

Designing gender-sensitive sanitation for floating villages

Gender
Poorest of the Poor

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Engineers Without Borders Australia and Live & Learn
Environmental Education

Towards Inclusive WASH Sharing evidence and experience from the field



Background

The Tonle Sap Floating Latrine Project¹ was implemented using a development and design process that ensured inclusion of both male and female adults and children as well as members of the, frequently excluded, floating communities of Cambodia's Tonle Sap Lake.

The vast Tonle Sap is just one of many water bodies hosting floating villages around the world. The lake provides the floating communities with a ready source of water used for bathing, cooking, washing and drinking. However this water is also polluted by the communities' human and household waste. Until recently, no toilets had been designed to provide a viable sanitation solution for floating households and schools that were affordable, accessible and effectively reduced water contamination. Traditional sanitation designs in Cambodia generally rely on pits dug into the ground for faecal storage, or sewerage systems that flush waste away for centralised

treatment—neither systems appropriate for floating communities. Whilst a few large and expensive floating systems have been trialled at public buildings, none are appropriate for household use, and each have demonstrated functional challenges or since ceased operating.^{2,3,4} This lack of appropriate latrine design had restricted the opportunity for government or organisations to promote sanitation uptake through sanitation marketing or community-led total sanitation approaches.

In 2008, Engineers Without Borders Australia partnered with Live & Learn Environmental Education (Live & Learn) to provide advice and guidance on the development of a sanitation system design that would be suitable for schools and houses in a floating environment.

The floating community situation

Before developing designs, the project investigated a range of aspects of the community context through gender-segregated community surveys and focus groups, observations and environmental monitoring. From the investigation, a number of situational challenges that constrained and guided the sanitation design options were uncovered. These situational challenges are described below.

» **Design constraint:** Homes and schools are buoyant because of the use of bamboo poles, sealed plastic barrels or upturned concrete water jugs strapped beneath them. This buoyancy allows the floating houses and buildings to shift seasonally with the lake waters and remain at the water surface, as the lake levels rise and

Location

» Tonle Sap Lake, Cambodia



¹ The Tonle Sap Floating Latrine Project is delivered through a partnership of Live & Learn Environmental Education, and Engineers Without Borders Australia, and has been supported and funded by the Ministry of Rural Development, Cambodia; UNICEF; iBOP; Resource Development International Cambodia; the Royal University of Phnom Penh; the Engineering Institution Cambodia and the Wheeler Foundation.

² At the Environment Visitor Centre at Chong Kneas at the north end of the Tonle Sap Lake, a large composting latrine had been implemented. This system demonstrated the need for sanitation in the lakes, and was effective in minimising the environmental impact from the use at the centre. A large building structure is needed to support this system of continuous composting.

³ The Environment Centre at Phat Sanday hosts a sanitation system implemented by an external donor. The system allows a flush toilet to operate, and it is understood it was designed to treat flushed water by moving it through a number of baffles in a sealed tank under the latrine. However, the rangers at the Centre reported a lack of confidence in the system, which they believed continued to contaminate the surrounding water, and had since discontinued its use.

⁴ The newly-built stilted Commune Centre in Phat Sanday has flush toilets that are piped to an elevated structure of concrete rings, which is poorly sealed and leaks directly into the surrounding waterway when it is submerged in the wet season. This system is the current officially-recommended solution for raised houses.

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Figure 1
Floating village on Tonle Sap Lake, Cambodia

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Figure 2
Floating houses during the dry season, Tonle Sap, Cambodia

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fall by up to 10 metres between dry and wet seasons (Figures 1 and 2). These structures are secured with guy ropes tied to trees and often tied up together.

- › **Consequence:** As a result of this mobility, sanitation systems that connect between houses or to the land beneath the water were deemed inappropriate.
- › **Design constraint:** Many of the houses are unsteady on the water and offer limited floor space.
- › **Consequence:** This limits the size and weight of systems that can be implemented in households.
- › **Design constraint:** There are no waste collection or disposal mechanisms in most floating communities on Tonle Sap Lake.⁵
- › **Consequence:** Systems need to consider waste collection, storage and disposal.

Existing sanitation practice and facilities

The project was designed to align with existing sanitation practice. Surveys found that community members squat to defecate and use water for anal cleansing. Water is also used by women for cleansing after urination. Women manage menstrual hygiene in private parts of their house. Disposable menstrual hygiene pads are the primary management system for menstruation and are wrapped in plastic bags and dumped into the lake waters after use.

