

THE PACIFIC ISLAND COMPOST TOILET

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Abstract

AusAID resolved to develop a 'Pacific Island Composting Toilet' on Kiritimati (Christmas Island) where, like other coral atolls in the Pacific, water is a scarce resource. Environmental Management has been involved in its development since 1997. Our experience on Kiritimati was that the principles of composting toilets are relatively straightforward, and it was the social acceptance of the toilets that was crucial to their success. Developing the Pacific Island Compost Toilet was an exercise in community consultation and in designing a toilet that was easy to build and use.

This paper presents a brief overview of the history of sanitation on Kiritimati and the pre-existing conditions that required us to overcome a widespread negative attitude towards composting toilets among the community. It then outlines the community consultation program and describes how the design of the composting toilet was altered to incorporate the needs of the community. The final design of the Pacific Island Composting Toilet is presented and the current performance of the composting toilets is reviewed. The paper closes by summarising the steps taken in the design of the Pacific Island composting toilet.

Keywords

Composting toilets, community participation, Kiritimati, monitoring, promotion

1 Introduction

Kiritimati (pronounced 'Christmas') Island, shown in Figure 1, in the Republic of Kiribati, is the world's largest coral atoll with a total area of 640 km², with its highest point only 13m above sea level. It has poor soils and low rainfall and was not inhabited when first sighted by Captain Cook in 1777. The only sources of potable water on the island are rainwater collection or groundwater, which is only 1 to 2m below the surface.

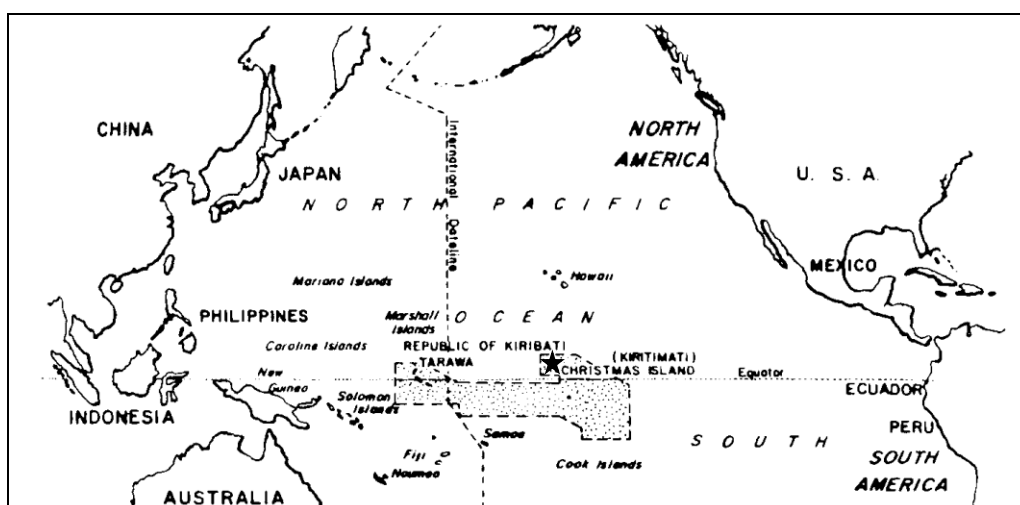


Figure 1: Location of Kiritimati

Kiritimati was virtually uninhabited until seasonal camps of coconut plantation workers were established in the early part of this century. Villages were set up over some of these bodies of water where the lens were closest to the surface. At that time, sanitation in these villages consisted of walking away from residences, to a beach if possible, for open-air defecation. The I-Kiribati term for defecating translates to 'going to the water'.

