

Sanitation Solutions for Flooded Zones: The WAND Foundation Experience

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Summary:

This publication details our experience in promoting ecological sanitation in flooded zones where flush-pour toilets is no longer effective and where people defecate in the open causing “acute gastroenteritis which is the second leading cause of morbidity in the country, while soil-transmitted helminthiasis (STH) continue to be endemic in a number of municipalities, making the Philippines the country with the second highest rate of STH incidence in Asia. (cited in DOH Administrative Order 2010 – 0021, “Sustainable Sanitation as a National Policy and a National Priority Program of the DOH.” Sanitation solution comprises simple single-chamber urine diverting, dehydration toilets (UDDT) and simple urine collectors. In this project, we found out that promoting decentralized sanitation system that is cheap, robust, appropriate and scalable for the bottom poor living in flooded zones is indeed realizable.

Introduction:

Sanitation for poor communities living in flooded zones such as coastal areas and rivers is a challenge either because of lack of space, constant flooding, financial incapacity and landlessness. Most coastal zones in the Philippines are government property and the poor build their abode with this situation in mind: transient and insecure. River dwellers on the other hand suffer from flash-flooding due to unmitigated cutting of trees in the uplands. Rivers change course making habitation transient.

The challenge is how to make a sanitation system that integrates the following design elements (as articulated in Bill and Melinda Gates Grand Challenges Explorations): a) prevent infiltration from surface and/or groundwater; a) provide robust and safe containment during heavy rain and flood events; b) function in tidal, riparian, or floating communities; c) low lifecycle costs, robust, and locally available components; d) easy to operate, maintain, and service during productive life; e) incorporate user-centered design elements that are appropriate for women, children, and “washer” communities and that are affordable for the ultra-poor.

The current sanitation solution in poor coastal and river communities is flush-pour toilets. In coastal communities this scheme is problematic because of the difficulty in building a septic tank in sand so septic tanks are not at par with what is recommended. Desludging is also never done and or done in an unsanitary manner. In communities near the river the situation is no better, septic tanks are washed-out every time flooding happens. So inhabitant practice what is for them most practical and that is to defecate in the open, thence the problematic situation of spread of diseases, diarrhea and host of parasites.

The WB-DOH-EM pilot project in Sustainable Sanitation in East Asia (SuSEA, 2006-2010) has confirmed that sanitation remains a critical public health and environmental problem that needs to be addressed in a sustainable manner. Some of these findings are:

- Access to basic sanitation in specific (target) communities is much lower than the national average, usually in low-income communities and those living on fragile environments, such as above water bodies, on isolated and remote islands
- Those without toilets defecate in the open fields, shorelines or along rivers
- While many of the households with pour flush toilets use septic tanks, but only a few have been desludged in the past 3 years
- Most of the septage and wastewater flow to open canals, rivers and other water bodies
- A large number of communities do not have any visible drains.

Open defecation, inconsistent hygiene practices, and low levels of investment in sanitation and in wastewater management results in high negative externalities for communities, municipalities/cities and even, water resource basins. Acute gastroenteritis is the second leading cause of morbidity in the country, while soil-transmitted helminthiasis (STH) continue to be endemic in a number of municipalities, making the Philippines the country with the second highest rate of STH incidence in Asia. (cited in DOH Administrative Order 2010 – 0021, “Sustainable Sanitation as a National Policy and a National Priority Program of the DOH.”)

In mid-2010, we implemented an initiative which is geared towards promoting ecological sanitation in depressed communities located in coastal areas and river settlements with little or no sanitation being practiced primarily because of marginalization and the lack of space and resources. The project was funded by the Sustainable Sanitation & Water Resources Management Network Asia (SSWRMNA) and the proponents are the WAND Foundation and Xavier University with Xavier University taking the lead because the WAND is not a member of the SSWRMNA. Total funding is 1,500 Euro or roughly Pesos 96,000.

