

# Floating Bio-digester for Integrated Waste Management in Agriculture and Energy Production

Innovated by Live and Learn Environmental Education Cambodia in partnership with the Royal University of Agriculture and Engineers Without Borders Australia

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## Introduction

The Tonle Sap lake and its surrounding area are home to 1.6 million people in Cambodia. Many of these people live in floating communities. Currently there few appropriate, affordable, sanitation options exist for floating houses. Addition of pig farms to these communities have increased the sanitation issues.



Floating community on the Tonle Sap

Live and Learn Environmental Education Cambodia are working in partnership with the Royal University of Agriculture and Engineers Without Borders Australia on the development and application of integrated food production and sanitation for floating communities.

One solution being proposed and trialed is biodigesters. Biodigesters convert human and animal waste, for example from floating pig farms, into gas for energy, and treat waste so it can be safely disposed of or used as fertiliser or fish feed.

Trials being carried out at the Royal University of Agriculture will be used to determine the effectiveness and value of this solution.

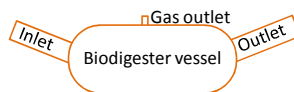
## Materials

- 4 soft plastic biodigesters
- 3 hard plastic biodigesters
- Wooden and bamboo floating frames
- Flexible piping
- Floating drum gas reservoirs
- Feed stock:
  - Pig waste,
  - Human waste,
  - Water Hyacinth, and
  - Water

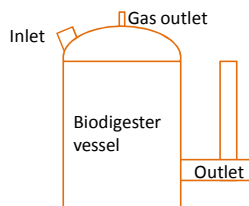
## Method

### Experimental set up

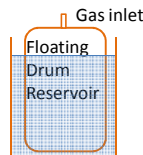
- Construct 4 soft plastic biodigesters and frames
  - 2 X 500 L
  - 1 X 1000 L
  - 1 X 1500 L



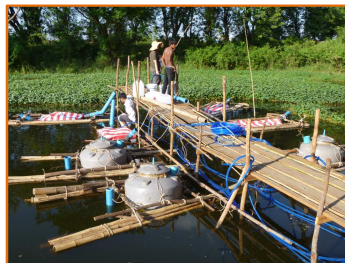
- Construct 3 hard plastic biodigesters and frames
  - 3 X 500 L



- Construct floating drum reservoirs



- Connect biodigesters to gas reservoir



Biodigester experiments at the Royal University of Agriculture, soft and hard plastic biodigesters



Floating drum gas reservoirs at the Royal University of Agriculture

## Method continued

### Daily Experimental

Biodigesters are fed daily with one of three mixes

- Feed 1 – Pig waste and water
- Feed 2 – Pig waste, water hyacinth, and water
- Feed 3 – Pig waste, human waste and water

## Results and Conclusions

### Results

As the experiments are ongoing we do not currently have any results. However the following measurements and parameters are being tested

- Daily measurements of gas production
- Methane content of the gas produced
- Pathogen reduction of the feed wastes
- Biodigested waste nutrient content

### Conclusions

- These experiments will be used for
    - Testing pathogen reduction during treatment (biodigestion),
    - Testing relationships between different feeds and gas production,
    - Exploring relationships between feeds and pathogen reduction,
    - Observing changes in food production when using biodigested waste as fertiliser
    - Identifying potential use of biodigested waste as a fish feed
    - Comparing different types of biodigesters
    - Provision of additional information for sizing of biodigesters.
- All this information will then be used to modify and improve biodigesters for use in the community.

## Acknowledgements

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