

## Practical Paper

# Needs and vulnerability assessment (NAVA) indicators for specific hazards in the context of Sri Lanka

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### ABSTRACT

Development of a four hazard-specific toolkit (drought, flood, landslide and chronic kidney diseases of unknown aetiology) for needs and vulnerability assessment in the water, sanitation and hygiene (WASH) sector included community consultations with district, divisional and community stakeholders in four selected districts of Sri Lanka, which are highly prone to the respective hazards. Existing global WASH tools such as sphere and global WASH cluster indicators are contextualized, and the toolkit covers three different displacement scenarios: no displacement, temporary displacement (short and medium term), and camp-based displacement. This toolkit focuses on four key sections of WASH: water supply, sanitation, waste management and control, and hygiene practices and promotion. The toolkit consists of a set of indicators in the areas of WASH that are relevant to the selected scenario in the Sri Lankan context for the specific hazard, a checklist for initial and rapid assessment before and after disasters, and some guide notes for the field works.

**Key words** | assessment, disasters, indicators, needs, vulnerability

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### INTRODUCTION

Sri Lanka has been experiencing multiple natural disasters with severe impacts over the past years affecting human lives, disturbing human settlements and damaging properties. The most frequently occurring natural hazards in Sri Lanka are floods and droughts. Apart from those, Sri Lanka is also prone to other hazards such as coastal erosion, landslides, cyclones and tsunamis ([DMC – Disaster Management Centre 2012](#)). Some parts of Sri Lanka are also facing an enormous challenge with chronic kidney diseases of unknown aetiology (CKDu) (geographical hazard profiles are shown in Appendix 1, Figures A1–A4, available in the online version of this paper).

It has been highlighted that there are many agencies working in the water, sanitation and hygiene (WASH) sector in Sri Lanka, and a set of commonly agreed indicators for a specific hazard in a specific context is still not available. Although current standards have been generally welcomed,

concerns have been raised about their use. One worry is that the main measures apply only to ideal situations in relief camps, and that standardization will prevent relief workers from adapting in more complex situations ([Griekspoor & Collins 2001](#)). A method to overcome this concern is to develop context and hazard specific indicators along with the widely accepted global standards.

Therefore, a common toolkit for needs and vulnerability assessment (NAVA) with contextualized indicators could be developed and worked upon in an agreed manner. Further WASH agencies prioritized the key vulnerabilities in different disaster scenarios in the Sri Lankan context, and poor assessment, data and information was reported as the first priority ([RedR India 2012](#)). Hence, the aim of this paper is to discuss the relevant framework developed for WASH vulnerability assessment before disaster and needs assessment after disaster, based on four specific hazards in Sri Lanka.

This toolkit contextualizes already existing tools and questionnaires to Sri Lankan specific hazard scenarios for the WASH sector. It comprises:

1. pre- and post-hazard WASH vulnerability indicators;
2. methodology of assessment;
3. operational guidance for carrying out the assessment in a participatory manner.

Such a toolkit will provide the humanitarian community with a uniform approach in assessing the WASH vulnerability and needs. As a result of a uniform approach using this toolkit by all WASH stakeholders under the leadership of the Ministry of Water Supply and Drainage Board, coordination becomes more effective in analysing data and devising the response.

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## CONTEXT – HAZARDS, WASH NEEDS AND VULNERABILITIES

### Drought

Despite the predominance of rainy patterns in governing the rainfall regime of Sri Lanka, drought has been a common feature of the Sri Lankan landscape since ancient times. This has resulted in significant economic, environmental, and social impacts and increased the vulnerability of communities to disasters. The entire dry zone of Sri Lanka is prone to very high drought hazard, and the wet zone possesses a low degree of drought hazard (DMC – Disaster Management Centre 2012).

The quantification of displacement related to drought remains a global gap. The displacement scenario for drought depends on the vulnerability of the livelihood of an individual family rather than a community as a whole (IDMC 2014). IDMC research has found that at least 80% of the world's disaster-driven displacement in the past five years has been triggered by rapid-onset hydro-meteorological events. The estimation methodology used in IDMC's global estimates was not well suited to assessing drought-induced displacement because of the complex, multi-causal and often delayed impact of droughts on displacement outcomes (Ginnetti & Franck 2014).

