Appropriate technology for forest conservation

Agricultural technology transfer society
Description of the project

- Agro forestry

Agroforestry has its impact on reduction of wind erosion, run-off and soil conservation crop rotation promotes soil cover greatly promotes conservation agriculture. The trend now is to move from erosion control, to soil quality conservation.

Using moringa and jatrofa trees as 'fertiliser trees' that capture nitrogen from the air and transfer it to the soil can reduce the need for commercial nitrogen fertilisers by 75 per cent while doubling crop yields.
Moringa and jatrofa agroforestry model
Farmer family before model implementation
Cereal (Dukun) intercropping with moringa trees at the site
Cucumber grown with the moringa trees
Women daily involved in stripping of leaves
Moringa packaging house
Moringa tea bags
Energy & food nexuses

- Approximately 89% of the rural households in Sudan rely on biomass, such as fuel wood, charcoal, agricultural wastes to meet their energy needs for cooking.
- **UNEP** estimates that fuel wood requirements for 2006 were around 27 to 30 million cubic metres.
- "**UNEP** predicts that within five to ten years, the northern states of Sudan will only be able to obtain sufficient supplies of charcoal from Southern Kordofan and Darfur as all other major reserves will have been exhausted,"
Fuel wood as energy
Growing demand for charcoal
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 can lead to famines, poverty, death of livestock and conflicts.

This may force people to lose their connection to their lands and affect their cultural traditions and may put pressure on other fragile environments and cause conflict and further relocations. Away from their local areas.
Biogas production from animal manure
Area of the study

The target area is West Kordofan State. Livestock is estimated at 465,000 cattle, 22,265,000 sheep, 2,064,000 goats and 747,000 camels.

The area suffers from illicit woodcutting deforestation problems; inadequate aforestation activities;
Traditional kitchen at a rural area
Biogas contribution towards sustainable development

**Social benefits**
- Smoke-free and ash-free kitchen, *Women are spared the burden of gathering firewood*

**Environmental benefits**
- Pollutants are reduced due to accumulation of manure
- Reduction of deforestation
- The sludge is a good fertilizer, increasing land productivity (and farm incomes).
- The release of methane is avoided thus contributing to **climate mitigation**.

**Economic benefits**
- Buying (fossil) fuel resources (e.g. kerosene, LPG, charcoal or fuel wood) is no longer needed
The average size of the homestead (locally known as Jubraka) area varies from less than 0.5 feddan to one feddan.

Jubraka crop yields are low - erratic rainfall and poor cultural practices due to poor soil fertility lack of appropriate soil and water conservation.

Crop yields are greatly improved using biogas fertilizer.
Traditional charcoal production

• Delta Toker produces about **50,000, (35Kg/sack)**. Earth kiln is the most common practice of making charcoal, two methods are used; one is that *earth is excavated* and wood is put in the pit which is then covered with the excavated earth, the second is that the mound or *pile of wood is put on the ground* and covered with earth. The *capacity of the mound kilns used in the area varies between 5 sacks usually used in subsistence production and 30 sacks used by traders* who sell small portion locally and export the rest to other nearby towns.

• Traditional kiln operation usually has a *7 day cycle*. The total process, including wood collection and loading charcoal for transport, can take up to **18 days**. Traditional earth mound kilns *efficiency is 16%.*

• Charcoal producers receive approximately **4.4 SDG per kg of charcoal sold to middle men and transporters.**
• The chain of those economically benefiting from mesquite charcoal business radiates from onsite charcoal producer to retail traders through lorry drivers, porters, wholesalers and brokers whose number is not known. Moreover, the approximately 30,000 delta landowners and sharecroppers depend mostly on charcoal as a cheap energy source.

• The daily production of charcoal in the Delta was informally reported to be 30 truck loads. When leaving the Delta the charcoal is being taxed.

• A prosopis-based wood industry could, for instance, produce flooring material for a luxury export market, as Prosopis wood belongs globally to the most valuable wood materials after it has been processed properly.
Adam retort kiln

• Some facts about the Adam Retort Biochar Kiln

• 1- Capacity 1tonne to 1.5 tonne Biomass Cycle approximately 8 hours

• 2- Output 300kgs – 500kgs of Biochar

• 3- Efficiency 50kgs of wood can pyrolyse 1.5 tonne through self heating mechanisms. 30:1 ratio
Adam retort
Technology application

- **Crop Residue Based Densified Total Mixed Ration as improvement of animal feeds**
  - The technology of straw-based densified complete feed as pellets could play an important role in providing balanced rations to livestock in the green forage scarcity.
  - The technology offers a means to increase milk and meat production. The process of densification increases the bulk density of the straw based feed by three times, and at the same time it reduces its volume by the same proportion. Accordingly, lesser storage space is required to store the bulky feed.
  - This makes the transportation of feed block much easier and cheaper than the straw.
  - The benefit provided by easier storage of feed pellets makes it possible to supply uniform quality of the feed throughout the year, with lesser price fluctuation, as against the large price fluctuation.
  - This could also have an impact on stabilizing milk prices, irrespective of seasons, and could produce milk of uniform quality.
Investment/ business rationale

- According to the harvested area, machine capacity, average output per hour, day and month, and working period a year and the finance required to complete costs of production cycle of one month, about 3,402 pelleting machines are required to process the crop residues into a palatable and nutritious feed.

- The important impact of introduction of such project for small producers, would contribute to food security and would mitigate the risk of low rainfall season. However, the project could be more feasible if farmers are organized in cooperatives.
Reasons diesel pellet making machine

It can solve your problem of lacking electricity while keeping the same productivity, especially in the fields or rural farms.

The diesel pellet machine has compact size, so you can place wherever you need.

It is also cost-effective, since it uses low price diesel oil.

Secondly, diesel pellet mill can process various kinds of raw materials like sawdust, wood chips, straw, sunflower husk, biomass, stalk, etc. No binder or additive is needed in pellets making process.
Animal production in the area

- Animal wealth is estimated as 2,044,000 heads of cattle, 2,935,000 heads of sheep, 1,358,000 heads of goats and 409,000 of camels.

- Such animal wealth is huge, which entails a diligent efforts to maintain a sufficient supply of forage, especially during dry season.

- Natural grazing is the main source for cattle breeders, which commences after advent of rainfall season. Accordingly, any acute deficiency in forage supply due to low rains could adversely affect animal breeding and compel breeders to sell at market price to lessen rate of loss due to lack of feed.

- Such situations increase the movement of animals towards remote far sources of forage that negatively affect animal weights and subject it to many dangers of insecurity and loss.
THANK YOU