NATIONAL GUIDING PRINCIPLES
ON
SANITATION IN CHALLENGING ENVIRONMENT FOR RURAL HOUSEHOLDS

JULY 2019
Preface

The Royal Government of Cambodia is committed to achieving 100% rural sanitation coverage by 2025. To join concerted efforts for achieving this strategic vision, the Ministry of Rural Development (MRD), in collaboration with development partners has developed a National Action Plan for Rural Water Supply, Sanitation and Hygiene 2014-2018 (NAPI) and is in the process of finalizing NAP II 2019-2023. Dissemination of NAPII will be accompanied by a set of national guidelines, including these guiding principles on Sanitation in Challenging Environments (SCE) for rural households.

Primary data from Cambodia Socio-Economic Survey (CSES) 2017 reported 71.2% of all rural households in Cambodia had access to the improved toilet facilities in their dwellings, in which almost all the improved toilets the households had used were connected to sewerage and septic tank. However, it is expected that the sanitation coverage is lower for people living in challenging environments; that is, areas affected by seasonal flooding, high groundwater, floating communities, seasonally water-scarse and hard ground. The attached document provides guiding principles to address a significant gap of sanitation for 27% of Cambodia's population who live in challenging environments impact their ability to access appropriate and improved sanitation solutions at all times (source WSP 2011).

To achieve universal coverage, in alignment with the UN Sustainable Development Goals (SDGs), the Government, with the MRD as a key responsible body developed a strategy to invest in improved SCE for rural households. To urgently meet the needs for appropriate sanitation solutions in challenging environments, MRD defined two output indicators in the NAPII that by 2023 there will be:

- 70% of households in Challenging environments with access to basic sanitation services
- 36 districts with Entrepreneurs providing sanitation products and services for sanitation in challenging environments

These guiding principles support the implementation of the NAPII effectively, efficiency and collaboratively, MRD along with development partners in WASH sector in Cambodia.

MRD sincerely thanks SCE Technical Team Members of Rural Sanitation and Hygiene (RuSH) Working Group under the Rural Water Supply, Sanitation and Hygiene (WATSAN) Sectoral Working Group of the Ministry of Rural Development (MRD), Development Partners, relevant NGO’s in providing options, inputs, technical support and financial support in establishing these guiding principles in response to the situation and activities for promoting safe sanitation in challenging environments for rural households in Cambodia.

Last not but least, MRD is pleased to encourage and appeal to development partners, relevant NGO’s and WASH implementers in promoting and implementing this guiding principles for providing sanitation for Cambodia’s population living in challenging environments.

Phnom Penh, July 09 2019

Director of Department of Rural Health Care

Dr. LON SAYTENG

July 2019
National Guiding Principles on
Sanitation in Challenging Environments for Rural Households

1. Introduction

The Royal Government of Cambodia is committed to achieving 100% rural sanitation coverage by 2025. A National Action Plan for Rural Water Supply, Sanitation and Hygiene 2014-2018 (NAP) was developed to coordinate action to reach this goal. NAP II will be developed in 2018 for period 2019-2023. The NAP is accompanied by a set of national guidelines, including these guiding principles on sanitation in challenging environments (SCE) for rural households.

Over a quarter of Cambodians (approximately four million people) live in a challenging environment, where sanitation infrastructure is particularly difficult to implement and maintain. There is currently no national data on sanitation coverage in challenging environments specifically, however it is presumed to be significantly lower than the 53% average for the rural population. There is a need for additional focus on not only sanitation technologies for challenging environments but also sanitation financing, training, education and faecal sludge management to specifically address the unique requirements of these areas. The impacts of climate change will further exacerbate the current issues and the need for appropriate sanitation solutions in challenging environments.

For Cambodia to achieve universal sanitation access as per its 2025 goal and ensure alignment with SDG 6; achieving access to adequate and equitable sanitation and hygiene for all and end open defecation by 2030, there must be an urgent focus on sanitation in challenging environments.

2. Definition of Challenging Environments

A Challenging Environment refers to a rural location where it is either difficult to construct conventional latrines or where the use of conventional latrines is likely to contaminate the surrounding environment, particularly groundwater and surface-water resources. Therefore, it is more difficult to ensure improved access and safely managed latrines as per the requirements of SDG 6. In Cambodia the most common challenging environments are seasonally flood prone areas, high groundwater locations, floating communities, seasonally water-scarce areas and hard ground. Challenging environments also exist in the coastal, mountainous and remote locations of Cambodia. Characteristics of common Challenging Environments in Cambodia include:

- Floating: Houses are floating for at least part of each year;
- Moderately, Medium and Severely Flood Affected: WSP report (2011) provides further advice on defining flood affected areas, see Appendix I for further information;
- High Groundwater: A number of reports provide guidance on groundwater levels around pit latrines, these are provided in Appendix I;
- Hard Ground: Latrine pit cannot be dug by hand;
- Water Scarce: The community lacks access to the water required to use conventional pour-flush pans.

