# Sanitation, Health and the Environment

**Workshop Report (May 27, 2004 and June 14, 2004**

# Ridge to Reef Watershed Project

USAID Contract No. 532-C-00-00-00235-00

## Sanitation, Health and the Environment

Workshop Report (May 27, 2004 and June 14, 2004)

July 14, 2004

Prepared for the

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and the

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Implemented by:

ARD, Inc.
P.O. Box 1397
Burlington, Vermont 05402

# Table of Contents


| | |
|---|---|
| Introduction | 5 |
| Purpose | 5 |
| Overview | 5 |
| Main Presentation | 6 |
| Discussion | 7 |
| Appendix | 13 |

## Introduction

Two workshops were held, the first on May 27 at the R2RW offices in Cambridge, St. James and the second at the offices at the Rural Agricultural Development Authority (RADA) in……Forty-eight persons attended the workshops – sixteen community representatives and six R2RW project representatives at the first workshop, and twenty-two community representatives as well as five R2RW representatives at the second. Thirteen community based organizations, the St. James Health Department, the Hanover Health Department and the United States Peace Corp were represented at the workshops.

## Purpose

The workshops were part of the efforts of the R2RW project to document, promote and mainstream low-cost sanitation solutions and to better understand the decisions made by house holders with regard to sanitation.

The specific objectives of these workshops were:

- To assist watershed residents to make more rational decisions on sanitation solutions for their community.
- To disseminate information on good practices
- To identify practices supportive of improved sanitation, e.g. where to build, cost and harvesting rain water.

## Overview

Representatives of the R2RW project gave an overview of its goals and activities at each of the workshops. The participants learned that R2RW supports the USAID SO2 for Jamaica namely:

- Improved quality of key natural resources in areas that are both environmentally and economically significant.

The three components of the focus of the R2RW project were outlined as being:

1. Sustainable environment practices
2. Compliance and enforcement
3. Institutional strengthening

Details of each year's activities were outlined as follows:

**Year 2 & 3**

- Demo Systems – Pisgah, Retrieve, Content, Mafoota
- Water Quality Monitoring
- Strategic Planning Workshop 2001

**Year 4**

- Solid Waste Management Seminar with NSWMA and MBMP

- Clean up days: Cambridge, Ramble Pond, Cedar Grove, Belmont, Chester Castle Seven River, and York Castle Heights

- Green Village Program

## Main Presentations

Mr. Stephen Hodges and Mr. Jason Excell made presentations. The main points made by them were as follows.

**Areas of Concern**

- Health
- Pollution
- Reef Damage
- Fish

A participant asked the question - why sanitation? It was explained that sanitation issues are important to stopping the spread of many diseases. Other points made were that:

- Natural bacteria will make things safe, but need time out of the way of people;

- Hand washing is a way of dealing with the problem when contamination is around; and

- There must be full coverage or everyone's at risk. This is why it is law.

**Impact on the Environment**

- Sewage contains nutrients such as phosphates and nitrates.

- Nitrates cause the blood not to carry oxygen well, particularly in babies.

- Nutrients damage reefs by helping algae grow.

- The nutrients get into the streams and rivers directly through gullies and in the groundwater.

Some of the sanitation methods being used and their impact on the environment were outlined. These were:

- The bush or scandal bag pollutes and spreads germs;

- The latrine is smelly but hygenic, can pollute;

- The flush toilet and absorption pit is great for health, but bad for groundwater; and

- The flush toilet and septic tank (and effluent disposal) better than a pit, but effluent still contains nutrients.

The point was made that both health and the environment are affected by people's choice of sanitation technology and the site of sanitation solutions in relation to rivers, streams and gullies

**Solutions and How They Work**

***Latrines***

- Hold the waste until it composts, with liquid soaking into soil.

***Absorption Pit***

- Soaks the liquid away and keeps the solids.
- Do a percolation test and avoid sinkholes.

***Septic Tank***

- Settle the solids and treat the waste. The effluent is suitable for disposal in a soak-away or tile field, but it still has nutrients.

***Improving the Technologies Being Used***

The following were recommended as actions which participants could implement.

- Stop using bush or scandal bags.
- Tidy-up and install a vent pipe on latrines.
- Use septic tanks and effluent disposal instead of absorption pits.
- Use a soak away, tile field or constructed wetland.
- Organize hand washing so that it is easy.

