Rainwater treatment options at public schools in rural Sierra Leone

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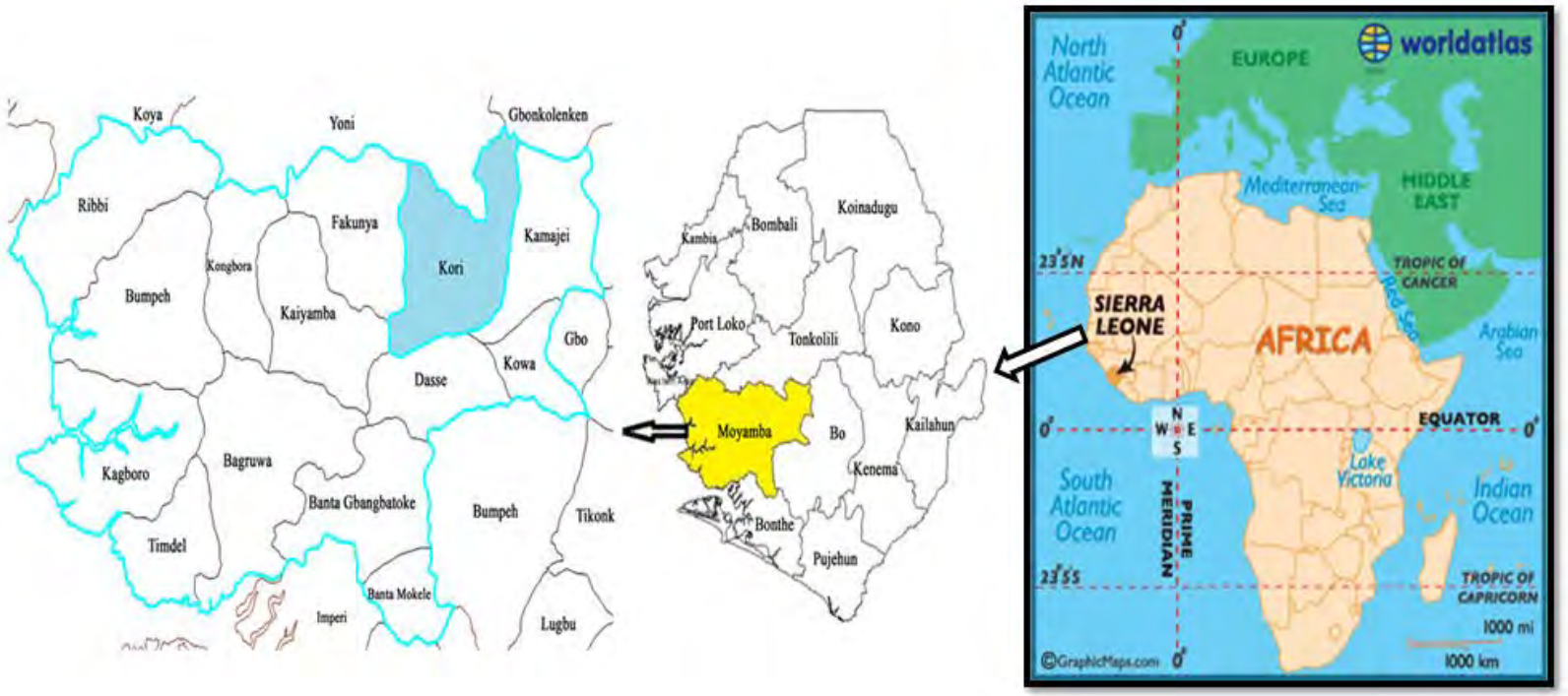
Study Area


Koya
Yoni
Gbonkolenken
Ribbi
Fakunya
Kamajei
Kori
Kongbora
Bumpeh
Kaiyamba
Gbo
Kowa
Dasse
Kagboro
Bagruwa
Banta Gbangbatoke
Bumpeh
Tikonk
Timdel
Banta Mokele
Imperi
Lugbu
Kambia
Bombali
Koinadugu
Port Loko
Tonkolili
Kono
Moyamba
Bo
Kailahun
Kenema
Bonthe
Pujehun
worldatlas
North Atlantic Ocean
EUROPE
Mediterranean Sea
MIDDLE EAST
23°5N
TROPIC OF CANCER
Red Sea
Arabian Sea
SIERRA LEONE
AFRICA
EQUATOR
0°
N
W
E
S
Lake Victoria
South Atlantic Ocean
Indian Ocean
PRIME MERIDIAN
23°5S
TROPIC OF CAPRICORN
1000 mi
1000 km
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Study Objective

- Evaluates two options for best practice in roof based rainwater harvesting in rural Sierra Leone, First Flush technic and Bio-Sand Filter, and determine whether First Flush can be used alone or in combination with Bio-Sand Filter.