Whilst some households have cubicles that provide privacy, all community members defecate, urinate, and dispose of waste directly into the lake waters, either from a hole in the floor or from the edge of the

⁵ Though in 2007, the environmental NGO Osmose commenced a floating rubbish collection and management programme in Prek Toal, in the northern end of the Tonle Sap utilising a community barge collection and sorting process.

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Figure 3
Existing latrine cubicle with hole in the floor directly over lake, Tonle Sap, Cambodia

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house boat (Figure 3). Household members bathe in the open on the house deck, using sarongs for privacy.

Similarly the Phat Sanday primary school had girls' and boys' latrine cubicles with holes again directly feeding waste into lake waters however the boys' cubicle was rarely used due to the strong smell of stale urine from boys 'missing the hole'. The high school had very poor and exposed cubicles for sanitation.

The lack of privacy for defecation, urination and menstrual hygiene management is particularly challenging for women.

Additional socioeconomic factors

Living in floating communities can be a response to landlessness and in Cambodia often provides refuge to immigrant minorities. Whilst households demonstrate a range of wealth, in general they are extremely poor, which sets a constraint for potential sanitation design and ongoing maintenance costs.

During early discussions some, particularly older, community members did not see a need for change of defecation practices from those of their parents and grandparents. The majority however were very receptive to change. Many had received education about the environment and pollution and were willing to change practices if there was an affordable and acceptable option available to them.

The community live in the vicinity of world heritage flooded forests, which places legal restrictions on fishing and wood collecting activities. The rangers stationed to protect the forests were very supportive of trialling new sanitation designs and were keen to role model appropriate sanitation and environmental protection to the community.

Innovative approaches to inclusive design

The project took on a number of measures to develop sanitation options and systems that would be attractive to and suit the needs and habits of community members.

Following community surveys of existing practice and investigation of sanitation techniques used internationally, initial design concepts were developed. The project then utilised a participatory and investigatory design process that focussed on learning about specific sex and gender needs of different parts of the community, and ensuring voice and ownership of community members in the design process so that latrine designs were logical and practical for use.

Live & Learn Women's Forum: Sharing intimate details of women's sanitation practice

A small women's forum was held in-house with women staff of Live & Learn during the development phase. Five women shared practices for defecation, urination and menstrual hygiene management (MHM) using props and mime. Practices used in squat pan facilities, in village settings and in open fields were discussed, mimed and documented in detail.

This private forum enabled a very open discussion between colleagues and an in-depth sharing of experience from a women's perspective. The Australian Project Manager was able to present alternative practices to both guide the group towards open sharing and to provide a point of comparison between different practices making the conversation two-way and interesting for all.

Even though WASH practitioners had regularly discussed general aspects of hygiene and sanitation practice with the

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Figure 4
Live & Learn Women's WASH Forum: Marta demonstrating sarong wrapping, Cambodia

Sodaneath



Figure 5
Bunthand, Daneath and Som Vanna during an information session, Cambodia

Engineers Without Borders Australia



community, this opportunity for culturally appropriate sharing of specific details opened up understanding and breached gaps in experience between designers and community members. More specifically, the women provided information on how water is used for cleansing after defecation, urination, and during menstruation (Figure 4).

This discussion progressed to preferred and aspirational sanitation facilities in Cambodia. For example women at the forum preferred sit-down toilets; this provided the opening for staff to propose and test this option with other community members.

The forum participants also assessed the first design of the Tonle Sap Floating Latrine as it was prepared for trial in Phnom Penh. The assessment recommended

modifications to increase its suitability for women's and children's needs including:⁶

- » Narrowing the third hole/wash basin so women can stand directly over it for cleansing during menstruation
- » Reducing the poo hole size to make it easier for children to use, and to reduce the risk or fear of them falling in
- » Mixing sand in with cement for footpads to create better gripping surface, rather than a smooth cement surface.

Women's and men's focus groups

Community consultation on latrine design was conducted with segregated men's and women's groups to ensure that voices from both sexes were heard. Joint sessions were also held to draw results together and for non-sex specific issues of sanitation management (Figure 5). Break-away groups discussed and responded to key questions for the project system design and concluded:

- » The latrine pan should be raised, with faeces collection in a bucket at floor level to prevent wave damage to a below-floor collection bucket; and
- » Faecal waste should be stored on a community barge in the community due to the high expense of transporting the waste by boat to shore.

