The forbidden fuel: Charcoal, urban woodfuel demand and supply dynamics, community forest management and woodfuel policy in Malawi

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**Article Info**

**Abstract**

This article examines woodfuel policy challenges and opportunities in Malawi two decades after woodfuel-crisis narratives and counter-narratives. A nuanced examination of woodfuel supply, demand, use, and markets illuminated options to turn stagnant policies based on charcoal 'bans' and fuel-substitution into proactive, realistic ones acknowledging woodfuel dominance and its socio-economic importance. Findings revealed growing, spatially differentiated woodfuel deficits in southern and central Malawi and around Blantyre, Zomba and Lilongwe cities. Poverty, limited electricity access, reliability and generation exacerbated by tariff subsidies, and complex fuel-allocation decisions restricted energy-ladder transitions from woodfuels to electricity, producing an enduring urban-energy mix dominated by charcoal, thereby increasing wood consumption. Diverse socio-political interests prevented lifting of the charcoal 'ban' despite progressive forest laws. Despite implementation challenges, lessons already learnt, efficiency and poverty-reduction arguments, limited government capacity, growing illegal production of charcoal in forest reserves, and its staying power, make targeted community-based forest management (CBFM) approaches more practical for regulated, commercial production of woodfuels than the status quo. New differentiated policies should include commercial woodfuel production and licensing for revenue and ecological sustainability under CBFM or concessions within and outside selected reserves, an enterprise-based approaches for poverty reduction, smallholder/private tree-growing, woodfuel-energy conserving technologies, improved electricity supply and agricultural productivity.

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1. Introduction

Although 'woodfuel crisis' narratives of the 1970s and 1980s projecting large deficits in sustainable woodfuel supply versus demand had by the 1990s been dispelled as simplistic and alarmist, energy policies in many African countries still reflect these misguided narratives, and sustainable woodfuel supply remains a major and growing challenge. Counter-narratives from several authors linked the crisis prognoses to misunderstandings of energy-use patterns and responses to scarcity (e.g., Arnold et al., 2006; Dewees, 1989, 1995a, b; Leach and Mearns, 1988). Misunderstandings included inflating fuelwood deficits through linear 'woodfuel gap' theory based on population, ignoring household-fuel substitution with biomass residues or demand-management responses to scarcity; misdiagnosing economic for physical scarcity, and overlooking significant supply from trees outside forests; and misguided policies based on the erroneous notion that woodfuel consumption is the main cause of deforestation instead of forest conversion to agriculture. Rather than build woodfuel/energy policies on such shaky ground, the counter-narrative authors called for more sophisticated, consistent, evidence-driven, targeted, and realistic policies, drawing on local knowledge and participation.

There is inadequate evidence of a 'return' to national or global woodfuel crises; still, woodfuels have received less consideration than is commensurate with their growing significance (Arnold et al., 2006). The 1990s and 2000s saw a lull in donor interest and funding of major woodfuel projects until a recent resurgence related to climate change. Although the beginning of the lull coincided with the counter-narratives, it was more likely caused by diversion of aid from Africa to Eastern Europe and former Russian republics after the end of the cold war, and by a new focus on global (rather than national) environmental issues following the Rio Summit, than by misinterpretation of the works of counter-narrative authors. Regardless, consumption of charcoal in Africa is projected to double and firewood to increase by 24% from 2000 to 2030 (Arnold et al., 2006). Localized or regional woodfuel...
deficits, often hidden in national analyses, are expanding, e.g., around major cities in Kenya, Mozambique, Tanzania, and Zambia (Mahiri and Howorth, 2001; Mwampamba, 2007; SEI, 2002). So, how does Malawi, a predominantly rural country of 13.1 million people heavily dependent on dwindling forest resources for energy, one of the world’s poorest and most densely populated countries, meet growing energy needs in ecologically sustainable ways while maximizing socio-economic benefits? That is a century-old challenge that frames this study. National population increased 2.4-fold 1977–2008 and by 332% for Malawi’s four main cities 1987–2008 (NSO, 2008). Over 52% of the population lived below a poverty line of US $0.50 per person per day (GoM, 2007). Further, Malawi lost a significant share of its remaining forest cover from 45% of the 94,276 km² land area in 1972 to 25.3% in 1990 (Satellitbild, 1993), and an extra 25% (669,000 ha) by 2008 as cultivated land expanded by 27% (MARGE, 2009).

Although Malawi depends on biomass for 89–93% of its energy needs (GoM, 2003b; MARGE, 2009), the Department of Forestry (DoF) maintains a de facto ban, despite legalization of regulated commercial charcoal and firewood production under license from indigenous wood under the largely progressive 1997 Forest Act, without providing real energy alternatives. The Department of Energy Affairs awaits energy transitions from woodfuels primarily to electricity theorized under the energy ladder hypothesis as the solution in a misguided and disjointed energy policy (Dewees, 1995a, b; MARGE, 2009; Openshaw, 1997). This dominant energy hypothesis for developing countries predicts that households transition from ‘inferior,’ traditional biomass fuels to ‘modern’ fuels (e.g., electricity, kerosene, and LPG) as incomes and urbanization increase (Arnold et al., 2006; Campbell et al., 2003; Hosier and Dowd, 1987; Leach, 1988). However, recent findings suggest that factors other than income—energy preferences, convenience and insurance against unreliable supply—prevent complete energy transitions and produce energy mixes instead (e.g., Hiemstra-van der Horst and Howorka, 2008; Masera et al., 2000). Yet, the woodfuel ‘ban’ only criminalizes the largest forestry industry (woodfuels) worth MK15.5 billion (US$105 or 3.5% of GDP in 2008) and the livelihoods of up to 200,000 people employed full or part-time in the industry (MARGE, 2009) while forgoing MK2.558 billion in potential VAT, without resolving energy or deforestation problems. Meanwhile, woodfuel production has become the political and public/media strawman for the more intractable, population-driven problem of forest clearance for agricultural expansion (Dewees, 1995a; Kambewa et al., 2007).