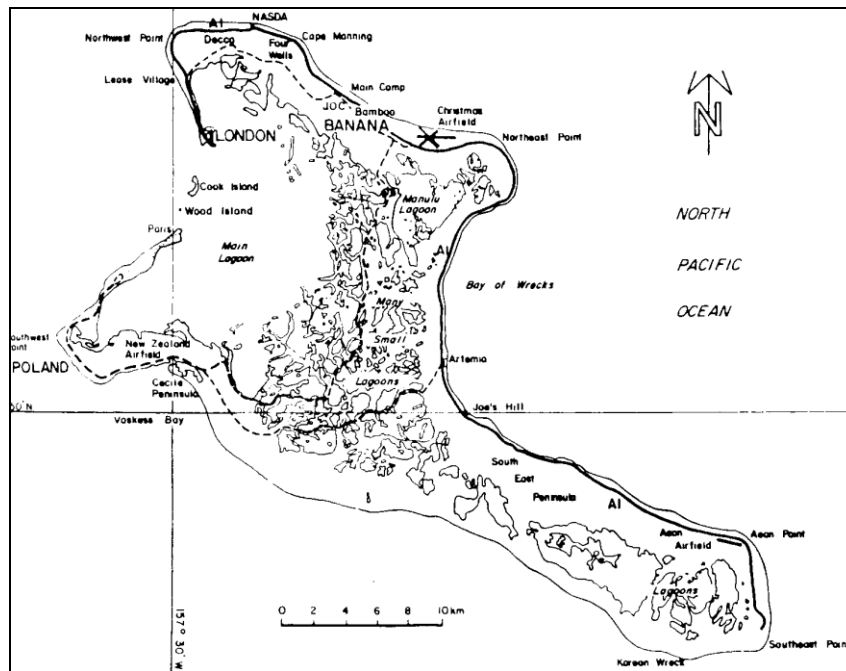


Figure 2: Map of Kiritimati

It wasn't until these temporary villages began to become more permanent, essentially after Kiritimati became part of the independent nation of Kiribati in 1979, that problems with sanitation appeared. Basically, pour-flush toilets with septic tanks were put into villages, with little consideration for their environmental impact or on public health. Contamination of village drinking water with faecal matter was guaranteed, not only through the proximity of wells and pits, but from poor maintenance of these systems. The traditional method of open-air defecation was also becoming constrained as village populations increased.

There are currently 5 villages on the island, London, Tabwakea, Main Camp, Banana and Poland, with an island-wide population of approximately 3,500. There are plans to increase the population of the island to around 10,000 people to take pressure off the main islands of Kiribati. It is therefore important that the type of sanitation used on the island suits not only the current level of population but can cope with the expected increase.

2 History of the Christmas Water Supply and Sanitation Project

In 1980, a detailed water resources study of Kiritimati by AusAid resulted in a decision to instigate a Water Supply and Sanitation Project. In the early 1990s, the feasibility of composting toilets was investigated as a viable sanitation alternative for the Project.

Kiritimati has low rainfall, shallow groundwater and infertile soils. The main reasons for considering composting toilets were that they use no water, are located above ground and produce material useful for gardening. As these physical conditions are common on coral atolls throughout the Pacific, AusAid reasoned that the composting toilet developed on Christmas should be applicable throughout the Pacific, in effect a "Pacific Island Composting Toilet".

A pilot trial for composting toilets started in 1994, and finished in 1995, where three different styles of batch composting toilets were built and studied. In total, 15 compost toilets were built in three of the villages. The three styles trialed were the wheelie-bin, the cage-batch and the double-vault.

2.1 Wheelie-Bin Composting Toilet

This style of composting toilet was developed by Dr Leonie Crennan and has been used successfully in Australia. Wheelie-bins are modified with interior pipes to assist aeration, and are placed under a pedestal and connected to an excess liquid trench, as shown in Figure 3. When full, the wheelie-bin is detached from the trench and placed in the sun, and a new bin is placed under the pedestal. There were eight wheelie-bin composting toilets constructed in the trial, with one of these eight shown in Photo 1.

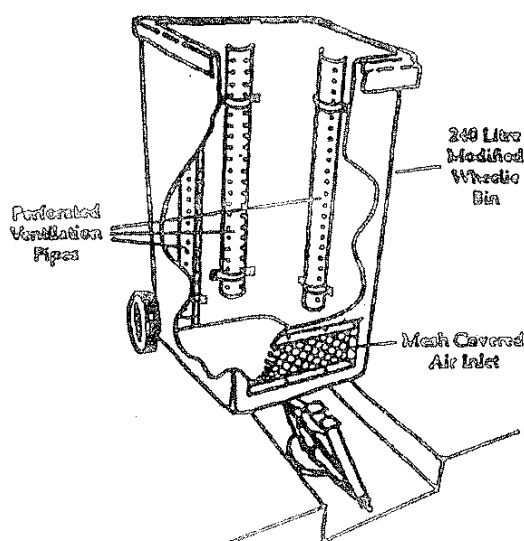


Figure 3: Detail of Wheelie-Bin



Photo 1: Wheelie-Bin Composting Toilet on Kiriritimati

2.2 Cage-Batch Composting Toilet

This style of composting toilet had two vaults, with the interior made of a galvanised mesh cage to aid air circulation, as shown in Figure 4. Both the wheelie-bin and cage-batch had superstructures of marine ply. Four cage-batch composting toilets were constructed in the trial, with one shown in Photo 2.