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1 NAP output 4.2.2 mentions specific targets on the increased development of latrine products for Challenging Environments
2 Affordable Sanitation in Challenging Areas in Cambodia and Lao PDR - Phase 1, WSP, 2011
3 Cambodian Socio-Economic Survey (CSES) 2015
4 WSP, 2011; Cambodian DRR Position Paper 2A (Water, Sanitation & Hygiene), Joint Action Group for Disaster Risk Reduction Cambodia, 2015
5 WSP 2011
3. **Purpose of the Guiding Principles**

The aim of these guiding principles is:

1. To improve clarity around the definition of SCE, highlighting the situation and the key challenges related to SCE.
2. To generate a coordinated and consistent approach to improving sanitation amongst communities living in challenging environments.
3. To provide information on current technology available which is appropriate for challenging environments.

These guiding principles are to be used by national and sub-national government, non-government and private sector organizations and donors.

4. **Key Considerations for SCE in Cambodia**

1) **Program Implementation**

Key considerations for program implementation are set out below:

4.1 Challenging environments need to be considered at all stages of a program from concept development and financing through to construction and implementation. Sanitation programs need to consider the geographical area\(^6\) they will be working in, accommodate the challenges these environments present and develop financing options for the technologies. The inherently more complex and expensive nature of sanitation initiatives in challenging environments must be accounted for during the early stages of a program to ensure appropriate financial and technical resources are available. Specialised technical solutions will need to be scoped or developed, and appropriate behaviour change approaches implemented as necessary. Sanitation in Challenging Environments needs to be supported through a broad approach including education and training, financing, marketing approaches and faecal sludge management as well as technology development and use.

4.2 Conventional pit latrines\(^7\) should only be promoted and constructed where they will not contaminate local ground and surface-water supplies. There should be a space of at least 1.5 metres vertical separation between the bottom of a latrine pit and the maximum annual groundwater level, and 30 metres horizontal separation between a pit latrine and any water source (such as a well)\(^8\). Pit latrines in areas prone to flooding must be well sealed to prevent faecal contamination of floodwater.

4.3 There is currently a lack of appropriate financing opportunities for sanitation technologies suitable for challenging environments and program implementation in challenging environments is sometimes more expensive than in normal environments. Often households in challenging environments are in the lowest wealth quintiles and are unable to afford appropriate sanitation technologies (where available) as they are significantly more expensive than standard sanitation options. Many sanitation programs are currently deterred from working in challenging environments due to the increased costs associated with working in these areas. Programs should develop sustainable financing options for challenging environment technologies. These options could include targeted smart subsidies\(^9\), specially developed loan packages for challenging environments (such as through Micro-Finance Institutions), and support for village savings groups.

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\(^6\) The ability of organisations to currently identify and plan appropriate programs of work in Challenging Environments is currently hampered by the lack of clear mapping of CE.s.

\(^7\) In rural Cambodia, conventional latrine technology can be considered a pour flush concrete-ring pit latrine


\(^9\) Programs using subsidies should refer to the National Guiding Principles on Sanitation Subsidies, however given the cost of many SCE technologies special considerations may be necessary for appropriate subsidies for challenging environments.
4.4 Programs should establish and support effective supply chains for challenging environments. Often local conditions do not support the ‘natural’ establishment of supply chains in these areas. Supply chains are crucial to support the ongoing implementation, affordability and scalability of SCE technologies.

4.5 SCE is closely linked with Disaster Risk Reduction (DRR). The construction of appropriate sanitation facilities in challenging environments, particularly flood and drought prone areas, helps mitigate the impact of climate change and disasters. Consideration of SCE and Faecal Sludge Management needs to be incorporated into community water safety planning.

II) Research & Development

Priorities for future research and development are set out below:

4.6 The development, promotion, knowledge sharing and use of challenging environment-specific technologies needs to be enhanced and prioritised across the sector. This is required to prevent human faecal waste contaminating the surrounding environment (including surface-water and groundwater resources) and to ensure affordable technologies are available for the wide range of challenging environments found in Cambodia.

As appropriate designs, construction techniques and implementation approaches are developed and successfully trialled, the findings will be captured in an SCE technology compendium that supplements and provides details to support the options outlined in Appendix II of these guiding principles.

