



CCDA-V

Africa, sustainable development and climate change
Prospects of Paris and beyond

ClimDev-Africa



Production of biogas from animal manure for rural household

MUNA AHMED

BANAZEER ABDEL-MAHMOUD



Problem statement 1/2

- Biomass in the form of mainly wood-fuel and charcoal is the dominant energy source used in sub-Saharan Africa. More than 500 million people living in sub-Saharan Africa do not have electricity in their homes and rely on solid forms of biomass (**firewood, agricultural residues, animal wastes**, etc) to meet basic energy needs for cooking, heating and lighting.
- The disadvantages of these traditional fuels are many: they are poor energy carriers and their heat is difficult to control, they produce dangerous **emissions** and their current rate of extraction is not sustainable. The **unsustainable** use of fuel wood biomass can accelerate deforestation and lead to soil erosion, desertification and increased risk of flooding and biodiversity loss. The problems arising from non-sustainable use of fossil fuels and traditional biomass fuels have led to increased awareness and widespread research on the accessibility of new and renewable energy resources, such as biogas.



Problem statement 2/2

- **Sudan** is characterized by high dependence on **biomass energy** (fire wood, charcoal, and agricultural residues), that constitutes 78% of total energy consumption. It is composed of 69% fuel wood (firewood and charcoal) and 9% residues. **Households** consume about **60%** of total energy and **72%** of total biomass energy. Sudan is facing real **environmental degradation** due to combine factors (drought, desertification, over-grazing expansion of agricultural land, firewood/charcoal production, etc) and depletion of forest resources.
- Many regions of Northern and Western Darfur are undergoing desertification and land degradation at a significant rate. Other states facing similar issues are Southern Kordofan, eastern Kassala, northern Blue Nile, northern Upper Nile and northern Unity state.
- The lower yield of crops and the limited grazing area for animals led to famine, poverty, death of livestock and conflicts.
- This forced people lost their connection to their lands, their cultural traditions have been affected and they put pressure on other fragile environments and causing conflict and further relocations.



Methods

- ❑ The target area was North Kordofan State located between latitudes 11.15 and 16.45°N and longitudes 27.05 to 32°E. It covers an area of about 245,000 km², with high animal wealth. The area suffers from illicit **woodcutting and deforestation**.
- ❑ The study investigated the impact of using biogas as an alternative energy in two villages on **kitchen health environment** and manure accumulation **risk hazards**. A questionnaire was designed for 361 households' to collect information such as: distance travelled to collect fuel wood, quantities consumed, time spent in cooking etc..
- ❑ 15 domestic biogas units were installed to convert livestock manure into biogas and slurry which is a **good fertilizer**. The biogas is used for **cooking and lighting**. Calculation was carried out to predict the amount of **methane emissions** that could be reduced in one year due to switching from traditional biomass resources to biogas clean energy supply.

Key Findings

Main Findings

- For women time taken to collect fuelwood is reduced to zero. Time spent to cook main meals is reduced from 2-3 to $\frac{1}{2}$ hour for breakfast, from 2 to 1 hour for lunch and from $1\frac{1}{2}$ - $\frac{1}{4}$ hour for dinner and too few minutes for tea. Money spent for purchasing wood fuel or charcoal was reduced to zero.
- More time is spent for children in education due to light provided from biogas.
- Reduction of environmental hazards due manure accumulation inside and outside the house is greatly reduced
- A single, small scale bio digester reduces between 3 and 5 tCO₂-eq/year. 15 units contribute to reduce 56 tCO₂/year.

Key Findings

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Social benefits

- ✓ Smoke-free and ash-free kitchen, so women and their children are no longer prone to respiratory infections;
- ✓ Women are spared the burden of gathering firewood .

Environmental and health benefits

- ✓ Keeping manure and waste in a confined area reduces the amount of pollutants in the immediate environment and increases sanitation;
- ✓ Deforestation levels is very much reduced
- ✓ The sludge remaining after digestion is a good fertilizer, increasing land productivity
- ✓ A single, small scale biodigester reduces between **3 and 5 tCO₂-eq./year**.

Economic benefits

- ✓ Buying (fossil) fuel resources (e.g. kerosene, LPG, charcoal or fuel wood) is no longer needed.
- ✓ Switching from traditional biomass resources or fossil fuels improves security of energy supply (locally as well as nationally or regionally) as the feedstock can mostly be acquired locally



Conclusions/Recommendations

Saving of firewood: environmental protection through reduced **deforestation**. For women and girls: less time for fuel wood collection, reduced **vulnerability** in terms of health risks, increased time for other activities (e.g. use of health service, income generating activities, literacy programmes etc.). **Agricultural** improvements in plant and animal production yields: improved nutrition and increased household income. **Fertilizer** production with subsequently protection and/or recovery of soil fertility.

Creating a favorable climate for biogas dissemination depends almost always on a whole range of decision makers. For example:

- **The Ministry of Finance** will decide on subsidies and tax wavers for biogas users.
- **The Ministry of Energy** can propose laws regarding the feeding of biogas-produced electricity into the grid. It can also propose financial and other assistance.
- **The Ministry of Agriculture and Livestock** can include biogas in the training curriculum of extension officers and agricultural colleges.
- **The Ministry of Education** can include biogas in the curricula of high schools and promote the construction of bio-latrines for schools.
- **The Ministry of Health** can include biogas in the curricula of public health workers and encourage the building of bio-latrines for hospitals.
- **Radio Programs** are an effective means in rural areas to familiarize the population with basics of biogas technology.

THANK YOU