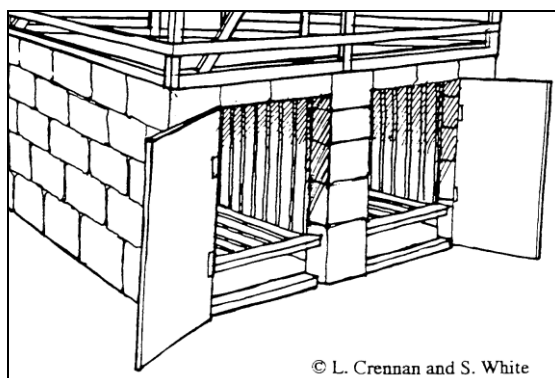


Figure 4 Detail of Cage-Batch – Concrete Bricks instead of Marine Ply



Photo 2 Cage-Batch Composting Toilet on Kiriritimati

2.3 Double-Vault Composting Toilet

The double-vault composting toilet was built from locally available materials such as coconut thatching with a tray for aeration, as shown in Figure 5. Three double-vault composting toilets were built in the trial, with one shown in Photo 3.

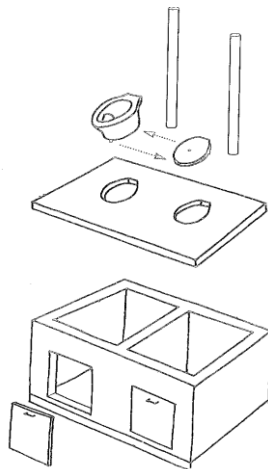


Figure 5 Detail of double-vault composting toilet

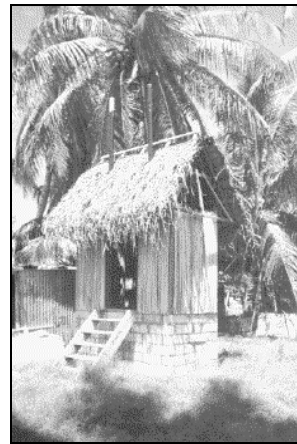


Photo 3 Double-vault composting toilet on Kiritimati

3 Sanitation and Community Involvement

The principles of sanitation design, including composting toilets, are straightforward. However, it matters little if a superbly designed sanitation system is built in a community if it is not what the community needs. As Pickford (1990) said, in talking about the introduction of new sanitation methods to a community, if it is “introduced from outside without consultation with community members, resistance may be so strong that the new ideas are positively rejected.”

This situation is changing, and it is increasingly recognised that for sanitation projects “...success depends more on promoting sanitation than on the efficiency of engineers and builders” (la Fond, 1995).

4 The Community of Kiritimati and Composting Toilets

Of all sanitation systems, composting toilets require one of the highest levels of maintenance and commitment from the user. In many areas, the need for the addition of bulking material and the removal of the compost outweighs the benefit of the final product, compost, to be used in agriculture. The importance of a well-designed and effective communications program is therefore essential to the community adopting the technology successfully.

There were several concerns with composting toilets for the I-Kiribati community, such as the cultural taboos associated with the handling of faeces. The implications of this for getting the owners to change over their composting toilet vaults could not be under-estimated.

Also, there was the issue of the superstructure height, which is much greater than most other buildings on the island. This drew attention to the composting toilet and, combined with open stairs where people could observe one going up to the toilet, was seen as too exposed.

There were also technical problems resulting from specific health issues of the local population, namely the high incidence of diarrhoeal diseases. As excess liquid trenches and the pipes to them are usually designed to take liquid, the viscous material going to the excess liquid trenches readily blocked the pipes. This led to the lower parts of the compost pile becoming saturated, anaerobic and smelling. This in turn attracted flies as well as complaints.

