World Agroforestry Centre

31

Policy brief

Opportunities and challenges of landscape approaches for sustainable charcoal production and use

Executive summary

- As charcoal is among the most commercialized resources in Sub-Saharan Africa, many stakeholders are competing for profit margins at different stages of the value chain, from rural supply to urban demand centres
- Current charcoal production and use presents serious tradeoffs of socio-economic and environmental outcomes across landscapes, namely, meeting urban energy demands and supporting livelihoods at the cost of multifunctionality of rural landscapes
- Poverty-induced charcoal production and resource degradation are reinforcing each other in the landscape context where counterproductive regulations and non-exclusive tenure conditions intersect to provide incentives for the overexploitation of natural trees
- Resolving tradeoffs and achieving synergies of economic development and sustainable energy provision calls for integrating charcoal into a landscape approach to provide incentives to protect natural resources through inter-sectoral/multi-stakeholder coordination
- Providing a diagnosis through the concept of charcoal economics discussed in this brief, we propose a landscape approach to address sustainable charcoal production and use

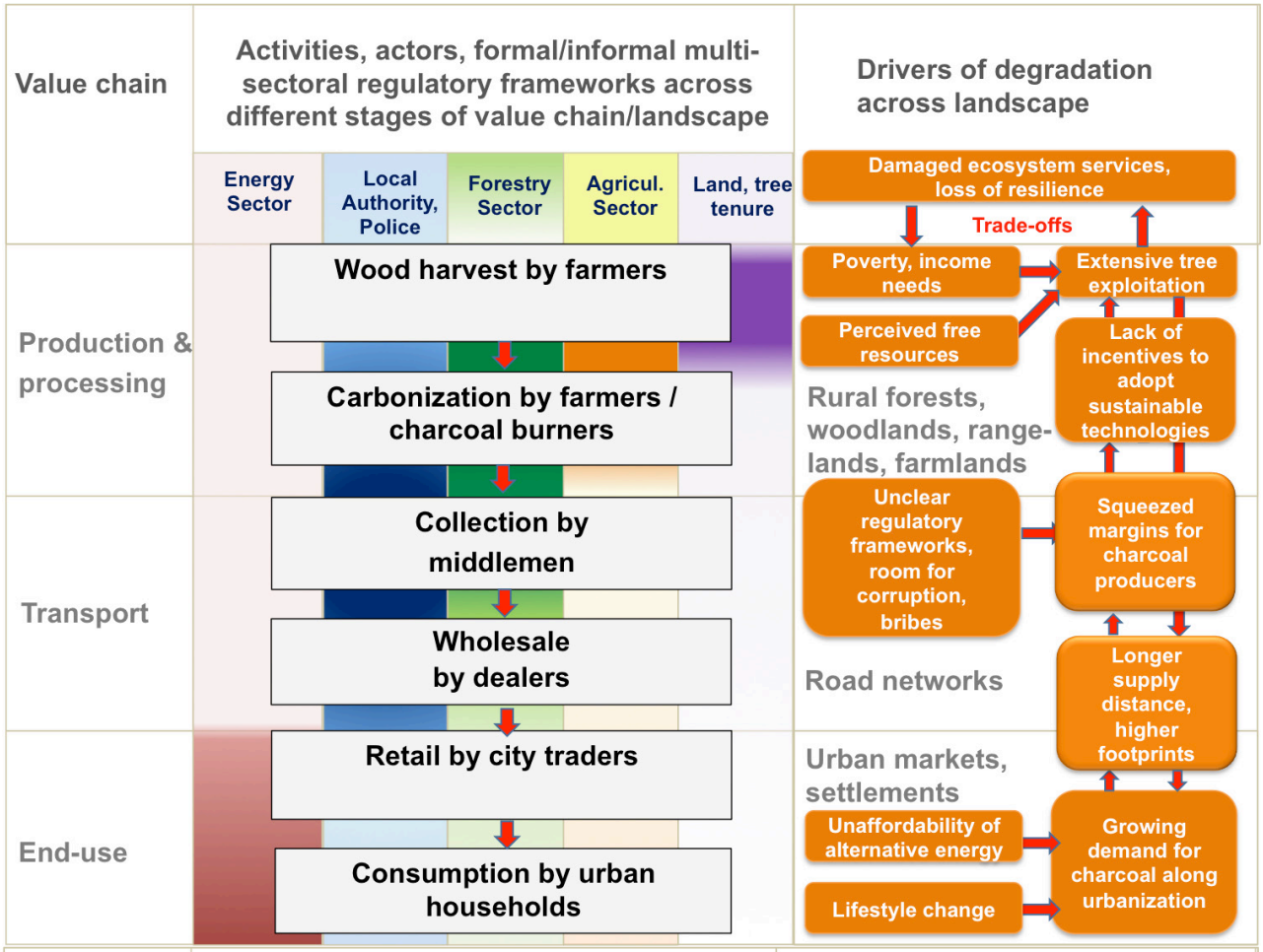
A charcoal burner carbonizing charcoal using an earth mound kiln whose efficiency is as low as 10% in a landscape comprising farmland, grazing land and woodland remnants in Bugesera, Rwanda.

