines include:

- accounts of Tearfund's experience in implementing CLTS in three different sites, and a summary of key learning points
- questions and prompts to consider locally available materials which could be used in building latrines
- questions and prompts to enable the community to consider vulnerable groups who face greater challenges in changing sanitation practice

1 The learning itself has come from:
- DMT country programmes in Afghanistan (visited in October 2009), DRC (visited in December 2009) and Southern Sudan (visited in January 2010), where CLTS programmes are currently being implemented or are planned
- other CLTS-experienced agencies represented in the CLTS Learning Group run by the Institute of Development Studies in the UK, in particular Plan International (who supported the formative work of CLTS) and WaterAid. The CLTS Learning Group is coordinated by Petra Bongartz, Coordination, Communication and Networking Officer: Community-Led Total Sanitation (CLTS), P.Bongartz@ids.ac.uk, Institute of Development Studies (IDS) at the University of Sussex, Brighton, BN1 9RE, UK. See website: www.communityledtotalsanitation.org

- questions, prompts and simple procedures for assessing the risk of waste fluids reaching the groundwater table or other water supply sources
- general observations from other agencies addressing the issues of environmental safety (especially the contamination of groundwater), structural soundness of latrine outputs, and the inclusion of all community groups in accessing improved sanitation.

Warning – use of base-level language!

CLTS is a process that is dependent on all community members being able to talk about defecation habits freely, and to break down any taboo around the subject. Hence, facilitators of the process encourage use of words that all the folk in the community understand.

What these guidelines do not address

A number of extremely useful practical publications and DVDs on the training and implementation of CLTS as a community-level process are now available, although the foundational *Handbook on Community-Led Total Sanitation* (Ref. 1) by Kamal Kar, the instigator of CLTS, remains the priority reading for understanding the process and its application. Therefore, apart from a summary of the CLTS process below, the reader should refer to the *Handbook*, and to some of the specific materials listed under References (page 28) for further information.

2 A summary of the CLTS concept and process[2]

CLTS was pioneered in Bangladesh by Kamal Kar (a development consultant from India) and the Village Education Resource Centre while they were evaluating an NGO's traditional subsidised sanitation programme. They wanted to convince the NGO to stop subsidising toilet construction, because subsidies in the past had not led to community ownership and toilet usage. Instead, they suggested that the NGO should encourage people to help themselves. The CLTS process they developed spread fast within Bangladesh among both Bangladeshi and international NGOs.

At the heart of the CLTS approach is a shift away from subsidising toilet construction for individual households and towards changing the attitudes and behaviour of the **whole community** in order to stop OD. If whole communities choose to go ODF, then every community member benefits, since the entire environment becomes cleaner. If only a few people remain entrenched in their practice of OD, then the whole community remains at some level of risk.[3]

The goal of ODF is achieved through mobilising the community. As a result, community members use their own initiative to build latrines. CLTS does not identify standards or designs for latrines, but encourages local creativeness. This leads to greater ownership, affordability and therefore sustainability. A very important concept which is borne out in CLTS is that community members gradually climb the 'sanitation ladder', improving their latrines over time, according to their increased understanding of the functionality of latrines, the benefits they have experienced from using them, and the resources they are able to commit.

Methodology

The facilitator's job is not to convince the community to stop OD and start constructing toilets. Instead, it is to assist the community in analysing the local sanitation situation. This generally triggers a sense of disgust and embarrassment and motivates the community to stop OD. It is important that the facilitator does not preach or tell people what to do, but instead asks simple questions to draw their attention to the issues. Throughout the process, community members are encouraged to use local terms to describe faeces rather than the polite terms, in order to break the taboos surrounding sanitation. The following are some of the ways used to trigger CLTS:

Transect walk

The process often starts with an informal talk with a few community members during a walk through the village (a 'transect walk'). During the walk, areas of OD are pointed out, as well as different types of latrines currently in use. It is important to stop in the areas of OD and spend time there asking questions. Having their attention drawn to the unpleasant sight and smell by a visitor to the community is a key factor in triggering mobilisation. Once the interest of a few community members has been captured, the process continues with all community members.

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2 Adapted from *Footsteps 73* (December 2007) by the Author (Ref. 2).

3 Robert Chambers in his paper 'Going to Scale with Community-Led Total Sanitation' (Ref. 3) recognises that the absolute standard of 100 per cent ODF is unlikely to be achieved in the short or medium term. He says: *'Another problem is that ODF presents an absolute standard of no open defecation. In the conditions in which CLTS takes place this is unlikely to be completed 100 per cent in the short or perhaps even medium term. Patterns and sequences with schools, markets, bus stops and similar public places vary, but their adoption of ODF tends to come after, not before, communities. Markets in particular have not initially been a primary focus of CLTS and may have much OD around them. In communities, there are liable to be a few people – who are old, obstinate, eccentric, mentally disturbed, dissenting, disabled, or very young children – who regularly or intermittently will go in the open. And others will do so in an emergency. And yet others again will go when some distance from a village, for example on their farms (though their faeces can easily be dealt with by burying). Then there are passers-by who are unaware of or do not respect the prohibition. Declarations of ODF may be associated with big changes in behaviour and many gains in wellbeing but perhaps not often with conditions that are completely and strictly ODF.'*

Mapping of defecation areas

Mapping involves creating a simple map of the community to indicate households, resources and problems, and to stimulate discussion. The map is often drawn on the ground. All households should be invited to locate themselves on the map, and use a leaf or stone to mark whether they have a latrine or not. The areas of OD are also marked and lines drawn to connect them to the households that visit them. The map can trigger discussions about when and how far some people walk to defecate and what this means in terms of safety, as well as indicating the contamination of water sources from the areas of OD.

Calculations

The size of the sanitation problem can be illustrated by calculating the amount of faeces produced. Households can use their own methods and local measures for calculating how much human excreta they are generating each day. Multiplication can be used to find a figure for the whole community, and to calculate the amount of faeces produced each week, month or year.[4] The quantities usually surprise the community. The calculations lead into further discussions about where the faeces go and the effects of having faeces on the ground. The key point in the process is reached when the community realises that open defecation needs to stop – a juncture known as 'triggering'. The discussion often turns to who would defecate in the open the next day, or who would take a bath in the river. If no one would do these things, the community is ready to discuss alternatives to OD. At this point, the facilitator should point out that he or she is not there to provide a solution, sell toilets or subsidise latrine construction. The community begins discussions about what action to take. If they ask the facilitator a question, he or she turns it back to them, so that they give an answer themselves. If people express an interest in constructing toilets but say it is too costly, the facilitator could draw a picture of a simple pit latrine built from locally available materials, to show that it does not have to be expensive.

CHILDREN'S ACTIVITIES

Children can be very strong advocates against open defecation. For example, they might lead processions where they shout slogans or sing songs about the need to stop open defecation. In some communities they use little flags to mark faeces to draw attention to them.

Action planning

Activities that communities might decide to carry out include:

- forming a sanitation action group with representatives from every neighbourhood in the community
- making a list or map of households and their access to sanitation
- digging pits and using them as temporary latrines until others are constructed
- getting wealthy households to start constructing latrines immediately; these households could lend land, donate wood or bamboo for constructing latrines, or allow poor families to use their latrine in the short term
- looking for suppliers of latrine construction materials.

4 It is suggested by Plan that 200 people produce approximately 100kg of faecal matter every day.

Challenges

Since 2000, CLTS has spread to many countries in Africa, Asia and Latin America, including India, Indonesia, Nepal, Pakistan, Cambodia, Ethiopia, Tanzania, Kenya, Bolivia, Sudan and Afghanistan. Using the approach in these other countries has raised some challenges.

The CLTS approach has challenged traditional mindsets and practices, particularly the idea that subsidies for hardware are necessary because people cannot afford sanitation facilities. Using CLTS, community members are not assisted by hardware subsidies, but are empowered to help themselves and each other. They are motivated by the realisation that unless they stop defecating in the open, the risks of disease will remain for everyone in the community. This means that:

- agencies that use the CLTS approach need to have confidence in the capability and social solidarity of communities; agencies need to become facilitators rather than providers
- agencies that have previously provided subsidies for sanitation have sometimes found it difficult to use the CLTS approach because they find it hard to break the community's dependency on them for provision of hardware
- agencies may find it difficult making the CLTS approach work in communities where other agencies are subsidising and promoting costly models of toilets.

Perhaps the overall challenge of CLTS relates to its long-term sustainability – do communities remain ODF years after the status is achieved? Evidence is mixed, but it is acknowledged that the 'supply side' of sanitation, and the concept of the sanitation ladder, play an important role in sustainability. So, for example, following CLTS campaigns in Bangladesh, 'sani-marts' sprang up in order to provide hardware to users, and this stimulated owners to improve or renew their latrines. Difficulties may arise where the supply side is not developed, and where supply chains are weak. Our programming of CLTS, including follow-up, should therefore consider ways of stimulating the supply side of sanitation. For example, through training local masons' groups, which could include women's groups and training of youths, giving advice in messaging and advertising, and in persuading local institutions (and in particular the church and other faith-based groups) and local government sanitation departments to become involved in demonstrating latrines and sanitation approaches.

Revisiting communities previously declared ODF, to see what is happening and to encourage adherence to ODF, should form a core part of CLTS programming of all facilitating agencies or government departments.

Finally, it is important to state that strong and clear messages on hand-washing must be inherent in the CLTS campaign. This is usually addressed during the triggering part of the process, when people are faced with the realisation that they are prone to digesting one another's faeces through environmental contamination brought about by OD. However, it is not always given the necessary emphasis, and it is pertinent that messages given in CLTS are supported in hygiene promotion programmes, such as PHAST sessions.

3 Case studies

3.1 AFGHANISTAN

Tearfund's DMT introduced CLTS in Afghanistan in 2008, following training by the Integrated Rural Support Programme of Pakistan (IRSP), a national NGO which specialises in resourcing and training in CLTS throughout Pakistan and the region. The CLTS programme initially began in Kapisa province, north of Kabul, and in 2009 the programme was extended to Jawzjan province in the far north. Unicef and the WASH Cluster in Afghanistan, as well as USAID and the MRRD (the Ministry of Rural Rehabilitation and Development), recognise and support Tearfund's lead in CLTS.

