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**The Buddy System at Work
At the Mount Kenya Game Ranch
Animal Orphanage**

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Dear Friends,

I was able to squeeze in a fast trip to Kenya in January after the holidays and before reporting to work for a six week run in an off-Broadway play. The education center was looking very good after the annual holiday repairs we do when school is out and students are at home. The rains had been very generous, even if ahead of schedule, and the countryside was green and lush.

We took advantage of the first week of school to conduct more evaluation tests in our rural schools. Through the generosity of the JL Foundation we were given a grant which allows us to assess the comprehension levels of our students in their courses. We continue to learn as we disseminate these tests.

There seems to be a grass roots movement catching the attention of many farmers in our area as they discover the importance of conservation of natural resources. Large farms are installing effective reclamation schemes for gray water. In addition, non-toxic forms of pesticides made from local plants are starting to be used. Groups are asking us for help and information and we are happy to help pass on the good news of these innovations. It is extremely encouraging to see these positive responses to the concepts of conserving nature.

I hope you will enjoy the reports in this issue, and we continue to ask for your support in all we do.

Warmest Regards,

Stefanie Powers

Vernon Center Middle School's Dunk The Drought Program

Dear Ms. Powers, Mr. Gituma and Mr. Ringera,

We are pleased to present you with a check in the amount of \$1,271 for the students' tuition at Nyariginu Primary School! It has taken us two months to raise all the money. We held a Dunk the Drought Basketball Shoot-a-thon to raise the funds. Our classmates went to the neighbors and families to collect the money. Some of the students went above and beyond and one student, Shaina Anderson, collected \$210! Adah Gillon collected \$100, Molly LaFlesh \$91 and Dan Alaimo collected \$74. These four students received gift certificates to Borders Books & Music for their extra effort, however everyone got a certificate for participating in the basketball shoot-a-thon. Every one of the students worked very hard and we are very proud.

Dunk the Drought is a fun and long program, but it is very beneficial. Students went out and collected 5 cents, 10 cents, or whatever the sponsor wanted to donate per basket. People also gave flat donations, like \$5 and \$10. Then one afternoon, our class went into the gym and shot 90 baskets. If you made 50 baskets and someone pledged you five cents per basket, you would go back to them and get \$2.50. We raised over a thousand dollars and we are very surprised because a lot of people have been giving money to charities in New York City because of the September 11 tragedy. Everyone did a wonderful job!

Miss Bruckner's block eight class discussed some of the things we would like the money to go towards. We realize that you may have a lot of things you want to use the money for, but we hope you take our suggestions into consideration. Books are really important in school. We are very fortunate here at Vernon Center Middle School to have classrooms with lots of books, but we noticed that in a picture you sent us, there was a bookshelf in the background with only a few books on it. We would like to fill those bookshelves up with books. Also, the class agreed that we would like you to consider buying more sports equipment for recess. Vernon Center Middle School has lots of sport teams and also a lot of equipment to use in the gym. We would like the students to have and enjoy the balls and other sports equipment that you will hopefully buy. We hope the students stretch their minds through new books and stretch their bodies using the new sports equipment.

Your friends across the globe,
Miss Bruckner's Block Eight Class



Biogas Feasibility Studies Siraji Homegrown Farm

By Peter Maina

The William Holden Wildlife Foundation has been running a biogas digester since 1990. However, in a bid to improve the yield of the gas produced at the education center we would like to modernize the plant in order to get more gas more efficiently. A trip was therefore proposed by the foundation's chairman, Ms. Stefanie Powers, to the Siraji Homegrown Farm. Dan Shaw (Snr. Admin.), Ephantus Mugendi (on internship program), Francis Ndungu (technician), James Kariuki (the llama attendant and in charge of the biogas plant) and Peter Maina (lecturer) therefore visited the Siraji Homegrown Farm and was given a tour by the General Manager Marcus Keane.

The Siraji Homegrown Farm is located on 117 acres between Timau and Kisima near the small hamlet of Gusichi. The farm deals in horticultural and floricultural production mainly for the UK market.

