

Chained to Charcoal: The Market for Forest Fuels in Tanzania

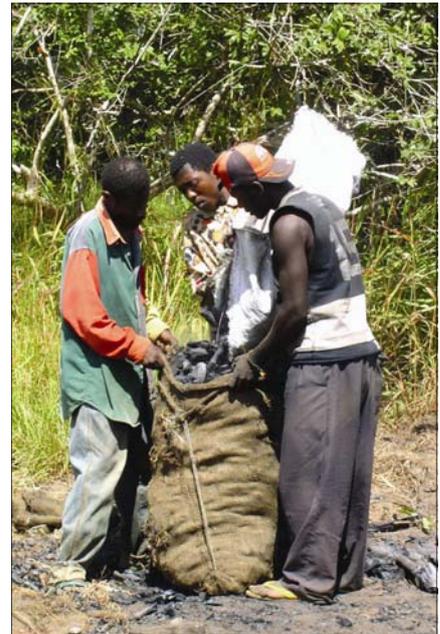
Overview

The primary use of wood harvested from the world's forests is not for building materials or paper, but for fuel. In developing countries wood is vital for basic welfare and economic activity, in fact, wood fuels are the world's most important form of non-fossil energy. Demand for firewood and charcoal is driven primarily by the growing numbers of rural and urban poor, who depend on wood for their cooking and heating needs.

Charcoal is the single largest source of energy in urban areas of Tanzania and its demand is growing due to an expanding population and lack of affordable alternatives. Charcoal is preferred in urban areas because it is cheap, easy to transport, distribute and store. It is almost smokeless and has a higher caloric value (30 MJ/kg) than firewood (15MJ/kg).

Charcoal is deeply ingrained in daily life in Tanzania. Its use stretches back many years and is part of Tanzanian culture and tradition. Its production and sale is the major source of income and employment for many rural people, since it is a labour-intensive business that requires a low input of capital. There are few options for alternative income-generating activities. The current method of charcoal production by using traditional earth kilns requires very little skill. However, charcoal comes at a cost. Deforestation is one of the major environmental problems of Tanzania. The traditional conversion of wood to charcoal wastes as much as 70% of wood caloric value, which accelerates the destruction of woody vegetation.

Charcoal demand and production is forecasted to continue well into the future. The main problem is that the supply chain of charcoal in Tanzania is highly unsustainable. So far, the Tanzanian government has responded to this situation by introducing rather incoherent policies at isolated segments in the charcoal chain. Without taking all parts of the chain into account, these policies will fail. Our study is the first systematic analysis of the charcoal chain: production, trade and consumption. This overview contributes to the development of a comprehensive policy with regard to the role charcoal plays in Tanzania's energy strategy. Our results highlight that ad hoc policy interventions do not work. A more comprehensive approach is required.



Issues facing policy-makers:

- What are the consequences of a continuation of the current trends in the charcoal chain? When will forest resources be depleted and what will be next?
- What are the most cost-effective options for eliminating the threats and unsustainable practices in the charcoal chain?
- How can the charcoal chain be made more sustainable without increasing poverty among rural and urban communities?
- How can money be generated for the implementation of these cost-effective policies?



Study Area

Located in east Africa, Tanzania borders the Indian Ocean, between Kenya and Mozambique. Almost all charcoal in Tanzania is produced in the rural areas, with the largest shares of raw materials extracted from open Miombo woodlands, reserved forests, bush-land forests, mangrove forests and farmlands. Most of the resources needed for charcoal production are found in the forested areas surrounding urban centres. The radius of these areas is gradually increasing.

While this report focuses generally on charcoal in Tanzania, much of the data comes from our work in the Coastal Forests surrounding Dar es Salaam, specifically the Pugu and Kazimzumbwi forests. Dar es Salaam is the largest city in Tanzania, serving as the commercial and industrial capital. The total population of Tanzania is about 37 million people, of which just over 3 million (around 10%) live in Dar es Salaam. The greatest impact of charcoal dynamics can be found in Dar es Salaam and its surrounding areas.

The approach

Both primary and secondary data were collected in order to produce an overview of all three components of the charcoal chain: production, trade and consumption. A broad range of methods was employed for primary data collection including semi-structured interviews, questionnaire surveys, choice experiments, contingent valuation and GIS. Our report is based on the chain approach, following the physical flow of charcoal moving from producers to consumers, while simultaneously monitoring the monetary flows that move in the opposite direction (Figure 1).

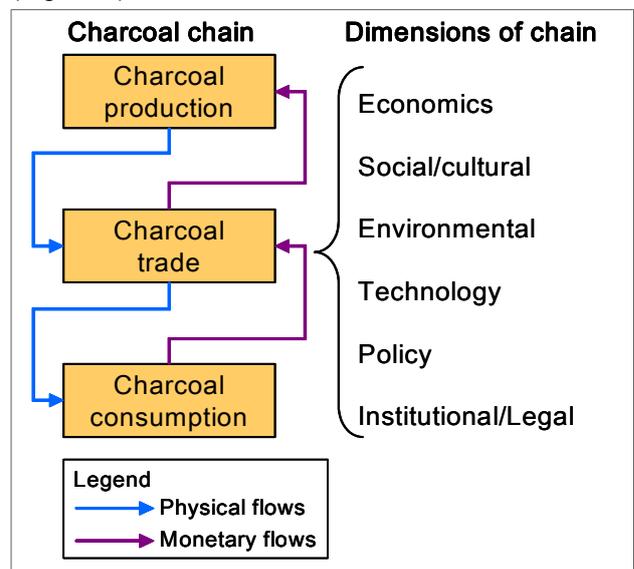


Figure 1: Analytical framework for the charcoal chain

To increase our understanding of the developments in the charcoal chain, we systematically addressed a number of dimensions in each segment of the chain. These dimensions either represent drivers that influence the course of the charcoal flows, or denote indicators that reveal the impact of certain developments within the chain.



