



## Faecal Sludge Management Seminar FSM2

International Convention Centre (ICC) Durban  
29-31 October 2012



### DIRECT MODE-SOLAR SLUDGE DRIER

Joseph Tchangwani Magoya<sup>1</sup> and Chifundo Tenthani<sup>2</sup>

<sup>1</sup> Water For People-Malawi, P.O. Box 1207, Blantyre, Malawi; Tel: (265) 01 8030 499; Fax: (265) 01 836 075; email: [jmagoya@waterforpeople.org](mailto:jmagoya@waterforpeople.org)

<sup>2</sup> University of Malawi, The Polytechnic/Bag 303, Chichiri, Blantyre 3, Malawi; Tel (265) 995 684 682; email: [ctenthani@poly.ac.mw](mailto:ctenthani@poly.ac.mw)

#### DEFINITIONS

Sludge: Semi solid material that is produced after sewage treatment and it is rich in nutrients such as nitrogen and phosphorous.

#### ABSTRACT

*In the peri-urban areas of Malawi, the management and utilization of sludge from the filled up latrines still remains a challenge to many households, where there are no sewer connections. There are very limited and uneconomical methods of managing the sludge from the filled up latrines. There are no many economical values associated with the Latrine sludge both in rural and peri-urban areas of Malawi. Furthermore the business managing sludge through emptying is also not lucrative as the cost of operating the business is high taking into consideration that most of the clients are low income earners and the emptied sludge is never utilized in any other way. If properly utilized the sludge has an economic value as it can be turned into manure for direct use into agriculture or selling to commercial farmers. In this study a solar sludge drier was designed, fabricated and tested at the Blantyre City Council Sewage in Zingwangwa, Blantyre. Preliminary results indicate that a maximum temperature of 57°C was achieved which is within range to kill pathogens that make the sludge into manure. The study concludes that a solar drier can be used to treat sludge into usable manure which is rich in nitrogen and phosphorous which can be used in depleted and eroded soils*

Key words: MALAWI, PATHOGENS, SLUDGE, SOIL, SUN.

---

## INTRODUCTION

Studies have shown that Malawi has the lowest proportion of people with access to improved sanitation facilities in the sub Saharan Africa. The MDHS (2010) shows that only 8% of the total population in Malawi have improved sanitation facilities. Increasing the percentage of the population with access to the improved sanitation in both rural and urban set up is another indicator for the Millennium Development Goals, Number seven (MDG).

In peri urban areas the choice between having an improved or basic latrine is measured by levels of household income, lack of funds and sludge management. Many households are experiencing challenges as far as faecal sludge management is concerned which results from the filling up of toilets. At the moment the only available alternative of managing the faecal sludge from filled up toilets is through emptying or abandoning the latrine and construct another new pit latrine. These two alternatives do not fully utilize the sludge in any other way which if properly utilized can economically benefit the households through the actual usage of the end product from the sludge or selling the end product.

## METHODS

A simple and cheap direct mode solar drier was designed in such a way that the sludge was distributed evenly on an absorber plate with the top surface glazed with transparent glass to allow solar radiation in. The absorber plate (metal) was painted black to maximise the absorption of heat. The radiation was therefore heating the sludge enclosed which resulted in heat build-up through the “greenhouse effect”. There was also a chimney to help in natural convection. Airflow was achieved when the lighter heated air rose and left through the chimney and was being replaced with incoming cold air.