A lot of their farming is done in the Green House, but at the same time they have big expanses of outdoor farms. Besides crop cultivation, they also do animal husbandry, especially that of the cattle used to feed the biogas plant. They get their water from a furrow flowing through the farm and also by pumping from the River Timau. This is done when the river is high in the water level and this is especially in the wet season. In the dry season, they do not pump because of the receding water levels in the river. At such times, they make use of their water reservoirs in the farm. They have a dam that can hold about 120 billion liters. At the time we visited the farm they had not used water in the river for the last four months. The kind of farming they do is water intensive and so need ample irrigation to succeed, thus the big arrangements in ensuring a reliable and consistent water supply.

Because their main market is UK, standards of production have to match those of the United Kingdom. As such, they have to chlorinate all water meant for drinking and other domestic chores. They, however, do not need to do the same for irrigation water.

They have an upcoming experimental pro-

gram called Integrated Pest Management, which is the first of its kind in the whole world as far as an outdoor field is concerned. All other projects had hitherto been carried out in the greenhouses. This program is still on experiment but it has taken shape with remarkable achievements so far. However, the farm still has to use such chemicals as herbicides, fungicides and chemical fertilizers.

The wetland program is one of the most interesting things being carried out on the farm. They are cleaning their gray water and using the filtered water to keep aquatic life, like fish. They use vegetation as water filters in the several dams where water runs from the highest place to the lowest as it is progressively being cleaned by water lilies and other plants.

The Siraji Farm also run a fleet made up of many trucks, tractors, small vehicles and fixed plant machines. All this equipment yields a lot of used oil when they are serviced. The farm uses an oil incinerator which is used to heat water that is eventually used in such places as the kitchen and bathrooms.

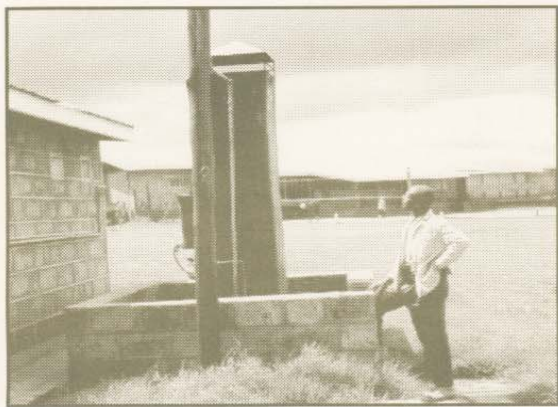
BIOGAS PRODUCTION

Biogas or methane is becoming an increasingly important source of domestic energy with rising numbers of farmers who are ready to install the same to cut down on the cost of heating (cooking) energy.

Methane is also an important industrial compound that makes up a large part of natu-



Wetlands cleaning gray water at Siraji



Siraji's oil incinerator

ral gas. It is formed when plants decay in places where there is very little air. In our case, we generate it by decomposing animal under controlled conditions. Methane is often called marsh gas because it is found around stagnant water and swamps. It is also called the chief substance in firedamp, a gas that causes serious explosions in mines.

The chemical industry uses methane as a starting material for many other chemicals. Methane reacts at high temperatures with a limited amount of air to form acetylene and with ammonia to produce hydrogen cyanide. It also undergoes partial combustion (incomplete burning), producing hydrogen and carbon monoxide gases. This mixture serves as a source for commercial hydrogen, and for carbon monoxide used in making methyl alcohol (methanol). Methanol is a colorless, odorless gas. It is non-toxic, but highly flammable. It is soluble in alcohol, but only slightly soluble in water. Methane is the first member of the paraffin series of hydrocarbons. Mixtures of methane with air, oxygen or chlorine are explosive. Methane is a significant part of the atmospheres of Jupiter, Saturn, Neptune and Uranus.

THE SIRAJI BIOGAS PLANT

The Siraji digester is fed on cow dung. This makes the major remarkable difference as we start comparing the two plants. While all carbonated matter will yield methane when decomposed under a set of conditions, there is a difference in the content of carbon between different material. Both cow dung and llama waste can suffice to run a tank, but in the case of the latter one has to allow a reasonable duration of time during which this pellets imbibe ample water.