To date, around ten communities in Afghanistan have been declared ODF as a result of Tearfund's CLTS campaigns, the majority of these being in the Kapisa region. Two case studies are presented below. The first, Baluch Khel village, focuses on the social benefits of CLTS. The second, Surkh, considers some of the challenges to safe and appropriate sanitation interventions following CLTS triggering. Both of these villages were among the first of Tearfund's beneficiary communities in the CLTS programme to become ODF.

STUDY A **Village of Baluch Khel, Kapisa** (1,500 population / 250 households)

Period CLTS campaign was implemented: July and August 2008

The village of Baluch Khel is sometimes difficult to access during winter rains, because of the increased flow of a stream which runs along the main road leading to the village and then cuts through the village centre. Seasonal flooding and flash floods are commonplace. Under the National Solidarity Programme (NSP) in Afghanistan, the village has access to clean water and an electricity supply. Tearfund has recently worked in the community in its Radio Club project, in which messages and discussions on PADR (Participatory Assessment of Disaster Risk) were broadcast.

The houses in Baluch Khel are grouped together and surrounded by farms (crops and livestock) and plantations, which provide the main livelihood in the village. The farmland is fed by rain and canals from the stream flowing through the village. The main crops are wheat, maize, fruit and vegetables, while the livestock consists of cattle, goats and sheep. A few community members work as civil servants, fishermen, hunters and labourers. The community is entirely Muslim in its belief and background.

Sanitation in the village

The Tearfund team observed that only 17 households had their own latrine. OD was the normal practice of all the other residents, and this took place throughout the village area, including the centre, among the homes, and in plantations or fields where the local farmers had not yet planted any crops. The villagers had never analysed the sanitary status of their village.

Realising the current condition of the village, almost all the residents agreed to stop OD in the vicinity of the village following the CLTS campaign – 53 per cent of the households built their own latrine immediately. Of these people, 50 per cent could be described as the better off in the village, while 50 per cent were among the poorest households. The remaining residents delayed latrine construction because of the arrival of harvesting time. The type of latrines built ranged from vault latrines to simple pit latrines, and the community asked Tearfund to build a demonstration model of a single-pit composting latrine in the village.

Interview with Mrs Bobo Gol, resident of Baluch Khel

'Before CLTS, it was really difficult for us (women), as there were no latrines in the homes, and we were forced to ease ourselves only early in the morning and late in the evening – it was extremely inconvenient. The men in our village used to walk far away for defecation, while the children used to defecate wherever they wanted in the village – there was shit everywhere! From the village mapping exercise, we realised that we had been defecating even in the middle of our village.

As a result of the CLTS campaign, we had a chance to understand the sanitation situation in our village and to analyse the outcome of open defecation and its effects on our entire life. We found it very shameful, disgusting and unhealthy for us, and realised that shit was everywhere in the village. Since the CLTS campaign, much effort has been made to improve the situation in our village. But now latrine construction is flourishing, and a lot more residents are committing to build latrines. We women have been able to find a lot of privacy, which was not the case before. Now I will work on improving the condition of the latrine to avoid flies and smell.

Our village looks clean, with fewer flies, and less sickness too. So far we have shared our CLTS knowledge with our relatives living in another village, so that they too may benefit from this campaign.'

The Community Development Committee (CDC) said, *'We use the latrine, we reduce sickness in the village, and our women and children have greater comfort, and on top of this we will benefit by using the faeces for agricultural purposes.'*

Choice of latrine technology

While a number of different latrines were built, it was surprising to realise that the community already possessed the basic skills necessary for construction. They have constructed dry basic-pit latrines with both cement slabs and slabs made from mud-covered timber. Some ventilated latrines have also been built. The concept of the single pit composting latrine seemed popular, and a demonstration model was built. Interest in building pour-flush latrines was also voiced by those who already had a basic latrine and were keen to progress up the 'sanitation ladder'. This demonstrates the ability of CLTS to introduce the concept of a sanitation ladder, in which households are inspired to improve their existing latrine system.

Gender roles in the CLTS programme

In Baluch Khel, the men are seen as the providers of the family, while the women manage the family. After the CLTS campaign, the women developed an interest in having access to latrines themselves, both in terms of their own comfort and dignity, and in terms of living in an ODF environment. The women were therefore highly motivated and participated in the CLTS campaign, becoming strong advocates of CLTS.

Conclusion

(By Tearfund's facilitator and WASH Adviser in Afghanistan)

The community of Baluch Khel understood the purpose of CLTS, its objective and benefit for their life. During the CLTS exercise we saw how they were shocked, and how they became ashamed. The majority of residents showed a very quick response, a small proportion did not take the campaign seriously, and a reasonable number were interested in the idea but expressed a desire for some sort of aid or assistance to construct their own latrine. Residents from both the better-off sector of the community and the poorest sector went further to build their own latrine using locally available materials and skills they already possessed. These skills and the latrines themselves will be improved through frequent supervision of sanitation and hygiene education.

It's not easy to change the culture and attitude of people within a short period; we can see the habit of OD not only in the rural areas but even in urban areas such as Kabul, Mazar, etc. In addition, the standard of latrine construction nationwide is low: it is just for avoiding collecting faeces on the ground surface. (While the Ministry for Rural Rehabilitation and Development (MRRD) stipulates standards for latrines, it would be much more encouraging for the community if standards considered the local income of the households and availability of materials in the village.) Therefore, altogether, CLTS looks like a great idea for the whole of Afghanistan.

It would be wise to raise awareness of the concept of the sanitation ladder so that communities might continue improving on their initial sanitation systems. This may include introducing and demonstrating different environmentally friendly latrine options. However, this may require technical support and advice [which would most sustainably be obtained from private sanitation marts and/or from government-run sanitation centres – *Author*].

STUDY B **Village of Surkh, Kapisa** (500 population / 80 households)

Period CLTS campaign was implemented: August 2008

Physical features

Physical features of note include the following:

- There are steep valley sides and hard bedrock, with thin, unstructured (and unstable) soils containing large stones. This makes digging beyond 1m depth extremely difficult, and virtually impossible anywhere except the valley floor (where it would not be suitable to build latrines because of the proximity of the water course).
- The stream flowing in the valley bottom is one of two main water sources. The other main sources are springs along the valley. These are set above normal river level, but can be inundated during flash flooding. It is easy to see how OD results in faecal matter being washed downhill through rivulets or across stone surfaces (whether exposed or lying just below the thin soil surface).
- Houses are grouped in small clusters, or hamlets.
- Homes are built using the natural (undressed) stone, with some wattle-and-daub infill, and a limited amount of timber. Houses are in very close proximity to one another, sharing walls and passageways, and are mostly sited on the steep slopes.

Surkh village is divided into various hamlets set on the lower slopes.

Surface water from the hamlets ends up in the streams on the valley floor.

Summary of favourable and unfavourable conditions[5]

FAVOURABLE

- Isolated, rural settlement.
- Socially and culturally homogeneous.
- No previous subsidised sanitation projects.
- Significant tree cover, even in the dry season (hence more places for OD).
- The majority of inhabitants suffer from water- and sanitation-related diseases at any one time (prior to CLTS).
- The stream in the valley floor is sometimes used as a potable water source (when access to the natural springs further up the valley is restricted). The inhabitants therefore have a vested interest in avoiding contamination of the stream. This would be enhanced by raising awareness of the ease with which faeces would find their way down the steep slopes into the water course.

UNFAVOURABLE

- Apparently clean conditions in main pathways and along stream bank (suggesting OD is controlled, to some extent).
- It is virtually impossible to dig a pit deeper than 1m by hand, with consequent limitations on the type of latrine solution (although the vault latrine is culturally acceptable and commonly found throughout Afghanistan).
- Women are seldom seen in public areas, and it is questionable whether they have a significant voice. In Afghanistan the village Community Development Committee (CDC) is often the key accountability group established to oversee the development of their own community. NGOs and government agencies encourage the CDC to be made up of men and women, but in practice women's participation may be stifled. Tearfund's WASH Adviser reports that it has been difficult to fully engage the CDCs in CLTS. Rather, the strength of a campaign lies with enthusiastic natural leaders, who sometimes include religious leaders (mullahs). Every CLTS campaign is conducted separately for men and women, with younger children joining either group.

5 The *Handbook* (Ref. 1, pages 14–17) helpfully lists the conditions which, through experience, are deemed as favourable and unfavourable towards good outcomes of a CLTS campaign. The observations in this box reflect these conditions and practices.

Latrine construction following triggering

- Exclusive latrine response is the single-vault latrine, usually built adjacent to a home or existing building. These are emptied once every three months on average.
- Most latrines appeared not to be in danger of contaminating surface streams/drainage channels. However, we saw two or three latrines from which waste liquid would potentially find its way down steep banks into rivulets and surface streams.
- All latrines had covers over the vault emptying hole, most of which were sealed in by mud or lime mix.
- Wattle-and-daub, natural stone and sun-baked bricks are commonly used in construction of the walls. The bricks and the stone are usually bound with mud. Roofing might typically be thatch or baked mud, laid on rough timber poles.

Key points in the process

The following tips are given by Tearfund's facilitator of the CLTS campaigns in Afghanistan. While they include points of specific instruction, facilitating teams must remember to maintain the spirit of spontaneity and self-actualisation that underpins CLTS. See Recommendation 4.7, page 24.

Sanitation:

- Share observations on latrine coverage in the village, and the estimated degree of OD – does the community agree with this status?
- Share and seek confirmation on the incidence of sanitation-related disease in the village.
- Find local expressions for OD and faeces – agree with the community to use them.

Water:

- Ensure understanding of what 'safe' water means, and the consequences of drinking contaminated water *(In numerous cases, this will be known through ongoing PHAST sessions, or through formation of WSPs if a water supply project is implemented.)* Facilitate discussion on all likely causes of water-related disease – and assess the extent to which the community really understands the issue.
- Ensure community members can name and categorise their water sources – this will help them to identify potential contamination routes.