The grant is divided into;

Cost of materials in building 100 coastal zone hanging UDD toilets (100 x 450 PhP) = 45,000.00 PhP

20 humanure collection drums (1 per 5 families; 20 x 370 PhP) 7,400.00 = 15,000.00 PhP

Flyers and other educational materials = 15,000.00 PhP

Small group discussions, orientation and meetings with the beneficiaries = 12,000.00 PhP

Monitoring cost (fuel, honoraria) = 9,000 PhP

Total: 96,000 PhP

Project Sites:

This initiative was piloted in Initao and Libertad Municipalities in Misamis Oriental with Initao showcasing ecosan for river settlements and Libertad showcasing ecosan implementation in coastal communities.

Lawis, Initao, Misamis Oriental

The purok in Lawis, Initao Municipality consist of 120 families living near the Initao river. The Initao river inundates its banks during heavy rains making pour-flush toilets difficult to establish and maintain. Most of the families in Lawis are vendors and artisans. They were evacuees in the war with the New Peoples Army and the Philippine government in mid-80's and they never return home to their farms in the mountains but opted to stay near the poblacion. Lawis is a stone's throw away from Initao poblacion. Most of the residents in Lawis are ultra-poor, earning about 60 pesos a day. The river provides them with some nourishment by way of small crabs and shrimps. Most residents especially children suffer from diarrhoeal sickness. Most of those without toilets defecate in the river banks or in the coconut trees dotting the place. Since houses are close to each other, this is a difficult enterprise and undignified especially for women. The reason they have no toilet facilities is mainly economic, the 60 pesos a day income is not even enough to buy rice and salted fish which is the staple here.

Purok 2, Libertad Municipality

Purok 2 is situated near the coastline fronting the Mindanao Sea. Most of the residents are local fishermen. Fishing is now becoming a difficult enterprise with so many people getting into the trade and fishes thriving far off into the oceans. In the early 80's dynamite fishing is rampant here but not anymore today. Houses in the purok are close to each other and it resembles a mini-slum. Toilet facilities are very difficult to build since the place is inundated when there is abnormally high tide happening during monsoons or when there is tropical depression. Libertad is near the typhoon belt and is affected by it. Septage is out of the question. Local people defecate in the coastal waters usually in the early mornings or in the evenings. No matter what time of day, this is difficult for women because with so many people/children milling around, there is no privacy.

Process conducted:

The idea of ecological sanitation is an entirely new conception for these communities and here lies the challenge when we started promoting the initiative. The re-use of faeces for agriculture is the most problematic since this has never been done before while the use of urine is easily understood because traditionally people use urine as fertilizer mainly for flowers especially for local orchid varieties. Observation here is that urine fertilized

flowers produces vigorous stems and excellent flowers compared to flowers that are just left alone.

When we started, we need to find what is called “trigger messages” in order for the inhabitants to adopt dry, ecosan toilets. There are various options we considered, namely;

- a. “Shaming” those without toilets.
- b. Invoking a barrio ordinance penalizing those without toilets.
- c. Informing them the problems caused by open defecation in terms of spread of diseases, intestinal worms and e.coli.
- d. Informing them about the varied values of ecosan toilets in terms of savings in water, sanitation, use in gardens, improving fertility and so on.

In all these, we fully used c and d but limited the use of a and b. Shaming is not feasible in the sense that the Filipinos’ “amor propio” (literally, “self-esteem” or pride) is legendary and once shamed the “shamer” is declared an enemy forever. In this case, no matter what you will say or do now and in the future will be considered with prejudice and opposition not only with the concerned individual but also with the rest of the extended clan. Family ties among Filipinos run deep. Invoking a barrio ordinance we leave with the mandated authorities because this is their job and in doing so we achieve a sense of legitimacy and ownership by the local leaders.

In the information education stage, we touched-base with barrio officials and conducted with them focused group discussion on the benefits of ecological sanitation. What heightened their interest is when we brought them to see actual constructed ecosan toilets and talk to the beneficiaries already implementing ecological sanitation living near the WAND office in barrio Lubluban, Libertad municipality. We also brought them to an “early champion” living in Initao Municipality whose “hanging” ecosan toilet is serving as an early model for people to see and observe. We think that more than hearing about it, local people adopt when they see, observe and interact with actual users.