Deficiencies in the pilot designs made them more susceptible to failure in this community. These might have been rectified in a normal project. It was nearly three years before the main part of the project started in 1997, and the pilot compost toilets were rarely maintained.

5 Community Consultation on Kiritimati

Overseas Projects Corporation of Victoria (OPCV), AusAid's managing contractor for the Kiritimati Water and Sanitation Project, engaged Environmental Management to design a composting toilet for Kiritimati based on the three previous styles trialed. When we first visited the island in late 1997, most of the composting toilets had failed and as a result were not being used, or if they were being used, smelt and attracted flies. The community saw composting toilets as inferior to the flush toilet that did not smell and was easy to use. They did not understand that septic tanks were polluting the groundwater that they were drinking.

We decided to go from first principles, and involve the community as much as possible in the design of the composting toilets.

"Participation from the outset has given (the consumers) a sense of ownership and responsibility for sustaining the flow of project benefits." (la Fond, p 15)

Ideally, we would have liked to give the community the choice of sanitation alternatives, but on Kiritimati composting toilets were the only sustainable option. Nevertheless, in all our work with the community, we explained why composting toilets were being built in preference to septic tanks.

Further, full-time local Community Liason Officers (CLO), male and female, were used to engage the local community in dialogue.

5.1 Community Meetings

We started with community meetings at traditional meeting buildings called "maneabas", where we would address large groups and explain the work we were doing. The first thing to be considered was that these maneabas were associated primarily with religious groups, and there could be up to three maneabas in a village, one Catholic, one Protestant and one Seven Day Adventist. It was necessary to visit all maneabas so that as many community members as possible were consulted. We also held informal meetings with smaller interest groups.

We explained that the composting toilets on the island were not working and were there to listen to them and get their ideas on how the toilets could be improved. It took time to develop a relationship of trust with the community and found that our second visit certainly gave us a lot more feedback than the first. From this feedback, inspections and interviews, the major problems with composting toilets were:

- Smell
- Flies
- Height of the building
- Collecting leaves for bulking material

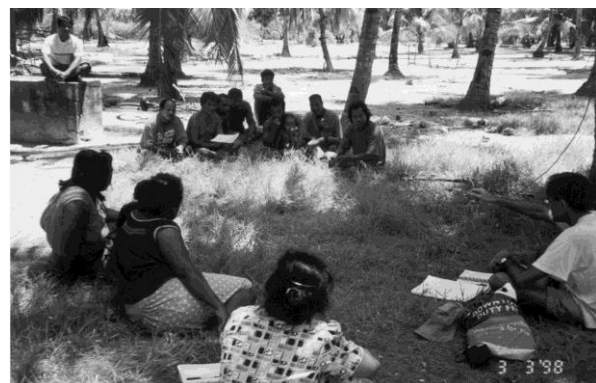


Photo 4 Informal Meeting on Kiritimati

A properly designed and maintained composting toilet could reduce or eliminate the first three issues, and that the last issue was important for maintaining the composting toilet properly.

5.2 Design of the Christmas Compost Toilet

To ensure that the new design of composting toilets worked well, we designed two double-vault styles – the only difference being how they aerated the compost. One style used a tray and the other a net. The design was made robust, to allow that, as in Australia, tradesmen building the facilities *know* that they know better. As far as possible, the materials used were those readily available, such as coconut coir for sealing the hatches.



Photo 5 Net Composting Toilet

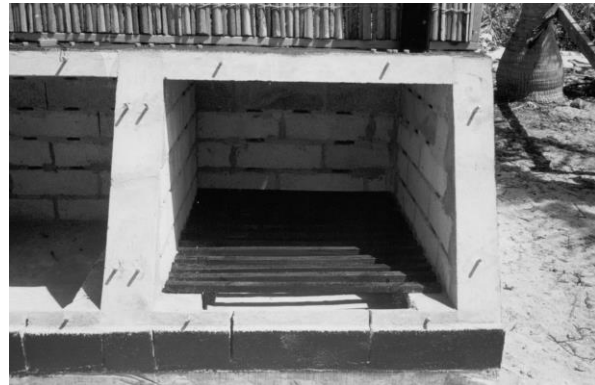


Photo 6 Tray Composting Toilet

The vault is a sit-down model, which allowed people to squat and reduced the height of the building. The stairs were put inside the building, making it less obvious in the landscape. Coconut sticks were used for the exterior, in keeping with traditional I-Kiribati homes.