During village mapping and transect walk:

- Guide community members to specify clearly where the water sources are, and visit all water sources on the transect walk. Ask the community to comment on the proximity of those sources to the OD fields. Map all nearby latrines and again ask them to say something about the distance of those facilities from water sources. The facilitator should demonstrate the risk of contamination while in the field.
- Take time to show how disgusting the situation is, and allow the community to reflect on this. If need be, explain more about how the situation could affect the whole village.
- Discuss the prevailing water-related diseases and the actual situation found on the ground, and link these directly to the current health situation of the village. Allow community members to make comment on this, and to say how they have understood what has been observed and explained.
- See what actions the community might suggest. If asked, at this point the facilitator may suggest appropriate technical issues to be considered by the community in their response to stop the situation. Allow them to discuss what to do, who should do it, and when. Explore ways with the community to make sure that these actions are taken.

Single vault latrines are built on the steep slopes.

Reflections and recommendations

ENVIRONMENTAL SAFETY

Vault latrines require very significant and careful management, since faeces are removed from the vaults before decomposition has had a chance to take place. The pathogen load therefore remains high, and there remains a significant health threat to those who remove the faeces. However, there is community awareness of the dangers of applying non-decomposed faecal matter directly to agricultural land (when surface runoff can become grossly contaminated), and those who remove the faecal matter bury it in holes in the ground for 6–12 months before applying it to the land. This seems an appropriate means of mitigating the risk of contaminating the surface or spring water supplies of the village, as long as the pits used for decomposition are located in areas where there is negligible risk of contaminating groundwater in the proximity of spring sources.

It can therefore be said that in respect of environmental safety, in the village of Surkh the emptying and dispersal of faecal waste is as great an issue as the siting of the latrine, if not greater.

In the vast majority of villages in Afghanistan, vault latrines are the accepted and cultural norm for excreta disposal: many livelihoods are based on collecting and removing excreta and applying it to the land. In any case, with the severe physical constraints found in Surkh, there are probably very few practical alternative safe sanitation solutions.

Recommendations to help ensure environmental safety therefore include the following:

- Basic training in safe handling of excreta for all those involved in vault emptying.
- Review current practice of applying excreta to agricultural land, ensuring
  - safe means of application to the land are understood and agreed (eg digging faeces into the soil rather than laying them on the soil surface) (this must take account of the winter months when the ground becomes frozen)
  - there is collective agreement about the areas where application to land may take place, and no application is done outside these areas.

Certain technical interventions to mitigate the risk posed by handling of non-decomposed excreta could eventually be introduced to the community, but promotion of these solutions would probably be

inappropriate in the period following ODF declaration and initial latrine building (the safe handling measures above are more critical). Nevertheless, improvements to latrine structures might include the following:

- Constructing covered 'holding' vaults immediately adjacent to the latrines. Here, fresh excreta can be stored once removed from the latrine vault, to allow for further desiccation (drying), and so reduce the pathogen load. When the latrine vault needs to be emptied (roughly on a monthly basis), the fresh excreta can be transferred to the holding vault after the older waste from the holding vault has been removed for application to the land.
- Constructing new latrines with the means to divert urine: urine contains bacteria which reduces the efficiency of decomposition of faeces, so solid human waste alone will decompose more rapidly. This will also ease the job of removing the solid waste from the latrine vault.

STRUCTURAL SAFETY OF LATRINES

On the whole, the vault latrines are built sturdily, in the same way, and using the same construction materials, as the homes of community members. Both are built on steep slopes, and a key concern would be to obtain sufficient foundational strength and support of the raised (above-ground) sections of the latrine vault on the down-slope side.

The other feature of potential concern is the cover slab to the vault opening. Vault openings would preferably be sealed by a tight-fitting metal door. But these are expensive to buy and more difficult to install, and it would not usually be appropriate to promote these in a poor community in the context of CLTS. However, concrete cover slabs, such as those used in Surkh, must be close-fitting to the vault opening, and must be sealed to the vault wall using lime or clay. It is important that the vault floor has a 'lip' or upturn towards the door to prevent waster fluids from seeping out.

INCLUSIVITY

Close, small neighbourhoods are naturally formed in Surkh, reflecting the sub-village or hamlet layout of the settlement. Within the hamlets, households collaborate on ensuring that each family has access to an improved latrine by means of community members offering labour to gather materials and construct the latrine. This is done on a voluntary, informal basis, but it is understood that payments-in-kind, eg providing home-grown potatoes, is sometimes exchanged for materials or labour. The CDC seems generally to play no role in managing or coordinating sanitation interventions. Exactly why is not known, but the CLTS campaign has had sufficient impact to sustain informal collective effort to achieve safe sanitation at community level.

3.2 SOUTHERN SUDAN

WASH *per se* is a relatively new programme component to DMT's Southern Sudan programme, and in the county of Aweil South, WASH activities have been supported only since 2008. During 2009, six boreholes were drilled by Tearfund's DMT programme in Tieraliet, along with hygiene promotion activities and the establishment of water user committees (WUCs) in various villages. A CLTS campaign took place in the community of Akach in July 2009. Besides this, a WASH project officer has facilitated a Schools-Led Total Sanitation campaign in Tieraliet village.

The case study below illustrates some of the challenges to achieving ODF status.

STUDY A Village of Akach, Aweil South County (700 population)

The CLTS campaign took place in July 2009, but to date, various issues have prevented the community from becoming open defecation free. This study is included to illustrate some of the challenges which can lead to the stalling of a CLTS campaign.

Current sanitation activities

The community claims 32 homes have at least begun building a latrine since those involved in the campaign in July 2009 committed to becoming ODF. However, this assessment visit revealed only one latrine fully completed. This is a very disappointing result five months after triggering. What is clear is that only a proportion of the community (less than 50 per cent, and possibly as few as 30 per cent) attended the initial campaign. Consequently, with it not being possible to view more than one complete household latrine during the visit, the validity of the community's claims to latrine construction, and even to its intended plans for sanitation improvements, becomes questionable. There is no doubt that the original participants were genuinely committed. However, their priority time since triggering has been given to finding or producing food, and consequently some families have relocated to a river-bank area where access to water for agriculture (and drinking) is greater.

Physical features

Physical features of note include:

- flat, open landscape, with no open water sources
- areas in and around the village prone to mild flooding in wet season
- sandy soils down to approximately 1m depth, then becoming heavier and more stable
- one handpump (mounted on a borehole) is located in the centre of the village. The next nearest handpump is reported to be some four hours' walk away.

Summary of favourable and unfavourable conditions

FAVOURABLE

- Small, isolated settlement.
- Socially and culturally homogeneous.
- No previous subsidised sanitation projects.
- Soil is unstable only in top 1m, and is relatively easy to dig.
- Incidence of sanitation-related disease in Akach is presently unknown.
- Payam Administrator is supportive of CLTS campaign, and agrees with reinvigorating CLTS.
- Current borehole (with handpump) is in good order, and is not in an area prone to flooding.
- Women are representative, and have a voice, at least to some extent.
- Flat, open land.

UNFAVOURABLE

- Food security and access to safe drinking water are compelling priorities for the community.
- Apparently clean conditions in central area of village (suggesting OD is controlled, to some extent).
- No unprotected shallow wells which would benefit from ODF status.

Environmental safety

- While not stipulating a minimum distance of space between a latrine and a home, the participants of the CLTS campaign demonstrated to us the distance (by sight) that they would allow for. This approximates to 20m.
- CLTS campaign participants were told by government officers to dig pits 4m deep, although no explanation of this dimension was given. While this depth may be appropriate for areas which are not prone to local flooding, some local flooding does occur in Akach. No guidance was given during the triggering period in terms of reducing latrine pit depths for localised areas where the water table comes closer to the surface or reaches ground level.

Minimum-cost latrine, built from locally available materials.

Latrine structure

- Only one latrine has been completed in this village! However, the structure appeared suitably robust, was made entirely from local materials, and was clean, odour-free, and free of flies. The owner said that it took him six days to complete. It is at least encouraging to see a type of structure that can be produced locally.

Inclusivity

- The vast majority of the community continues to practise OD.
- Households which are unable to build their own latrine (perhaps through sickness, or the lack of any able-bodied worker) are identified by the WUC and receive help from other community members.
- The entire family (men, women and children) will use latrines when they are completed. An interesting statement made by community members is that women would be embarrassed to be seen going to a latrine (ie everyone would know what she was going there for). On the other hand, men are embarrassed when they are seen going off into the bush to defecate.
- The CLTS group admitted that since the campaign in July of last year, energy to achieve further ODF has dwindled. If possible, they would like local government representatives to come and support and reinvigorate the campaign.
- The participants are aware of the importance of hand-washing with soap, but claim that soap is unaffordable for them (a bar of soap costs 1 Sudanese Pound, which is approximately 40 cents US). However, they are aware of using alternative materials for hand-washing, particularly ash from their cooking fires.

Reflections and recommendations

- While it has been innovative for the Tieraliet team to pilot CLTS triggering events, the outcome has not achieved significant success, and there is doubt as to how to follow up or to reinvigorate the campaign. Lack of experience in facilitating CLTS is one reason for this, but another major reason is the relatively small proportion of the community which took part in the campaign in the first place. Even though the group were apparently enthusiastic to declare they would cease OD, they were insufficient in number for the ODF concept to gain momentum. With the added burden of food security issues, the priority of improving sanitation practices soon dissipated.

- WASH-focused staff, and community mobilisers from the Tieraliet team who are likely to be involved in CLTS activities in the future, should receive formal training in CLTS at the earliest opportunity. In this case, Plan Kenya is recommended as training facilitator (Plan Kenya is currently negotiating training for Tearfund's Disaster Management Team in the DRC).
- A new CLTS campaign should be planned for Akach, involving enthusiastic participants of the first campaign, along with supportive local government officers (such as the Payam Administrator), the school community, and any local CBOs. The timing of the second campaign will be crucial, and should carefully consider agricultural responsibilities, access to the community, and the status of food security in the village. It is recommended that the second campaign should not take place until more household latrines are completed and in full use, so that more families can testify to the benefit of their latrine, and to their means of construction. PHAST training sessions could also be arranged following the CLTS campaign, earmarking particular focus groups, such as school pupils and women's groups.
- It would also be beneficial to pilot and demonstrate low-cost examples of ecosan, such as the *Arborloo*, or even the *Fossa-Alterna*. This would bring the significant benefit of improving food production, as well as offering a safe sanitation approach in places where the water table comes closer to the ground surface during the rainy season. This piloting and demonstration would be an appropriate role for the local church, if it could be engaged.