4.7 There is a clear need for significantly improved mapping of challenging environments in Cambodia. Simple maps are required to identify, floating, flood-prone, and water scarce areas to enable clear identification and prioritisation of impacted areas. For maximum effectiveness, areas with high groundwater, coastal and difficult access would also be included. Mapping which includes population densities would be beneficial as it would aid in estimating the number of people impacting by a challenging environment. These maps would greatly improve the planning and implementation of projects in challenging environments.

4.8 The environment-specific sanitation behaviours present in challenging environments need to be more clearly understood and addressed. Examples of the behaviours that need addressing are households opening their latrine pits to wash the faecal sludge into flood waters, and the practice of open defecation into flood waters because ground-level latrines are flooded.

5. Monitoring and review of these National Guiding Principles

These guiding principles will be reviewed in conjunction with the NAP review cycle. The review will examine the effectiveness of these guidelines and commission assessments and evaluations as required. Guidance on sanitation technologies in challenging environments is an evolving and dynamic part of the sanitation paradigm in Cambodia. As technologies, implementation approaches and resource materials are developed these guiding principles will be amended, and additional resources such as a technical compendium of sanitation technology options in challenging environments will be updated.

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10 As per NAP outcome 4.2.2.2
Appendix I

Unaffected, Moderately, Medium and Severely Flood Affected
The following extract from the WSP paper “Affordable Sanitation in Challenging Areas in Cambodia and Lao PDR, Phase 1, WSP 2011” provides a definition on flood affected areas:

“...Four categories of affected people were defined: (1) Severely affected: people dealing with challenging area problems every day or for months at a time; (2) Medium affected: people dealing with the problems for weeks at a time every year, or once every 2-3 years plus annual flooding; (3) Moderately affected: people dealing with challenging area problems for short time periods of a week or less annually, or affected once every 5-10 years by large flood or rainfall events; and (4) Unaffected: people who are out of the flood locally or have otherwise resolved sanitation issues...”

High Groundwater:
Reports which provide guidance for the recommended spacing between groundwater levels and pit latrines include;

2. Pit latrines for special circumstances, Guide 29, WEDC, Loughborough University, 2014 [link]
3. Affordable Sanitation in Challenging Areas in Cambodia and Lao PDR, Phase 1, WSP 2011
## Appendix II

<table>
<thead>
<tr>
<th>No.</th>
<th>Name &amp; Contact</th>
<th>Description</th>
<th>Product</th>
<th>Floating</th>
<th>Flood prone</th>
<th>High Ground Water</th>
<th>Water Scarce</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Handypod system</td>
<td>High quality treatment producing effluent meeting “recreational standards”. Originally designed for floating houses but suitable for flood prone &amp; high groundwater.</td>
<td>$150 for product + installation (excluding super-structure)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>CONTACT:</td>
<td>Wetlands Work!</td>
<td><a href="mailto:wetlandswork@gmail.com">wetlandswork@gmail.com</a></td>
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<td>2</td>
<td>ATEC* Bio-Digester</td>
<td>ATEC* Bio-digester: sanitation solution &amp; gas &amp; fertilizer production. Flood-prone &amp; HGW areas. Direct connection of toilet to inlet of bio-digester. Requires household to have one to two cows (or four pigs).</td>
<td>$650 for bio-digester (includes biodigester, cooking stove, rice cooker, pipework &amp; after sales service)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>CONTACT:</td>
<td>ATEC*</td>
<td><a href="mailto:info@atecbio.com">info@atecbio.com</a></td>
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<td>3</td>
<td>Sky Latrine</td>
<td>Ceramic pan (squat or sit styles available) with oversized PVC piping to reach from stilted house floors to ground. Includes catchment box (underneath pan) and tiled floor surface. Recommend to pair the Sky Latrine with pit/tank technology suited to flooded environment.</td>
<td>$140 approx. including an oversized, sealed pit latrine</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>CONTACT:</td>
<td>iDE</td>
<td><a href="mailto:Cambodia@ideglobal.org">Cambodia@ideglobal.org</a></td>
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<td>4</td>
<td>3C Pit Latrine</td>
<td>Adaption to standard concrete pit latrine (Easy Latrine) to have septic-tank style functionality. Custom concrete moulds required. Trial in 2017-2018 by EWB &amp; iDE.</td>
<td>$99 approx. for 3C pit</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>CONTACT:</td>
<td>EWB or iDE</td>
<td><a href="mailto:sceproject@ewb.org.au">sceproject@ewb.org.au</a></td>
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<tr>
<td>No.</td>
<td>Technology</td>
<td>Description</td>
<td>Costs</td>
<td>Challenging Environment</td>
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<td>5</td>
<td>SATO latrine Pan</td>
<td>Low-water use latrine pan. For use in drought-prone, seasonally dry or water scarce communities. Trial in 2017-2018 by UNICEF MRD + others.</td>
<td>$50-60* for SATO pan approx. *import costs unknown &amp; will affect final cost</td>
<td>✓</td>
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<td></td>
<td>CONTACT: EWB <a href="mailto:sceproject@ewb.org.au">sceproject@ewb.org.au</a></td>
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<td>6</td>
<td>HDPE Septic Tank from China</td>
<td>Low cost HDPE septic tank manufactured in China. Import costs are substantial for small quantities. Once importing a container load (90 units) becomes cost effective.</td>
<td>~$90/unit</td>
<td>✓ ✓ ✓</td>
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<td></td>
<td>CONTACT: Reyao for import.</td>
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<td>7</td>
<td>Amended concrete pit</td>
<td>Concrete pits with series of internal chambers inside the concrete rings with a second outflow chamber. Approx. 200 units installed.</td>
<td>Unknown</td>
<td>✓ ✓ ✓</td>
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<tr>
<td></td>
<td>CONTACT: <a href="mailto:echoi@korea.ac.kr">iWC (Innovative Water Centre)</a></td>
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<td>8</td>
<td>Amendment to Pit latrine – “Cess to Fit”</td>
<td>Being developed by the NATS team at the Asian Institute of Technology (AIT) Bangkok. A central, cylindrical, prefabricated additional component is inserted in the middle of the cesspit/latrine pit to improve treatment.</td>
<td>Unknown</td>
<td>✓ ✓ ✓</td>
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</tr>
</tbody>
</table>
Technology No. 1, Handypod system