Project design proceeded in accordance with the consensus of the group.

Targeting schools to improve attendance by girls and young women

Schools have a special interest in appropriate sanitation to provide a positive school environment and therefore encourage school attendance. Young women particularly benefit from school latrines as urination in places without latrines is far more difficult for girls than for boys, and because of their need for a private and clean place to manage menstruation.

Schools were also targeted for initial trials because it was considered that they offered an institutional mechanism for cleaning and maintenance. The large numbers of students that could potentially use the trial latrines was also considered a benefit because they

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⁶ The full learnings from this workshop have been documented and are available as a supporting reference on the Inclusive WASH CD or at www.inclusivewash.org.au/case-studies

Figure 6
Prototype low cost urinal,
Cambodia

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could provide a rich source of feedback, give high exposure of the latrines within their community and enable fast collection of waste for microbiological analysis purposes.

The school latrine design considered the needs of girls and boys and in particular girls' MHM including bathing, privacy, washing and napkin disposal. Early consultation with the school showed that boys' urinals needed to make private urination possible and had to be easy to clean (Figure 6).

The inclusive sanitation and system design

The Tonle Sap Floating Latrine is a three-hole urine diversion desiccation latrine designed to be ergonomically appropriate for urination, defecating, menstrual hygiene and washing needs of men, women, girls and boys. This design is under trial in households and in community schools. Key features include:

- » Users of the latrine squat over the pan for defecation, urination and washing
- » A centre hole allows faeces to be captured below the pan in a recycled bucket, which can be found in markets all over Cambodia. Ash is added to the faeces to dry it and alter the pH. This prevents its attractiveness to flies and starts to kill

pathogens within the faeces. The hole is covered with a bowl available at markets or the bucket lid to prevent access by flies and to increase aesthetics

- » Urine is collected in a front basin separately to the faeces. It is diverted with a hose either directly into lake waters or captured for use as a fertiliser
- » A back basin (with the third hole) allows anal washing and cleansing during menstruation and after urination
- » The design recognises the need for a bucket for sanitary napkin disposal, and the supply of soap for washing and cleansing in all discussions and promotion material
- » Soap can be used with water over the back basin for menstrual washing
- » The latrine is raised above the floor, which allows easy access to the faeces bucket, and prevents risk of damage from wave action
- » The project included a low cost boys' urinal for schools, which makes urination easier for boys, and improves the cleanliness of the latrines.

Development and implementation of the design is a community process. One example of community involvement is the commitment of householders and schools to supply soap, schedule water and ash collection, and manage waste disposal (emptying of faecal buckets). The pan itself was made locally from cement using regional construction methods (Figure 7).

A Floating Community Waste Management Station, or barge, was constructed in Phat Sanday and is used for storage of faecal collection buckets until the faeces are safe for composting (approximately six months). The safe waste has then been trialled as a material for growing vegetables in the landless communities creating additional income opportunities and improved health opportunities.

Project progress and impacts

The Tonle Sap Floating Latrine has been trialled in more than ten facilities across the Phat Sanday Community. Waste is collected in buckets and treated with ash,

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Figure 7

Som Vanna, team member, constructing a prototype three-hole pan, Cambodia

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Figure 8

Community consultation during the dry season, Tonle Sap, Cambodia

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and is transported to and stored on the Phat Sanday Floating Waste Management Station. The designs and systems of the latrines have continued to be improved based on feedback and performance in the community.

In households where systems and processes for collecting and transporting the waste were well established, the latrines continue to be used. In those houses where firm commitment to these processes was not established, there has been some drop-off in use. There are continued requests by community members for access to this sanitation for their own families (Figure 8).

The project raised the interest of the broader WASH sector for sanitation that is inclusive both of those living in challenging and marginalised environments, and of the sanitation needs of women. The challenges and needs for appropriate sanitation for people living in floating and flooded communities are now better understood and have also gained more interest. Interest from the Royal Government of Cambodia, and the World Bank's Water and Sanitation Programme has increased, including through their investigations into sanitation in challenging environments in Cambodia and across the region. The latrines have shown that affordable, locally built and community designed systems are possible, and the interest and desire to develop sanitation in challenging environments is increasing.

The project also raised the need for gender awareness in programming in Cambodia

through the WASH sector meetings, and through sharing and testing of approaches and findings.