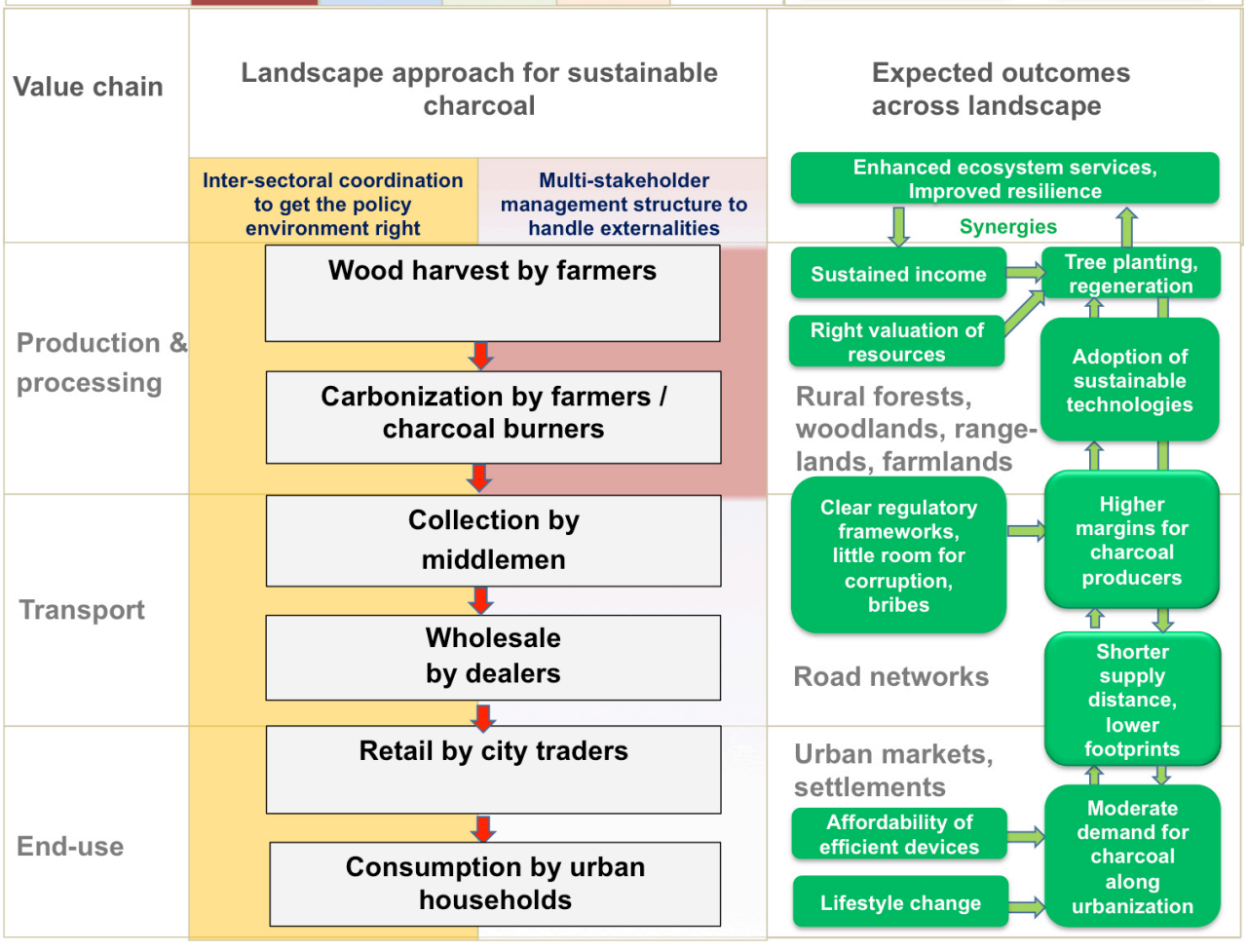
Introduction

The charcoal sector in Sub-Saharan Africa (SSA) generally shares two contradicting features. First, while charcoal is one of the most important commercialized resources and its trade contributes to the economy, its production is generally considered informal, even illegal, and highly associated with rural poverty.

Second, despite the depletion of resources it causes, charcoal supply in SSA has been regarded as highly efficient in meeting the ever-growing urban demand. With further growing demand for charcoal projected in the coming decades, depletion of suitable wood species in landscapes will lead to the shifting of charcoal production frontiers with increasing distances between rural-supply and urban-demand zones, thus increasing emissions considerably. In turn, if produced and used sustainably, charcoal can be a renewable fuel, contributing significantly to reducing greenhouse gas (GHG) emissions in SSA while also supplying energy to urban markets and employment to tens of millions of actors across the value chain if synergies are achieved throughout the landscape scale for economic development and sustainable energy provision.

This brief aims to highlight the mechanisms underlying the current unsustainable charcoal production and use within the wider social, ecological and economic context of SSA landscapes, and to identify challenges and opportunities to transform the charcoal sector for healthy landscapes.


Value chain
Activities, actors, formal/informal multi-sectoral regulatory frameworks across different stages of value chain/landscape
Drivers of degradation across landscape
Energy Sector
Local Authority, Police