Problem Statement

High water demand

Contaminated water source

Significant of the Study

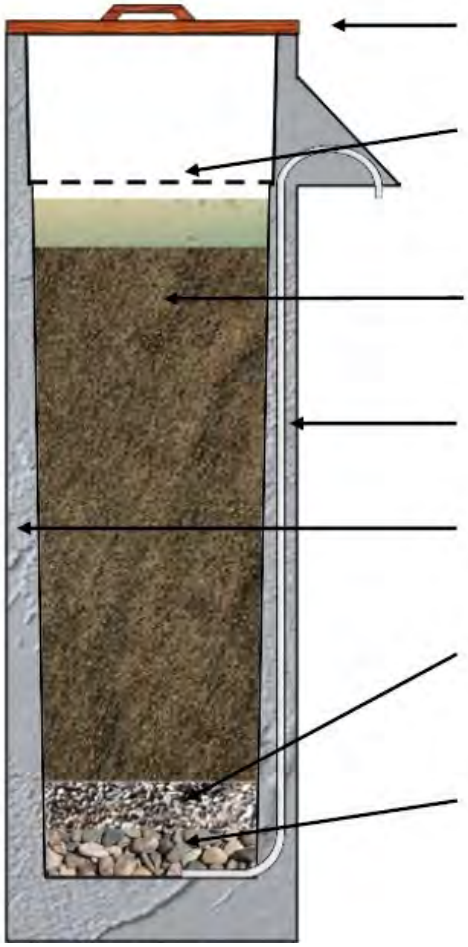
- It may encourage the practical application of rainwater harvesting programs in both urban and rural cities as a means of improving rainwater quality and minimizing water related health issues.

- It allows women and children the time to tend to other household duties and even seek jobs in the town centre.

- Lastly, this study may promote the support of government administrations in rainwater harvesting investment, and as well review water legislation in African countries, Sierra Leone to be particular

Rainwater Harvesting Systems

Bio-Sand Filter



1. **Lid –** Tightly fitting lid prevents contamination and unwanted pests.
2. **Diffuser –** Prevents disturbing the filtration sand layer and protects the biolayer when water is poured into the filter.
3. **Filtration Sand Layer –** Removes pathogens and suspended solids.
4. **Outlet Tube –** Required to conduct water from the base to the outside of the filter.
5. **Filter Body –** Holds the sand and gravel layers.
6. **Separating Gravel Layer –** Supports the filtration sand and prevents it from going into the drainage layer and outlet tube.
7. **Drainage Gravel Layer –** Supports the separating gravel layer and helps water to flow into the outlet tube.