Committed engagement with the Commune Council, school teachers and rangers from the Environmental Centre increased organisational and community knowledge about the need for total sanitation in their community and provided support for community engagement and awareness-raising. The project has also been able to draw strong linkages between sanitation and environmental protection, particularly with the support of these local institutions.

Community involvement has been at the centre of the project from the beginning. The community was integrated in all stages of design innovation and refinement and provided valuable input complementing the formal technical expertise of the Live & Learn and Engineers Without Borders teams.

An inclusive latrine design has been developed, which is suitable for management by the majority of community members. It is lightweight, locally manufacturable and allows safe handling of faeces. Community members are now using the latrine, collecting and treating their waste. This results in a direct reduction in pathogens entering their water source. Effective demonstration of an appropriate latrine for floating schools, designed to be suitable for girls, has shown that this barrier to girls' access to sanitation, hygiene and education can be overcome.

The latrines are at the stage of being appropriate for a full whole-of-system trial.

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Such a trial might include:

- (i) Comprehensive user satisfaction analysis;
- (ii) Further improving toilet designs based on user feedback;
- (iii) Working with local producers to develop an improved manufacturing process;
- (iv) Building the capacity of local entrepreneurs to undertake construction within the community and to build interest and market the latrine; and
- (v) Engaging with government and practitioners to consider self-sustaining user pays trials in new communities.

Challenges and lessons

Incorporation of menstruation systems within the sanitation design was new to some Cambodian and Australian practitioners contributing to the project. There was reticence demonstrated by team members to discuss and collect data around menstruation, and to include menstruation services as a key component of the project. Some considered that removal of faeces from the water around households was the purpose of sanitation and that therefore menstruation-appropriate facilities and services were a non-essential extra. Despite this hesitation, the project retained its commitment and focus on a design and system that addressed the needs of all community members.

Whilst community members demonstrated a good understanding of the risks of water pollution, and the value of sanitation, inertia to change such a fundamental aspect of lifestyle has been a key challenge of the project.

For broad uptake, the sanitation design will require community members to invest around US\$30 in household level infrastructure, to maintain a ready water and ash supply and to engage in the waste delivery or collection processes. It takes less effort to pollute the waters around the lake through direct defecation, so continued efforts are needed to encourage uptake.

The project was also challenged by community preferences for pour flush latrines, which are suitable in some parts of Cambodia. This preference created

attitudinal barriers to uptake of appropriate designs. It seems some would prefer nothing rather than a more affordable and locally appropriate toilet. Many of the households show this prioritisation, lacking a toilet but having televisions and other modern appliances.

Project research shows demand would be higher if treated waste from the latrines was utilised. A livelihoods approach to sanitation would assist to embed ownership and incentives for sanitation operation and maintenance in the communities. To address this, the project has trialled the use of the treated faecal waste for vegetable growing material. Additionally, some households are using urine diverted through the system as a fertiliser.

The project continues to refine and review the floating latrine system, including design, manufacture, distribution, and treatment/management of waste. The lessons learnt from this project so far are valuable for further work developing improved similar or alternative appropriate systems. Alternatives this project is considering include future small-scale composting or biodigestion systems.

Conclusions

Inclusive WASH relies on the consideration of the community and individual circumstances. Obvious biological differences between sexes are demonstrated in sanitation more acutely than most sectors. Urination is a fundamentally different activity for the two sexes, and females are the only ones to menstruate.

Whilst women and girls make up 50 per cent of community population, active measures continue to be required to ensure they are visible and vocal. Women should have access to opportunities, services and solutions within their communities and within projects. Seeking to understand and engage with women on their practices, preferences, needs and ideas from the earliest concepts of a design project are first measures for achieving this.

Additionally, actively considering the needs of boys and men for urination, particularly in schools, contributes to a balanced approach as well as cleaner toilets.

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The development of sanitation solutions in challenging environments continues to be an issue worldwide. Social aspects of WASH are crucial and are a major focus of international organisations and governments in developing nations. However, attention to the technical aspects of WASH has not yet been solved, and there remains significant responsibility and opportunity to continue focus on these.

Supporting Resources

- » Hagan, J (2009) *Intimate explanation of sanitation practices in Cambodia – from Live & Learn Women’s Forum*, Tonle Sap Floating Latrine Project Cambodia, Live & Learn/ Engineers Without Borders, 1 September 2009

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