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Surface water management in humanitarian crises

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This paper reports on the scoping stage of a practical toolkit being developed to support the application of surface water management practices in humanitarian contexts. The toolkit is predominately aimed at refugee and IDP camps for displaced people and aims to address the lack of suitable guidance in this area (Abbot et al. 2017). Effective surface water management will protect the health, dignity and wellbeing of communities in humanitarian crises. In developing the toolkit, the authors recognise the challenges posed in creating a document that can effectively support an audience with diverse interests and roles within humanitarian contexts. This will be a key focus for the next stage of the project.

Introduction

The inadequate management of surface water, leading to flooding and unmanaged ponding of surface water, has direct impacts on health and the environment, including health issues, the spread of vector-borne diseases, water pollution, impacts on pedestrians and vehicles and unsanitary living conditions.

Why manage surface water?

The reasons for managing surface water are wide-ranging both temporally and spatially There are some positive aspects, such as opportunities to harvest/reuse rainwater, recharging groundwater, and providing social, ecological and visual benefits, but many of the factors relate to avoiding associated damages, such as:

- Erosion and subsequent damage to structures and roads including slope stability (see Photograph 1 below);
- Siltation (resulting from previous erosion), blocking drains and rivers;
- Flooding of homes and latrines, blocking of roads and paths;
- Creating muddy conditions, impeding travel and making areas dirty;
- Spreading pollution, including pathogens and therefore water borne diseases; and
- Providing habitats for vectors such as mosquitoes and other unwanted pests.

Many of the issues listed above also have a detrimental impact on human health and wellbeing in communities; so whilst surface water management may be viewed as a technical infrastructure issue, it also has a significant impact on health and social factors, relating to the first protection principle which states:

"Principle 1 (avoid causing harm) addresses those protection concerns that may be caused or exacerbated by humanitarian response. As stated in the Charter, those involved in humanitarian response must do all they reasonably can to avoid exposing people affected by disaster or armed conflict to further harm, for example by building settlements for displaced people in unsafe areas."

(Sphere Handbook 2011)

What do we mean by surface water management?

The project defines surface water as water flowing across the land and includes the management of both sources of rainwater and some aspects of greywater. Greywater can be defined as water that has been used for bathing, laundry or cooking and is contaminated but, unlike sewage (or black water) does not contain (much)

faecal matter. In temporary camps (and low-income settlements), excreta disposal is mostly by dry, on-plot facilities so faecally-contaminated wastewater is (mainly) limited to institutions such as clinics, and again managed on-plot.

Greywater generated at a domestic level needs to be managed, especially in key locations such as showers, laundries and water distribution points. Water distribution points, in particular, generate a certain amount of very clean greywater, as water containers are ideally washed out before re-filling. People may also bathe and do laundry nearby if there are no bespoke facilities. Spillage, taps left on and leaks, are also sources of grey water.

Photograph 1. Erosion due to surface water runoff

Source: OXFAM

Why include greywater?

Reasons for including greywater within the context of surface water management mainly, in this instance, include:

- A lack of distinction at policy level between the two water sources (natural (e.g. rainfall and rivers) and man-made (e.g. spilt water and greywater). These sources of water are grouped together in the Sphere Handbook (2011);
- There are strong similarities across the surface and grey water systems in terms of spatial distribution; and the planning of drainage routes;
- The technical response required, within a humanitarian context, for the two sources are similar (whilst recognising the potential differences).

