The importance of hygiene behaviour

The links between sanitation, water supply, and health are directly affected by hygiene behaviour. It is important to bear this in mind when considering technical options, so that sanitation facilities provided in emergencies are acceptable to the users and can be used and maintained hygienically.

1. Excreta Disposal in a Rural Flood Setting

The priority in any flood situation is the speed of response. It is essential that any immediate phase technology can be installed quickly and that it is effective in containing excreta. Traditional excreta disposal technology, such as pit latrines, pour-flush toilets and raised UD toilets, are often used in immediate phase responses and may be difficult to implement quickly in a sudden onset flood. Such technology may not be well adapted to the physical conditions found in the flood areas, particularly when the terrain is under water or water logged. It may also be difficult to install enough units in quick and cost-effective manner, particularly when those affected have been displaced into temporary camps.

Immediate Excreta Disposal Options

In the immediate phase of the emergency, the immediate excreta disposal options include:

- Excreta clean up campaigns
- Chemical "Portaloo" toilets
- Packet latrines (with or without enzymes)
- Bucket latrines with close fitting lids
- Storage tank latrines
- Latrine kits/hardware (IKEA type)

The choice of the option will depend on the situation, in particular whether the flood has displaced communities or whether they have decided to sit the flood out.

Criteria for Selection

In an emergency setting, a number of factors must be fully considered before introducing the chosen solution. The choice of technology should be based on a solid assessment of the situation2. Consultation with the affected community is an essential part of the assessment, and a number of parameters should also be considered, including:

1) The physical constraints (rocky ground, high water table, flood plain, etc.) existing in the target community?
2) Fully understanding the community’s preferences regarding excreta disposal practices and facilities? Are there any strongly held beliefs or taboos about urine or faeces?
3) Understanding existing local knowledge & local organisations involved in promoting sanitation, the availability & of hardware?
4) Understanding the different requirements of men, women, children and those with special needs?

Setting Minimum Standards

Some minimum standards for implementing sanitation in emergencies are:

1. Sanitation should be part of a WASH approach and implemented in line with SPHERE and other environmental protection guidelines.
2. Community participation should be used at all stages during the assessment, site selection, design, construction and the operation & maintenance of excreta disposal facilities.
3. Designs should be culturally appropriate, with separate latrines for men and women and provision should be made for supplying appropriate anal cleansing material.
4. Excreta disposal facilities should be affordable, cost effective, create appeal to users and discourage vectors (e.g. flies)
5. Provision should be made to disposal of children and infants excreta safely, including child friendly latrines and culturally appropriate nappies.
6. Equitable access should be provided for the less-able, children, adult & adolescent

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1 Definition according to SPHERE
2 Excreta Disposal in Emergencies Manual
women. Space should be provided for those using wheelchairs.

7. Hand washing facilities and soap must be provided on site at all latrines.

8. In hurricane and cyclone affected areas, roof materials such as Corrugated Galvanized Iron must be secured correctly by clamps or hooks.

In the case that facilities have to be shared, minimum objectives, inspired by SPHERE guidelines, can be established.

### The Advantages and Disadvantages of the Immediate Excreta Disposal Option

<table>
<thead>
<tr>
<th>Description</th>
<th>Advantages/Disadvantages</th>
<th>Excreta clean up</th>
<th>Storage tank latrine</th>
<th>Toilets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean up with a shovel or covering excreta with mud. Involvement of communities in the clean up.</td>
<td>Advantages - Low cost - May be appropriate in the short term but only in areas where latrines are not used</td>
<td>Disadvantages - Labour intensive - Not sustainable</td>
<td>Advantages - Large storage tanks are often available in relief shipments - They are rapid to set up/construct</td>
<td>Advantages - Hygienic and odour is minimised</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemic al Toilets</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single prefabricated plastic units incorporation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Excreta Disposal in High Water Tables

Generally, the latrine pit bottom should be 1.5 m above the wet-season water table to prevent contamination of the water table. In flood situations, this may not be feasible? To protect water sources, it may be more cost-effective to develop alternative water sources than to provide alternative excreta disposal facilities. Where groundwater is less than 1m from the surface, greater attention should be given to ensuring people do not use water from wells in the vicinity of excreta disposal facilities. The risk of pollution through sub-surface movement of pathogens depends on a number of factors and risks need to be assessed carefully. Generally, a distance of 10 metres minimum from a latrine to a water source is adequate to prevent linear contamination. When a pit is dug, digging below the water table increases the available pit volume. There is evidence that wet pits take longer to fill. The ideal solution is to provide every family with their own latrine, but this might not always be possible, and communal or shared latrines may have to be used.