The purpose of this article is to examine current woodfuel policy challenges and opportunities within Malawi’s politically charged deforestation debate, including potential for regulated commercial woodfuel production under community based forest management (CBFM). I argue that (1) a nuanced understanding of principle causes of deforestation, of woodfuel supply patterns and chains, woodfuel markets and trade, and patterns of energy use is essential to move a stagnant woodfuel policy based on fuel-substitution to a more proactive and realistic one acknowledging woodfuel dominance; (2) counter-indications to the energy ladder hypothesis limit the potential for large-scale switches from woodfuels to electricity under current conditions, thereby maintaining the dominance of woodfuels in the energy sector; and (3) community-based forest management is a more practical option for sustained commercial production of woodfuels than the status quo of prohibitive centralized control and an administrative ban.

The article revisits the woodfuel situation in Malawi drawing primarily on secondary data from recent woodfuel studies (e.g., Arpaillange, 1996; Kambewa et al., 2007; MARGE, 2009; Openshaw, 1997). It also draws upon 15 years of personal experience in Malawi forestry and fieldwork, including key-informant interviews, focus groups, and survey of 381 households in 58 villages of southern Malawi and forest inventory analysis of four community forests in 2003. Recent developments prompted a revisit also suggested by Peter Dewees (1995a); adoption of new, CBM-centered forest policy (GoM, 1996) and law (GoM, 1997), the 2003 National Energy Policy, and the 2009 Malawi Biomass Energy Strategy (BEST) study/report (MARGE, 2009), political decentralization in 1998; and changing patterns in woodfuel demand, supply, markets, trading, and use. CBFM devolves forest management responsibilities and rights to local communities for ecologically sustainable utilization for poverty reduction. CBFM faces significant challenges in Malawi (Blaike, 2006; Jere et al., 2000; Kayambazinthu and Locke, 2002; Zulu, 2008, 2009a) and elsewhere (e.g., Campbell et al., 2001; Shackleton et al., 2002), but lessons have also been learnt to improve it (e.g., Lund and Treue, 2008).

First the article reviews woodfuel policies and interventions in Malawi interrogates socio-political processes that underwrite current policy paralysis or the staying power of the charcoal ‘ban’ despite being unrealistic and untenable. A revisit of woodfuel demand and supply confirms growing deficits in sustainable supply in pockets around urban areas in central and southern Malawi, and surpluses in the north. Urban energy patterns revealed growing woodfuel consumption and a shift mostly from using firewood to charcoal and electricity within an energy mix. Findings suggest a low transition ceiling or pace and a charcoal-dominated urban-energy landscape, given limited access, reliability and production capacity for growing demand, and unsustainable tariff subsidies. Decomposition of the value of woodfuels accruing to different participants along the supply chain revealed highest profits to charcoal retailers and urban firewood wholesalers, significant bribes to transport illicit charcoal into town, hence room for a formalized taxation system. CBFM experiences in the Blantyre City Fuelwood Project (BCFP) area in southern Malawi and elsewhere revealed challenges and opportunities for CBFM to regulate sustainable commercial woodfuel production in targeted but dwindling areas with significant forest resources. Policy discussions and recommendations precede the conclusion.

2. Background and methods

Malawi’s total per capita energy consumption is low (12.15 MJ, 15.6% of upper-middle income countries) and dominated by the household (84%) and biomass (93%) sectors (GoM, 2003b). Over 91% of households used firewood and 6.2% charcoal for cooking (NSO, 2007). Most of the firewood and nearly all the charcoal come from indigenous miombo woodlands, Malawi’s main natural vegetation type. Miombo are dominated by trees of the Brachystegia, Julbernardia, and Isoberlinia genera and cover 2.7 million km² in southern and eastern Africa (Campbell et al., 1996). Malawi’s miombo are usually in low rainfall areas (800 mm) supporting low productivity.

Community based forest management (CBFM) was formalized under the 1996 forest policy after a century of failure of top-down management to arrest deforestation (see French, 1986). Political decentralization reforms followed in 1998. The Norwegian funded Blantyre City Fuelwood Project (BCFP) implemented the earliest (1997–2002) significant CBFM project involving 98 villages managing 4700 ha of government-established Eucalyptus plantations and 15 villages managing portions of 12,000 ha of miombo woodlands in Blantyre, Chikwawa and Zomba districts.2 The

2 The BCFP ($16 million) started in 1986 as a woodfuel-crisis-era peri-urban fuelwood project to supply Blantyre and Zomba cities. Failing to do so cost-effectively, BCFP turned the forests to CBFM in 1996/1997 (Kalipeni and Zulu, 2002).
Table 1
Strategies to adapt to famine in southern Malawi, 2003.