Pointers on how to get started were given. These were for participants to:

- Organize to know what the sanitation situation is in the community;
- Work with the public health inspector to ensure that there is full coverage of environmentally friendly toilets; and
- Help to make hand washing possible as well as toilets.

## Discussion

Chief Public Health Inspector, Mr. Desmond Clark, said he was happy that hand washing had been emphasized. A community member said that if laws were being enforced every one would have appropriate sanitation.

Mr Clarke was asked to say what had gone wrong in the enforcement of public health laws. Mr. Clarke responded that public Health was more reactive than proactive. He said that the Public Health Department no longer did house to house inspection as it had become impossible to inspect everyone's premises given only a few inspectors. It was noted that the law requires every building to have a toilet even during construction. One community response was that it was frustrating when the Public Health Department does not respond when alerted to problems.

In response Mr. Clarke said that there is a complaints register in St. James the telephone number of which is 979-7820-4 or 952-3831. He said that complaints about sewage problems should be investigated within 24 hours. He said that the Public Health Department was promoting health and groups in communities must be vigilant and make reports when necessary. He noted that there were also roles for NEPA and the Parish Councils.

**There was a discussion on the sanitation situation in communities. The following table summarizes the responses.**

| Communities | 95% Very Good | 75-95% Good | 75% Poor | Comments |
|---|---|---|---|---|
| Cedar Grove | | * | | Pit &flush, households share latrines |
| Castle Heights | | * | | Lack of finances |
| Retrieve | | | * | |
| Belmont | * | | | Those without just need to fix what they have |
| Catadupa | | | * | R2RW/Peace Corp Project |
| Lethe School | * | | | Near River |
| Lethe Comm. | | * | | Action boys did awareness |
| Catherine Hall | * | | | |
| Ramble Pond | | * | * | Financial problems |
| Norwood | | * | * | Financial Problems |

The Public Health Department Representative was told of a specific situation, which needed attention, It was reported that the National Water Commission pumps sewage via a drain running beside the Howard Cooke primary School and out to sea. It was also reported that there had been a breakout of shigalia (running belly) in Catadupa a year ago and that in the community 65/1000 households had no sanitation.

Participants were of the view that construction of sanitation solutions should have a higher priority than enforcement of the laws and that communities should be strengthened. It was said that the Public health Department should be treated as a partner and be invited to speak to community groups

In discussions in small groups the following were identified as the main problems, solutions and concerns for the communities.

**Group 1**

***Cambridge***

Main Problem

- Garbage & Sewage
- Poorly constructed pit toilets/shallow

Solution

- Testing of water

Concerns/Existing Situation

- Closeness of sewage to houses
- Soil sandy and possibility of ground water contamination
- In lower Cambridge 95% have flush toilet and /or pit latrines

***Dundee***

Main Problem

- Poorly constructed/shallow pit toilets

Solution

- Constructed wetland proposed

**Group 2**

Main Problem

- Pit toilets & Garbage Disposal
- Public toilet not working

Solution

- Mt. Horeb – open land for disposal
- Cleanup Day
- Expansion of garbage collection
- Portion of fees from public transportation to fund construction of public toilets
- Petition MPs & Parish Council to come in and meet with the community

**Group 3**

Main Problem

- Sanitation is poor, 30 persons are without toilets and 35 are not in good condition.
- Shigella outbreak in community (running belly)

Solution

- Survey conducted

- Community has met
- Wetland system and VIDPs to be introduced
- Proposal prepared for funds to improve sanitation
- Beneficiaries will pay monthly to fund additional systems
- Public health involvement.

