

POLICY BRIEF

Eco-Safe Toilet Technology for Efficient Waste Management, Water Recycling and Reuse, Improved Food Security and Green Environment

Executive summary

Over the past decades, the population in the Tamale metropolitan area has grown considerably, outstripping the provision of water, sanitation, hygiene and health facilities and employment opportunities. The city continues to suffer perennial water shortages and sanitation facilities are inadequate. Food security is threatened as available lands have been converted for housing. After an in-depth consultation with a random sample of the people, Tamale residents opted for innovations based on efficient management of water, rainwater harvesting, water treatment, recycling and reuse. They also prioritized improved agriculture and backyard poultry and vegetable farming. The **Eco-Safe Toilet Technology**, an integrated waste management system, holds the key. It's cheap to construct, replaces the traditional septic tank, conserves water through recycling, uses minimal water for flushing, and transforms solid waste into compost.

Context and problem statement

Tamale is the fastest growing city in West Africa. Majority of its over half a million people is engaged in agriculture and agriculture-based livelihood activities. As a result of rapid population increase, agricultural lands have been converted for residential purposes and this makes land for farming unceasingly scarce. Alternative livelihood opportunities are also woefully inadequate. Over half of the population (52.6%) is unemployed (PHC 2000).



Tamale in the peak of water crisis

Tamale also suffers acute perennial water shortages. A potable water supply system was established in the Metropolis in 1972 with a capacity of 13,000

m³/day and upgraded in 1999 to 19,560 m³/day to respond to high demand for water. This notwithstanding, only 38% of the population is served with potable water daily and 54% when water is rationed. To make matters worse, Tamale has a very low water table, which means in many parts of the Metropolis it is not possible to sink wells to augment inadequate pipe borne water supply. The perennial water stress that the city endures has wide-ranging implications for hygiene, sanitation and the health of residents. Houses have no toilet facilities and public toilets are constantly overcrowded and poorly managed. There are no sufficient refuse disposal areas, thus people indiscriminately dispose of waste. Enforcing by-laws on sanitation is a challenge - refuse bins provided at market centers are not emptied on time and solid waste piles up causing not only a nuisance but also a health hazard to the city's residents.

Using the Deliberative Polling® (DP) method, the West Africa Resilience Innovation lab at the University for Development Studies convened a random sample of 243 residents in the Tamale metropolitan area to discuss these issues and make concrete proposals for action. Deliberative Polling is a citizen-based data generation method developed by Jim Fishkin, a professor of Communication at Stanford University in the United States of America that seeks to contribute to the process of developing interventions that respond to the felt needs of the people. The Deliberative Polling® concept is thus described as *the gold standard for consulting the people on development issues*. The DP process samples peoples' opinion before and after they have had the opportunity to thoroughly discuss the pros and cons of various policy options in order to prioritize issues for action. Briefing materials were developed around Water, Sanitation and Hygiene (WASH), and Livelihood Diversification to provide deliberators with accurate and comprehensive information to guide the discussions. A video version of the briefing materials was developed to enable those who could not read and write effectively participate.

The Tamale Deliberative Poll, the first of its kind in West Africa, enabled residents debate and prioritize policy options for addressing the daunting challenges of a rapidly urbanizing city. From January 10-11, 2015, deliberators gathered at the Dungu campus of the University for Development Studies, discussed and prioritized policy options. Out of 39 policy options tabled for discussion, 28 recorded major changes in opinion between before-deliberation and after-deliberation. The deliberators, who were scientifically randomly drawn from among residents of Tamale, opted for appropriate technology based on efficient management of water, including rainwater harvesting, water treatment, recycling and reuse. They also prioritized diversified livelihoods through improved agriculture and backyard poultry and vegetable farming. A report that reflects the voices of the people is available online at www.warilab.org.



Four of the policy options in the Deliberative Poll focused specifically on eco-friendly toilets and use of wastewater as shown below.

Table I: Results on Toilets and Waste Water

| Question | T1 | T2 | T2-T1 | Sig. |
|--|------|------|-------|----------|
| 23. Promote the use of environmentally-friendly toilets in all houses | 9.27 | 9.48 | 0.21 | 0.052** |
| 24. Promote the use of environmentally-friendly toilets in all institutions | 9.24 | 9.44 | 0.20 | 0.059 |
| 25. Ban the use of untreated waste water for gardening | 8.53 | 9.09 | 0.56 | 0.004*** |
| 29. Promote a low cost treatment of waste water for farming through the use of charcoal and stones | 7.77 | 8.36 | 0.59 | 0.003*** |

Note: The survey results presented are means from pre deliberation and post deliberation, with the different between the post and pre deliberation mean and statistical significance. All questions are on a 0 to 10 scale, where 0 is extremely unimportant and 10 is extremely important. Significance below 0.01 is indicated with “***”, below .05 with “**” and below .10 with “*”.