### Figure X: Example of an aqua privy

![Diagram of an aqua privy]

The Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Kit latrines</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consists of flat packed superstructures and slabs, designed specifically for rapid deployment in an emergency</td>
<td>- High cost, difficult to transport and require regular emptying</td>
<td>- Hygienic and odour is minimised</td>
</tr>
</tbody>
</table>

**Figure X:** Techniques for pits in high water tables (WEDC)
Excavated material can be used to build a mound or embankment around the latrine. This mound can be used for liquid infiltration from the pit if it is:

a. Formed with permeable soil
b. Well compacted with a stable side slope of 1:1.5
c. Thick enough to ensure that filtrate does not seep out of the sides of the mound

The slab should be constructed at least half a metre above the highest water level.

**Raised UD Toilets**

Normally, UD toilets are used to separate faeces and urine for re-use (ecological sanitation). In a flood environment, re-use of the by products may not be the main priority.

UD toilets are suited to rocky ground or areas with high water tables, and more resistant to cyclic flooding. They can also be used for many years, making them an attractive and sustainable option. The impermeable bottom of the chamber prevents contamination of both the soil and ground water. Normally, one chamber is in use, while in the other, faeces breaks down into compost. The seat or squat slab is connected to a hose or piping to separate the urine, which can be either be collected in a container or drained to a soak away.

**Figure X**: Twin vault UD latrine, Sri Lanka (courtesy ACF)

Raised latrines may not be socially acceptable if people feel 'exposed' going in and out of the unit. They may also restrict access for disabled people, the elderly, pregnant women and others. Choosing hardware to meet the needs and cultural preferences of users (i.e. seated, squatting, wet or dry anal cleansing) is key for acceptance.

**Simple composting latrines**

Space permitting, a household may choose to dig a shallow, unlined pit latrine above the water table that will have a short life. The simplest and best-known composting toilet is the "Arborloo". This toilet uses an unlined shallow pit (1 – 1.5m deep), fitted with a ring beam, slab and portable superstructure. When the pit is nearly full, a new pit is dug close by, and the ring beam, slab and superstructure are moved to the new site. The old pit is covered with soil, allowing contents to compost down. When fully composted, a tree can be planted.

**Figure X**: Urinal and container (courtesy GTZ)

The adoption of urinals for men, who prefer to stand when urinating, is one way of improving the performance and effectiveness of UD toilets.

**Potential Rural Flood Related Problems**

- The creation of new breeding sites due to poor drainage
- The creation of poor sanitary conditions in camps and overcrowded areas
- An increase in the number of vector host species present
- Displacements from one location to another and an increase in vector and human contact

In the post-flood period, the first priority is to assess the risk of vector-borne disease transmission, as quickly as possible. If an intervention is required, major vector control activity should take place as soon as possible.

The necessary resources must be mobilized rapidly, and an operational management framework put in place swiftly to allow vector-control activities to be implemented. Key vector control measures include:

1. Identifying assessment teams with expertise in vector control and quickly mobilising the teams.
2. Developing systems for the collection and review of all relevant background information.
3. Developing vector profiles of the flood prone areas and ensuring an assessment programme, to evaluate the potential risks, is in place.
4. Identifying equipment, supplies and resources for vector control and ensure mechanisms are in place for their mobilization.
5. Ensuring appropriate waste management strategies are put in place in the flood area.
6. Developing public advisory & education material and identify mechanisms for their dissemination.

**Vector control responses**

In a post-flood situation, flood-affected people need to have the knowledge and the means to protect themselves from disease and nuisance vectors that are likely to represent a significant risk to health and/or well being. Risks must be kept to an acceptable level.

The control of a vector-borne disease can be achieved by various means in emergencies. These include:

- Medical diagnosis and treatment.
- Vector control using chemical/biological means
- Environmental sanitation.
- Promoting personal protection. 