There was a general discussion on the priority areas for action and some specific activities which should be accomplished by the R2RW project. These are listed in the following table in order of priority based on participants' vote at the end of the discussion.

| **Empower Communities to Improve on Sanitation Practices Though Education** | **13** |
|---|---|
| Community launch meetings with NEPA branch office | |
| Sanitation forums | |
| Establishing flyers and pimples | |
| Creation public awareness through media | |
| Organizing field trips to model areas | |
| Identifying legal funding agencies (R2RW) | |
| **Research of Available Resources, Status and Technology** | **8** |
| Launch activities with service group | |
| Research and survey to ascertain sanitation needs and available technology | |
| Identify appropriate technology and commence activity to construct necessary sanitary conveniences | |
| Encourage full participation of all citizenry to fully utilize built conveniences | |
| Institute and continue monitoring process to ensure fur participation by all with assistance of P.H.I | |
| Lead and monitoring agencies, citizen association, youth club, Golden Age Club | |
| **Construction and Maintenance of Suitable Environmentally Friendly Sanitation Facilitates** | **2** |
| Carryout survey to ascertain sanitation status | |
| Contact SRC/NEPA/CRDC/Peace Corp | |
| Ministry of Health to learn about sanitation option | |
| Construction of wetland | |
| Septic tanks in water shed area | |
| Construction of garbage receptacles | |
| Disposal of waste materials | |
| Assist persons to provide appropriate solutions | |
| Providing proper water supply | |
| Repair acceptable solution/facilities | |
| Build toilets | |
| Building sewage systems within the community | |

| Strengthen Existing Organizations to Focus on Sanitation and Environment Priorities | 2 |
|---|---|
| ✍ Lobby for garbage pick-up<br>✍ Unite citizens/associations<br>✍ Educating community<br>✍ Forming community awareness groups<br>✍ Finding economical sanitation method | |

Vision without action is a daydream

Action without vision is a nightmare --------- health

The time is always right to do what is right.

**Group 1**

- ✍ L. Brady
- ✍ Alison McFarlane
- ✍ Oscar Powell
- ✍ O. Haughton
- ✍ Edgar Bower

**Group 2**

- ✍ Neville -----
- ✍ Stephen Hodges
- ✍ P. Stevens- Pisgah
- ✍ D. Clarke –Cambridge
- ✍ H. Bernard – Rushea
- ✍ L. Stewart - Hanover Dept.

**Group 3**

- ✍ Jason
- ✍ Leo
- ✍ Marline
- ✍ C. Fen… - PVC C.
- ✍ Glegg

# Presentation

## Elements of Small Scale System

- Pretreatment or Preliminary Treatment
- Treatment (Primary, Secondary, & Tertiary)
- Reuse and/or disposal of treated effluent
- Sludge and septage Management

## Pretreatment

- The inclusion of an oil and grease trap in the small scale system is very important
- Especially, when dealing with kitchen waste from households and Restaurants
- Inadequate pretreatment will lead to premature failure of the system

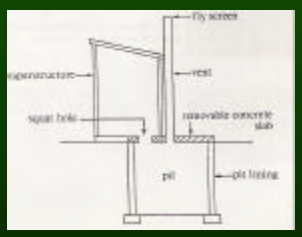
# Treatment

- Primary ( Standard Septic Tank, absorption pits, & Latrines)
- Secondary (Aerobic Digester, Anaerobic (Bio) Digester, & Constructed Wetland)
- Tertiary (Constructed Wetland, Evapo-transpiration beds & anoxic updraft sand filter with Chlorine Contact Chambers)
- Ideally we would like all treatment to be to a tertiary level, or at least to the point where effluent can be reused, rather than seen as wastewater to be disposed of!!!

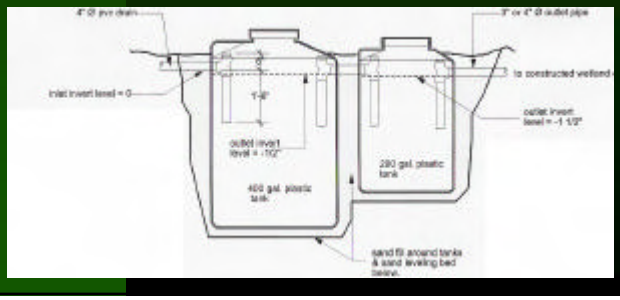
# Primary Treatment

- Absorption Pit

- Vented Improved Pit Latrine

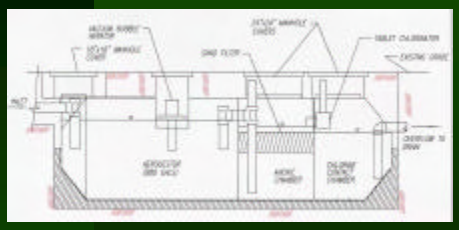


- Standard Septic Tank, using plastic tanks



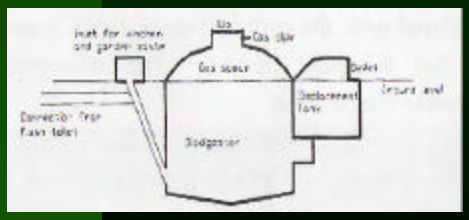
# Secondary Treatment

- Aerobic Digester



Note:
- Usually designed for 1 ½ day retention
- Relatively small foot print.
- odour free effluent typically
- Very flexible (above ground or below)
- Tanks can be made of plastic, f bergla or concrete
- Very low power consumption