<table>
<thead>
<tr>
<th>Adaptation strategy</th>
<th>Percent (n=381)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduced number of meals per day</td>
<td>48.0</td>
</tr>
<tr>
<td>2. Substituted maize with non-staple foods (e.g. pumpkins, potatoes, wild foods)</td>
<td>45.9</td>
</tr>
<tr>
<td>3. Engage in piecework (ganyu) to earn income to buy food</td>
<td>39.1</td>
</tr>
<tr>
<td>4. Food grants from the government and other agencies</td>
<td>32.8</td>
</tr>
<tr>
<td>5. Produced or sold charcoal to buy maize</td>
<td>29.7</td>
</tr>
<tr>
<td>6. Sold livestock to buy food or exchanged livestock with food</td>
<td>16.8</td>
</tr>
<tr>
<td>7. Sold other crops (e.g. vegetables, cassava, potatoes, etc.) to buy maize</td>
<td>16.0</td>
</tr>
<tr>
<td>8. No food deficit in year</td>
<td>14.2</td>
</tr>
<tr>
<td>9. Sold firewood to buy maize</td>
<td>11.8</td>
</tr>
<tr>
<td>10. Income from small businesses</td>
<td></td>
</tr>
</tbody>
</table>

Blantyre/Chikwawa component (over 800 km²) had supplied charcoal and firewood to Blantyre City since the 1930s. Rampant poverty and low agricultural productivity increased livelihood dependency on forests mainly charcoal, from 25% of households in 1988 to 31% (up to 47% during famine), cf. 23% for subsistence dependency on forests mainly charcoal, from 25% of households poverty and low agricultural productivity increased livelihood controls largely continue British colonial policies dating back to 1930.

Rampant charcoal and firewood to Blantyre City since the 1930s. Investigators indicated charcoal and firewood sales and 76% poverty as the major proximate and underlying causes of deforestation, respectively (Zulu, 2008).

The study used mixed social and natural science methods, relying primarily on secondary data from various reports and published work on woodfuel policies/laws, supply, demand, trading, and use patterns. Second, it drew on insights from fieldwork conducted in 2003, observations during several visits up to July 2009, and 18 years of personal experience in Malawi forestry. The fieldwork involved 381 household interviews, focus groups with forest committees, charcoal traders and producers, and interviews with key government and community CBFM actors in 58 villages in the Blantyre/Chikwawa portion of the BCFP. It focused on the socio-economic context, woodfuel supply-side dynamics and day-to-day experiences in constructing CBFM. The surveyed households were selected by stepwise stratified random and systematic sampling drawing 6–7 interviewees per selected village. The study tangentially drew on forest-inventory analysis of four indigenous village forests to characterize forest productivity and sylvicultural viability of CBFM. Analysis involved descriptive statistics, wood volume and growth-rate computations, synthesis and projections from existing data, and description.

3. Woodfuel policies, strategies and obstacles to regulated production

Responsibility for Malawi’s woodfuel policies is split mainly between the Department of Forestry (DoF) on production and the Department of Energy Affairs addressing demand and broader energy issues. Both the National Forest Policy (1996) and National Energy Policy (2003) emphasize forest and energy contributions to economic development and poverty reduction, and private-sector or community involvement. The main goal of the latter is to “transform the country’s energy economy from one that is overly dependent on biomass to one with a high modern energy component,” reduce dependence on biomass from 93% in 2003 to 50% in 2020 and transition to alternatives, essentially electricity (GoM, 2003b). As for forests, controls largely continue British colonial policies dating back to the Forest Ordinance of 1911, which focused on protecting forests from people through creation of forest reserves and restricting commercial utilization rights to communities on customary lands.

DoF focus on protection and control of miombo forests and wide-ranging woodfuel interventions introduced by World Bank (WB) policy reviews and two Wood Energy Projects, WEPs (US $30.5 million, 1980–1993), have influenced postcolonial woodfuel policy strategies significantly. WEP interventions included tree-harvesting restrictions, market-price interventions, smallholder/private tree growing, and energy conservation through improved woodfuel stoves and furnaces/boilers, and production of charcoal from waste plantation pinewood, but many failed to meet expectations. The World Bank (1990b) reduced problems of deforestation and woodfuel deficits to market distortions and policy failures which led to suboptimal forest-resource use. It singled out uderpricing of government-grown wood and apparent flooding of the market with free/cheap wood from miombo forests with inadequate harvesting restrictions for reducing prices and the true market value of wood, masking economic costs of deforestation, and discouraging investment in tree-growing and conservation. The DoF did not fully implement WB-imposed annual 15% increases in government-wood prices to reach cost recovery by 1996 (World Bank, 1986). Dewees (1995a) argued that price interventions would be ineffective regardless, because they applied only to the 1% of national woodfuel demand supplied from government plantations/forests. Aggressive resource policing and licensing failed to stem cheap woodfuel inflows into urban areas, while hurting poor producers and traders disproportionately. Comparing DoF statistics on impounded charcoal sales for 2008 to demand estimates (MARGE, 2009) suggests that less than 0.02% of illegal charcoal was intercepted. Observations in the BCFP area showed that while wealthier transporters easily internalized charcoal losses to impoundment as operational costs, impoundment meant loss of capital or weeks of back-breaking work for poorer producers or traders. Subsidized seedling production to promote smallholder woodfuel production was misguided because a market for poles provided adequate incentives, and a US $0.03 cash bonus paid per planted tree surviving for 2 years proved too costly to administer, without significantly improving tree growing (Dewees, 1995a). Regulated charcoal production from waste industrial pinewood in the Viphya DoF plantations (northern Malawi) and transportation to major urban areas (1986–1993) failed to alter the flow of and consumer preference for, indigenous charcoal, or to penetrate the indigenous-charcoal marketing system, therefore failing to catch on (Habitat, 1993). In contrast, the stoves program was successful at dissemination wood-saving technologies (Arpaillange, 1996)