Bio-Sand Filter

Bio-Sand Construction

Finished product

Data Collection setup

Old and New Zinc

Data Collection

Rainwater Samples

Samples preparation & Analysis

FIELD TESTING SUPPLIES

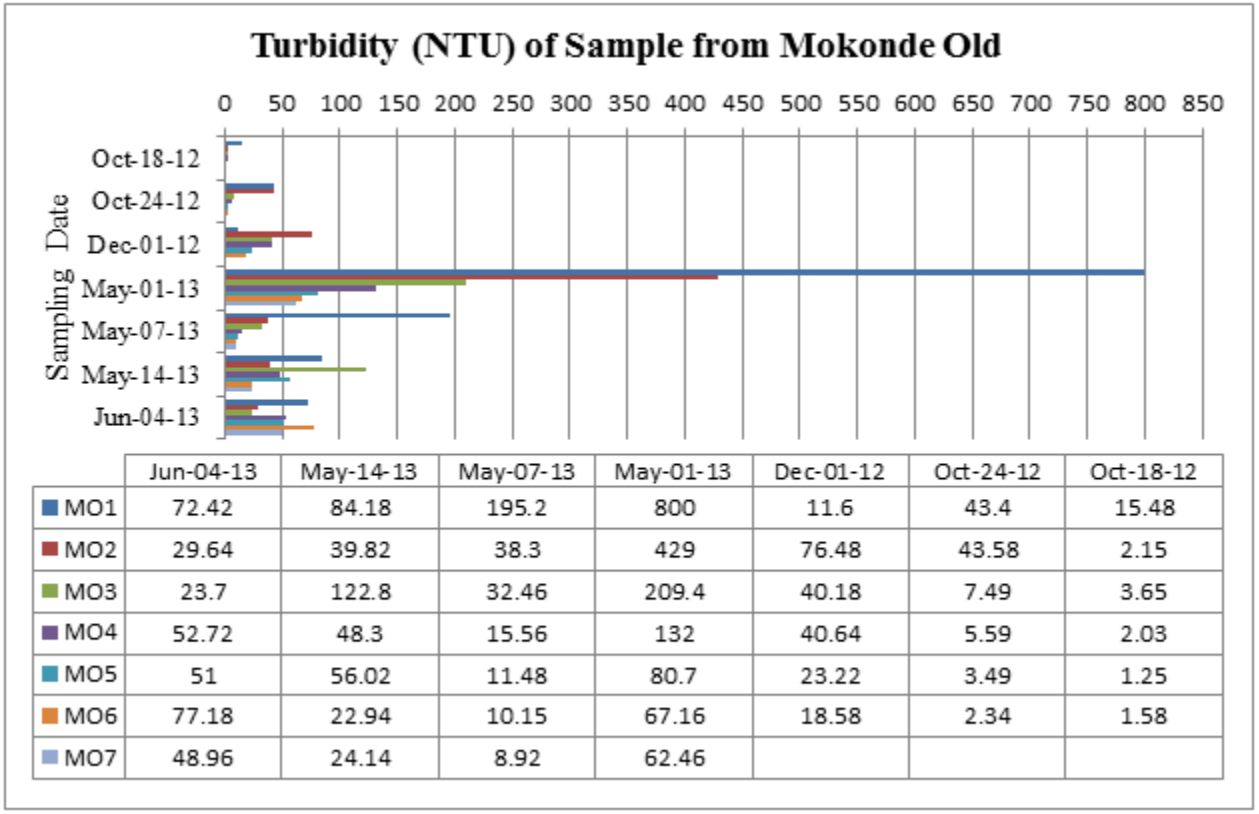
Hach Coliform & *E. coli* Field Filtration Kit