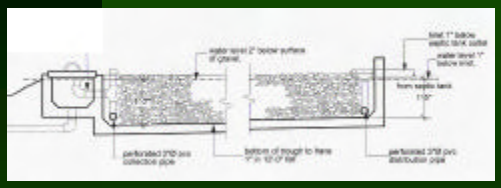
- Anaerobic Digester (Bio-digester)



Note:
- Usually designed for 6 day retention
- Bio-gas generated as a by-product
- Relatively large foot print
- no electricity required

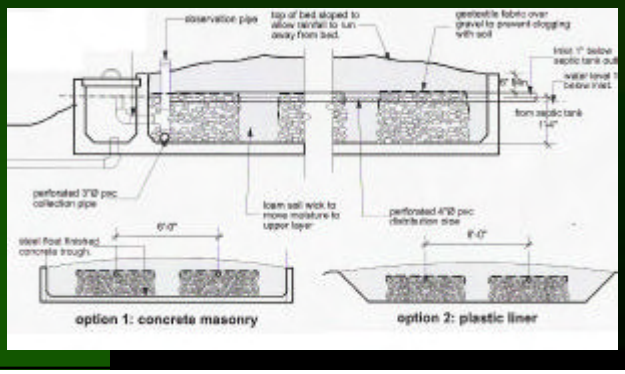
# Tertiary Treatment

- Constructed Wetland



Note:
- Usually designed to treat 1-2 gals/sq. ft.

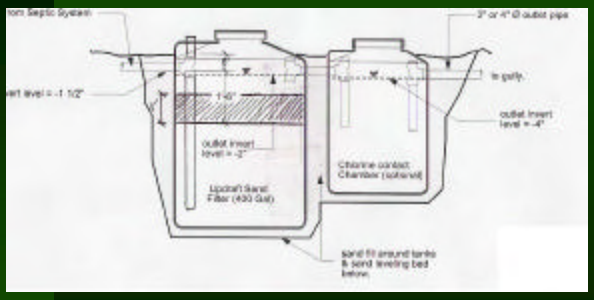
- Evapo-transporation Bed




Note:
- Usually designed to treat 0.25-0.5 gals/sq. ft.

# Tertiary Treatment con't

- Sand filter with Chlorination or Ultra-violet purification




Note: When using a sand filter with some form of disinfection, the final treated effluent will still need to be either reused or disposed of in tile field or soak away pit (these methods are generally preferred over direct discharge into a gully, or river).

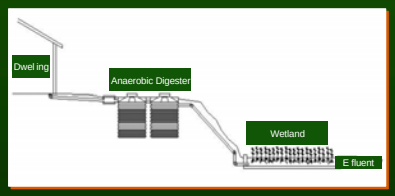
# The roles of Technology – Old & New

- When designing for a small community or individual lots for subdivisions there are many combinations

1. Septic tank - constructed wetland
2. Septic tank – evapo-transpiration bed
3. Aerobic Digester – Sand filter – Chlorine Contact – reuse, tiles field or soak-away
4. Anaerobic (Bio) Digester – constructed wetland
5. Septic tank – tiles field
6. Absorption pit
7. Vented Improved Pit Latrine

# Septic Tank – Wetland System

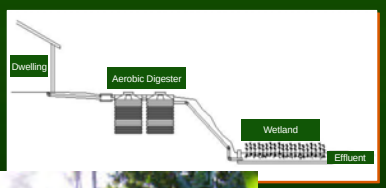
- Individual Residence in Red Hills
- Designed assuming 5 occupants -160 L/P = 800 LPD
- Both the septic tanks and wetland were sized for 3 days retention
- Note: Since, only two persons planned to live there, the wetland was built in phases, 1 ½ days retention for the first phase
- With daily water usage being measured, on average 350 LPD. There was zero – runoff, except during heavy rain when there was storm water runoff
- There is no effluent discharge for reuse