Forestry Sector
Agricul. Sector
Land, tree tenure
Damaged ecosystem services, loss of resilience
Trade-offs
Production & processing
Wood harvest by farmers
Carbonization by farmers / charcoal burners
Poverty, income needs
Extensive tree exploitation
Perceived free resources
Lack of incentives to adopt sustainable technologies
Rural forests, woodlands, range-lands, farmlands
Transport
Collection by middlemen
Wholesale by dealers
Unclear regulatory frameworks, room for corruption, bribes
Squeezed margins for charcoal producers
Road networks
Longer supply distance, higher footprints
End-use
Retail by city traders
Consumption by urban households
Urban markets, settlements
Unaffordability of alternative energy
Growing demand for charcoal along urbanization
Lifestyle change


Value chain
Landscape approach for sustainable charcoal
Expected outcomes across landscape
Inter-sectoral coordination to get the policy environment right
Multi-stakeholder management structure to handle externalities
Enhanced ecosystem services, Improved resilience
Synergies
Production & processing
Wood harvest by farmers
Carbonization by farmers / charcoal burners
Sustained income
Tree planting, regeneration
Right valuation of resources
Adoption of sustainable technologies
Rural forests, woodlands, range-lands, farmlands
Transport
Collection by middlemen
Wholesale by dealers
Clear regulatory frameworks, little room for corruption, bribes
Higher margins for charcoal producers
Road networks
Shorter supply distance, lower footprints
End-use
Retail by city traders
Consumption by urban households
Urban markets, settlements
Affordability of efficient devices
Moderate demand for charcoal along urbanization
Lifestyle change

