

Report on the Grey Water System on Chumbe Island, May 2009



CHUMBE ISLAND
CORAL PARK
Zanzibar Tanzania

Introduction

Nutrients are harmful to coral reefs as they will promote fast and extensive algal growth. An increased amount of algae (macro algae in particular) will shade the corals and reduce the amount of essential sun light that reaches the corals. The reduced light intensity will eventually starve the corals, since they are dependant on the photosynthetic energy produced by microscopic algae inside their tissue and may cause bleaching of the corals.

When we shower, wash our hands or do dishes – the waste water contains lots of nutrients. The waste water that comes from showers, sinks, or kitchens is called “grey water”. In order to prevent these nutrients to reach the reef, the waste water needs to be cleaned before it can be released into the nature. One way to remove nutrients is to let the waste water pass through a sand filter. On Chumbe Island we have two different kinds of



Picture 1. The new well-functioning grey water filtration system

filters to suit our different type of waste water. The soapy water from the shower and sinks in the bungalows is filtered by a “sand and gravel filter” before it used to irrigate the plants around the bungalow. The very nutrient rich waste water from the kitchen is filtered by a more advanced grey water filtration system – a sealed artificial wetland.

History of grey water filter systems on Chumbe

Over the years, the Chumbe Island Coral Park (CHICOP) management has struggled to find a well functioning grey water filtration system for the island kitchen. Much appreciated help from different experts have been received and in 2005 a VSO volunteer, Mr. Ken Wyatt from the UK designed and implemented a large system with three storage tanks intended for the decomposition of the nutrient. The system did not work very well in the Chumbe context and in 2007 a new expert from the German Senior Expert Services (SES) was consulted to make improvements. During the closed maintenance period in

2008, Dr. Eberhard Böhm together with Ali Bashir and his technical team on Chumbe managed to install a new, deep artificial wetland system just outside the guest kitchen, using the original design from 1998.

The new design includes 4 steps (to get the most effective filtration);

1. The food and oil is effectively removed from all pots and plates with a spatula, and taken to the compost.

2. Once the dishes are cleaned with water, left over fats and other organic matter passes into a “grease trap”, from where most of it is collected and taken to the compost.

3. After passing through the grease trap, the water still contains nutrients that need to be filtered out. To clean the water from the nutrients, the water is transferred to one of the two reed covered basins. Each basin is designed to filter the water through the reed and deep layers of sand. In the sand, aerobic bacteria consumes the nitrogen from the water and phosphorous will bond to the surface of the sand.

4. The filtered water is collected in a “well” and evaluated in order to see if it needs to be filtered again. If the water needs more filtering, we pump the water back to step 2 and re-do the filtering process. If it is clean, we used the clean water to irrigate our small plantations around the education center; hence the water will once again pass through layers of soil before it will reach the ocean.

Control and maintenance of the filter after the first pilot year

Emptying the system

During the closed season (between April and June) in 2009, the grey water system had been running for one season, and a check up on the system was advised by Dr. Eberhard Böhm. The aim with the control was to check the sand filter and the porosity of the sand, as well as to check the pipes, nets and basins. The whole procedure was done in close collaboration with Dr. Eberhard Böhm who gave detailed instructions on the entire process, even if he could not come and participate on site.



Figure 2. The rusty mesh (above) and the pipe with non-clogged holes (below)

Between the 6th and the 18th of May 2009 the two basins were emptied, all the parts were checked for possible problems, leakages and other failures. The result was overwhelmingly positive - everything was in perfect shape! The sand was still porous all the way to the bottom, the pipes were well functioning and not clogged, the iron mesh was rusty and functioning, the main basins had no leak and there was no bad smell, even at the very bottom of the sand.

Refilling the system

After the system had been checked and dried, the grease trap was lined with new cement to prevent leakages, and the refilling process was started. On the bottom of the basins the pipe was placed according to Dr. Eberhard Böhm's original description; slightly tilted, with the holes placed downwards, surrounded by gravel and covered with a rubber mat (to avoid the sand to mix with the gravel and clog the holes). On top of the pipe, layers of new sand were put, including the rusty iron mesh. The very top layer was planted with fresh reed and the grey water system was ready for a new season to be started again.



Discussion and conclusions

The control showed that Chumbe Island now have a very well functioning, non smelly, grey water filtration system. This system provides us with irrigation water for our small plantations in front of the education centre and our nutrient rich waste water will not cause problems to the coral reef. The Chumbe team are very happy and grateful to all the people being involved in this process and special thanks goes Dr Eberhard Böhm, Ken Wyatt and VSO and SES for providing the expert advice.



Figure 3. The Chumbe maintenance team