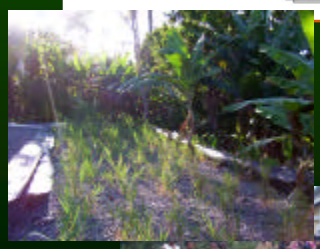


# Aerobic Digester – Wetland System

- Pisgah All Age School R2RW grant.
  - 300 students
  - 2 – 4000 LPD Aerobic Digester w/ wetland (liner with PE liner)
- Retrieve All Age School R2RW grant
  - 120 students
  - 1- 4000 LPD Aerobic Digester w/ wetland (built from concrete block)

Note: Both are working well, but we are utilizing only half of the wetland and we still have zero-runoff



## Aerobic Digester – Sand Filter – Chlorine Contact Chamber

- Silver Sands Villas
- Existing Absorption pit system, was upgraded to Aerobic Digester system w/ sand filter capable of handling 2,000 GPD
- The treatment effluent is now used to irrigate the plants, green areas

## Reuse and Disposal of Effluent

- Reuse and Disposal are usually at different end of the spectrum when designing wetlands or evapo-transpiration beds
  - Disposal systems are usually designed for zero run-off, are bigger, and more costly

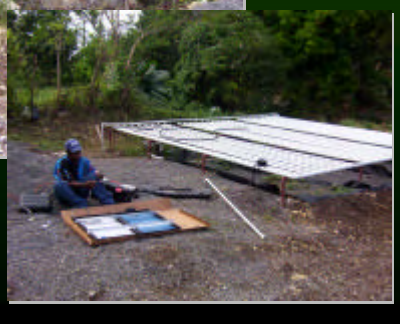
2. Reuse systems are usually smaller, and generate a savings to the user of the system (reducing water consumption)

## Reuse ….con't.

- If you want water from the system for irrigation, etc. One draw back when using wetlands for tertiary treatment is that you lose some of your treated effluent (50% to 60%)

## CASE Project (study) Integrated approach to treatment

- Reuse treated effluent from Biogas Digester to grow hydroponics and ornamental fish
- A solar powered pump is being used to supply nutrient rich water to hydroponics System from the fish pond
- Excess water finally used to irrigate a spice garden demo plot.
- Recycling & reuse to the Max…..



## Sludge and Septage

- The whole issue of sludge and septage removal and treatment would take a presentation on it's own

  1. Specialized plant for its treatment
  2. Certification of trucks

- The sludge management of the system needs to be part of the complete system

  1. On-site composting, where waste sludge is incorporated into composting schedule

## Cost comparison 800 LPD System

| system | Absorption pit (40k-85k) | Septic tank (20K-50K) | Evapo-Bed (60k-120k) | Wetland (15k-45k) | Tile field (8k-16k) | Total Cost |
|---|---|---|---|---|---|---|
| 1. Pit | * | | | | | 40k – 85k |
| 2. ST & CW | | * | | * | | 35k – 95k |
| 3. ST & EB | | * | * | | | 80k-170k |
| 4. ST & TF | | * | | | * | 28k – 65k |
| 5. Vented Latrine | | | | | | 20k-45k |
| 6. Latrine | | | | | | 15k-30k |

## Cost comparison 8000 LPD System

| System | Anaerobic Bio Digester (550k-650k) | Aerobic Digester (250k-550k) | Septic Tank & Tile Field (500K) | Wetland (250k-300k) | Sand Filter, CCC (80k-120k) | Total Cost |
|---|---|---|---|---|---|---|
| 1. BD & CW | * | | | * | | 800k-950k |
| 2. AD & CW | | * | | * | | 500k-850k |
| 3. AD,SF, & CC | | * | | | * | 330k-670k |
| 4. ST & TF | | | * | | | 500k |
| | | | | | | |

## Conclusion

- Our biggest challenge is to design, install, maintain, and permit small scale systems that are:

1. Environmentally Friendly
2. Cost Effective
3. Require minimum maintenance
4. Allow us to reuse the by-product, when feasible (I.e. Treated effluent, sludge, Bio gas, etc.)

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