The result is a composting toilet that works well, in a building that does not stand out in the landscape, and reduces the stigma attached to using it. The lead-in to construction of the composting toilets was around 18 months.



Photo 7 Views of Composting Toilet Showing (from left to right) Exterior of the Building, steps Inside Building and toilet Seat on Top of Vault.

5.3 Monitoring Program

A monitoring program was developed to educate the users of the composting toilet. A first visit is made to each family when the composting toilet is finished, with follow-up visits within 2 weeks and then monthly visits. The local CLOs conduct these visits, with the assistance of Government of Kiribati health staff.

Instructions included not only how to use the composting toilet, but why they needed to be followed. For instance, using leaves after every visit reduces smell and helps keep flies away. Understanding why they were to use leaves meant that people were more likely to use them.

A survey is taken during the monthly visits. It collects details on the technical performance, use and maintenance of the composting toilet for analysis. As well, compost samples are being taken at intervals for testing.

5.4 Promotion Program

A promotion program was developed and is running concurrently with the construction of composting toilets. Radio information programs are held each week and dramatic plays held regularly within the community, to increase the knowledge of the wider community. Schools are visited regularly, and instructions given on the environmental and social benefits of composting toilets to the community. This promotion program works with the sanitation and hygiene programs run by the Kiribati Government.



Photo 8 Primary Class on Kiritimati

6 Results of the Community Consultation Program

Improved operation of the composting toilet, together with improvements in the design, meant that the smell and flies associated with the earlier models have been greatly reduced. We found that once the Christmas composting toilet was seen to be working well, with no smell and no flies, people began to view them more positively.

Households with a composting toilet saw that when looked after they worked well, and so have continued to look after them. A promotion program was developed and is running concurrently by the CLOs with the construction of composting toilets. Radio information programs are held each week and dramatic plays held regularly within the community, to increase the knowledge of the wider community. Schools are visited regularly, and taught the environmental and social benefits of composting toilets to the community.



Photo 9 Composting Toilet with the Bathroom to Left of Toilet

As a result, more and more families are requesting the composting toilet, with the local doctor and leading Government of Kiribati personnel already having them on their land. As an example of this, Photo 9 shows a composting toilet with a bathroom placed right next to it. This bathroom and washing area would not be placed anywhere near smells or flies.

The success of the communications program, in particular the use of full-time local CLOs, can be seen in that around 98% of all households with the Christmas composting toilet collect leaves and do not regard it as a problem. This is in stark contrast to the beginning of the project, when it was one of the most important impediments to the adoption of composting toilets by the community.

7 The Future of the Project

The monitoring and assessment program is still in progress. At the present time, over 100 composting toilets have been built and analysis of the results so far show that apart from some fine-tuning needed, the toilets are working well and have been accepted by the householders and the wider community.

This high level of acceptance is due to:

- the effort taken to consult the community in the design phase
- designing the compost toilet for cultural acceptance in height, appearance and use, and
- intensive education of composting toilet users with the assistance of the local CLOs.

8 Summary

Composting toilets are a suitable form of sanitation for coral atolls – they use no water, are situated above ground, and provide a useful product for gardens. However, composting toilets are not well known in the Pacific and community resistance on Kiritimati to the technology was great, exacerbated by the failure of composting toilets in a Pilot Trial left unsupported for nearly three years.

Extensive community consultation resulted in community concerns being incorporated into the design. The resulting design worked well and fitted in with the landscape.

Households with a composting toilet received extensive education from the local CLOs on the proper use of the toilet, and the wider community educated through radio, drama and existing sanitation programs run by their Government.

The high level of acceptance of the composting toilet, by individual households and the wider community, is evidence that the approach was successful.

While it is important to have a robust design based on sound technical principles for a composting toilet in a developing country, the success of the project will depend mainly on winning the support of the community.

Disclaimer

This paper reflects the views of Environmental Management and not necessarily those of OPCV or AusAid.

References

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