In the Sri Lankan context, community-scale displacements are very minimal as a result of drought. However

*ad hoc* local migration of labour from families whose livelihood is vulnerable to drought is visible in the drought-prone areas. Therefore, considering the significance of large numbers of families choosing their own coping mechanisms without displacement, and given the limitations in framing the displacement scenarios of communities for drought, no displacement scenario for drought was developed. Additionally, a set of indicators for the post-drought scenario, with specific needs of the non-displaced community, has been included in the framework.

### Flood

Sri Lanka is an island with a unique orographic region which acts as the hub for the radially flowing river system. Sri Lanka's most susceptible region for floods is in the Kalu Ganga basin, where the Ratnapura district, for example, suffers from floods almost annually. Although the size of the Kalu Ganga basin is 2,803 km<sup>2</sup>, which is about a quarter of the size of the Mahaweli Basin (10,448 km<sup>2</sup>), its annual discharge is almost at the same level or slightly higher than that of the latter (Swan 1983). Further, trend analysis of floods in Sri Lanka from 1990 to 2011 reveals that the frequency of floods has been increasing, particularly since 2003. In Sri Lanka only a few areas can be called flood-free, and most of the flood-prone areas tend to be in high rainfall areas of low elevation and close to a stream, reservoir or sea. The Desinventar database in the Disaster Management Centre, for floods events in Sri Lanka, shows that the highest number of flood events are reported from the high rainfall areas, Ratnapura and Kalutara districts (DMC – Disaster Management Centre 2012). Although the occurrences of floods in some districts are not that high, the significant vulnerability of people make the floods more devastating, such as in the flood of 2011 in Batticaloa district, which was the worst flood since the 1950s. Sri Lanka has riverine floods, flash floods and localized floods.

### Landslides

Often we hear of a landslide and the consequent damage after heavy precipitation (Bandara 2005). The level of rainfall has been directly correlated in studies to the possibility of a landslide event in Sri Lanka (ADPC 2009). Therefore,

landslides are mainly triggered due to heavy rainfall, as the likelihood of other causes such as earthquake, are limited in the hilly areas of Sri Lanka. However, landslides are also caused by human activity, for example, high levels of deforestation can lead to poor soil stability. In the context of Sri Lanka, unless disastrous landslides occur, the number of families that need to be relocated will be small, thus not resulting in a massive camp structure. However, until a suitable relocation place is found, these families need to live in small camps.

Landslide hazard zonation maps should be used as a planning tool, and utilized for planning human settlements and infrastructure including WASH infrastructure, which are very critical during occurrences of landslides. If the area is medium or low risk for landslides, the damage is also less. Therefore people may come back and build back more landslide-resilient structures. As the scenario is similar to floods, people could be accommodated in temporary displacement centres until the landslide warning is lifted. This requires a short-term response within the temporary displacement scenario. Assuming that better early warning systems are in place for landslides, we consider a temporary displacement scenario for the purpose of pre- and post-WASH activities in this paper. However, the camp scenario cannot be completely eliminated as this situation is highly likely in areas at high landslide risk. As the landslide risk is very scattered, changing very differently from point to point rather than from area to area, the impact situation can also be very different based on the point vulnerability.

### Chronic kidney diseases of unknown aetiology

Chronic kidney diseases of unknown aetiology (CKDu) has now become a major public health problem in Sri Lanka, mainly in the north central region. The total number of affected individuals with CKDu is unknown; however, hospital statistics suggest that in excess of 8,000 people are currently undergoing treatment for this condition (WHO 2012). Worldwide, diabetes mellitus is the most common cause of chronic kidney disease, but in some regions other causes, such as herbal and environmental toxins, are more common (Jha *et al.* 2013). Research reports highlight that CKDu in the Northern Central province, particularly in Anuradapura district in Sri Lanka, is on a steep rise in

