The ADB Water Sector Group’s Experience Notes are case stories on inclusive sanitation projects. The stories invite readers to learn about innovative approaches, technologies, and strategies used in initiatives supported by the Sanitation Financing Partnership Trust Fund (SFPTF) under the Water Financing Partnership Facility. Each case lists lessons and tips that can guide water supply and sanitation practitioners. These are critical as the world continues to wrestle with the coronavirus disease (COVID-19) pandemic, making water and sanitation essential to protecting and saving lives.

Creating demand for toilets. It is critical to understand the motivational factors for floating communities to buy and use the floating digesters to increase its sociocultural acceptance (photos by ADB).

For generations, going to the toilet has been a risky business for people living in floating villages in Tonle Sap Lake. Residents of the largest freshwater lake in Southeast Asia want better sanitation but few solutions exist to meet the demands of their harsh environment.

In the case of Math Ma, it has been a 40-year struggle. She lives with 10 family members in Kampong Luong commune, a flood-prone village in Pursat Province, one of the five provinces surrounding Tonle Sap Lake. At 58 years of age, she has never owned a proper toilet since they moved to the commune in 1981.1

“My family usually goes to a nearby flooded forest, about 30 meters from our home. But we realized that it is harmful for us. As women, it is so embarrassing for us to go there. We also do not know if there are poisonous snakes or insects that are hiding. We might also be harassed by unknown people,” she said.

Sadly, even for women who relieve themselves in their houseboats, the situation is not better. They often rely on a flimsy plastic screen or galvanized iron sheet to get an ounce of privacy. Without a standard latrine, they must take care not to slip on the narrow wooden platform. Feces, as well as urine and disposable sanitary pads, go straight through a hole and into the water.

The situation is fraught with risks. The water is highly polluted with waste and other contaminants. Waterborne diseases, specifically diarrhea, are the number one killer of children under 5 years old. Children have also fallen into the lake and drowned while relieving themselves.

Durable toilets and the dream for a healthier environment

Ma wants a more convenient, safe, and dignified option rather than going to the flooded forest or defecating in the open. “We really want a complete set of formal toilets. We could help with the labor and materials, like the pillar and zinc roof,” she said. However, there are several barriers to owning an adequate toilet. First, she does not know the choices in the market, nor the prices and benefits of these choices. Many are also skeptical due to the cost and their negative, past experience.

Despite these hurdles, Ma wants to have an improved toilet but first she needs to see that it really works. Her family just earns $75–$112 per month from fishing yet she is willing to set aside the money if it means an improved and hygienic toilet, with people who will regularly empty the pit and safely dispose of the waste.

Improving access to safe and reliable water and sanitation. Results from the pilot test will pave the way for better sanitation solutions that will serve vulnerable communities around Tonle Sap Lake (photo by ADB).

She and her neighbors want a toilet that is sturdy even during bad weather and durable since their houseboats move depending on the lake’s water level.

**A pilot test to give people better options**

In 2017, the Second Rural Water Supply and Sanitation Sector Project—Additional Financing (RWSSP-2 AF) rose to the challenge of testing appropriate and affordable sanitation solutions for floating and flood-prone villages (Figure 1). The Sanitation Financing Partnership Trust Fund supported the pilot test for four types of floating toilets digesters with 793 households in the provinces of Kampong Chhnang, Kampong Luang, Pursat, and Siem Reap.

The project was an opportunity to test on-site sanitation technologies in a challenging environment. It also engaged the poorest communities who are not benefiting from the massive sanitation improvements in other parts of Cambodia.

“Our goal was to demonstrate the technical feasibility of four different designs. We connected mostly pour flush ceramic toilet bowls with water seal to aerobic or anaerobic digesters. Instead of directly dropping the feces into the lake, the effluent was discharged into the lake or river after treatment. After we set these up in the target communes, there were no more floating human feces visible in the area,” said Noun Pichninth, project manager.

From 2017 to 2020, local contractors, skilled laborers, and fecal sludge management operators joined a series of trainings on how to build different types of digesters that decomposed waste with the presence of air or without air.

They studied the advantages and disadvantages of each design, how to install them, and maintain the quality. Contractors also learned how to manage fecal sludge and enhance their sanitation business.

At the village-level, 15 commune sanitation teams shared sanitation information from house to house. They taught parents safe water-handling practices, how to correctly use and maintain household toilets, and good hygiene practices. They also monitored activities in the commune.

