

Design a wastewater treatment system for floating community schools

Focus area: Sanitation

Skills needed: Engineering design

Synopsis:

The Tonle Sap is South East Asia's largest freshwater lake and one of the world's most productive fisheries. Almost 100,000 people live in floating communities on the lake, typically earning their living from fishing. A thriving local economy exists, including a range of stores, schools, temples and markets.

Cambodia aims for everyone everywhere to have access to a toilet by 2025. Crucial to this target is finding solutions for the hardest to reach, such as those living in challenging environments where traditional technological solutions for toilets are not appropriate. It's estimated that a quarter of Cambodia's population live in areas which annually flood, so finding an innovative solution for the communities of Tonle Sap that could be adapted for other locations in Cambodia (and elsewhere, such as Bangladesh and the Niger Delta) is a priority.

WaterAid's partner Wetlands Work! has created the HandyPod, the only practical wastewater treatment system for this situation so far. The HandyPod consists of a simple latrine connected to an anaerobic (oxygenless) digester tank, which is in turn connected to a floating garden of hyacinth plants. After passing through the digester tank, the roots of the hyacinths break down faecal matter to a safe quality, so that human waste can be safely discarded into the lake. Currently, all 30,000 households living on the lake practice open defecation, polluting the water where children spend much of their time playing and families wash, cook and clean.

The materials required to construct a HandyPod are currently not available locally and with local production it is difficult to control quality. The current solution is to procure and prefabricate as much of the HandyPods as possible in Phnom Penh and then transport to Tonle Sap. On the lake, local carpenters can assemble and install the product for households.

The HandyPod has also been adapted to be used in institutional settings such as schools. By providing safe toilets for school children, the aim is to mainstream their use while increasing demand for the household HandyPod model. However, this new school design has some weaknesses: it is bigger; more complicated; more likely to break during storms; is prone to damage from boats dropping children off; and is at risk of vandalism and theft during school holidays.

Community members are currently being encouraged to buy household HandyPods and people's behaviour around toilets is being changed through an approach called 'community led total sanitation'. However, at present a HandyPod costs US\$ 100, which is a significant investment for a household. A 'sanitation raffle' is therefore being carried out, where community members can buy an attractive low cost mug that enters them into a raffle to win a variety of hygiene-related prizes, including HandyPods. The goal is to create awareness of and exposure to HandyPods, and to increase the aspiration to own a HandyPod.

The challenge

Find solutions to one or both of the following:

- **Design improvement: Come up with recommendations to improve the HandyPod design for an institutional setting, namely floating schools, whilst maintaining the simplicity of the design and keeping costs down. The design must be affordable, under US\$ 100, and be technically sound (i.e. must have sufficient buoyancy and treat waste adequately). Recommendations must include a low-cost plan to maintain the infrastructure.**
- **Providing flushing and handwashing water: The challenging environment where HandyPods are implemented presents problems when obtaining water for flushing and handwashing. In institutional settings such as primary schools, how can a sufficient amount of water be ensured at all times inside the cubicles (technical or behavioural solution)? What is the best way to ensure handwashing, especially by young children (technically and behaviourally)? Does ambient water need to be treated in order to ensure there is an obvious benefit from handwashing? To what level must water be treated, and what is the best way to do so?**

Design a drinking water station and communications strategy for hospitals

Focus area: Water supply

Skills needed: Design, communications/marketing

Synopsis

WaterAid is partnering in a program to install centralised water filtration systems in ten referral hospitals in Cambodia. Each system is a combination of a membrane filtration and chlorine dosing, purifying water to drinking quality. This water is available for free to all staff, patients and visitors at the hospitals. The filtered water is connected to the distribution network inside the hospital and linked up to sinks in the hospital complex. Basic signage has been placed next to the sinks where filtered water is available, indicating that it is safe water for drinking.

Despite the placement of signs and meeting with staff, recent monitoring shows knowledge about the system and its potential uses is lower than expected. Few patients are aware that the water is safe to drink. Because patients are a transient population, they do not always know of changes to hospital infrastructure. They are accustomed to bringing drinking water with them when they or their family members are obliged to stay overnight in hospital. Meanwhile, staff turnover is also high and some of the staff members don't understand that the treated water is safe to use and consume.

Aside from a lack of awareness, most Cambodians are not used to getting their drinking water from an ordinary sink. This inexperience causes taps to frequently break. To compound this issue, Cambodians do not trust the water out of taps and hospitals are not considered clean environments, so drinking water from a tap in a hospital is a foreign concept. Furthermore, Cambodians are very sensitive to changes in the taste and smell of water, and are not accustomed to chlorine, reducing the likelihood of them drinking chlorinated water.

Due to these various factors, many of the patients and staff continue to bring or buy their own water, particularly at small shops at the hospital entrance. By buying water, they are spending their small earnings on water readily available and free at the hospital.

The challenge

To get patients and hospital staff to use the drinking water by:

- **Designing low cost, durable drinking water stations that can replace existing sinks.**
- **Developing a communications strategy for the hospitals to implement that increases awareness and consumption of the free drinking water available.**

Redesign and marketing of the LaBobo handwashing station

Focus area: Hygiene

Skills needed: Product design, design and marketing

Synopsis:

Washing hands is the easiest and most cost-effective way to prevent diarrhoea, which kills 315,000 children under-five every year worldwide. If we consistently wash our hands at critical times, especially after using a toilet and before preparing food, we can prevent nearly half the cases of diarrhoeal disease and one third of the cases of other potentially fatal infections, according to the World Bank. But the global rate of handwashing with soap remains severely low despite billions of dollars spent on education in schools and homes around the world.

Research shows that a key barrier to translating knowledge about handwashing into practice is the lack of water and soap easily available where people want to wash their hands – for example, near the toilet or kitchen. For many, handwashing is an inconvenient and time-consuming task. Sinks are often out of reach for children and millions of people have no sink at all. Handwashing stations remove this barrier.

WaterAid's partner, WaterSHED, has developed a small stand-alone handwashing station (the LaBobo) that is suitable for use in the household. The LaBobo makes it easy and fun to wash hands with soap, but also stands as a physical reminder to reinforce hygienic behaviour. Today, LaBobo is the only purpose-built, portable and mass-manufactured handwashing device in the world. The product has been designed and refined through a Human Centred Design process over a number of years. As well as being functional, the LaBobo is designed to be aspirational and modern – a product people want to have in their homes. The final design includes a custom low-flow spout to conserve water and a conveniently placed soap dish to ensure an all-in-one handwashing package



The product parts are manufactured in Vietnam and assembled in Cambodia. The product has been marketed in Vietnam for three years and the intention is to now begin marketing in Cambodia. Initially the price of the LaBobo will be set at \$20.00.

The challenge

To design attractive and affordable options to accessorise and adapt the aesthetics of the LaBobo to:

- **Increase the appeal of the device to consumers to improve uptake.**

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- **Achieve more consistent handwashing behaviour.**
 - **Demonstrate how your design changes develop the LaBobo into an integral part of wider hygiene practice in the home e.g. cleaning teeth.**