The plant in Siraji is 1.5 feet from the

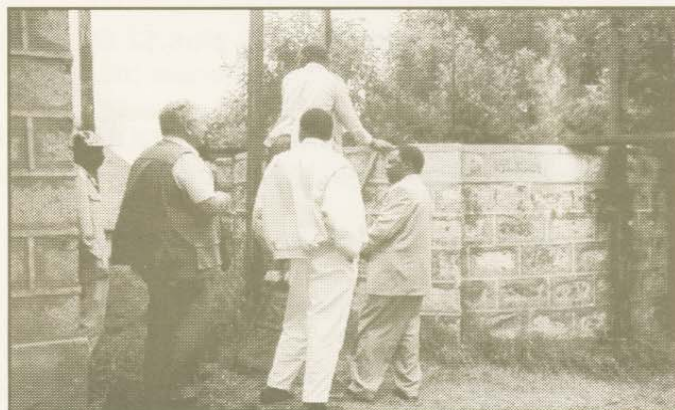
ground. It is built on concrete blocks on the side and then covered with a metal plate. There are fasteners on the top cover which ensures the pressure of the gas does not raise the cover up. The effluent then produced enters the waste chamber from where it is pumped into a trailer and taken to the farmers as a manure.

At Siraji, the water to be used is slightly warmed to activate the methanogenic bacteria that break the waste into methane and other compounds. I have to mention that while it is desirable to emulate this idea of warming water for the digester, care should be taken to ensure that the temperature is not above the optimal level. The bacteria are living organisms and will be killed if the temperature exceeds a certain limit. If the temperature is again too low, the bacteria becomes inactive and very little gas is produced.

At the collection point, which is a concrete tank several hundred meters away, the gas collects in a metallic tank floating upside down in water. When the tank is full, the gas runs their kitchen for more than 36 hours, using all four stoves in the kitchen.

At the collection tank, they have added the normal used oil collected after servicing the farm's equipment for two purposes: 1) it slows the escape of the gas from the collection area into the atmosphere, and 2) it makes inhabitable the tank for mosquitoes.

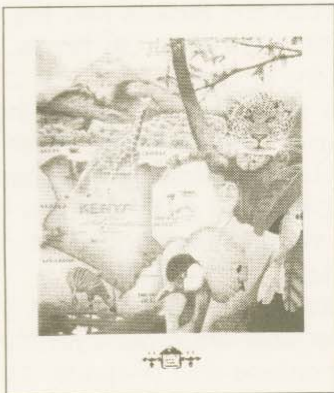
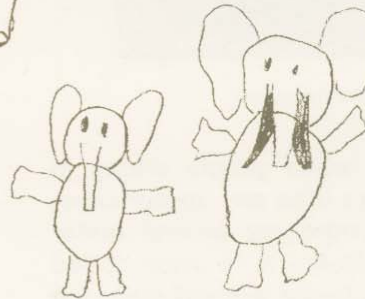
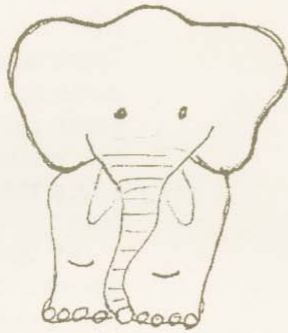
Methane (biogas) does not yield as much energy per unit like other hydrocarbons such as butane, pentane and propane, but on the other hand, taking its ease in production and affordability of the whole process, it supersedes such other hydrocarbons. This is why methane is increasingly gaining in importance as a household cooking energy source.



Concrete tank the gas collects in

California School for the Deaf

Once again, Nancy Norton's six grade class from the California School for the Deaf collected pennies and conducted various fund-raising events in their yearly contribution to help save the elephants in Kenya. Their efforts this year raised \$400. We thought everyone would enjoy some of their sketches we have reprinted to the right. Once again, everyone at the education center sends their thanks to the students.



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Just a reminder ... the Foundation has WHWF t-shirts!

T-shirts are \$12.00 each (\$10.00 plus \$2.00 postage).
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