CBNRM policies and the Forest Act 1997 allow local communities to participate in CBFM after demarcating a forest area, forming a community organization and electing a committee to lead it, formulating forest rules, developing a forest management plan, and entering a forest management agreement (FMA) with the DoF (GoM, 1996, 1997, 2003a). The legislation grants communities new commercial rights to “develop a licensing system in collaboration with the Director of Forestry,” issue permits, and set and charge fees for harvesting indigenous forest

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3 Comparable interceptions were 1% Mozambique, 10% Zambia and 25% Tanzania (Sel, 2002).
4 The DoF impounded illegal charcoal/firewood and conveyance. Impounded charcoal was sold for government revenue and the vehicles redeemable with fines of MK15,000–MK30,000 (US$138–$276) per truck, depending on size (US$1=MK108.57, September–December, 2003). A Blantyre transporter said he could financially absorb one impounded charcoal trip in five.
resources on unallocated customary lands managed under an FMA. However, commercial charcoal production, harvesting protected tree species (now 14), and wood for processing industries require a special license issued only by the Director of Forestry (GoM, 1997). Requiring an applicant to prove that the wood is from a sustainable source with a management plan essentially continues an administrative ban on miombo licensing dating back to the early 1990s, and criminalizes virtually all indigenous woodfuel production, transportation and trading.\(^5\) Thus, incentives for miombo-based CBFM and co-management were largely limited to minor or non-wood products. Several factors, including DoF responses to WB/WEP stipulations or policy recommendations (July/August 1990), help explain persistence of the ‘ban’.

Social considerations, turf protection, DoF mistrust of community abilities and private sector intentions, vested political interests, the negative image of the charcoal trade, and civil society/media pressure helped to maintain the charcoal ban. First, the DoF invoked affordability for the urban poor to justify implementing fewer wood-price increases than required (Dewees, 1995a), and rejecting a WB recommendation to reduce investment in “expensive peri-urban woodfuel plantations” (World Bank, 1990b).\(^6\) Second was the “natural desire to protect the interests and power of the DoF (and its contacts with private sector forestry and powerful politicians)” (Kayambazinthu and Locke, 2002, p. 5) combined with community distrust (Zulu, 2009a). The DoF also rejected turning ‘costly’ forest reserves over to community or private management because “the private enterprise would overcut (clearfell) and undermine water-catchment protection” (World Bank, 1990b).

Third, vested interests by senior civil servants and politicians involved in charcoal/timber trading and transportation favored the status quo. Even the minister responsible for forestry was in 2003 implicated in illicit charcoal transportation. Politicians often abused their political power to reclaim impounded produce or trucks. In one case, a DoF clampdown on rail trafficking of charcoal into Blantyre enforcing a parliamentary resolution in 2002 ended prematurely on ‘instructions from above’, which also permitted certain influential transporters to transport charcoal. Politicians often supported illegal charcoal production for political gain. Enforcement patrols were perverted into cash generators for DoF-staff allowances and other extra-budgetary activities (creating opportunities for abuse), or into tokenism ordered at will by politicians or senior staff to weather criticism of inaction. In 2002/2003 the Southern Region Forestry Office generated MK1.7 million ($18,904) from 7550 bags of seized charcoal and fines on 51 trucks.

Fourth, charcoal has a negative reputation as a seedy and ruthless business. Thus, a concession agreement allowing pine charcoal production in the Viphya Plantations took many inter-ministerial discussions to overcome “the bad reputation which charcoal production on government plantations could have” (World Bank, 1990a, p. 52). Fifth, while ostensibly favoring CBFM, civil society balked at deforestation, which they often reduced to woodfuel extraction, and demanded stringent top-down enforcement of restrictions. Finally, intra-government contradictions allowed some government agencies to benefit from the illicit charcoal trade. Local governments collected market for charcoal while the Malawi Revenue Authority collected taxes (MK20 per bag) for charcoal transported by train from Nsanje (Michael-Phiri, 2006).

4. Fuelwood crisis revisited – woodfuel supply and demand

Estimates of whether Malawi was in a woodfuel deficit or surplus varied within and across scales. Relatively reliable supply estimates still depend on projections from a 1993 forest-cover and biomass survey (Satellitbild, 1993), and put national standing-wood stocks for 2008 at 400 million m\(^3\) and sustainable supply at 29.8 million m\(^3\) yr\(^{-1}\)—twice the annual demand of 14.9 million m\(^3\) yr\(^{-1}\) (MARGE, 2009; see Table 2a).\(^7\) ‘Forests’ (at least 20% tree cover) covered 2,248,500 ha or 24% of land area. Woodfuels constituted 91.6% of total wood demand (78.2% firewood, 13.4% charcoal), and poles and sawn wood 8.4%. However, inaccessibility of many forests to demand centers and continued depletion meant economic availability was lower than physical availability. Over half the forests were in protected areas—88 forest reserves, 5 parks and 4 wildlife reserves (Table 2b). Girdis and Hoskote (2005) estimated 30 million m\(^3\) in sustainable annual yield for 1996. Orr et al. (1998) estimated 25.8 million m\(^3\) for 1990, to be exceeded by demand by 2003, while the DoF declared “a chronic supply and demand imbalance” of 7–8 against sustainable supplies of 15 million m\(^3\) in 2001 (GoM, 2001). While varied methods and data explain some of the disparities, the estimates still converged on growing wood deficits.\(^8\)

