



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Value chain development of a clean-burning solid biofuel in southern Africa

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Abstract

Bush encroachment degrades over 120 million ha across Southern Africa. It stifles herbaceous plants, reduces biodiversity, depletes groundwater reserves, and degrades the soil. Its negative ecosystem impact undermines surrounding communities' food and water security. Encroachment diminishes and weakens productive farmlands and rangelands, reducing livestock productivity. Encroached areas can lose over 44 million litres/year/ha of groundwater through evapotranspiration. This threatens the fragile water balance in these semi-arid regions. However, the costs of controlling the bush encroachment exceed the immediate benefits of increased agricultural productivity. There is a pressing need to create value for the harvested biomass (bush). The EU Horizon 2020 “SteamBioAfrica” project seeks to create added value through the use of superheated steam (SHS) technology with an output of a clean-burning, solid biofuel for household as well as industrial consumption in three target countries of Botswana, Namibia and South Africa. As part of the project, the CSCP together with partners are developing value chains for the solid biofuel, which eventually will contribute to enhancing the renewable energy sector of the three countries. In 2022, the project undertook a baseline survey to gain insights into the existing biomass value chains. The value chain analysis employed a mix of qualitative and quantitative data analysis, which included a baseline survey, key informant interviews, and literature reviews. Collected qualitative data went through a triangulation process and collected quantitative raw data went through frequency analysis for the categorical variables for each country. Collected data was compiled and contrasted. Conclusions were then reached through logical inference based on a set of observations and seeking the most likely and simplest inference from the observations. The findings reveal, households in the three countries still use a mix of energy sources for cooking and heating. These include firewood, LPG, paraffin and electricity. More than 50% of respondents reported using firewood, particularly in rural areas, while charcoal is generally used for leisure activities such as “braai” (barbecue) due to its higher price than firewood. Introducing the new solid biofuel to households will require new business models.

Keywords: Agricultural productivity, biodiversity, biomass value chains, bush encroachment, business models, farmlands, solid biofuel, SteamBioAfrica, superheated steam (SHS) technology, water security