Medical diagnosis and treatment are outside the scope of this paper, and should be undertaken by the competent authorities.
### Chemical vector control measures should be undertaken in a way, which ensures the staff, those affected by floods and the local environment, are all adequately protected. The use of chemicals should be done in a way that avoids creating resistance to that particular substance. Application methods include:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Application method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dusting</td>
<td>Hand-held dusters, manually operated or mechanized.</td>
</tr>
<tr>
<td>Residual Insecticide Spraying</td>
<td>Knapsack sprayers with special nozzles.</td>
</tr>
<tr>
<td>Ultra-low volume spraying</td>
<td>Low-dosage applications to large areas from fixed-wing aircraft or helicopters.</td>
</tr>
<tr>
<td>Space spraying</td>
<td>Interior or exterior applications with pesticide aerosols dispersed under pressure from sprayers.</td>
</tr>
<tr>
<td>Impregnation</td>
<td>The treatment of materials such as bedding, clothing and mosquito nets with pesticides in emulsion or solution (by dipping and drying, or by spraying with knapsack sprayers).</td>
</tr>
</tbody>
</table>

### Table X: Pesticide application methods & equipment
Where possible, the vector control activities should be coordinated with the local authorities and the relevant public health body.

Environmental sanitation measures include; draining standing bodies of water; removing vector breeding sites (such as piles of rubbish, old tyres, water jars, bamboo poles, etc.); setting traps (rats & flies); etc.

Personnel protection measures include; the distribution of insect/mosquito repellent; promoting using long sleeves & trousers; fitting houses/shelters with mosquito/fly netting on windows & doors; distributing insecticide treated bed nets (ITNs); and wearing Wellington boots.

### 3. Waste Management in a Rural Flood Setting
If large numbers of people have been forced into camp type settings by the floods, it is likely that waste management will become a major issue. A system of managing the waste, in a safe and environmentally friendly manner, should be put into place. A decision must be taken if the waste will be dealt with on-site (burial), or whether it is necessary to transfer to a remote disposal site? The keys steps in WM are:

- Collection, containment & storage
- Waste transfer
- Final waste disposal

### Sphere: Key indicators
- People from the affected population are involved in the design and implementation of the solid waste programme
- Household waste is put in containers daily for regular collection, burnt or buried in a specified refuse pit

### Sphere: Key indicators (continued)
- All households have access to a refuse container and/or are no more than 100 meters from a communal refuse pit
- At least one 100-litre container is available per 10 families where domestic refuse is not buried on site
- Refuse is removed from the settlement before it becomes a nuisance or a health risk

### 4. Clean up Campaigns in a Rural Flood Setting
Floodwaters may be contaminated by sewerage systems or from agricultural by products. Floodwater in contact with the skin does not pose a serious health risk, but there may be some risk of disease by eating or drinking food items contaminated by floodwater. People may become infected with diseases such as leptospirosis if cuts, sores or wounds come directly into contact with floodwater. During the emergency period, it is critical to practice basic hygiene. Hand washing with soap and clean water is one of the most effective ways of protecting against disease. Children should be prevented from playing in floodwater and their toys and possessions should be disinfected.

### Cleaning up floodwater
Houses that have been filled with flood related debris, such as sediment and silt, may need to be cleaned by organizing mass clean up campaigns. The use of a “Cash-for-Work”, approach is an appropriate way of mobilising the affected communities. Tools, such as picks, shovels and wheelbarrows will be essential. It may be necessary to organise trucks and mechanical diggers to evacuate the debris, depending on the volume deposited. Protective clothing such as Wellington boots, overalls and gloves should be provided to all those involved in clean up campaigns.

### Cleaning and disinfecting with bleach
An unscented proprietary liquid bleach (Sodium Hypochlorite), between 4 – 6 % should be used. The safety instructions on the container must be carefully read and closely followed. Wellington boots, gloves and goggles should be used to handle the solution and it should never be used in a closed space.
To reduce potential health risks, a proper drainage plan may be necessary to deal with storm water drainage. Small-scale, on-site drainage can be provided to dispose of domestic wastewater. In the event that houses have been filled with floodwater, communities should be mobilised to clear drainage channels and repair small breaches in flood defences using a “Cash-for-Work” approach. Key CFW activities include:

- Removing standing water near dwellings by improving drainage to reduce vector breeding sites
- Protecting shelters, paths and water and sanitation facilities from erosion and from flood water
- Providing sufficient appropriate tools for small drainage works and maintenance where necessary
- Protecting existing surface or groundwater sources from erosion or from contamination

Large-scale drainage is generally determined by site selection and the development of drainage plans is outside the scope of this paper.