There was also considerable geographic variation. Reliable 2008 estimates establish an 11% woodfuel deficit versus supply for the densely populated Southern Region, and small (5%) and large (77%) surpluses in the Central Region and sparsely populated Northern Region, respectively (MARGE, 2009). Additional wood from unsustainable land clearing for agriculture reduced demand to 89%, 79% and 21% of supply in the south, center and north, respectively (Table 2a). The Blantyre/Zomba and Lilongwe urban woodfuel catchments had deficits of 25% (3% with wood from land clearings) and 31% (1% with clearings), respectively (Table 3). Incorporating biomass residue-use reduces the deficits further. The Lilongwe City deficit grew 3% over 1996 estimates (Openshaw, 1997), while that for Blantyre/Zomba dropped 5%, probably due to data differences. Still, woodfuel-source areas expanded from 10 to 20 km in the 1980s to 20–70 km in the 1990s, up to 150 km by 2006 (e.g., Balaka or Nsanje to Blantyre).

Trees outside forests were important for woodfuel supply, contributing 40% of urban wood sources in 1996 (Openshaw, 1997).\(^9\) Nationally, 54.6% of rural households in 2007 collected their wood from unfarmed areas, 15% from forest reserves, 9.3% from community forests, and 4.1% from own woodlots/woodlands (NSO, 2007). Interpretation of analysis by Orr et al. (1998, p. 31, Fig. 8) of wood demand versus supply, which projected (1995) wood demand and (1992) supply estimates backwards to 1945 and forward to 2005, suggests that wood from outside forests exceeded within-forest supply around 1975/1976 and total national demand exceeded total sustainable supply from forest and non-forest sources around 2002. In contrast, there was a shift in urban-charcoal supply from customary lands to protected areas. By 2007 nearly 60% of charcoal wood for the four major cities came from protected areas, 48% forest reserves and 10% national parks (Kambewa et al., 2007) compared to 12% (25%

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\(^5\) By July 2009, no charcoal license had been issued. Most DoF reserves/plantations had no management plans.

\(^6\) The DoF responded to the World Bank mission Aide Memoire in a letter dated 17 August 1990.

\(^7\) A World Bank study using remotely sensed data puts biomass estimates in 2004 at 388 million m\(^3\), having decreased 16% from 1990 (Bandopadhhyay et al., 2006).

\(^8\) Common exclusion of branchwood and trees outside forests in DoF surveys and vested professional interests in crisis narratives help to explain the 3–4-fold lower supply estimates.

\(^9\) ‘Counter-narrative authors’ also drew attention to trees outside forests (e.g., Dewees, 1995b; Leach and Mearns, 1988).
for firewood) in 1996 when 63% came from customary lands (Openshaw, 1997). Thus, charcoal production appears a bigger threat to protected than customary-land forests. The tobacco industry used 522,500 m³ (3.5% of 2008 wood demand), a localized threat because tobacco depended on customary-land forests for 60% of their wood needs (GoM, 2001). Land clearance for agriculture remained the largest cause of deforestation, compounded by low maize productivity and rapid expansion of special crops. Between 1983 and 2007 maize productivity grew by 3.5% p.a. (MARGE, 2009). Some 45,000 ha of forest and grassland were created in rural areas producing and trading MK3258 million ($22 million) in woodfuels in 2008 (MARGE, 2009) based on survey by Satellitebild (1993).

5. Urban woodfuel markets and woodfuel price decomposition

5.1 Blantyre woodfuel markets and prices

Retailers enjoyed the biggest cost, but more critically so for firewood (63% of total costs and 38% of retail value versus 40% costs and 19% retail value for charcoal), followed by production costs. Retailers enjoyed the highest price markup over costs—43.5% for charcoal and 35.1% for firewood—and the largest share of total markup per tonne (58.4% of MK14,748/tonne for charcoal and 65.0% of MK3355/tonne for firewood). Virtually non-existent.

5.2 Firewood and charcoal producers

Table 2b

Distribution of forest resource by type.