farming communities and possible environmental and socio-economic risk factors have been attributed. They include high fluoride content in the groundwater in some of the affected areas, the farming community's exposure to inorganic pesticides and fertilizers, the leaching of heavy metals such as cadmium from agricultural chemicals into water sources, and the use of low-quality aluminium pots and barrels to store drinking water (IRIN 2008). CKDu research studies on heavy metal and ochratoxin exposure have revealed conflicting results. Fluoride content of well water in all these areas exceeded the WHO recommended level of 0.6 mg/L. Water in all areas was alkaline, which could facilitate mobilization of fluoride from minerals, indicating a fluoride-mediated mechanism for renal damage (Wanigasuriya 2012). The increasing number of CKDu-affected people in Sri Lanka is a real concern of health-related issues and particularly in the north central dry zone. Several studies have been carried out to understand the root causes, which can help health and other relevant authorities to mitigate the CKDu as well as to respond to the needs of CKDu-affected patients. The findings of one research suggest that although no single geochemical parameter could be clearly and directly linked to CKDu aetiology on the basis of the elements determined during the study, it is very likely that the unique hydro geochemistry is closely associated with the incidence of CKDu (Chandrajith *et al.* 2011). However, other research analysis attributes the issue of CKDu to multiple factors including water, but the root causes have not been well established so far.

It is apparent that numerous CKDu-related research projects have been completed, most of them from the health point of view, but none of them seem to conclude a real definitive root cause for this problem due to the complexity of different factors causing CKDu. Some research findings attribute this problem to Cd and As, while other researches look into multi-disciplinary cause factors. A progress report submitted in February 2012 in research on chronic kidney disease of uncertain aetiology, in North Central and Uva Provinces in Sri Lanka within the framework of the National Research Programme, highlights that a minimum of 15% of people in the age group 15–70 years are affected by CKDu in those provinces. Men over the age of 40 years, who have been engaged in farming for more than ten years, are at higher risk of developing this disease. In

addition, exposure to agrochemicals also increases the risk of developing CKDu. The majority of men and women suffering from this disease excrete raised levels of arsenic and/or cadmium in the urine. This indicates consumption of arsenic and cadmium in either water or food. Studies done so far on (drinking) water samples from Anuradhapura, Polonnaruwa and Badulla show that cadmium and lead levels are within normal limits.

In the context of WASH indicators for CKDu in Sri Lanka, the no-displacement scenario was considered, where families still live in the same area affected by CKDu. Therefore, pre- and post-CKDu division becomes complex, and for the purpose of WASH indicators for CKDu it is included in the pre- and post-health care, as CKDu is a chronic issue. Since CKDu issues are inter-related with other sectors such as agriculture, food, environmental and chemical usage, this issue needs to be fused very well with all sectors, rather than relating to water alone.

## MATERIALS AND METHODS

A framework was developed for four different hazards (see Appendices 2 and 3), and all possible scenarios were listed. These scenarios include no displacement, temporary displacement, medium-term and long-term camp-based displacement. Two sets of indicators, one for pre-disaster vulnerability assessment and the other for the post-disaster needs assessment, were developed, and corresponding indicators for the context in Sri Lanka (contextualized from the indicators available from the Global WASH Cluster and Sphere Project) were identified.

### Study locations

Four sample locations were selected from Batticaloa, Kilinochchi, Nuwara Eliya and Anuradapura districts. Selection of districts was based on the three major natural disasters in Sri Lanka, namely, droughts, floods and landslides, and the issue of CKDu. Kilinochchi district is selected mainly for drought, Batticaloa district for floods, Nuwara Eliya district for landslides and Anuradapura district for CKDu.

The complexity in the post-disaster needs assessment indicators comes with different possible scenarios of disaster

impact. Depending on the severity of disaster, i.e., the impact in risk elements and response by the affected population, different scenarios will arise, as depicted in Appendices 2 and 3, Figures A5 and A6. Therefore indicators will differ for each scenario for the specific hazard. In order to develop a uniform toolkit on WASH vulnerability assessment that is contextualized to the natural hazards in Sri Lanka, the following methods were used:

1. Study of the existing tools already developed and employed by different WASH agencies (governmental and non-governmental);
2. Field visits were undertaken to the selected locations. These include:
  - (a) meetings with identified key stakeholders at district divisional level;
  - (b) focus group discussion with the community at risk on selected locations;
  - (c) semi-structured interview with the key informant interviews.

A wide range of stakeholders was consulted during the field visits to the four selected districts at district, divisional and village level.