STUDY B Consideration of CLTS for Tearfund project villages in Wuror County, Southern Sudan

While Tearfund is yet to begin CLTS programming in Wuror County (Jonglei State), the prevailing conditions suggest OD could be considered as the first rung of the sanitation ladder in isolated rural areas. The rationale is summarised below.

Given the following factors –

- vast open spaces in the region
- the extremely low population density
- the lack of any open water courses
- the intense heat (all year round), which quickly desiccates faeces and accelerates pathogen kill
- the socio-cultural link to OD, tied in with factors such as the migratory nature of the community
- the unstable soils
- the current comparatively low incidence of sanitation-related diseases

– it seems rational to conclude that OD, if practised in terms of digging a hole to bury faeces, covering the hole, avoiding areas close to water sources (wells and boreholes), avoiding areas near homes, avoiding areas where populations pass through, etc, and focusing on good personal hygiene, particularly hand-washing after defecation and at other key times, can actually form an acceptable 'first rung' of the sanitation ladder. In this light, classical CLTS may not be appropriate, since this has the single objective to end OD per se. Instead, an emphasis on the PHAST approach seems appropriate, and this should incorporate compatible components of CLTS and water safety plans, in particular community mapping and transect walks, which can be used to raise awareness of areas where OD is least likely to cause harm, and the areas where OD would threaten the safety of water supplies and people's health generally. Sufficient attention must be given to times when community members are likely to compromise the safe areas, for example, when access to them may be restricted during the rainy season, or when individual members become sick.

The Water Policy for Southern Sudan provides room for CLTS to be implemented, although there is more scope in this for a rural rather than urban setting. At the time of writing, the Government of Southern Sudan is about to start writing specific strategies for sanitation. NGOs (including Tearfund) and donors will be included in consultation on these strategies, and many parties are keen to ensure that the CLTS approach will be specified. Many NGOs, as well as Unicef (the WASH sector lead), are already carrying out CLTS, or

are planning to. Likewise, numerous donors are keen to fund this approach. Unicef has already planned to provide a consultant to train whoever wishes to participate in CLTS. There is therefore a lot of hope that CLTS will be adopted in many locations of Southern Sudan.

Latrine construction could still be promoted in this context, not directly as the specific objective for addressing the risk to health, but from the sanitation-marketing perspective of privacy (especially for women), comfort, clean **local** environment (particularly regarding the safe disposal of faeces from children and babies), and ease of access for the elderly and the sick. Matrix Ranking would potentially be a useful tool for helping communities to decide on appropriate types of latrine structures, given the priority of attributes they would expect a latrine to offer them. (See Ref. 2, page 10.)

The rationale given above of not adopting pit latrine construction as a universal objective for safe sanitation, when combined with the following factors –

- unstable soils
- food insecurity and the lack of any fertiliser
- high temperatures, which enhance composting
- adoption of a simple, low-cost latrine approach which could meet the needs and aspirations stemming from sanitation marketing

– suggests that promotion of the *Arborloo* (a low-cost, ecological sanitation approach) is an appropriate way forward. The concept is based on using a shallow pit, encouraging composting conditions by adding cooking ash (and some soil and leaves on occasion) to the pit after each defecation, and, when the pit is full (typically after four to six months), removing the light superstructure, the latrine slab and the reusable concrete collar, and planting a tree directly on top of the pit. The composted waste material provides an abundant source of fertiliser for productive tree growth (eg a Neem tree, or a Moringa tree, or fruit trees).

ARBORLOO
– The simplest single pit compost toilet

Taken from *Toilets that make compost* (Ref. 4)

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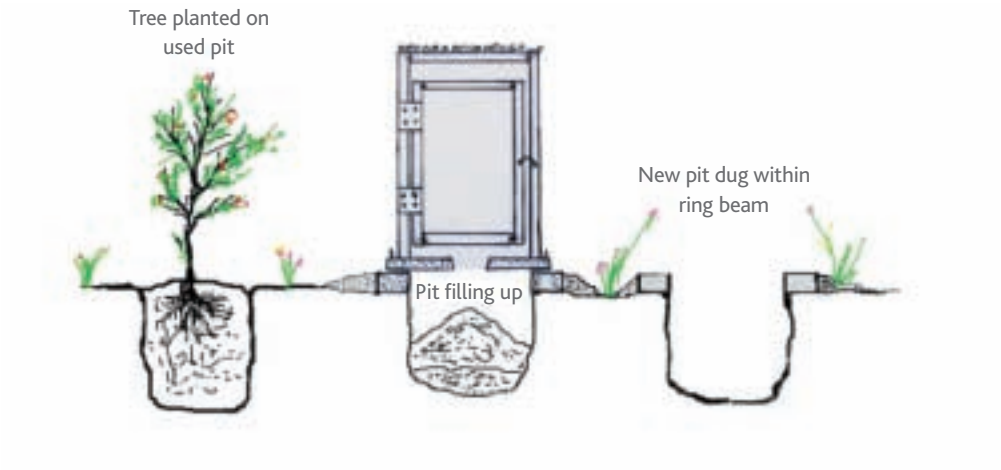


4 General recommendations

4.1 Combine CLTS campaigns with water safety plans, wherever possible

Water safety plans (WSPs) are a means for a community to ensure the safety of its drinking-water supply, ie to maintain safe water quality. It is a plan based on the community's good understanding of the various points in the supply from the catchment to the point of consumption, of where the water supply is at risk of contamination, and of how the community manages that risk. WSPs were originally designed for large public utilities, but considerable work has been done by Tearfund's teams in Southern Sudan, Afghanistan, DRC and Liberia on a community-level format of a WSP – one that can be designed and managed by the user community itself. The reader is strongly recommended to refer to Tearfund's publication *Adoption of Water Safety Plans (WSPs) for Tearfund-supported water supply projects: Guidance for implementing at community level* (Ref. 12).

Tearfund's recommended procedure for facilitating a community to establish its own WSP includes some components that are identical to CLTS, in particular community mapping and transect walks. In the case of WSPs, community mapping locates the water sources which community members use for their domestic supply, as well as key drainage routes, areas prone to flooding, and water bodies used for non-domestic purposes such as livestock watering and irrigation. The transect walks help the community members to identify all of these sites, and to consider the vulnerability of the sources to contamination.

Clearly, it is hugely advantageous to correlate areas of OD with potential water contamination routes, and so a community map can be drawn to show both. In the triggering phase of a CLTS campaign, the community is normally asked to mark sites of OD on the ground using coloured powder, flour, or a similar substance. The suggestion here is to transfer this information to the same large sheet of paper used for demarcating water sources. This combined map can then be kept by the community in a key public place, such as the school, covered meeting area, or, in the case of Afghanistan, in the building or room where the CDC meets.

It is probably advantageous to conduct two transect walks – one to identify OD sites (for CLTS) and one to recognise water sources, drainage, and waste collection/dispersal sites (for WSPs), in order to maintain the focus on disgust which is the essential desired outcome of the CLTS transect walk. The rational suggestion would therefore be to incorporate (retrace) the OD transect walk route when visiting the water sources during the WSP process, and to connect the OD sites with the risk to water source contamination.

The process for establishing a WSP is altogether likely to take longer than the pre-triggering and triggering phases of a typical CLTS campaign, particularly as it involves a period of testing, monitoring and revision of the plan. The fluidity and spontaneity sought in a CLTS campaign may therefore be held back if the two processes are fully combined, which is clearly not desirable. For that reason it is not recommended that facilitation of a single, combined procedure is attempted, but rather that key components are shared and complemented, and that cross-referencing of OD sites and the consequences of OD, with the means of protecting and monitoring water sources, is encouraged.

4.2 Questions to ask during the CLTS transect walk

The foundation *Handbook* (Ref. 1) contains numerous helpful tips on conducting a transect walk, such as those illustrated in the following excerpt:

Taken from *Handbook* (Ref. 1)

Tips on the transect walk:

- Ask questions about which families use which areas for defecation, where women go, and what happens during emergency defecation at night or during high incidence of diarrhoea. Sometimes people point out whose shit it is.
- Do not avoid the defecation areas, but rather spend as much time as possible in them, asking questions, while people inhale the smell of their shit and feel uncomfortable at having brought an outsider there. This will help to trigger the sense of disgust and shame that will make them want to do something to change. If no shit is visible, this may be because of so much diarrhoea which simply soaks in or in rains washes away.
- Draw attention to the flies on the shit, and the chickens pecking and eating the shit. Ask how often there are flies on their, or their children's, food, and whether they like to eat this kind of local chicken.
- Look out for solid and liquid shit, and ask why not all the shit has shape and form. Often the liquid is closer to the dwellings, where children and adults are more likely to be infected.

However, questions regarding contamination routes of water supplies might include, *'Where does this shit go to?'*

The answer from the participating group will depend on whether those responding are considering the route during the wet or dry season, or both. There will be some downward percolation of liquid faction, but this is likely to be very small. The main issue comes as a result of surface runoff, ie *'where does the shit get washed to?'* Explore the answer by literally walking the route suggested by the responses. This may quickly be lost among undergrowth, or several alternative routes may present themselves in a short distance. However, it gives the facilitator the opportunity to follow some of these routes (encouraging some of the community members to lead the group) by following rivulets and small channels, or obvious drainage channels, or simply following a general downward slope until a rivulet or drainage channel is reached. From here the route might be traced to a stream or a body of standing water, or it might pass close to the village water source directly (village handpump, or a spring catchment, or a stream, canal, river or a pond/lake).