“Promote the use of environmentally-friendly toilets in all houses” increased significantly in support after deliberation getting a rating of 9.27 out of a possible score of 10. “Promote a low cost treatment of waste water for farming through the use of charcoal and stones” also scored very high. Hence after weighing all the pros and cons of each policy option during deliberation, “the use of environmentally-friendly toilets...” and the “treatment of waste water...” were among issues that received the highest consideration by the scientific random sample. In the small group discussions, one participant commented, “all houses should have toilets because you can pick up diseases from the public toilets.” Another noted: “Sometimes we don’t have water to drink, not to talk of using it to flush toilets.” So the eco-friendly toilets, which are far more efficient in terms of water usage, are particularly attractive as a solution. There was also strong support for the proposal, “Ban the use of untreated waste water for gardening [farming]”. Though it may not be practical to ban the use of untreated waste water for farming, the strong support suggests that local government authorities might want to discourage the practice by promoting the filtering of waste water to make it safer for agriculture.

Policy options

In order to take the DP voices forward, experts at an Innovation Strategy Workshop (ISW) studied the policy options and identified three intervention pathways inter alia: Water, Sanitation and Hygiene (WASH); Agricultural Practices and Marketing; Livelihood Diversification and Financial Inclusion. Afterwards, a multi-sectoral team of experts,



using the Collaborative Resilience Innovation Design (CRID) approach, critically examined the intervention pathways. They concluded that, in designing resilience innovations with potential transformational impact, priority should be placed on projects that address challenges across the three pathways. It was also agreed that waste was no longer a nuisance but a resource. Among others, the experts recommended interventions that support multiple uses of water, and proper waste recycling into organic fertilizer. They called for a business model that enables Metropolitan, Municipal and District Assemblies to enter into partnership agreements with the private sector to develop businesses around; Water, Sanitation, Hygiene and Health; improved Agriculture and Markets; and Livelihood Opportunities.

The status quo

Innovations are being sought to address the old toilet system of septic tanks and soak-away that are in use across the Metropolis. The obvious challenge of the septic tank system is that it is costly to regularly evacuate. Besides, there is no safe place for dumping the liquid waste when it is evacuated. For health and sanitation reasons, the government is also discouraging the construction of public toilets. KVIPs, that are relatively cheaper to construct, turn out to have a repulsive smell and are not attractive to households.

Currently, A **Bio Toilet** facility for households is being promoted in Tamale. It uses the ordinary flush toilet water closet but with a bio-digester system. It leaves no scent at all. It also has a water-recycling component that comes at an extra cost for those who can afford. As the system is based on the normal water closet system, the **Bio Toilet** is a challenge for places like Tamale where the need to economize water is of paramount importance. The **Bio Toilet** is also susceptible to blockage when household waste, such as sanitary pads, gets into it.

The proposal

This policy brief makes a case for an **Eco-Safe Toilet System**. The Eco-Safe technology involves flushing the waste (excreta) with minimal water and effectively separating the solid component of the waste from the liquid. Aerobic transformation turns the solid parts into compost, and filtration of the liquid component is recycled for non-edible purposes including vegetable farming and gardening. The **Eco-Safe Toilet Technology** is a convenient and integrated waste management system that converts human excreta into energy with the following benefits:

- ✚ An appropriate technology that replaces the traditional septic tank
- ✚ Uses minimal water for flushing



- ✚ Compost/organic fertilizer to improve farm yield
- ✚ Water conservation through recycling
- ✚ Cheap and easy to construct
- ✚ Requires small space for installation and may not need evacuation
- ✚ Ensures a clean, green and sustainable environment

The **Eco-Safe Toilet Technology** is ideal for backyard poultry and vegetable farming using organic manure. This can be a reliable source of income for urban households where land for farming is scarce. The water and compost can also be used to grow flowers and fruit trees and to green the environment.

The **Eco-Safe Toilet Technology** comes with the following key benefits for Tamale residents: Improved household water supply; efficient liquid waste disposal and overall sanitation; water conservation, recycling and reuse; improved food and nutrition; improved agriculture through maximizing use of available land; and diversified livelihoods. As a result of the system's efficiency, cost-effectiveness and user-friendliness, the **Eco-Safe Toilet Technology** is being supported for implementation in all 16 Metropolitan, Municipal and District Assemblies in the Greater Accra region.



Installed: A Typical Eco-Safe Digester from Outside



Parts of the Internal Features of an Installed Eco-Safe Digester



Interior of the Eco-Safe System



Outside of a Stand-Alone Eco-Safe System



Action

Political authorities in the Tamale Metropolitan Area and other Municipal and District Assemblies should explore the possibility of entering into Public-Private-Partnership (PPP) agreements with **Eco-safe Toilet Technology** for efficient waste management, water recycling and reuse, improved health and sanitation, diversified livelihoods for food and nutrition security, and for a green environment.

Sources

1. Tamale DP Briefing Materials
2. Tamale DP Report: “What people say when they truly speak: Results from Ghana First Deliberative Poll.” 2015
3. RAN Collaborative Resilience Innovation Design (CRID) – Report: A powerful alternative approach to developing system level innovations aligned to RILab Intervention Pathways March 26-27, 2015, West Africa Resilience Innovation Lab (WA RILab), Tamale, Ghana

Contact information

Policy brief developed by the West Africa Resilience Innovation Lab (WARILab)

For further details contact:

Dennis Chirawurah

Project Director, WARILab

School of Medicine and Health Sciences

University for Development Studies

P. O. Box TL 1883 Tamale

Tel: (+233) 0209205460

(+233) 0243507505

Email: afeyire@gmail.com