Design elements:

Designs:

The basic ecosan toilet design we implemented consist of;

- a. a single detached ecosan toilet, and,
- b. an ecosan built into the house of the beneficiaries.



Photo 1. Simple ecosan toilet built beside a house. The materials comprising woven coconut palm fronds for roofing, woven bamboo slats, round wood poles, coconut lumber are all locally procured. Local people here are expert bamboo and palm weavers.



Photo 2. View of a classic “hanging” ecosan toilet. The upper portion is the toilet while the lower portion is the container that stores the faecal matter and urine. Tidal waters do not affect the toilet.



Photo 3. View of a detached single-vault ecosan toilet.

The basic consideration for either a or b above consist of the choice of the beneficiary and/or the availability of space where the unit is to be built, eg. some of the beneficiaries prefer ecosan built attached to their houses for ease in using it while others prefer the stand-alone built just near their house.

The single detached ecosan toilet is much easier to build and pre-fabricate. However the ecosan toilet attached to the house of the beneficiaries takes into consideration the basic configuration of the house, its measurements, ease in use of the toilet, choice of the family and other factors.

In all these units, the basic materials are the following;

- a. drum cut in half as feces collector, or a big rattan basket, or woven coconut fronds,
- b. garbage bag and ramie sacks,
- c. container for urine collection,
- d. flooring, roofing and walling made of local materials.



Photo 4. Pre-fabricating walls of ecosan toilets is our production area in Libertad Municipality.

The difference with dry toilets compared with the traditional flush-pour is that with ecosan one has to contend with collecting the faecal materials and urine and storing them

in a storage area for re-use in agriculture later on or as needed. Urine can be used immediately but faeces need to be stored in 6 months in order to destroy all the pathogens. The ideal way in this situation is for the local residents to use/recycle the human waste for their own use but the problem is that they live in close proximity to each other without a land to do agriculture with. The only option is for a logistics arrangement involving a small truck, a storage facility and a farm/s where the humanure can be used. Some ecosan proponents fail to take this into account and they have mountains of faeces pestering in the countryside and or urine just dumped somewhere defeating the purpose of closing the loop between sanitation and agriculture. Ecosan implementers should take a system and cyclical view of its nature.

In our case, we did 3 things in terms of humanure re-use, a. feeding the faecal materials into our vermi-compost, b. incorporating it into the terra-preta biochar compost, c. using it as fertilizer for fruit and timber trees and the farmer not touching the faecal material. Letter c may be controversial in the sense that if we follow the WHO standards, faeces should be stored for at least 6-8 months in order to destroy pathogens. For us, this is so if one handles the faecal material directly or if one uses it for vegetable production. These 2 conditions are absent in our case in that, a. the “no touch” rule is followed, b. the material is used in timber trees.

Incentive mechanisms:

The idea of “shaming” local people so that they will realize the value of having a toilet and “jump and dig their own pits” is a disincentive for sanitation, at least in our local area. Letting a community draw an “open defecation map” and letting them stand where these OD happens (oftentimes near their houses) and in the presence of ministers or mayors will be a massive loss of face. People here kill each other over a game of pitch and toss. The “amor propio” character of the Filipino run thousands of years already.

Our incentives comprise giving the users certificates of recognition, implementing local contests (eg. well-kept toilets, productive gardens, regular visits and praises).

a. Running a contest

Contests are small-time, localized affairs. It is a fact in social psychology that people respond well when pitted against each other rather than doing it alone. In this case, we run two contests, a. for well-kept toilets, b. for productive gardens. The contests were occasions for pride by the contestants and they participated with gusto. Of course there is also the possibility of getting a prize no matter how small it is. Prizes are household utensils, small cash, small animals that they can raise (chickens and pigs) and garden package comprising tools and seeds.

b. Giving of certificates

A piece of paper with their names written on it and signed by the local official such as the mayor is with great value to local people, for us, we take this for granted already but for them it is something to crow about and hang in their walls.

c. Regular visits and praises

Regular visits and inspections are no more than “pats in the back” but for those who are seldom recognized or supported, this is psychologically rewarding and an enriching experience.