<table>
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<tbody>
<tr>
<td></td>
<td>1000 ha forest1 (%)</td>
<td>1000 ha forest2 (%)</td>
<td>million m³</td>
<td>million m³</td>
<td>Mean change 1000 ha (ha/yr)</td>
</tr>
<tr>
<td>North</td>
<td>1,698,502 (63)</td>
<td>196.83 (48.4%)</td>
<td>868.2 (33.7%)</td>
<td>1124.3 (42.3%)</td>
<td>−256.1 (−22.8%)</td>
</tr>
<tr>
<td>Center</td>
<td>5,491,034 (154)</td>
<td>119.70 (29.5%)</td>
<td>523.4 (26.3%)</td>
<td>737.4 (27.7%)</td>
<td>−214.0 (−19.0%)</td>
</tr>
<tr>
<td>South</td>
<td>5,876,784 (185)</td>
<td>89.79 (22.1%)</td>
<td>596.9 (30.0%)</td>
<td>795.8 (28.0%)</td>
<td>−198.9 (−17.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>13,066,320 (139)</td>
<td>406.38 (100%)</td>
<td>1082.4 (23.6%)</td>
<td>2053.4 (35.2%)</td>
<td>−669.0 (−59.5%)</td>
</tr>
</tbody>
</table>

Notes: (a) Source: 2008 population and housing census preliminary report (NSO, 2008), <http://www.nso.malawi.net>.
(b) Forest1 represents closed forest and forest 2 includes forest in extensive agriculture areas (90% forest). Biomass includes all above-ground wood sources and percent, and only the closed forest biomass and yield (m³/ha/yr).
(c) Forest change is based on only the closed forest class; forest1 in the third and fifth columns.
(d) Supply1 is sustainable annual wood growth only, supply2 is annual growth and wood from cleared land, supply3 is annual growth and residues (source: MARGE, 2009, p. 73).
and Zomba share a catchment area.

data are from Malawi Biomass Energy Survey (MARGE, 2009). bMonetary units are in MK200, data are from Malawi Biomass Energy Survey (MARGE, 2009).

2009) and 2008 population data (NSO, 2008)

bribes, and instead create opportunities for replacing this ‘private

tax’ with formal one(s), without disrupting the woodfuel market.

The Malawi Revenue Authority (MRA) already collected a tax

of MK20/bag (in 2006) for charcoal transported by rail from

Nsanje into Blantyre (Michael-Phiri, 2006). Local government

markets also collected retail market fees on the illegal charcoa-

l
to forests and the charcoal market by employing a variety of

strategies, the most common and widespread is the charging of

market fees, respectively. The higher markup by retailers may

officials for illicit passage into cities, and local government-

market fees, respectively. The higher markup by retailers may

partly reflect these ‘marketing costs’ and higher profits from

selling in small amounts. However, multiple transport modes,
routes and traders, and unknown proportions of firewood or

charcoal traversing them, and/or being intercepted by rent-

seeking officials render further conjecture unproductive.

The main point is that the 12–20% of charcoal retail-value

going to bribes was internalized as a tax, albeit to personal

pockets of corrupt officials. While legalization and regulated

commercial production and transportation of woodfuels is

unlikely to eliminate such corruption, it would remove a major

incentive (illegality) for police and forestry officials to extort

bribes, and instead create opportunities for replacing this ‘private

2008a

| catchment, | tons major city | tons major city | tons (1000 m3) | tons (1000 m3) | tons (1000 m3) | min. mean annual increment, 1000 m3 | firewood and charcoal | 
| population | (1000 m3 | city) | city) | wood [% of total] | wood [% of total] | (demand/ | | 
| 2008) | all urban) | all urban) | | | | supply1) [demand/supply2] | | 
| Blantyre | 661,444 | 78,143 [521,214] | 161,214 [241,821] | 170.25 [255.38] | 87,910 [558.23] | 30,000 [60.0%] | 6228 [125%] [103%] [57.24] | Ichiumula, Zomba, Michiru FRs, Neno/Mwanza area. Smaller amounts from Mulanje, W. Blantyre/Chikwawa and Zomba. Main supply area radius is 80 km, but over 150 km for train transport (Makhanga, Balaka). | 
| Blantyre | 661,444 | 6228 [125%] [103%] [57.24] | 1263.989 | 189,504 | 146,623 | Chikangawa and Kaping’ina FRs; Choma, Ekwendeni, Lungangazi, Nhaka Bay, along Rumpai Road. Shortest distances as low as 10 km. Zomba Mt. FR; charcoal Malosa/ Domasi area and Chingale. Longest distance about 25 km. | 
| Mzuzu | 128,432 | 500,35 [750.35] | 10,321 [165.25] | 209,361 | 146,623 | 15,000 | 
| Zomba | 87,366 | 300,35 [450.52] | 21,294 [31.94] | 4301 [27.31] | 1250 | 5304 [111%] [101%] [56.92] | 

Fig. 1. Decomposition of mean urban retail price, costs and markups for firewood (A) and charcoal (B) in Malawi Kwacha per tonne, 2008. aMonetary units are in MK100, data are from Malawi Biomass Energy Survey (MARGE, 2009). bMonetary units are in MK200, data are from Malawi Biomass Energy Survey (MARGE, 2009).
Findings also suggest that improvements in road networks and woodfuel transportation efficiency may mitigate the transportation bottleneck and reduce prices. Regional forestry officials underscored the growing significance of charcoal transportation by rail from Nsanje, Chikwawa and Balaka into Blantyre. Rail transportation was MK80/bag versus MK120/bag by truck (Michael-Phiri, 2006). Transport options and impacts on woodfuel supply require further analysis.