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**Figure 1. Description of the Different Types of Floating Digesters**

**COMPOSTING**
Charcoal, sand, coconut husks, humus soil, and wood chips break down waste with the presence of air.

**HYBRID**
Container 1 with pipe uses air to break down waste while container 2 decomposes waste without air.

**ANAEROBIC**
The container is partially submerged under water. It decomposes waste without air.

**ANAEROBIC TWIN**
The containers are connected in a series and they decompose waste without air.

Photos by Bimal Tandukar.
Promising results based on household feedback and laboratory results

After the pilot test, the majority of the residents were satisfied with the performance of the floating digesters (Figure 2). Most preferred the anaerobic digester among all the designs. Several residents were also motivated to change their practice since they learned that it will be better for their health.

All the designs were low maintenance and reduced the level of coliform bacteria by up to 99%. The pilot test also showed which one was better given the weight and size of the houseboat, its safety during severe weather, quality of the effluent, and the presence of any foul odor.

Insights

The pilot test was useful because it showed what can potentially work in a remote area like Tonle Sap Lake where no proven sanitation technology exists. The project identified practical and technical aspects that needed attention, which will be crucial when new designs are developed. More than that, the engagement process also generated insights in innovation. Below are some lessons from the pilot test:

1. Know your audience.

Understanding the local context and the experience of the target community is critical in introducing sanitation solutions. In this case, the toilet demand is rather high but locals are highly skeptical due to negative outcomes of earlier projects. One effective way to help residents develop a better image of the technology is to conduct well-designed demonstrations. The more people see and test innovation results, the higher the likelihood that they will adopt it faster.

Village-level educators should also adapt Community-led Total Sanitation (CLTS) tools and techniques to suit the situation in floating- and flood-prone villages. For instance, one helpful tool was asking pilot test participants to compute how much feces their family excreted daily, weekly, and yearly given that the average volume is 300 grams per person per day.

This exercise helped them realize how polluted and unsafe the water was given the amount of waste discharged in the lake.

2. Build the capacity of local skilled workers.

It is vital to invest in training local builders to ensure that they will make quality products and that the system is properly installed. If they perceive that the technology is too hard to understand or use, this will be an obstacle to spread the innovation. Results from the pilot test showed that small mistakes in setting up the digesters in the houseboats may change the system from aerobic to anaerobic. If this happens, they will fail to produce the desired results.

Quality assurance will build the capacity of local skilled laborers and will increase people’s trust. If possible, the local government should engage a dedicated and accountable agency that will take charge of certifying the quality of sanitation technologies and services.
Local masons also play a key role to help families make informed choices. They can share the advantages and limitations of each design and suggest one that best suits their needs. They can also be strategic partners in promoting sanitation by sharing positive feedback of happy customers.

3. Promote the value of the byproduct.

Change how the community perceives sanitation by promoting the value of useful by-products such as biogas, fertilizer, ash, nutrients, and maggots and larvae for fish farming. These have the potential to increase the marketability of the toilets because of their relative advantage compared to traditional toilets.

In this case, the aerobic digester and the hybrid can produce about 4 liters of compost per person per year. Farmers in the area are keen to take advantage of this by-product since they want to reduce their dependence on chemical fertilizers. Additional investigations, however, are needed to learn more about the potential for reuse. Users also need to understand the risks or any safety issues, if any, so that they can decide based on facts.

4. Communicate strategically and aggressively.

It is vital to develop a long-term strategic communication plan to spread the benefits of better sanitation solutions and hygiene practices. While a participatory process is a time- and resource-intensive process, it is much needed. Many villagers in floating- and flood-prone communities currently get information through word-of-mouth but this will not be enough to disseminate knowledge and know-how on sanitation and hygiene. Future projects must be creative in developing effective strategies in areas with low literacy rates. They can take advantage of people’s preference for stories and their trust in referrals from friends and relatives.

5. Accept and share failures.

Sometimes, project innovations do not work as intended. For instance, the project introduced the concept of end-of-pipe treatment to further treat the effluent from floating digesters. However, waves caused by bigger boats and storms dismantled the system.

When this happens, it is important be honest and transparent. Technologies do not always meet expectations. This is one of the reasons why pilot testing is important—to identify the necessary adjustments to arrive at the appropriate solution. Use the experience instead as an opportunity to reflect as a community on how to do things better next time. This will foster openness to learn and help manage frustrations.

Conclusion

Ma used to say, “We could not dream of living in a good and healthy environment. The water that we use and the air that we breathe are all polluted.” With innovations in on-site sanitation such as the floating digesters, she had the chance to own a real working toilet and also achieve a small part of her dream.