Management cost

One of our aims in implementing these type of toilets is basically for us to pilot an innovative mode of improving sanitation in poor coastal and river communities and in order for us to generate a lot of waste for our humanure-based agriculture and small-scale forestry research. In terms of management cost, there are 2 scenarios. Scenario 1 is if the implementation of the whole system is localized, eg. local implementers use the humanure themselves for their vegetables, bananas or coconut trees, then management cost is nil. The beneficiaries can stockpile the faeces, wait for 6-8 months then use it as soil amendment while using urine directly to the plants when the container is full, or with regards faeces, the beneficiaries can directly fertilize it in coconut trees and not wait for several months. The fertilizing technique is to bore several holes around the coconut trees and bury the faeces there. The one handling the faeces should wear heavy-duty gloves and masks while doing this activity.

In the 2nd scenario, as in our case, we collect the urine and faeces and bring it to our farm demo area. In the case of Lawis, the distance is about 3 kilometres while in the case of Purok 3, Libertad, the distance is 2 kilometres. Cost involve in the collection which is done once a week for 45 ecosan toilets comprises, fuel for the vehicle at 80 pesos and cost of a driver and 1 laborer totalling 70 pesos. Collection time is approx 3 hours for the 2 areas. Total cost is 150 per week for the collection activity. Note: 1 Eu = 63 pesos.



Photo 5. Our service vehicle collecting ash and urine and delivering replacement materials such as sacks for humanure collection.

Allied activities:

Urine collection –

We collect urine in the case of beneficiaries who cannot make their gardens or whose gardens are very small and urine production is in excess. We are collecting urine from selected communities as a way to pilot-test decentralized, household urine collection and use it directly in our farms and gardens. When we started, we used black, recycled 18-liter containers but we found out that it is difficult to monitor the contents resulting in spills and bad smell. Because of this, we decided to use discarded mineral water bottles with the top cut and glued back inverted. In this way we are able to monitor the content and prevent spills. We pour the urine in the black containers, close it and put it on storage until use.



Photo 6. Basic materials for urine collector. The charcoal is used to prevent smell and to contain N escaping to the atmosphere.



Photo 7. Women-friendly urinal.



Photo 8. Urine storage and use.

Gardening

We highlight small-scale gardening activities because for coastal and river communities hampered by a lack of space for agriculture and in situation of constant flooding, small-scale gardening is an option. Vegetables can be grown using simple hydroponics or soil-less cultivation and containers and in available spaces and using recycled materials as growing medium. Fertilizer comes from household wastes which comprises 90% organic and urine because urine can be used immediately as plant fertilizer. Vegetables have shorter cycles, fast growing, require little space and very dependable and are resilient food security option for vulnerable populations. Vegetables are expensive and difficult to procure and this cheap source of micro-nutrients like Vitamin A, iodine and iron is often absent in the diet, leading to poor mental and physical development especially among the young crippling local communities further. Moringa for example is touted as a nutrient powerhouse and this can be grown in small, open spaces or in containers and hydroponics with available sunlight.



Photo 9. Simple urine-fertilized hydroponic gardening using recycled containers. I bring local people to my place for them to see how this may be done.



Photo 10. Home-gardens in Purok 2, Libertad Municipality. The creativity of the local people is unleashed here.



Photo 11. Close-up of spring onions growing in recycled containers. No need to go to the market to buy vegetables that maybe pesticide-laced.



Photo 12. Small gardens provide much needed micronutrients for the family whole year round.



Photo 13. Showing local leaders the use of urine as fertilizer to various crops. Local leaders are “gate-keepers” and helps in the promotional aspect.



Photo 14. Where is fecal material now? All are vermi-composted high-grade organic fertilizer already.



Photo 15. Faecal matter can be fertilized immediately to the plants if we use innovative techniques in which the material is not touched.



Photo 16. Terra Preta Sanitation Biochar Rice Demo has the potential for increasing rice self-sufficiency in the Philippines.