Of course, we would be missing the point if we did not also acknowledge the role of flies, and animals which will pick up faeces on their paws, legs or beaks and which will then go and bathe in, or drink from, water sources which are used for human consumption.

The aim here is to demonstrate that the faeces left by OD will very likely enter water courses, and that it is possible that those water courses will contaminate acknowledged water sources. Draw the more obvious contamination routes on the community map.

4.3 The use of a sanitary survey

A sanitary survey is an inspection technique which helps the user to spot potential risk of contamination of the water supply. Conducting a sanitary survey is another activity which would be common to managing a WSP and helping to ensure outputs of CLTS pose minimum risk to contamination of drinking water supplies.

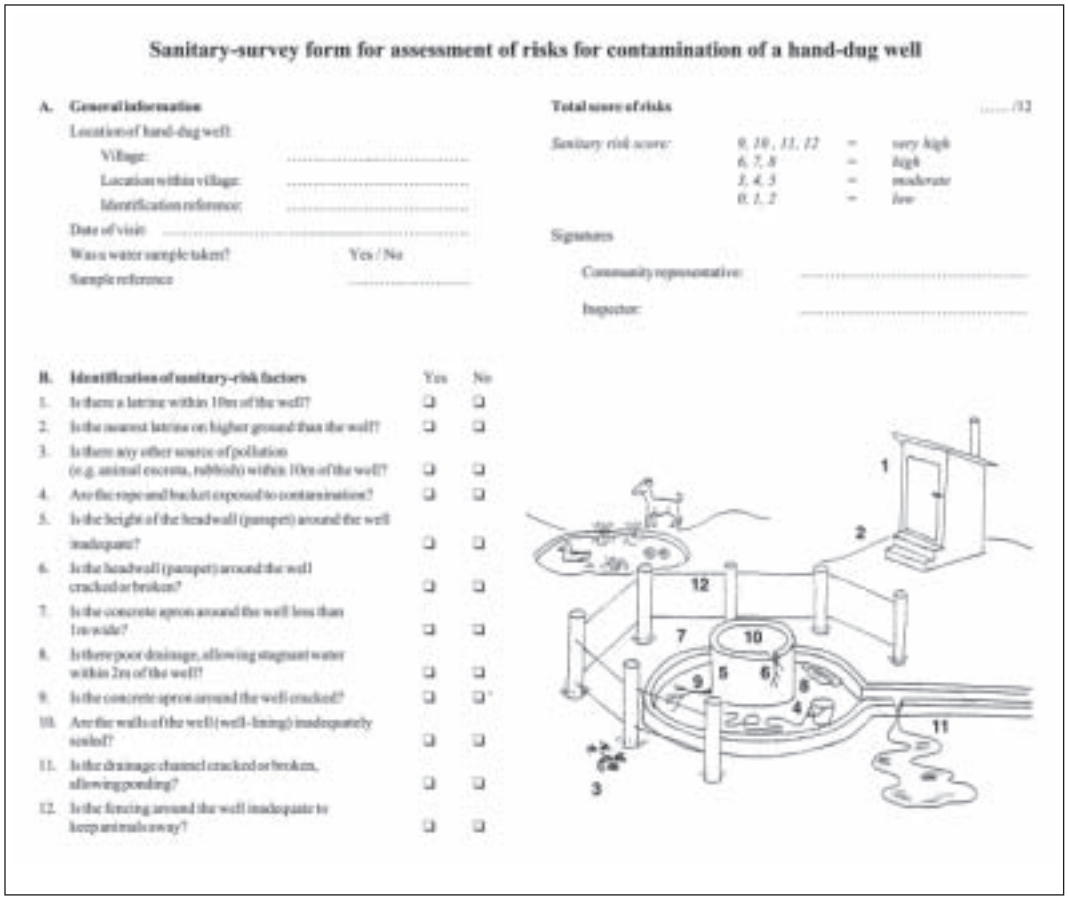
A simple example of a sanitary survey is given below, and can be seen essentially to require the observer to complete a brief tick-sheet. The community can be encouraged to utilise such a sanitary survey form for every latrine that is built as a consequence of the CLTS campaign. Of course, the survey form needs to

portray the actual water supply resources used by the community in question, and it is likely to make the questions more straightforward if a separate annotated drawing, with its corresponding set of questions, is used for each different water supply source.

AN EXAMPLE OF AN ILLUSTRATED SANITARY SURVEY FORM

Taken from WEDC Technical Brief No. 50, 'Sanitary Surveying' (Ref. 5)

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 ...../12

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?	❑	❑

4.4 Risk assessment of groundwater contamination

'The contamination of boreholes and shallow wells from on-site latrines is an issue that is generally poorly understood and irrationally assessed by organisations implementing water supply and sanitation programmes. This should not be the case as the health risks are often lower than popularly anticipated' (Ref. 6). To better understand the risks of groundwater contamination, and so to be able to confidently inform the post-triggering phase of CLTS without imposing unhelpful or unfounded restrictions, the reader is referred to the WELL Factsheet, *The Microbiological Contamination of Water Supplies* (Ref. 6, available in Appendix C). The factsheet provides background information on the factors that lead to microbiological contamination, and then sets out a simple risk assessment procedure to gauge the threat of groundwater contamination from latrines.

Assessing the risk of water point contamination from latrines is based on gaining an understanding of the amount of time it would take the water, and the pathogens it contains, to travel from the pit to the water point. The longer it takes, the greater the reduction in the number of pathogens through natural die-off. The overall aim in siting either a latrine or a water point is to ensure that the pathogen die-off has been sufficient to reduce the risk to a level where it is not a public health concern. The time taken can be used as a proxy indicator for assessing the risk of contamination. The factsheet provides a simple risk categorisation (significant risk, low risk, or very low risk, based on the pathogen travel time).

This risk assessment method requires three different observations or measurements, which are then fed into straightforward calculations which suggest travel times. The information inputs required are:

- the depth of the latrine pit (and type of latrine envisaged as an outcome of the CLTS campaign)
- the distance (in metres) from latrines to water points
- the nature of the soil below the latrine.

Perhaps the most complicated part of the procedure is deciding the nature of the unsaturated zone in which the latrine pit is dug (or which occupies the space between the ground surface and the water table). Essentially, this is the soil type that has been dug to form the latrine pit, and the factsheet makes just five categorisations. Starting from the smallest grain size, these are silt and clay, fine sand, medium sand, coarse sand, and gravel. The following table will assist in this categorisation:

CATEGORISATION OF SOIL TYPE

Soil type	Properties
Silt and clay	Individual grains too small for detection (less than 0.06mm in diameter) Will stain or polish when smeared
Fine sand	As in sand dunes
Medium sand	Seashore sand
Coarse sand	Approximately 1mm in diameter (eg builder's sand)
Gravel	Typically 3–4mm in diameter or greater

This factsheet is not intended to be given to the community user group to assess the risk of contamination. Rather, the facilitating team would carry out the assessment in the pre-triggering phase, and would therefore have the necessary guidance regarding latrine approaches which they can bring to the attention of the community **if** latrines are deemed to be a significant threat to water supply contamination.

If it is found that latrines would indeed pose a threat of contamination to the groundwater supply, various ways forward would be considered. The factsheet suggests the following:

- Increase horizontal separation distances between latrine and water point.
- Move water point higher than latrines.
- Change to a drier form of latrine.
- Increase vertical separation between bottom of pit and water table by using shallower pits or vault latrines.
- If a borehole is being used, site the screens lower in the water table.
- Treat water supplies or encourage use of home water treatment.

Interestingly, in a recent issue of *Waterlines* devoted to on-site sanitation and water quality, both Macdonald *et al* (Ref. 7) and Barrett *et al* (Ref. 8) suggest that better well construction may be more significant than latrine location or construction in protecting the water being consumed.

4.5 Discussion of local materials available for building latrines

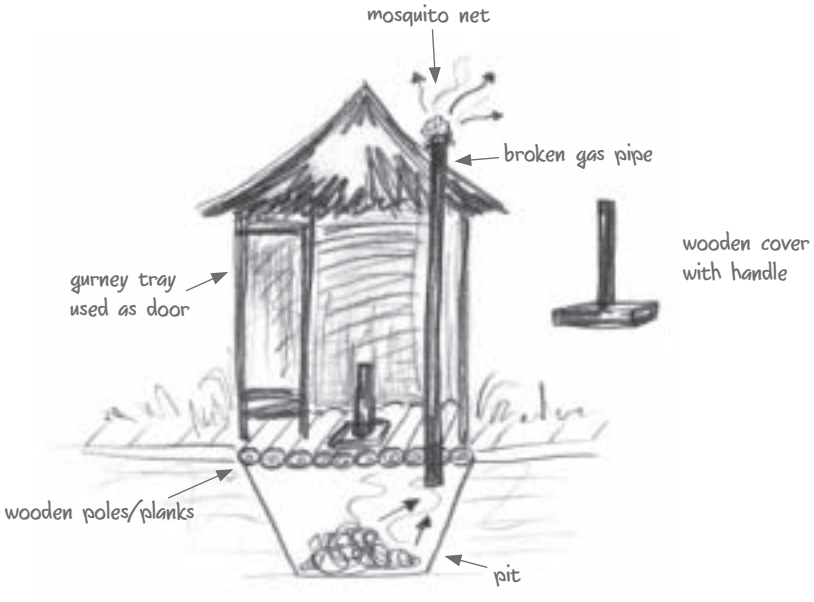
Immediately following triggering, the community could meet expressly to consider the materials and resources they have available in order to build safe sanitation solutions. The *Handbook* (Ref. 1) makes it explicit that in CLTS no design or latrine blueprint should be stipulated to the community (see page 37). It is fairly inevitable that some community members will suggest that a latrine is actually too costly for them to build, and that perhaps the facilitating agency should provide key latrine components to all community members! Their idea of latrine cost may commonly be in the region of $100–$250. At this stage the facilitating team

should tell them about low-cost latrines constructed elsewhere, and explain that it is likely that a latrine can be constructed for less than $10 – a figure likely to be disbelieved by most community members!