Existing standards for drainage

There are some standards or indicators for drainage currently in use for humanitarian response. Although these guides tend to be vague or very specific, the standards or indicates are dealt with in different sections of these books, by different organisations, with no clear responsibility allocated. Examples of drainage guidance are outlined below:

Table 1. Overview of available surface water management guidance, standards and indicators

Source	Overview of guidance, standards and indicators
Sphere Handbook (2011)	• 'Drainage standard 1: Drainage work: people have an environment in which health risks and other risks posed by water erosion and standing water, including stormwater, floodwater, domestic wastewater and wastewater from medical facilities, are minimised; • Water point drainage is well planned, built and maintained. This includes drainage from washing and bathing areas as well as water collection points and hand washing facilities; • There is no pollution of surface water and/ or groundwater sources from drainage water; • Shelters, paths and water and sanitation facilities are not flooded or eroded by water; and • There is no erosion caused by drainage water.'
Harvey, Baghri and Reed (2002)	• Standing water around facilities, slippery surfaces, minimisation of breeding sites for vectors, not liable to erosion, not in danger of flooding and ensuring constant access (minimum objectives for drainage combined with those for wastewater).'
Johns Hopkins Bloomsberg School of Public Health and International Federation of Red Cross and Red Crescent Societies, (2008)	• 'The minimum standard where people have an environment in which the health and other risks posed by water erosion and standing water (including storm water, floodwater, domestic wastewater and wastewater from medical facilities) are minimised has been established for drainage in emergencies: • Areas around dwellings and water points are kept free of standing wastewater; • Storm water drains must also be kept clear; • Shelters, paths, water and sanitation facilities are not flooded or eroded by water; • Water point drainage must be well planned, built and maintained including drainage from washing and bathing areas as well as water collection points; • Drainage waters do not erode or pollute surface or ground water sources; and • Sufficient numbers of appropriate tools are provided for small drainage works and maintenance where necessary.'
Division of Operational Services UNHCR Geneva (2006)	• 'Water points should have proper drainage'
UNHCR Handbook for Emergencies (UNHCR, no date)	• Drainage is regarded as a cross cutting/ environmental issue and is mentioned under both camp planning and WASH, albeit with no clear direction and guidance. • At a policy and strategic level, drainage is recognised as an issue but guidance on responsibilities, actions and standards is not explicit. • Flooding is regarded alongside firefighting as a risk, but risk management does not appear to be very active. • This Handbook also indicates the ambiguity of the term 'drainage', with greywater and wastewater included as well as surface water.
Davis and Lambert (2002)	• Technical advice about drainage is outlined within the road chapter. • Some of the issues raised under 'drainage', for example surface water filling pit latrines, are more properly dealt with under the design and construction of sanitation facilities, rather than reacting once the problem becomes apparent.

Photograph 2. Ponding due to road construction, Uganda

Source: B Reed

Photograph 3. Polluted drainage channel, South Sudan flood damage to shelters in Jaman Camp, South Sudan

Source: V Hammond

Key gaps in the content of surface water management guidance

A wide exploration of issues relating to surface water management in humanitarian contexts is given in (Reed, 2017). In summary, the main issues raised in this paper were:

- A lack of clear standards in relation to managing surface waters;

- The varied nature of the problem (spatial and temporal depending on topography, soils and climate), means the issue varies significantly , unlike universal issues such as water supply or education. Bastable and Russell (2013) indicated problem was more noticed by field staff than international managers; and
- Core guidance (such as (The Sphere Project, 2011) and (Davis and Lambert, 2002) does not consider drainage at three levels in detail;
  - Macro (camp planning and management);
  - Meso (smaller, more local drainage along roads); and
  - Micro (drainage of individual areas and buildings, or for vector control).

Current challenges

Presently, the practical solutions for the better implementation of surface water management are poorly understood in humanitarian contexts. There is a lack of guidance to help humanitarians implement appropriate solutions and unlock the multiple benefits of good surface water management. Research suggests that the available guidance does not fully appreciate the complexities of a multi-sector response that is required for the implementation and management of solutions. The guidance that does exist is mainly focused on the drainage of roads rather than wider scale management of surface water.