Scalability:

There is much potential for scalability in using ecosan in flooded zones the Philippines and maybe in some other SE countries for the following reasons;

- a. The situation in coastal and river areas in the Philippines is similar, eg. poor communities, difficulty in implementing septage-type toilets, houses built very close to each other and our system is versatile and robust enough to be used in this type of situation.
- b. Providing incentive mechanisms. Economic incentives such as awards and certificates and “pats-in-the-back” such as praises and visits by local officials are powerful drivers in order for local people to implement sustainable sanitation solution.
- c. Gardening in small spaces, vertical and horizontal and using simple hydroponic system is applicable almost everywhere. We are in tropical climate and the sun provides energy for photosynthesis to occur.

Some notes on enhancing acceptability:

- a. In the case of the use of urine as fertilizer, using experiences with our grandparents as example are example since the locals can very well relate to this.
- b. Using plants growing near open-pit toilets as example of the response of crops to humanure. This is best exemplified in bananas growing luxuriant at the sides of open-pit toilets.
- c. Explaining the route of flies from faeces to food as cause of disease spread.
- d. Using powerful group facilitation methods such as the Technology of Participation or ToP.
- e. Piloting/modelling with early champions. This means installing one pilot ecosan model with a family in a village and then people to look and see for themselves.

Conclusion:

The conclusion for this write-up can best be presented by showing the robustness of the system as against the criteria set by the Bill and Melinda Gates Global Challenge for sanitation;

- a) Provide robust and safe containment during heavy rain and flood events;

So far we can safely say that we are the first to ever think of designing a system that can contain human excreta during heavy rains and flood events. Our ecosan system is simple, easy to construct and when there is indication that flooding occurs, can be safely transported or evacuated.

- b) Function in tidal, riparian, or floating communities;

Our single-vault system can function in this biophysical regime by simply raising the posts or integrating it in floating houses or communities then installing a subordinate waste management collection system.

- c) Low lifecycle costs, robust, and locally available components;

Our ecosan system costs in the vicinity of 25 USD per unit, and the cost goes down as the beneficiary uses his own labor and materials. All components are locally available and robust. For example the recycled 200-liter drums are made of steel, the bamboo flooring and walls will last a long time, so too the cement ecosan bowl whose lifespan can be 50 or more years.

- d) Easy to operate, maintain, and service during productive life;

The units are very easy to maintain and clean, there is even no more training needed for the beneficiary to understand how the system functions.

- e) Incorporate user-centered design elements that are appropriate for women, children, and “washer” communities and that are affordable for the ultra-poor.

The system is designed to be used for men and women as well as children, with the children being provided with additional toilet seats designed for their purpose. The simple addition of a separate hole in the toilet floor makes our toilet system applicable for “washer” communities.

About the Authors

Elmer V. Sayre

Elmer V. Sayre was born in 1959 in a sleepy, farming village of Turno, in Dipolog City, in a family of nine, of near-landless parents eking an existence as toddy gatherer and housewifery. In childhood he strived to better his lot through study, hard work and discipline with the goal that in so doing he will in return help the poor and unshod, the lineage where he came from. He was able to study in some of the premier schools by winning scholarships, most notable is a Ph.D. fellowship given by the International Development Research Centre (IDRC) in Canada. His fields are Agricultural Economics (Xavier University, 1980), Extension Administration (Silliman University, 1985) and Community Development (University of the Philippines at Los Banos, 1991).

After a teaching stint at Xavier University and Silliman University where he taught subjects in agricultural economics, project planning and rural extension, he decided to work in grassroots areas in Mindanao, where talent and expertise is very much wanting and where poverty, social exclusion and helplessness stare daily in the face. He focused his attention to promote activities related to water system development, biodiversity and

agro-forestry, ecological sanitation and rural organizing with emphasis on the poorest of the poor. To date his work spans three provinces with more than 3,000 farming families being assisted. His initiatives won a number of recognition already (Israel, United States, Philippines). In 2007 he won an Australian Leadership Award enabling him to do research and study at the Crawford School of Economics and Government, Australian National University in Canberra. To sharpen his scholarship he wrote about his experiences and spoke to a number of international conferences in Turkey, Vietnam, Germany, Australia and Malaysia. He is married to Cora Zayas, also a social development worker like him and has 2 children. In July-August 2010 he was a scholar-in-residence at the Rockefeller Center in Bellagio, Italy. This year 2011 he is selected as one of “public intellectuals” by the Japan Foundation. His hobbies include writing poetry and short stories aside from his passion for farming and small-scale agro-forestry. He managed a 20-hectare agro-forest farm in Libertad, Misamis Oriental where the WAND eco-village featuring ecological sanitation is located. He is a published poet and a short story writer.