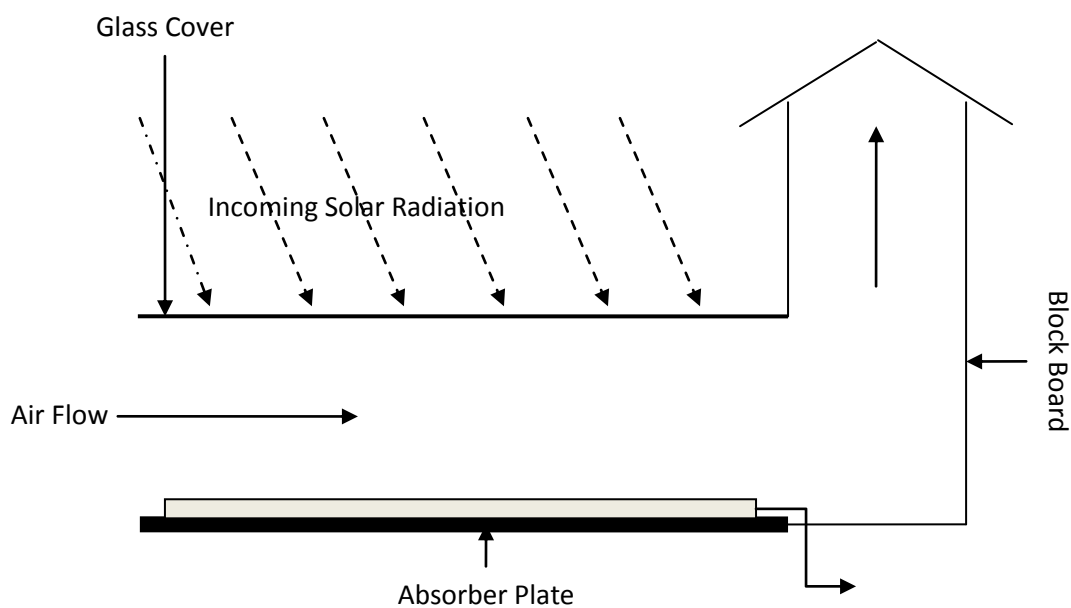


Figure 1: Schematic drawing of a solar sludge drier

## RESULTS

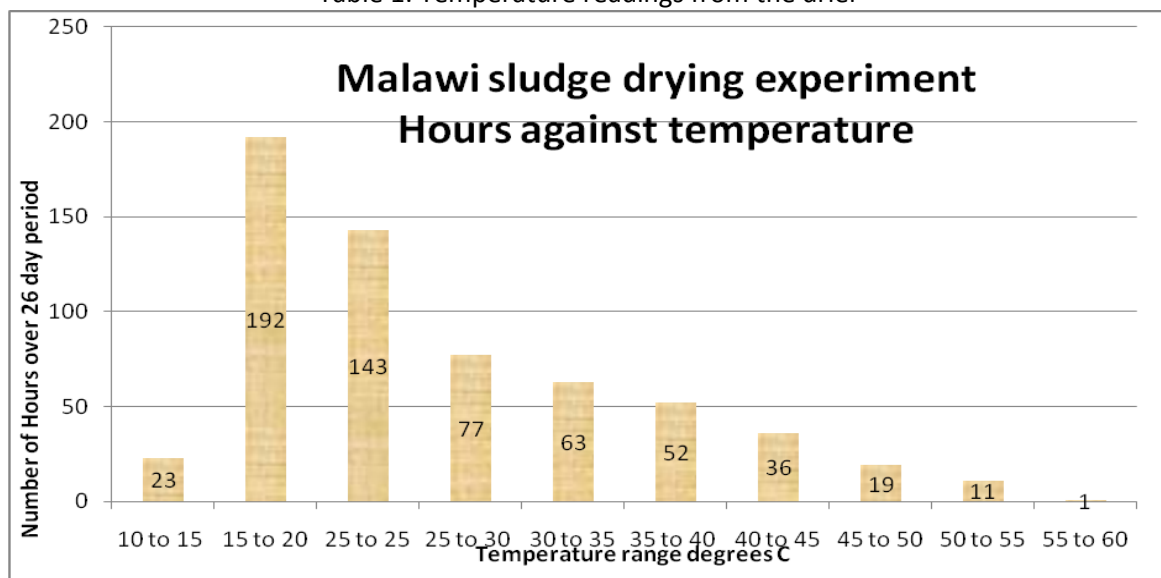
In this research, the solar sludge drier was designed and fabricated in Zingwangwa Low Income Area of Blantyre city. The actual testing of the apparatus was done at Soche Sewerage Disposal site owned by Blantyre City Council. The sludge that was used in the drier was emptied from a functional Ventilated Improved Pit latrine (VIP) from Ndirande using a Gulper. About 60 litres of sludge from the latrine was loaded on the perforated tray of the drier covered with black paint to conserve heat energy. The sludge

was covered in the insulated drier for 28 days which was placed on an open area ( free from shadings) to increase the surface area for sun energy.



Fig 1: A solar Sludge Drier ready for testing

Table 1: Temperature readings from the drier



### CONCLUSION

The direct mode-solar sludge drier has the maximum potential of drying sludge from pit latrines utilising the free solar energy. In reference to the primary results of the research study the apparatus managed to raise the temperatures to 57 degrees Celsius within the apparatus for close to an hour, which is within the temperature range to kill pathogens. However in terms of utilising the apparatus for business there is need to work on increasing the temperatures inside the drier which will in turn reduce the time period to have the sludge completely dried from 28 days.

### WAY FORWARD

- To redesign further the apparatus to increase the heat energy and reduce the drying time
- To analyse nutritive value of the manure from the solar sludge drier

---

## REFERENCES

- The Malawi Demographic Health Survey ( 2010)