Current thinking on surface water management has changed since some of the existing advice was written (Davis and Lambert, 2002, Ouano and Cairncross, 1991, Bjerregaard and Meekings, 2008) with a move towards managing the water at source, rather than conveying it away as fast as possible. The existing design approaches imply access to data on design flows, rainfall patterns and soil and geological factors, which may not be readily available to those within a global humanitarian emergency context. This lack of specific design information is coupled with similar gaps in clear standards and performance criteria, although this is partly due to the contextual nature of the problem. This presents a challenge in generating specific guidance, as the fieldworker will need to know when to act (often in advance of there being a problem) and for the designer knowing what standards to meet.

Currently, surface water management thinking at an international level emphasises the application of localised, catchment focussed solutions, mimicking natural processes in the water cycle and managing surface waters as close to the source as possible. Meanwhile, existing humanitarian guidance often emphasises rapid conveyance of surface waters downstream, which can just move the problem and even make it worse.

Globally, there is often extensive and detailed guidance on designing drainage in various climates and contexts. However, there are a few issues that mean these are not suitable for direct adoption and future guidance should also address the following:

- A wider scope (e.g. to include vector control, faecal pollution);
- Specific recommendations with respect to variations in climate, regulations or other contextual aspects;
- Information on rapid provision and subsequent adjustments during disaster response stages;
- Guidance on rapid assessments; and
- Detailed enough for the intended audience and possible interventions but not too long and unwieldy.

Need for simplifying language and solutions

Language around surface water and drainage has evolved significantly with many different names being used for the same or very similar techniques. For example, the phrase attenuation basin and detention basins are used interchangeably, but both refer to a dry vegetated depression in the landscape designed to slow flows and hold back water for short periods of time.

Given, the variety of backgrounds of humanitarians, working to provide infrastructure and plan sites, this variety of language provides a communication barrier. Terminology is frequently vague and confusing. Consequently, any new guidance should make sure that clear distinctions are made between different techniques and components (e.g. infiltration, conveyance etc.) to simplify the vast surface water management vocabulary that current exists globally. Slight variations should therefore be included as possibilities under these simplified options.

Need for ownership in humanitarian contexts

Despite the lack of guidance for surface water in humanitarian contexts, drainage as a topic, whilst sometimes being poorly defined, is recognised in most strategic level documents as being an issue. It is recognised as being cross cutting, but this wide scope can also lead to loss of “ownership” of the issue. Whilst drainage is mainly in the WASH section of the Sphere Project (2011), the draft version for 2018 keeps greywater in the

WASH section but moves surface water (from rain and rivers) to the 'shelter' and 'settlement' section. This is a better institutional fit but may lead to lack of technical expertise for surface water management.

Conclusions and lessons learnt

This scoping study concluded that there are significant gaps in the quality of the information available for practitioners to practically apply surface water management. It is apparent that guidance on managing surface water needs to consider:

- Silt, faeces, solid waste and other contaminants;
- Other forms of surface water (e.g. split water, "clean" greywater);
- Vector control;
- Local conditions (e.g. climate, soil, settlement plans) whilst being adaptable to global context;
- Temporal and spatial assessments of risk; failing to address the quantity, quality and amenity value of this resource;
- Institutional responsibilities;
- Stages of emergency response; and
- Scales of implementation and the life-cycle of a camp.

The next stage of this project will therefore attempt to fill many of the gaps identified in this paper, through developing a practical toolkit that is simple to navigate, end-user focussed and aims to build surface water management capacity of both practitioners and communities benefiting from infrastructure designed to manage surface water.

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Notes

1. This project is part of a Humanitarian Innovation Fund study on 'Surface Water Drainage in Emergencies', which is part of the HIF's 'Knowledge Access Challenge' project looking for innovative

proposals to develop tools and guidance to support field practitioners implementing surface management solutions in a humanitarian context.

2. The Sphere Project is an initiative that brings a wide range of humanitarian agencies together around a common aim. The Sphere Handbook is a Humanitarian Charter and outlines the Minimum Standards in Humanitarian Response (The Sphere Handbook, 2011).

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