Jed Christian Zayas Sayre

Jed Christian Zayas Sayre at 23 years old is a Municipal Councilor of Libertad Municipality in Misamis Oriental where the Association of Locally-Empowered Youth in Northern Mindanao (ALEY-NM), active in promoting ecological sanitation is based. Jed is a Fellow of the Philippines 21 Young Leaders Initiative of the Asia Society. This is a cross-national engagement of new generation of leaders in the Asia-Pacific region and the US, from across the fields of business, politics, civil-society, media, arts and culture, and academia. He is also an Asia-Pacific Future 100 Fellow for Most Inspiring Entrepreneurs and Social Change-makers. His work in ecological sanitation is funded by the Japan Fund for Water and Idea Wild. He is also the Executive Director of the Tuburan Para Libertad Foundation, Inc. TPLFI provides micro-financing support to local livelihood ventures implemented by the youth and poor artisans as well as he is the Proprietor of Jed’s Kofi. Jed’s Kofi is locally-made coffee from corn, coffee, moringa and lemon-grass.

Useful websites:

Sustainable Sanitation Alliance (SuSanA): www.susana.org

Center for Advanced Philippines Studies (CAPS); www.caps.ph

Solid waste Management Association of the Philippines (SWAPP); www.swapp.org.ph

EcoSanRes Program of Stockholm Environment Institute (SEI): www.ecosanres.org

Ecosan Program of German Technical Cooperation (GTZ): www.gtz.de/ecosan

Philippine Ecosan Network (PEN): www.ecosan.ph

Appendix 1.

Ecosan Club Philippines

Ecosan Club - Philippines is a non-profit membership organization composed of communities of Ecosan users and practitioners, champions and supporters. The Association was established by leaders of the WAND Foundation on July 20, 2010 under SEC Registration No. CN201030103 with the purpose of focusing solely on the promotion and marketing of ecological sanitation products and services.

VISION, MISSION & OBJECTIVES

Vision: Improving health, sanitation and overall quality of life of the base of the pyramid through ecological sanitation.

Mission: To rapidly build the capacity of LGUs, communities, and private sector to promote ecological sanitation as a sanitation option through research, trainings, technical assistance, information exchanges, and network building.

Objectives:

1. To actively promote ecological sanitation as one of the sanitation solutions for the base of the pyramid.
2. To provide education, training and other services related to ecological sanitation, sustainable small farm development and agro-forestry.
3. To create Ecosan Clubs that will promote and champion ecological sanitation and related initiatives in rural and urban areas.
4. To partner with stakeholders with the goal of improving the overall quality of life of the base of the pyramid through ecological sanitation.

SERVICES OFFERED

Capacity-building: Ecosan Club - Philippines designs and implements customized Ecological Sanitation-related trainings, facilitate study tours and conducts occasional conferences and seminars.

Information Services: Ecosan Club - Philippines produces ecosan, small farm development and agro-forestry training and instruction manuals.

Marketing and scaling-up: Ecosan Club - Philippines markets low-cost ecosan toilet bowls, starter pre-fabricated ecosan units for demonstration and pilot purposes, toilet bowl molds and other ecosan-related products such as vermi-compost and seedlings.

For inquiries and information about membership please contact: Ecosan Club-Philippines c/o WAND Foundation, Libertad, Misamis Oriental, 9021 Philippines.

Website: wandphilsorg.com; Email address: empower_8@yahoo.com

Note about WAND Foundation:

The Water, Agroforestry, Nutrition and Development Foundation (www.wandphilsorg.com) promotes and implements social development initiatives focused on the improvement of the environment and the agriculture sector, rural entrepreneurship, ecological sanitation and peace-building. WAND Foundation has grown out of a pool of community development workers in Northern Mindanao who are truly concerned about poverty, health and sanitation, local resource management and lasting peace.

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