Portable incubator, solar panels & battery

Hannah Instruments pH/EC/TDS meter

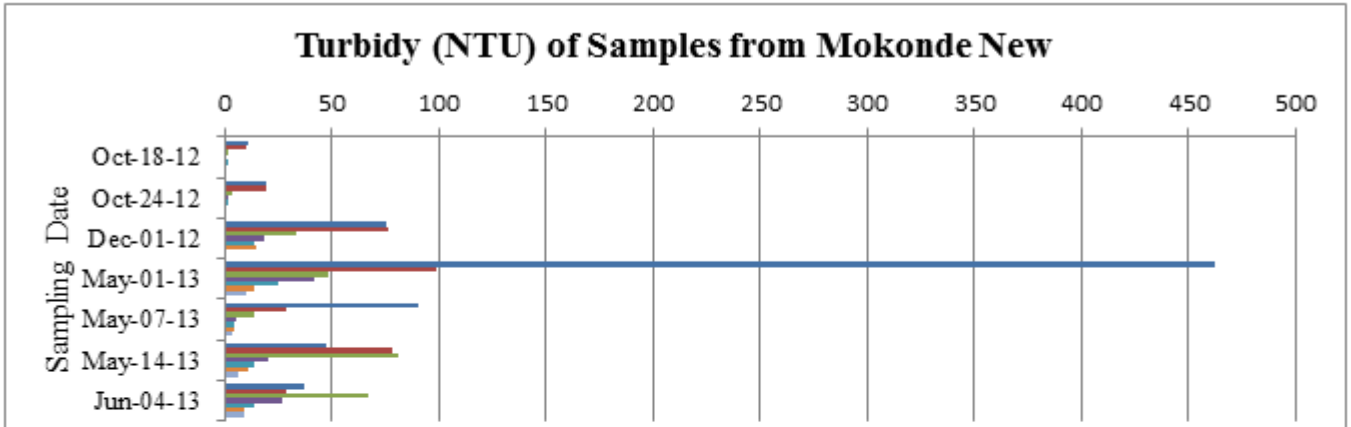
Hach Turbidity Meter

Turbidity



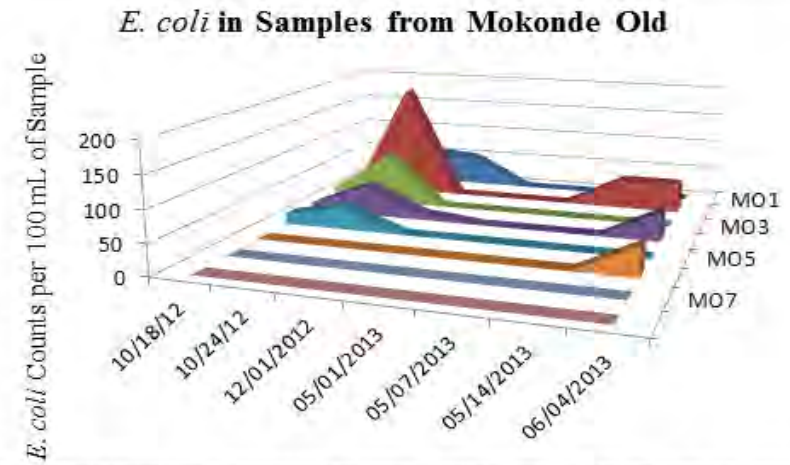
	Jun-04-13	May-14-13	May-07-13	May-01-13	Dec-01-12	Oct-24-12	Oct-18-12
MO1	72.42	84.18	195.2	800	11.6	43.4	15.48
MO2	29.64	39.82	38.3	429	76.48	43.58	2.15
MO3	23.7	122.8	32.46	209.4	40.18	7.49	3.65
MO4	52.72	48.3	15.56	132	40.64	5.59	2.03
MO5	51	56.02	11.48	80.7	23.22	3.49	1.25
MO6	77.18	22.94	10.15	67.16	18.58	2.34	1.58
MO7	48.96	24.14	8.92	62.46			