6. Urban energy transition or an enduring firewood, charcoal, electricity mix?

Despite a significant movement up the energy ladder the past 30 years, the main outcome has been an energy mix consisting mainly of firewood, charcoal, and electricity, but dominated by biomass. Some 66% of urban households used more than one fuel for cooking in 2008 (MARGE, 2009). Urban households using firewood as the main cooking fuel halved from 78% in 1981 to 35% in 2007, and charcoal and electricity users tripled from 14% to 44% and 6% to 20%, respectively (Fig. 2). Despite methodological and temporal differences across studies, findings show a consistent, sizable ‘energy-ladder’ shift from firewood to charcoal—the ‘middle class fuel’—driven as hypothesized by scarcity and increasing costs and possibly by modestly rising incomes. In energy terms, urban households used 19,076 TJ of energy in 2008, 56% as firewood (cf. 66% in 1994), 33% charcoal (24% in 1994) and a doubling in electricity use from 4% in 1994 to 9% (MARGE, 2009).

Several factors undercut expected large-scale energy-ladder transitions from biomass to electricity. They include rapid population growth, poverty, wood-to-charcoal energy conversion losses, and low capitalization limiting electricity access, reliability, and generation, capacity. The 332% growth in population of the four major cities from 1987 to 2008 (2.4-fold increase nationally) means more people using the main energy forms (NSO, 2008). The national dominance of rural household energy (80%) over urban (12%), and of firewood (87%) over charcoal (6.7%) or residues, 6.4% (MARGE, 2009) limits potential impact of urban energy switches, although rural charcoal use grew from 0.4% in 1998 to 4.2% of households in 2007 (NSO, 1998, 2007).

Malawi remains very poor (ranked 164/177 globally), incomes are chronically low and relatively stagnant, with high disparities. From 1990 to 2007, per capita GDP grew only 0.3% annually to

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Table 4

Decomposition of mean urban retail price of charcoal and firewood in Malawi Kwacha per tonne, 2008.

<table>
<thead>
<tr>
<th>Location on supply chain</th>
<th>Cost</th>
<th>Cumulative cost</th>
<th>Markup</th>
<th>Selling price</th>
<th>Percent markup</th>
<th>Markup as % of total markup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charcoal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw wood</td>
<td>2790</td>
<td>2790</td>
<td>0</td>
<td>2790</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Production site</td>
<td>5377</td>
<td>8167</td>
<td>1793</td>
<td>9960</td>
<td>16.4</td>
<td>12.2</td>
</tr>
<tr>
<td>Roadside</td>
<td>1230</td>
<td>9397</td>
<td>3330</td>
<td>14,520</td>
<td>29.8</td>
<td>22.6</td>
</tr>
<tr>
<td>Wholesale, town</td>
<td>4270</td>
<td>13,667</td>
<td>1010</td>
<td>19,800</td>
<td>5.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Retail, town</td>
<td>0</td>
<td>13,667</td>
<td>8615</td>
<td>28,415</td>
<td>43.5</td>
<td>58.4</td>
</tr>
<tr>
<td>Total</td>
<td>13,667</td>
<td>14,748</td>
<td>28,415</td>
<td>108.0b</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Firewood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw wood</td>
<td>975</td>
<td>975</td>
<td>0</td>
<td>975</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Production site</td>
<td>900</td>
<td>1875</td>
<td>300</td>
<td>2175</td>
<td>10.5</td>
<td>8.9</td>
</tr>
<tr>
<td>Roadside</td>
<td>695</td>
<td>2570</td>
<td>610</td>
<td>3480</td>
<td>28.0</td>
<td>18.2</td>
</tr>
<tr>
<td>Wholesale, town</td>
<td>2470</td>
<td>5040</td>
<td>265</td>
<td>6215</td>
<td>7.6</td>
<td>7.9</td>
</tr>
<tr>
<td>Retail, town</td>
<td>0</td>
<td>5040</td>
<td>2180</td>
<td>8395</td>
<td>35.1</td>
<td>65.0</td>
</tr>
<tr>
<td>Total</td>
<td>5040</td>
<td>3355</td>
<td>8395</td>
<td>66.6b</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

* Weighted mean costs, markup and retail price information for Blantyre, Lilongwe, Mzuzu and Zomba cities were obtained from the Malawi Biomass Energy Strategy report (MARGE, 2009). The study assumed no costs associated with retailing.

b The total percent markup is the total markup divided by total costs; not the sum of the individual percent markups for traders along the supply chain.

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Fig. 2. Changing patterns of urban energy use in Malawi, 1981–2007.

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11 Actual demand estimates are lower than BEST estimates, which were based on higher 2008 urban (by 15%) and national (by 4%) population projections than 2008 census results.
US$250, while mean annual inflation of 30% cut into real incomes (UNICEF, 2009). The 2004–2005 Integrated Household Survey indicates that 54.2% of Malawians lived below an annual poverty line of MK16,165 per person (US$0.42/day), including 25% of urban dwellers (NSO, 2005). Only 13% of Malawi’s population was in wage/salary employment, earning mean annual incomes of MK73,274 in urban areas and MK10,867 in rural areas. Although mean annual per capita expenditure increased by 38.1% from MK18872 in 1998 to MK26058 in 2005—MK52,594 (US$494) in urban and MK22,454 rural areas, 56% on food—2005 expenditures were in real terms only 53.6% relative to 1998. NSO statistics revealed that non-food expenditure increased by 6.2% annually (total 37%) between 1998 and 2004 (NSO, 2005) while charcoal, firewood and electricity prices increased from 40.5% to 53.0% annually. From 1996 to 2008 mean firewood, charcoal, electricity and paraffin price increased 5.3, 4.9, 6.5, and 16 times, respectively, although in real terms (1996 base) energy prices stagnated or declined, except for paraffin (Fig. 3). Poor households suffered more from these hikes than wealthier ones. According to Arpaillange (1996) the poorest urban households bought charcoal in small amounts and paid 60% more (MK2.76/kg in 2004) than the wealthiest group (MK1.72/kg), which often bought charcoal in bulk. Kambewa et al. (2007) found that energy constituted 23.7% (MK2087.23) of monthly household expenditures for the lowest of five income groups, and only 7.9% (MK4348.59) for the highest (see also Fig. 4).