It would then be helpful to quickly draw a simple pit latrine, such as that pictured below:

DRAWING OF A SIMPLE PIT LATRINE

Taken from *Handbook* (Ref. 1)



Do not produce a pre-drawn diagram, but draw the picture on the spot. Then, working through component parts of the latrine, ask the community for suggestions of materials that could be used (locally available), where they would be obtained, and at what cost, **if any**. If the community is predominantly literate, it may be useful to construct a very simple matrix, such as that shown below:

MATRIX OF AVAILABLE MATERIALS FOR LATRINE PARTS

Latrine part	Local materials which may be used	Available from...	Cost?
Pit lining *	Natural stone	Hillside, beach, local quarry	None
	Bamboo	Forest	None
	Wooden poles	Forest	None
	Burnt brick	Brick yard	$8?
Latrine slab	Wooden poles and compacted soil	Forest	None
	Bamboo poles and compacted mud	Forest	None
Walls	Wattle and daub	Edge of village	None
	Reed mats	Fields, or market	$1–$2 if bought
Roof	Thatch	Fields	None

* *Facilitators can use this opportunity to suggest whether or not a pit lining is recommended. This would predominantly depend on soil stability, which should be assessed by the team prior to the meeting. The local community would be aware of soil stability, so this does not require any deep technical debate, but simply an agreement on the need for a lining or not.*

The overall message here is that a very basic latrine (dry-pit, or with raised or shallow pits if high water tables occur) is quite adequate for safe sanitation, as long as the latrine is used properly and kept clean (and good hygiene practices accompany the improved facility). Latrines are often improved by the users as time goes by, and this is commendable. Innovations and local adaptations should be actively encouraged.

4.6 Recommendations to help ensure inclusivity/equity

Following ODF declaration, very poor households that do not have access to material, the required labour or even a minimum amount of cash depend on solidarity within their community to get the help they need (Ref. 11). Kamal Kar, in his handbook on CLTS (Ref. 1), suggests the following advice to help include poorer households and vulnerable groups so that they can achieve access to safe sanitation following the declaration of ODF status.

Encourage help for weaker and poorer members of the community: Often as a result of good and powerful triggering of CLTS, better-off members of the community offer direct help and support to poorer members. Such offers of help could include allowing construction of latrines on the margins of private land, providing a few bamboo poles or wooden planks, purchasing toilet pans for poor people or even providing interest-free loans to fellow community members.

Encourage donors to come forward: Be alert for and promote emerging donors in the community. Facilitate the identification of those who are weaker, poorer, landless or otherwise unable to construct their own toilets. These may be old people, widows, single mothers, disabled people, those who are chronically sick or others. Ask the gathered community how they will solve their problems. Do not make suggestions. Proposals for action can be expected in communities where total sanitation has been fully understood. Your role is to facilitate the linkages between the weaker and poorer and those who are better off and willing to help them, whether through labour for digging and construction, materials, money, or loans. Often the spirit and enthusiasm of many poor families to abandon OD encourages those who are better off to come forward spontaneously to extend their help and support.

The experience of WaterAid in their CLTS programmes in Bangladesh, Nepal and Nigeria was that poor people very often share latrines. It was generally reported in all three countries that sharing was 'between related families' and that the number of families sharing one latrine was limited, although up to six families were found sharing a single latrine in some cases (Ref. 10).

The International Water and Sanitation Centre at The Hague in the Netherlands has supported work on the structural inclusion of solidarity with poor people within the context of CLTS (Ref. 11). It has proposed a system involving welfare classification, which draws out the community's acknowledgement of the poorest in its midst, their access to sanitation, and their locations within the community. All of this information is then used to plan, monitor and account for solidarity, supporting those least able to build a toilet in cash or in kind.

4.7 Maintain a spirit of empowerment rather than teaching

The success of CLTS lies in its ability to empower a community, encouraging initiatives for mobilisation which come from the community itself in response to the shame and disgust of OD. The procedures recommended in these guidelines for making a CLTS campaign more robust in terms of environmental safety, structural appropriateness and social inclusivity, should be applied with that same mindset of empowerment, rather than cause the CLTS campaign to be turned into a teaching exercise. This would quickly destroy the spontaneity and self-actuation on which CLTS thrives. For example, assessment of groundwater contamination demands that the facilitating team has the necessary knowledge of the risk of contamination before the triggering process is even begun, and any resulting guidance is fed into the campaign in a positive manner, rather than presenting a list of 'do's and don'ts' to the community.

It has been said about CLTS that 'facilitation is everything', and an impacting campaign requires capable, well trained facilitators, who maintain an attitude of empowerment and stimulation as the community faces its opportunity to cease OD.

IRC CASE STUDY

Taken from *CLTS-Plus: Some suggestions for strengthening Community-Led Total Sanitation*

IRC International Water and Sanitation Centre (Ref. 11)

Structural inclusion of solidarity with poor people

A key characteristic of CLTS is the absence of toilet subsidy as the core of sanitation promotion. To become open defecation free (ODF), households get information on technology options and designs and use any kind of local materials – including very low cost and free materials – to build the types of toilets they want and can afford. External funds that in the past were used for household subsidies now go in principle to capacity building for the CLTS approach and sometimes also to awards that communities can get for achieving ODF status. Very poor households that do not have the required material, labour and minimum of cash depend on solidarity within their community to get the help that they need (Kar and Bongartz, 2006, Ref. 9). This solidarity is an essential condition for equity within CLTS and could be built in structurally by two measures: (1) including the identification and mapping of the poorest households as explicit steps in the sequence of PRA tools, and (2) making planning, monitoring and accounting for the support of these households an integral part of the community sanitation programme. The steps were developed in a sanitation programme in South India and were also used in sanitation projects in central Java, coastal Sri Lanka and eastern Nepal. In the PRA sequence, identification and mapping of poor people happen after mapping the OD and calculating faecal loads and before planning the programme, and is done in three steps:

1 Welfare classification

The facilitator organises a meeting with a local group of women and men. In the meeting s/he asks the group to form three or four sub-groups (the number depends on how many main social welfare groups there are in the community, eg better off, poor, intermediate and ultra-poor). S/he gives each sub-group a sheet of paper and some felt-tipped pens in different colours and asks them to choose a welfare category and to depict the typical characteristics of that category on their paper. They may do this in any way they want: make a list of indicators or draw the indicators or draw a typical household for each class. The groups then present their results and count how many households in the community fall in each category.

2 Stratification of community sanitation map

The whole group then chooses a colour for each category and draws a stratified sanitation map on a large sheet of paper. Each house of the ultra-poor, poor etc is drawn in the agreed colour. They also indicate if the house already has a toilet, eg by adding a dot behind the house or placing a T or a cross in the house.

Gender focus: In cultures in which (young) women cannot easily participate, males and females may each make their own maps, and then decide which one the community will use for action planning and monitoring. A second reason for each sex doing their own map is that males and females map in a different way. While males prefer to draw the community outline (borders, road system) first (the 'structural approach'), females prefer to start with a central feature such as the local mosque, school or the homes where they live, and then draw the houses of the neighbours left and right, a part of the road and then the neighbours opposite, and so on (the 'social approach').

3 Preparing a community sanitation matrix

Having completed the sanitation map by social welfare categories, the group finally compiles the sanitation matrix. In this matrix, they list the three or four welfare categories, noting the number of households with and without a toilet in the respective columns, and discuss emerging trends.

The community sanitation committee, or any other community organisation which manages the local CLTS programme, uses the map and matrix as tools to plan, monitor and account for solidarity, supporting those least able to build a toilet in cash and/or kind. Local financing options might include giving support by neighbourhood, by partnering each poor household with a group of intermediates and better-offs who share the costs, by a fund raising collection among middle-class and better-off people, or from community resources such as local government funds. The organisation monitors and accounts for the contributions and results (toilets built) in the sanitation map and matrix.

APPENDIX A Glossary of key terms used in CLTS and other WASH approaches

Arborloo	A low-cost form of ecological sanitation in which human waste is collected in a shallow pit until it is full, when a suitable bush or tree is planted directly on top.
DMT (Disaster Management Team)	Tearfund's department focusing on the impact of disasters in which Tearfund staff directly implement projects in crisis situations, and/or offer support to the relief operations of partners.
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/Facilitating team	The person or team who raise awareness of and run the CLTS process until triggering has been reached.
Fossa-Alterna	A low-cost form of ecological sanitation in which two shallow, lined pits are used alternately to collect human waste. When full, one of the pits is temporarily sealed (eg with soil or lime), while the second pit is utilised. By the time the second pit is full, the contents of the first pit will have decomposed and can be safely removed and applied to land as a fertiliser. The empty pit can then begin to be filled with human waste once again, while the first pit is sealed.
Groundwater	Water held in the pore space of rock or unconsolidated deposits, or within fractures of rock, below the ground surface.
Inclusivity (in terms of CLTS)	The issue of whether or not all community members, including the very poor and vulnerable groups, obtain equal potential access to improved sanitation following a CLTS campaign.
On-site sanitation	Approaches whereby human waste is held at the site where defecation is practised – it is not removed from site for treatment or storage. This typically includes pit latrines and all dry systems, besides ecological sanitation systems. It does not include sewered systems where waste is removed from site by pipes or trenches.
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 fauna.