Turbidity



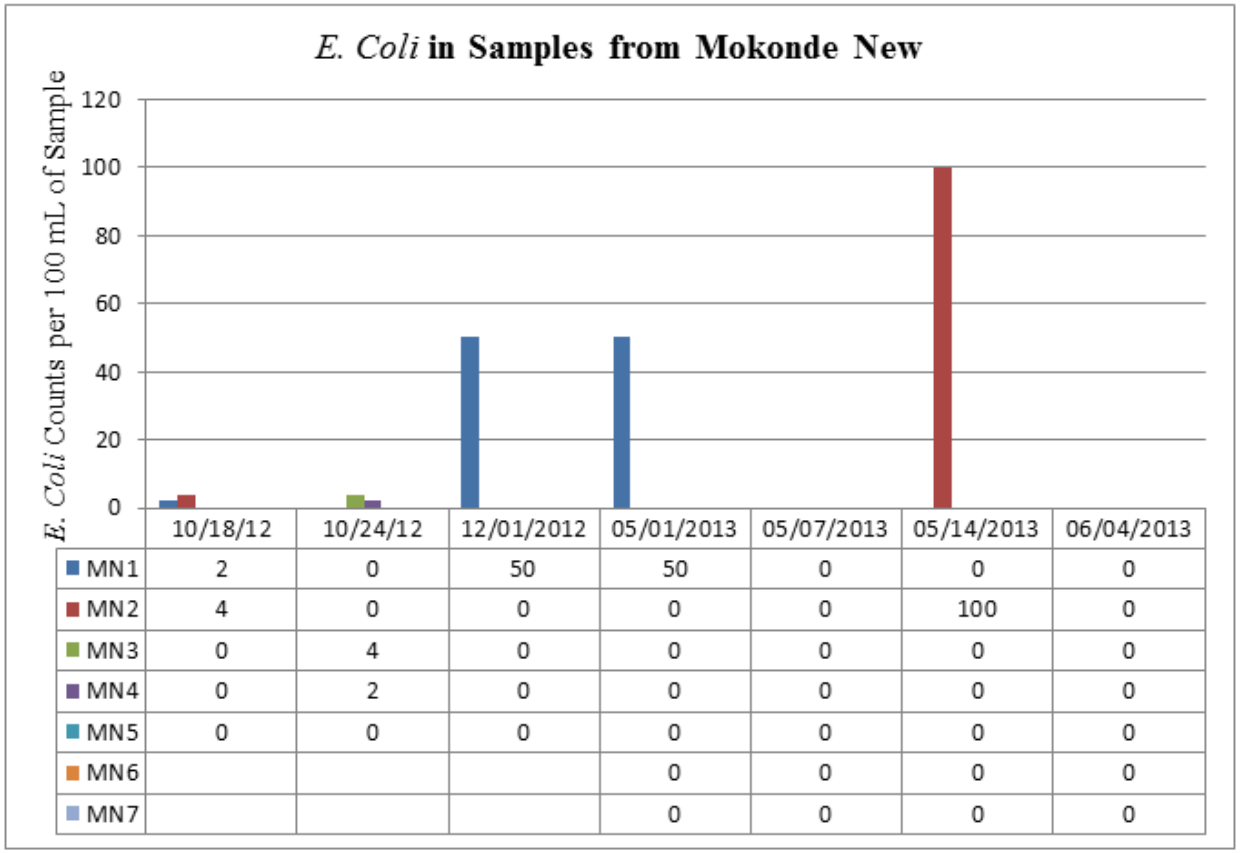
	Jun-04-13	May-14-13	May-07-13	May-01-13	Dec-01-12	Oct-24-12	Oct-18-12
MN1	36.98	47.66	90.56	462.4	75.24	19.42	10.44
MN2	29.02	77.92	28.56	99.04	76.68	19.32	10.31
MN3	67.06	80.96	13.3	48.62	33	3.104	1.66
MN4	27.1	20.1	5.23	41.78	18.48	1.94	1.02
MN5	13.98	13.92	4.702	24.76	13.54	1.308	1.19
MN6	9.28	10.92	3.956	13.22	14.32	0.92	0.98
MN7	9.21	6.37	3.162	9.96			

E.coli



	10/18/12	10/24/12	12/01/2012	05/01/2013	05/07/2013	05/14/2013	06/04/2013
MO1	8	57	50	0	0	0	0
MO2	2	188	0	0	0	50	50
MO3	20	86	0	0		0	0
MO4	12	52	10	0	0	0	50
MO5	18	36	0	0	0	0	0
MO6				0	0	0	50
MO7				0	0	0	0
MO8				0	0	0	0

E.coli



	10/18/12	10/24/12	12/01/2012	05/01/2013	05/07/2013	05/14/2013	06/04/2013
MN1	2	0	50	50	0	0	0
MN2	4	0	0	0	0	100	0
MN3	0	4	0	0	0	0	0
MN4	0	2	0	0	0	0	0
MN5	0	0	0	0	0	0	0
MN6				0	0	0	0
MN7				0	0	0	0

Bio-sand filtration test results

Sample Location	Treatment Status	Non faecal coliform count		
		Sample1	Sample2	Mean
U.M.C Mokonde	Raw Water	37	41	39
	Bio-sand filter	Nil	Nil	Nil
R.C Mosongo	Raw Water	35	31	33
	Bio-sand filter	7	9	8
U.M.C Bonganema	Raw Water	21	19	20
	Bio-sand filter	Nil	Nil	Nil

Findings

- The results revealed difficulty in ascertaining first flush technic as the only treatment option. The need to add a second treatment method became obvious.

- The bio-sand filtration mechanism was proven to be effective in both filtration and disinfection of rainwater harvested.

Beneficiaries

U.M.C Bonganema

U.M.C Mokonde

Beneficiaries

Thank you!

Greetings from the Lion mountain!