These are the results :

1. The charcoal chain is a massive industry.

The total annual revenue generated by the charcoal industry for Dar es Salaam alone amounts to 350 billion Tsh (\$350 million) and generates employment for more than a hundred thousand workers. More than 85% of the urban population are charcoal consumers. Thus the charcoal chain is a core sector for the Tanzanian economy. Figure 2 is a graphical presentation of the charcoal chain for Dar es Salaam in 2006.

With such a massive industry, changes in the sector must be realized slowly. Sudden intervention such as the ban on charcoal transportation in 2006 is counter productive. The ban had little effect on production. Producers continued to manufacture their product during the ban and stocks of charcoal increased. The ban was later lifted and with the increased demand from consumers and little stock in the cities, producers began to double their prices from the pre-ban level.

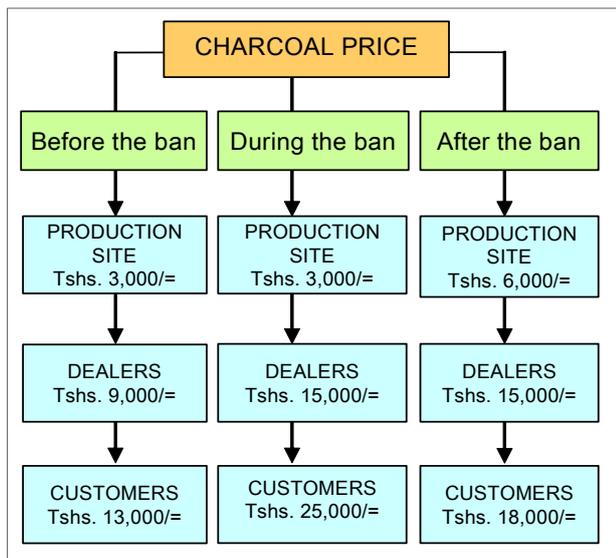


Figure 2: Charcoal production, trade and consumption per year in Dar es Salaam

2. Charcoal is a means of last resort to escape extreme poverty.

Tanzania is one of the poorest countries in the world. Deforestation and poverty are strongly linked, since many poor people rely on forest products for income. Charcoal is the most important source of income for many different people along the charcoal chain. Although environmental awareness is high amongst charcoal producers, poverty leaves them no option but to continue making charcoal. It is often a last resort as labour



conditions are poor and there is a constant threat of being arrested. Many are willing to shift to alternative livelihoods but currently there are no suitable options.

3. Charcoal induced deforestation causes many externalities, such as downstream water shortages.

The principle cause of deforestation in Tanzania is the felling of trees for the production of charcoal. An externality is said to exist when the welfare of one person or sector is influenced by the actions of another person or sector. Deforestation is one of the major environmental problems of Tanzania. It causes substantial off-site hydrological impacts such as local flooding, gully erosion, sedimentation of streams and reservoirs and drying up of water sources. One example of this is that water resources feeding into the hydro-energy plants have diminished substantially. As a result, electricity supply to Dar es Salaam was jeopardized significantly, leading the Tanzanian government to ban charcoal production in February 2006. The efficiency of charcoal burning kilns is also low (11-30%) which means that more wood is needed to meet the energy needs of consumers. This accelerates the rate of deforestation.

4. Current policies directed at the charcoal chain are inefficient.

The charcoal industry is largely an informal business. There is no comprehensive policy that addresses charcoal production, trade and consumption in an integrated manner. Those regulations and policies which do exist are patchwork in nature and poorly enforced. One example is that licences given out for forest harvesting and charcoal trading do not compare

with the quantities traded in Dar es Salaam. This means that many of the activities in the charcoal chain are unregistered. Tax evasion in the trade segment is also common practise. Although charcoal transported to urban centres legally should be taxed, checkpoints are frequently unmanned and the government loses millions each year.

Solutions for policy makers

Preliminary lessons include the following:

- The vast magnitude of the industry implies that changes in the sector can only be realized **gradually with a comprehensive approach** as a basis. Sudden interventions such as the ban on charcoal production and trade are countereffective;
- Despite high environmental awareness among the charcoal producers, their poverty leaves no alternative but to continue the profession of charcoal making. **Lack of alternative livelihood** options prevent them from shifting to more sustainable income sources;
- Kiln efficiency is extremely low thereby enhancing the rate of deforestation. Projects supporting the **improvement of kiln efficiency** would greatly support local communities as well as the environment.
- Another option that should be considered is the **establishment of production forests** for the purpose of charcoal supply.
- Charcoal induced deforestation causes ample externalities, such as downstream water

shortages. Because of these relationships, **innovative economic instruments** such as Payments for Environmental Services (PES) could be considered.

- Current policies directed at the charcoal chain are inefficient in many ways. The command and control policies dominating the approach of the current Tanzanian government need to be supplemented by **market-based approaches**.

Our study is the first systematic analysis of the charcoal chain in Tanzania. We have identified several possible solutions, but with investigating such a vast industry we are still faced with a lack of information. However, we have identified several potential leads and knowledge gaps where we can focus future research.



PREM: In brief

The Poverty Reduction and Environmental Management (PREM) programme aims to deepen and broaden the exposure of economic researchers and policy advisors in Africa and Asia to the theory and methods of natural resource management and environmental economics. It is anticipated that this will encourage policy changes that address both poverty reduction and sustainable environmental management.

This policy brief is based on the PREM Report, 'Optimization of the charcoal chain in Tanzania: a gap analysis'.
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