Multi-sectoral regulatory environment affecting the value chain

Several stakeholders are involved in different stages of the charcoal value chain which geographically stretches from rural to urban areas. They include farmers, charcoal burners, middlemen, dealers, city traders and urban consumers, as well as traditional and official authorities. At the same time, the charcoal value chain operates in a complex, multi-layered, multi-sectoral regulatory environment. Incoherent legislation from different government departments, result in an unclear framework for stakeholders. Legislation is, however, rarely effectively enforced, but ends up promoting corruption. Consequently, farmers earn low returns while urban consumers pay higher prices, as bribes often add up to 20% or more of the final price.

Tenure systems governing resource accesses and uses among multiple stakeholders

Farmers, agro-pastoralists and pastoralists in rural landscapes depend on the same resources in a seamless continuum from woodland, rangeland to farmland. They "manage" or "mine" multiple vegetation layers (trees, shrubs and grasses) under either customary regulations and/or formal laws that define their rights of access to the resources.

In rural Africa, some land use activities may be complementary, for example, farmers clearing areas previously operated by charcoal producers. At the same time they can create competition for resources. An example is selective cutting of slow-growing hardwood species by charcoal producers, thus depleting fodder for the pastoralists, while free grazing by pastoralists hinders natural regeneration of trees.

Charcoal production targets mature hardwood species with significant impacts on degradation

Mechanisms underlying unsustainable charcoal production

Planting trees is an inherently risky venture in rural landscapes where the survival rates are low, due to not only harsh climatic conditions, but also damage caused when rural tenure arrangements allow multiple users access to the same resources. Furthermore, priority is often not given to planting trees for charcoal by risk-averse households because slow-growing species are preferred for charcoal production which, along with other results of the poor policy environment, leads to low producer margins.

However, charcoal producers will keep exploiting native vegetation on their farms and beyond in extensive landscapes as long as wood can be obtained sufficiently cheaply to ensure adequate private economic returns. The perception of "free" wood is due to most costs being treated as economic externalities or the lack of exclusiveness of access to tree resources under prevailing tenure conditions (see Figure 1).

Trade-offs

Rapid urbanization has accelerated rural degradation due to the high levels of unsustainable tree cutting for charcoal supply by individual producers across expansive rural landscapes. In contrast to firewood for subsistence use, for which deadwood or fast-growing tree species on private land are exploited, charcoal producers generally prefer large-scale felling of slow-growing hardwood species by finding landholders who, either willingly or through coercion, allow natural trees on their lands to be cleared.

Furthermore, with the low conversion efficiency of between 8% and 20% of most conventionally used earth kilns, the wood required for a unit of charcoal is far greater than that for firewood.

Eventually, the depletion of the wood resources, which multiple stakeholders depend on and derive distinctive goods and services from, can lead to impairing ecosystem functions and resilience, and exposing local communities to climatic and other hazards. Eventually as the wood resources on a piece of land are exhausted, production sites shift to different supply locations leading to a constantly expanding charcoal catchment area, accompanied by downgrading of woodland to bush, and bush to scrub, across landscapes. Dwindling supply coupled with increasing distances can increase prices for urban households.

Integrating landscape approaches in sustainable charcoal production and use

Many projects were implemented during the 1970s-80s specifically to address the supply side of the woodfuel crisis. Most, however, failed due to their ignorance of incentives affecting woodfuel production in the landscape context. We propose a landscape approach (LA) to addressing the sustainable charcoal production and use through the application of Sayer et al. (2013)'s 10 LA principles (Box 1). If successfully implemented, a landscape approach for charcoal production and use can contribute to economic development, climate change mitigation and adaptation, thus healthy landscapes.