### 6. Disposal of Dead Bodies in a Rural Flood Setting

#### Health risks
There is a widespread belief that corpses (both animal and human) pose a risk of communicable diseases after a flood. Such beliefs are frequently mistaken, especially if death has been caused by trauma or drowning. Dead bodies are unlikely to cause outbreaks of diseases such as typhoid fever, cholera or plague, though there may be a risk that water sources become contaminated.

#### Recovering dead bodies
In the event of human deaths in a flood, the main risk is of mental trauma caused to survivors of the event. In this situation, it is important to organise the collection of corpses to minimise distress, and to allow the communities to grieve and bury/cremate their dead in line with their cultural practices and traditions.
## Technical Excreta Disposal Options in Bangladesh

<table>
<thead>
<tr>
<th>Location Context</th>
<th>Immediate Options</th>
<th>2nd Phase Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embankment</td>
<td>• Trench latrine with fence, lower slope of embankment</td>
<td>• Normally, no digging is allowed on embankment</td>
</tr>
<tr>
<td></td>
<td>• Temporary raised direct latrine using 5-rings, &amp; mortar seals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bucket latrine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Offset pour-flush toilet connected to pit at bottom of embankment by drainpipe.</td>
<td></td>
</tr>
<tr>
<td>Roadside</td>
<td>• Trench latrine with a fence</td>
<td>• Unlikely to continue, but if so, continue the immediate options</td>
</tr>
<tr>
<td></td>
<td>• Temporary raised direct latrine using 5-rings, &amp; mortar seals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bucket latrine, large clay pot, etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Containment by using an empty drum</td>
<td></td>
</tr>
<tr>
<td>Shelters</td>
<td>• Improvement of existing latrines</td>
<td>• Construct more permanent direct or offset latrines that are raised if necessary</td>
</tr>
<tr>
<td>Communal, schools, public buildings</td>
<td>• Trench latrine with fence (away or outside main premises)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Temporary raised direct latrine using 5-rings, &amp; mortar seals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bucket latrine (drum, clay-pot, plastic bag and other type of containment)</td>
<td></td>
</tr>
<tr>
<td>Chair</td>
<td>• Clay pot,</td>
<td>• Direct or offset latrine raised to the level of house plinth</td>
</tr>
<tr>
<td></td>
<td>• Drum</td>
<td>• Bucket latrine</td>
</tr>
<tr>
<td></td>
<td>• Bamboo mat containment with plastic lining</td>
<td></td>
</tr>
<tr>
<td>Raised HH</td>
<td>• Raised direct or offset latrine with sealed rings, stablized by bamboo frames.</td>
<td>• Raised direct or offset latrine, in flood prone levels raise to plinth level</td>
</tr>
<tr>
<td></td>
<td>• In flood prone levels raise to plinth level</td>
<td>• Bucket latrine</td>
</tr>
<tr>
<td></td>
<td>• Bucket latrine (drum, clay-pot, plastic bag and other type of containment)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bamboo mat containment (plastic lining if necessary) under the raised squatting.</td>
<td></td>
</tr>
<tr>
<td>Haor</td>
<td>• Clay pot,</td>
<td>• Raised direct or offset latrine using 7-8 rings-steps or pathways.</td>
</tr>
<tr>
<td></td>
<td>• Drum</td>
<td>• Latrine raised to level of house plinth</td>
</tr>
<tr>
<td></td>
<td>• Large containment.</td>
<td>• Bucket latrine</td>
</tr>
<tr>
<td></td>
<td>• Boat latrine</td>
<td></td>
</tr>
<tr>
<td>Hill tracts areas</td>
<td>• Clay pots</td>
<td>• Direct or offset pit latrine with plastic pan, one ring and slab.</td>
</tr>
<tr>
<td></td>
<td>• Direct or offset pit latrine with plastic pan, one ring and slab.</td>
<td>• Avoid water seal &amp; use flap</td>
</tr>
<tr>
<td></td>
<td>• Stilt-offset-direct pipe to covered pit-a traditional tribal practice (avoid water seal-use flap)</td>
<td>• Bucket latrine</td>
</tr>
<tr>
<td>Displaced people’s camp</td>
<td>• Controlled defecation zones</td>
<td>• Community off-set latrines with twin pits (avoid water seal &amp; use flap)</td>
</tr>
<tr>
<td></td>
<td>• Trench latrine with a fence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bucket latrine (drum, clay-pot, plastic bag and other type of containment)</td>
<td></td>
</tr>
</tbody>
</table>

*Table X Excreta Disposal Options for Emergencies in Bangladesh*