Sanitation ladder	Through CLTS, or other demand-led sanitation approaches, households choose a toilet design which matches their needs and available resources. Over time, as the benefits of using a latrine are appreciated and latrine functionality is better understood, the household is likely to make improvements to the latrine (eg adding a ventilation pipe to reduce flies and odour, or constructing a lockable door, or building a more robust closet). The resources to do this may result from the increased income that improved health affords. The family thus climbs the 'sanitation ladder' to more robust and efficient latrine structures or sanitation systems that have attributes to which the family aspires.
'Sani-mart' (Sanitation mart)	A market centre where local producers display, demonstrate and sell sanitation hardware components (such as latrine slabs, ventilation pipes, pedestals), latrine structures, and possibly even latrine-construction services.
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. 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 usually developed in preference to other sources.
Surface runoff	Rain or overspill from lakes or streams that runs across the ground surface can be collected in channels or pipes and stored at or below the ground surface. Once treated, this can form a valuable source of water, even for drinking.
Transect walk (CLTS context)	The process by which community members and the facilitating team walk a route through the village and its outskirts, passing through areas where OD is practised. The transect walk not only locates the areas of OD but also generates a sense of disgust which is critical in moving the community to the point of deciding that OD will no longer be practised within the community.
Triggering (Pre-triggering, Post-triggering)	The process by which a collective sense of disgust and shame among community members regarding OD brings them to the point of agreeing and declaring that OD will no longer be practised.
Vault latrine	This is a latrine in which human waste is collected in an accessible pit below the latrine slab. The contents are removed at intervals ranging from around twice monthly to once every three months. Even at the longer collection interval, faeces from a vault latrine have not normally had sufficient time to fully decompose. Hence, emptying a vault latrine can pose a threat to health if good personal hygiene and protection is not observed. Equally, disposal of the contents of a vault latrine can lead to environmental contamination if not carried out with proper planning, such as the use of intermediary pits for decomposition.
Village mapping (CLTS context)	A process by which villagers mark the location of OD sites, dwellings, water points and key public places on a map, usually on the ground, although ideally it is then transferred to paper or a suitable display.
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 upon the other two.
Water safety plans (WSPs)	A risk assessment and risk management method of maintaining safe water quality, which considers the entire supply route from source to mouth.
WUC/WUG	Water Users' Committee/Water Users' Group

APPENDIX B References and further resources

1 *Handbook on Community-Led Total Sanitation*, Kamal Kar, with Robert Chambers, 2008. Prepared with the support of Plan International. Available in English, French, Spanish, Portuguese, Hindi, Bengali and Arabic (currently being translated). http://www.communityledtotalsanitation.org/resource/handbook-community-led-total-sanitation

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4 *Toilets That Make Compost: low-cost, sanitary toilets that produce valuable compost for crops in an African context*, Peter Morgan, Stockholm Environment Institute EcoSanRes Programme, 2007. www.ecosanres.org/pdf_files/ToiletsThatMakeCompost.pdf

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

6 *The Microbiological Contamination of Water Supplies*, Steven Sugden, April 2006. WELL Factsheet. http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/Contamination.htm

7 'Pit latrines – a source of contamination in peri-urban Dhaka?' Macdonald D et al, *Waterlines*, Volume 17, Number 4, 1 April 1999, pp 6–8(3).

8 'On-site sanitation and urban aquifer systems in Uganda', Barrett M et al, *Waterlines*, Volume 17, Number 4, 1 April 1999, pp 10–13(4).

9 *Update on Some Recent Developments in Community Led Total Sanitation*, Kamal Kar and Petra Bongartz, 2006. Update paper on IDS Working Paper 257, Brighton: Institute of Development Studies. http://www.livelihoods.org/hot_topics/docs/CLTS_update06.pdf

10 *Sustainability and Equity Aspects of Total Sanitation Programmes – A study of recent WaterAid-supported programmes in three countries*. Global Synthesis Report, prepared for the 34th WEDC Conference, May 2009.

11 *CLTS-Plus: Some suggestions for strengthening Community-Led Total Sanitation*. International Water and Sanitation Centre, The Hague, the Netherlands.

12 *Adoption of Water Safety Plans (WSPs) for Tearfund-supported water supply projects: Guidance for implementing at community level*, Tearfund internal publication, Greaves F, and Simmons C, 2010.

APPENDIX C Risk assessment guide to the potential contamination of water supplies

By kind permission of the Water, Engineering and Development Centre (WEDC). This document is available to view and download online at: http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/Contamination.htm

WELL FACTSHEET The Microbiological Contamination of Water Supplies

Author: Steven Sugden, April 2006; Quality Assurance: Sandy Cairncross

Introduction

The contamination of boreholes and shallow wells from on-site latrines is an issue that is generally poorly understood and irrationally assessed by organisations implementing water supply and sanitation programmes. This should not be the case as the health risks are often lower than popularly anticipated. The method of risk assessment outlined in this fact sheet is within the technical capacity of a competent engineer and should be regarded as being the first step in gaining a better understanding of the problem. This fact sheet provides background information on the factors that lead to microbiological contamination, the basic principles of risk assessment, and points those requiring more guidance in the right direction. It does not contain any information about assessing nitrate or chemical contamination from latrines, which can be a problem in some areas.

Pathogens characteristics and water point contamination

The majority of disease organisms (pathogens) lack the capacity to propel themselves through the environment in which they live, and those that can are not capable of travelling very great distances. Instead, pathogens are carried from one point to another within the medium in which they live and in the case of water point contamination from latrines, this is in the liquid that accumulates within the pit. Pathogens, therefore do not travel further or faster than the water in which they are suspended and this is an important fact to remember when trying to understand water point contamination.

There are two other important attributes of pathogens that affect their ability to contaminate a water point; their size and their die-off rate.

SIZE Helminth (worm) eggs and Protozoa are relatively large and are efficiently removed through the physical filtration process in the soil (Lewis, Foster et al 1980). Bacteria and viruses are much smaller and are much more able to travel unrestricted through the subsoil. The bacteria and viruses in the table below are some of the greatest causes of concern:

Viral Disease	Infectious hepatitis, Poliomyelitis, Diarrhoeal diseases
Pathogen	Hepatitis A virus, Poliovirus, Rotavirus, Norwalk agent, other virus
Bacterial disease	Cholera, Typhoid Paratyphoid, Bacillary dysentery, Diarrhoeal diseases
	Vibrio cholerae, Salmonella typhi, Salmonella paratyphi, Shigella spp, Enterotoxigenic E coli, Salmonella spp, Campylobacter spp

DIE-OFF RATE

Faecal micro-organisms, like all life forms, have a limited life span in the environment and die off exponentially at rates which vary enormously from a few hours to several months. In ground water, some viruses are known to survive for up to 150 days. In the case of E. coli indicator bacteria, an estimated half life (ie the time taken for 50% reduction in numbers) in temperate ground water has been noted as being as high as 10 to 12 days, with survival of high numbers up to 32 days. Some salmonella species have been shown to persist for up to 42 days (ARGOSS). If the time taken for pathogens to be transferred to the water point is large, the pathogens will have died off and the water will no longer present a threat to public health.

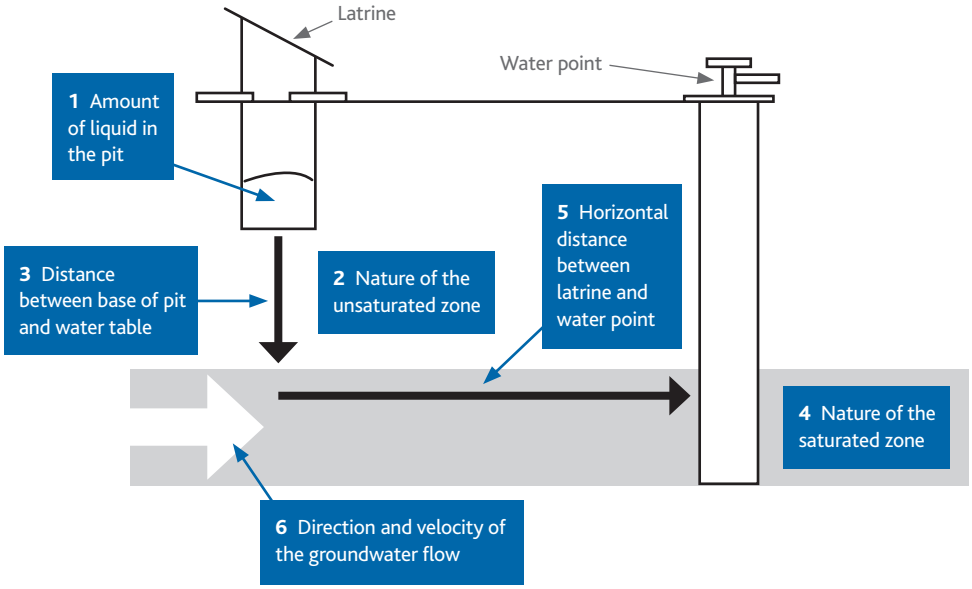
The figure below shows six different factors which can effect pathogen transmission from a latrine to a nearby water point. These are discussed in turn.

1 Amount of liquid in the pit

Any liquid in the pit is certain to be grossly contaminated. The amount of this liquid depends on the type of latrine and the method of anal cleansing. If the pit (or tank) is full of liquid a large static head is created within the pit and the liquid forced under pressure into the unsaturated zone of the subsoil (ie the zone above the ground water table, which is not saturated with water). If the pit is dry, there is no liquid to create a static head, no pressure is exerted, and there is no flow into the unsaturated zone. With dry latrine systems the pathogens remain within the pit and water point contamination does not occur. This puts the dry systems used in ecological sanitation among the safest options from the perspective of ground water contamination.

General rule: *The smaller the amount of liquid in the pit, the lower the risk of water point contamination.*

2 Nature of the unsaturated zone



The spaces between the grains in some types of sub-soil are so small that they physically prevent the passage of a pathogen. In effect the sub-soil acts as a filter. This filtering process is enhanced in established latrines when an organic film of micro-organisms develops on the surface of the soil particles (as in a slow sand filter) and this effectively further restricts the passage of the pathogen.

Sediment	Silt and Clay	Fine sand	Medium sand	Coarse sand	Gravel
Grain size	<0.06mm	0.06mm to 0.2mm	0.2mm to 0.6mm	0.6mm to 2mm	>2mm

Some clay soils also have the capacity to absorb viruses and prevent their passage to the saturated zone.

General rule: *The smaller the sediment grain size the lower the risk of contamination*

3 Distance between the base of the pit and water table

The further water containing the pathogen has to travel to the water table, the more tortuous its route and the longer it is retained. This additional time allows for greater numbers of pathogens to die off naturally. Care is needed when assessing this factor to consider the higher water table level in the wet season and not just the dry season water levels.