Designing a landscape approach to facilitate inter-sectoral and multi-stakeholder coordination for sustainable charcoal production

Cross-cutting issue

- Adopting flexible, continual learning and adaptive management
- Understanding the diverse interests of all stakeholders across the value chain landscapes
- Facilitating the shared recognition of socio-economic (developmental) and environmental outcomes (synergies) of sustainable charcoal and use

Inter-sectoral coordination to get the policy environment right

- Reviewing all existing formal and informal regulations affecting the charcoal sector, and identifying their effects on access to the resources or markets by stakeholders across different stages of the value chain to determine the scope of formalization, liberalization and decentralization
- Setting up a policy forum where all the relevant ministries discuss, streamline and harmonize their authority and responsibilities to regulate the charcoal sector as a prerequisite for an enabling policy environment
- Simplifying and harmonizing related regulations dealing with tree access and felling among the relevant authorities at the decentralized local level to ease legal compliance by stakeholders
- Multi-stakeholder management structure to handle externalities
- Setting up a management structure of all the stakeholders involved in and affected by charcoal production
- Helping the structure to map the resources, rules governing access and use, and conflicts arising from charcoal production and other activities
- Empowering the structure
- Scoping for alternative income opportunities and livelihood activities to compensate for potential loss due to the resource protection, while developing mechanisms of benefit sharing from sustainable charcoal

References

Iiyama, M., Neufeldt, H., Dobie, P., Jamnadass, R., Njenga, M., & Ndegwa, G. (2014). The potential of agroforestry in the provision of sustainable woodfuel in sub-Saharan Africa. *Current Opinion in Environmental Sustainability*, 6C,138-147.

Iiyama, M., Neufeldt, H., Dobie, P., Roy Hagen, R., Njenga M, Ndegwa G, Mowo J, Kisoyan P, Jamnadass R. 2015. Opportunities and challenges of landscape approaches for sustainable charcoal production and use. In Minang PA, van Noordwijk M, Freeman OE, Mbow C, de Leeuw J, Catacutan D. (eds.) Climate-Smart Landscapes: Multifunctionality in Practice, Nairobi: World Agroforestry Centre (ICRAF), pp. 195-209.

Milder, J. C., Hart, A. K., Dobie, P., Minai, J., & Zalesky, C. (2014). Integrated landscape initiatives for African agriculture, development, and conservation: A region-wide assessment. *World Development,* 54, 68–80. doi.org/10.1016/j.worlddev.2013.07.006

Sayer, J., Sunderland, T., Ghazoul, J., Pfund, J-L., Sheil, D., Meijaard, E., … Buck, L. E. (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses, *Proceedings of the National Academy of Sciences,* 110(21), 8349–8356. doi:10.1073/pnas.1210595110/-/DCSupplemental

Citation: Iiyama, M., Neufeldt, H., Dobie, P., Hagen,R., Njenga, M., Ndegwa, G., Gasper Mowo, J., Kisoyan, P., Jamnadass, R. (2014). Opportunities and Challenges of Landscape Approaches for Sustainable Charcoal Production and Use. ICRAF Policy Brief 31. World Agroforestry Centre. Nairobi, Kenya.

Acknowledgement: This work benefitted from the financial support of Forests, Trees and Agroforestry Program of Consultative Group on International Agricultural Research (CGIAR) as well as the Japanese Government which contributed to the lead author's engagement in bioenergy-related projects at the World Agroforestry Centre (ICRAF). The brief is adopted from Chapter 14 of the book *Climate Smart Landscapes: Multifunctionality in Practice* published by ICRAF.

From the People of Japan

World Agroforestry Centre

CGIAR

The World Agroforestry Centre is a member of the CGIAR Consortium

United Nations Avenue, Gigiri, P.O Box 30677-00100 Nairobi, Kenya
Phone: +254 20 7224000, Fax: +254 20 7224001
Via USA phone: (1-650) 833-6645, Fax: (1-650) 833-6646
Email: worldagroforestry@cgiar.org

www.worldagroforestry.org