Technology No. 2, ATEC* Biodigester

ATEC* Biodigester system has evolved to meet customer requirements

Can be installed in areas that experience seasonal flooding, high-groundwater, hurricanes and earth tremors

3.25m³ system for small scale and 10m³ system for medium scale farms

Can be moved and/or on-sold by household as an asset, 3 tons

of carbon abated per unit per year, 75 tons per product per lifetime

Can be toilet connected to remove up to 99% of harmful bacteria

Average household net income increase of $521 per year*

*In a typical rural farming family scenario with 2 to 3 livestock, a Biodigester system can provide enough biogas for all daily cooking needs, as well as high-quality organic fertilizer for 1.5 hectares of rice or vegetables.

*Source: Shining OEC Impact assessment 2016
Technology No. 3, Sky Latrine

Technology No. 4, 3C Pit Latrine

Technology No. 5, SATO latrine pan
Proposed amendments to existing Pit latrines to improve suitability for challenging environments:

Approximate numbers of households in each environment are given\(^{11}\).

**Flood Prone Locations (Approx. number of HH: 4,000,000+)\(^{12}\)**

FP1. Latrine pits must be designed and constructed so that they a) do not contaminate flood waters, and b) cannot be easily opened, releasing the pit contents (faecal sludge) into flood waters.

- **Option 1:** The top and any exposed rings of latrine pits are carefully sealed with mortar to stop faecal waste from escaping the pits and contaminating floodwaters.
- **Option 2:** Latrine pit concrete ring stacks are raised above the height of floodwaters (to contain the faecal sludge), with a separate soakage trench for black water.

FP2. Latrines must be accessible and useable year-round, including during times of flooding. Latrine pans must be elevated well above the maximum height of floodwaters, either inside houses or in separate elevated structures.

FP3. Simplified septic tank/anaerobic baffled reactors can be created using a series of sealed concrete pit chambers.

**High Groundwater Locations (Approx. number of HH: 300,000\(^{13}\))**

HG1. Raise the latrine pan and latrine pit in an earth mound to separate the latrine pit from the groundwater table by at least 2 metres.

HG2. Constructing simplified anaerobic baffled reactors with a higher outflow point using a series of connected, sealed concrete pits. For example: sealing the base of the first latrine pit and connecting this to a second soakage pit that is only one-ring deep and is located just below ground level.

**Other**

O1. Installing elevated Decentralised Wastewater Treatment Plants (DEWATs) at institutions such as schools and office buildings.

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\(^{11}\) Approximate numbers of households affected are taken from: Affordable Sanitation in Challenging Areas in Cambodia and Lao PDR - Phase 1, WSP, 2011; Cambodian DRR Position Paper 2A (Water, Sanitation & Hygiene), Joint Action Group for Disaster Risk Reduction Cambodia, 2015

\(^{12}\) The population affected by flooding is heavily influenced by the criteria used to define flood-prone areas. At least two million people are classed as severely/significantly impacted by flooding.

\(^{13}\) This is likely to be on the low side. There is limited data available on groundwater in Cambodia and the database used to calculate the figure does not have data for the whole of Cambodia, and does not fully take into account seasonally-high water tables.