General rule: *The greater the distance between the base of the pit and the water table, the lower the risk of contamination*

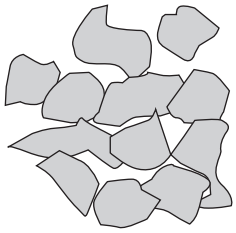
4 Nature of the saturated zone (aquifer)

The ease at which water can flow through a rock is known as its permeability (measured in metres per day (m/d)) and is dependent on both the size of the spaces (or pores) and how well they are connected with each other. Sands and gravels have large well connected pore spaces between their grains and allow water to flow relatively easily. As a result they have permeability ranging between 10 to 100 m/d. Clays have a high porosity, but are poorly connected and water has difficulty in passing through them easily; as a result clay has permeability ranging from only 0.01 to 0.1 m/d.

The ability of an aquifer to store water depends on the volume of the spaces (or pores) between the grains. Sands can have a porosity of 0.3 (ie 30% of their volume is air space), whilst consolidated rock porosities rarely exceed 0.01.

General rule: *The greater an aquifer's permeability, the higher the risk of water point contamination*

5 Horizontal distance between latrine and water point



Large, irregular shaped grains result in pore spaces that are well connected and allow water to easily pass

Small, regular shaped and tightly packed grains have poor connections between pores and restrict the flow of water

The further the horizontal distance the pathogen has to travel from the point of entry into the water table to the water point, the longer it is retained and the more likely the pathogen is to die.

General rule: *The greater the distance between the latrine and the water point, the lower the risk of contamination*

6 Direction and velocity of the groundwater flow

The rule that water flows downhill holds true for the vast majority of ground water, although there are exceptions. It would be more accurate to say that water always travels down a hydraulic gradient from areas of high water pressure to areas of low pressure. Groundwater will generally follow the slope of a hill and flow towards a river, sea or lake. The steeper the hydraulic gradient the faster the groundwater (and the pathogen it contains) will travel towards the water point.

If the latrine is located physically lower than the water point it is highly unlikely that contamination from the latrine will be a problem. However, many rural villages, and the latrines they contain, are sited on the highest points in an area whilst water points are usually found in the valleys where it is easier to find and access ground water.

General rule: *The greater the hydraulic gradient towards the water point, the higher the risk of water point contamination*

With an understanding of these six general rules it is possible to undertake a rudimentary risk assessment.

Assessing the risk of water point contamination

Assessing the risk of water point contamination from latrines is based on gaining an understanding of the amount of time it would take the water, and the pathogens it contains, to travel from the pit to the water point. The longer it takes, the greater the reduction in the number of pathogens through natural die-off. The overall aim in siting either a latrine or water point is to ensure that the pathogen die-off has been sufficient to reduce the risk to a level where it is not a public health concern.

The time taken can be used as a proxy indicator for risk of contamination. The Guidelines for Assessing the Risk to Groundwater from On-Site Sanitation (ARGOSS) produced by the British Geological Survey (BGS) states that the following times are applicable to assessing risk from microbiological contaminates.

ARGOSS, British Geological Survey, 2001

Significant risk	Time taken is less than 25 days
Low risk	Time taken is more than 25 days
Very low risk	Time taken is more than 50 days

AGROSS takes care to stress that the 'low risk' category should provide confidence, but no guarantees, that the travel time would result in levels of micro-organisms which are unlikely to represent a major risk to health. The 'very low risk' category provides a further margin of safety and therefore greater confidence that the water will meet WHO guidelines and that the more persistent pathogens will have been removed.

Assessment stage one – is the unsaturated zone sufficiently reducing the pathogen levels?

Because of the very low velocities of unsaturated flow, the unsaturated zone is the most important line of defence against faecal pollution of the aquifers (Cave & Kolsky 1999). If the rate of transmission to the aquifer is slow, by the time the water from the pit reaches the aquifer, the pathogens in it will have died off and the risk to public health will be minimal.

The capacity of the latrine design and the unsaturated zone to reduce the risk of contamination can be estimated by using a combination of the following tables.

REDUCTION THROUGH LATRINE DESIGN

RISK CATEGORY	LATRINE TYPE
Very low	Dry composting ecological latrines
Low	VIP, traditional pit latrine, low usage pour flush latrines
High	Septic tank, Aqua privy, high usage pour flush latrines, pit used to drain water from bathroom

REDUCTION IN THE UNSATURATED ZONE

Geology of unsaturated zone	Water table less that 5m below ground level	Water table between 5m and 10m below ground level	Water table greater than 10m below ground level
Fine sand, silt, clay			
Weathered basement			
Medium clean sand			
Course sand and gravels			
Solid rock			

Significant risk that micro-organisms may reach water table at unacceptable levels

Low to very low risk that micro-organisms may reach water table at unacceptable levels

If these do not sufficiently reduced the pathogens to 'low risk' levels, it will be necessary to estimate the effect of the aquifer has on pathogen reduction.

Assessment stage two – the effect of the saturated zone on pathogen levels

This is based on the number of days the pathogen remains in the aquifer before it enters the water point. It is calculated using the following formula:

$$\text{Number of travel days} = \frac{\text{Porosity} \times \text{Horizontal distance}}{\text{Permeability} \times \text{Hydraulic gradient}}$$

ARGOSS provides the following table to act as a guide when the exact figures are not known. It also suggests using a hydraulic gradient of 1/100 (0.01).

ARGOSS, British Geological Survey, 2001

Type of aquifer	POROSITY	PERMEABILITY (m/d)
Silt	0.1–0.2	0.01–0.1
Fine silty sand	0.1–0.2	0.1–10
Unconsolidated weathered basement	0.05–0.2	0.01–10
Clean sand	0.2–0.3	10–100
Gravel	0.2–0.3	100–1000
Fractured rock	0.01	Difficult to generalise – can be thousands of metres per day

Example 1 In a clean sand aquifer where the latrine is situated 20m from a water point the number of days taken for a pathogen to travel to the water point is:

$$\text{Number of travel days} = \frac{0.25 \times 20\text{m}}{60\text{m/d} \times 0.01}$$

Number of travel days = 8.3 days = significant risk of contamination

EXAMPLE 2 In a fine silty sand aquifer where the latrine is situated 20m from a water point the number of days taken for pathogen to travel to the water point is:

$$\text{Number of travel days} = \frac{0.15 \times 20\text{m}}{6\text{m/d} \times 0.01}$$

Number of travel days = 50 days = a very low risk of contamination

If the actual figures for porosity and permeability are not known, it is worthwhile placing figures from the top, bottom and mid-way of the given ranges into the calculations for a specific situation This will provide a guide as to the maximum and minimum ability of the saturated zone to reduce the pathogens to a safe level and allow the designer to make a more considered assessment.

Other factors to consider

- In urban areas where there may be latrines in a relatively small area, the accumulative effect of pollution reaching the water table could be significant and extra care needs to be taken.
- Thin highly permeable horizontal layers may occur within the aquifer which provides a rapid pathway to the water point. How uniform is the aquifer?
- The presence of fractures in harder rock aquifers may allow the very rapid transfer of pathogens to the water point.
- High extraction rates (for example, from a borehole supplying a large community), will increase the hydraulic gradient in the area around the water point and hence reduce the time taken to reach the water point, increasing the risk of contamination.

Next steps

If the assessment clearly shows that the risk of contamination is very low, then no other action is necessary other than to monitor the situation to ensure distances are adhered too and the designs and quality of construction remain high.

If the assessment shows a low risk of contamination it may be worthwhile to confirm the result with a series of water quality checks of a representative sample of water points. If the results confirm some form contamination, it will be necessary to verify that the latrines are in fact the cause of the problem. Water point contamination can occur from many causes, including faulty or substandard water point construction which allows surface runoff to enter.

Be careful not to jump to conclusions. The methodology described is conservative and makes a number of assumptions based on approximate categories of soil type, conductivities, gradients etc. If the results show borderline risks it may be worthwhile employing the services of a hydrogeologist to undertake a more exact assessment.

It is important to keep the community informed and to discuss with them the implications of your findings. With community-owned water points the users should have the ultimate decision as to what action to take.

Your role may be only to ensure that they base their decisions on sound knowledge and an awareness of the different options.

Methods of reducing the risk of contamination

- Increase horizontal separation distances between latrine and water point
- Move water point higher than latrines
- Change to a drier form of latrine
- Increase vertical separation between bottom of pit and water table by using shallower pits or vaults latrines
- If a borehole is being used, site the screens lower in the water table
- Treat water supplies or encourage use of home water treatment

Other issues to consider before taking action

- What are the alternative sources of water if the water point is closed? If the alternative is even more heavily contaminated, closing the water point may not be the most sensible option.
- What are the alternatives if pit latrines are banned? If the community are forced to return to open defecation the health risks may be greater than those from drinking contaminated water.
- If the option of building a sewer is being considered, it is worth remembering that it is generally a lot more expensive than providing a new off-site piped water supply system.
- If you have access to a water testing kit, why not test the water at different points of the drinking water chain. Test the water straight from the water point, from the container in which it is carried home, from the storage container in the home and from any cup or container used as a drinking vessel. Calculate how additional contamination could be entering the chain and take a more holistic view of the problem. Decide what action or change of behaviour would result in the largest reduction in the bacterial levels of the water finally consumed.

Some final points to ponder?

'Groundwater contamination is thus a matter of degree, and rather than basing all decisions on absolute water quality targets or guidelines, it may be more helpful to strive for the best practicable water quality which may be achieved with economic, financial, technical, and social constraints. Such an approach will vary with locally available alternatives of water supply.

'If however, one reviews the epidemiological evidence concerning the relationship between dose and response in drinking water, the evidence for the most commonly used indictor, (E coli), appears significant at doses greater than 1000 E.coli / 100ml… It would thus appear unwise to forego the health benefits of affordable and sustainable sanitation to eliminate the risk of groundwater contamination of less than 1000 E.coli / 100ml.'

Cave and Kolsky, *Groundwater, Latrines and Health*, WELL Task 163, 1999.

Further information

The Guidelines for Assessing the Risk to Groundwater from On-Site Sanitation (ARGOSS), British Geological Survey (BGS), 1991.

Groundwater, Latrines and Health, WELL Task 163, Ben Cave and Pete Kolsky, 1999.

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