The drought toolkit was field tested by front-line workers from a local NGO during the drought in 2013 in the northern and eastern parts of Sri Lanka. The feedback from the field test was obtained, and the toolkit was made more user-friendly with the required guidelines. A draft toolkit was then presented to the National Water Sanitation Coordination meeting and their feedback was also incorporated, which made the toolkit development a participatory process from bottom to top.

### Process

The WASH NAVA toolkit for Sri Lanka has two sections: the first section includes a general framework for pre- and post-disaster assessment and a hazard specific assessment framework, and the second section includes WASH indicators. For a comprehensive post-disaster response needs assessment, it is required to have access to vulnerability data of the location and community in a pre-disaster situation. This will include demographic and physical, social, economic and cultural characteristics of the disaster-affected

community. A Comprehensive Disaster Management Plan (CDMP) drawn up by the Disaster Management Centre was linked to the WASH assessment, particularly for hazard specific indicators.

The toolkit consists of general community characteristics and pre-disaster WASH indicators to be assessed. This helped to develop a WASH profile of the community in the pre-disaster situation, which serve as a baseline for any future WASH-related assessments including post-disaster needs assessment.

A framework for drought condition in the context of Sri Lanka considered no displacement scenario and CKDu followed the same framework. However, for floods and landslides, temporary displacement is a common and very frequent scenario in the Sri Lankan context, as summarized in Table 1. The global and Sri Lankan WASH indicators' list of available resources for additional reference and formats for WASH vulnerability and needs assessment were also included in the annex of the toolkit.

The WASH vulnerability and needs assessment toolkit (see Appendix 4 for list of contents) consisting of indicators, methodology and guidelines, has been divided into four sub-categories:

1. water supply (access, quality and quantity);
2. sanitation (excreta disposal);
3. vector control and waste management (drainage, vector control and solid waste management);
4. hygiene practices/promotion.

**Table 1** | WASH focus areas in the context for specific hazards in Sri Lanka

Scenario for specific hazard	No displacement	Temporary displacement	Long-term displacement
Floods	Not considered	Water, sanitation, waste management and hygiene	Not considered in the Sri Lankan context
Drought	WASH	Not considered	
Landslide	Not considered	Water, sanitation, waste management and hygiene	
CKDu	Water	Not considered	

However, vector control and waste management has less relevancy in relation to drought conditions in the context of Sri Lanka. Therefore, water supply is mainly discussed and some indicators for sanitation and hygiene practices/promotion are also included in the pre- and post-drought conditions. For CKDu issues, only water supply indicators are considered (access, quality and quantity) for the purpose of pre- and post-assessment in this toolkit as it is factored with water. Due to the temporary displacement scenario arising for floods and landslides, all four WASH sector focus areas are considered in this toolkit (see Table 1 for summary).

### Lessons learnt

Initially it was decided to focus on three prioritized hazards (floods, drought and landslides) in the context of Sri Lanka, based on the frequency of occurrence, scale of impact on people and their livelihood, as well as future risk factors. However, during the process of the consultation with the Ministry of Water Supply, it was decided to also include CKDu, which is a chronic hazard that has been a serious concern of many in the north central part of Sri Lanka and being mostly factored with water, although different research studies indicate multiple causes.

Field testing of the drought toolkit highlighted that the checklist for the front-line workers is user-friendly and it provides them with a clear snapshot of what to look for just after the disaster. A specific set of indicators listed in the checklist that are more relevant to the highly likely displacement scenario in the Sri Lankan context is the unique characteristic of this toolkit.

The common assessment format, which has an exhaustive list of indicators, becomes less relevant to the disaster and to the specific displacement scenario. Therefore, having a contextualised hazard and displacement type specific feature in the checklist guided the field workers to focus more on the relevant indicators and gave a clear framework in assessing focused vulnerabilities.

### CONCLUSION

The NAVA toolkit for the WASH sector in Sri Lanka is a contextualized toolkit following global standards and

indicators for pre- and post-disaster situations. The toolkit, comprising the indicators, checklists along with the guidelines with a participatory approach, provides the humanitarian community with a uniform approach for WASH NAVA for four prioritized hazards in Sri Lanka.

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