The government thus subsidizes electricity tariffs, thereby reducing capitalization needed for equipment maintenance and development and undermining the quantity and quality of electricity supply, while benefiting the relatively wealthy. The subsidy amounted to US$830 annually for an upper-income household, and $320 and $80 for medium- and low-income ones, respectively (MARGE, 2009). It made cooking with electricity superficially the cheapest option, followed by firewood, then charcoal (MARGE, 2009) projects a 39% increase in commercial annual firewood demand from 890,000 tonnes in 2008 to 1.25 million tonnes in 2013, a doubling of charcoal demand from 305,000 to 606,000 tonnes, and quadrupling of electricity demand for cooking from 241 to 910 GWh. MARGE argue that meeting the increased electricity demand for cooking alone would require 392 MW in new electricity generation (cf. 285 MW in 2008) at a cost of US$600 million, and that ESCOM (the parastatal electricity company) connects 25,000 new households to the grid annually. In 2008 ESCOM connected 15,000 households and had a backlog of 15,000! While the government can choose to maintain the subsidy as an incentive to meet fuel-switching and forest conservation goals, the subsidy is currently self-defeating and commercially unsustainable. As MARGE aptly observe, the rationale of allocating more than half Malawi’s electricity to cooking when electricity demand is projected to exceed supply by 2011 even with the extra 64 MW coming online.

Fig. 3. *Trends in charcoal, firewood, electricity and paraffin prices, 1996–2008.* Data source: National Statistical Office of Malawi and the Malawi Biomass Energy Strategy report (MARGE, 2009), and personal communication with Keith Openshaw and Matthew Owen.
common in Malawi (e.g., Makungwa, 1997), and variable use rates should be a major part of energy policies, including improved stoves, tobacco-barns and industrial boilers. Yet, even with the fairly successful improved-stoves program. Adoption of the adapted Kenyan Jiko ceramic stove with thermal efficiencies up to 30–35% increased 5.5-fold in 15 years (6% in 1990 to 33% in 1995). A remarkable 72% of charcoal users (cf. 4% for firewood) used the stove for cooking, consuming 25% less charcoal (with a potential of 35–50% savings) than those using traditional metal stoves (Arpaillange, 1996; Kambewa et al., 2007).

Finally, given firewood-to-charcoal as the dominant energy-ladder transition, wood consumption and ecological costs generally increased, *ceteris paribus*, because conversion-inefficiency losses often exceeded expected energy-efficiency gains from climbing the energy ladder (higher energy content), even with the fairly successful improved-stoves program. Adoption of the adapted Kenyan Jiko ceramic stove with thermal efficiencies up to 30–35% increased 5.5-fold in 15 years (6% in 1990 to 33% in 1995).

7. Potential and challenges of woodfuel regulation under CBFM

Poverty, livelihood dependency on forests, continuing deforestation, and growing woodfuel deficits in the Blantyre-city catchment make BCFP experiences relevant for assessing woodfuel-production potential, and underscore the need for CBFM to improve conservation, livelihoods, and governance. For instance, nearly every able-bodied male produced charcoal in the area, but most characterized themselves as reluctant charcoalers forced by poverty into illicit charcoaling despite its high labor/time demands, physical and health toll, economic insecurities, and indignities of physical abuse and harassment by DoF and police officials.17

Despite considerable challenges, indications suggest that CBFM had better potential for regulated woodfuel production than the status quo. First, CBFM offers the spatial and social penetration needed to monitor resource use and administer supply-side woodfuel licensing systems. Charcoaling is hard to hide, and someone in the village often knows who is producing charcoal, where. Production took weeks to months, produced telltale smoke, and involved unconcealable social networks including village or clan heads, individuals and committees selling wood to outsiders, villagers renting houses to itinerant charcoaling gangs, money lenders, bicycle renters and repairers, charcoal scouts/packers, independent or ‘contract’ local producers, and traders. Second, payment of formal and informal ‘royalties’ for wood and bribes to corrupt local officials revealed potential for formal royalties. In fact one village (Kabuluzi, Blantyre) demonstrated that communities can devise and implement appropriate licensing/taxation systems.18 Committee members collected MK500–MK1500 per charcoal kiln or MK10/bag of charcoal produced, and established two village roadblocks to enforce the locally devised system.

Third, many causes of CBFM failure were more about flawed process than concept, hence correctable.19 The biggest was lack of downward accountability of forest committees, itself a product of failure to balance the exercise of power among key CBFM actors. Most committees operated as corrupt, elite clubs monopolizing decision-making and benefits. Of 399 responses, only 11.8% indicated that CBFM decision-making was collective. Less than 20% thought forest committees represented community interests, and 40.6% said committee members monopolized benefits. Relative success was associated with strong, creative, respected/ feared, and charismatic village heads who were able to balance

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16 Conversion rates of 10–12% are often cited, but 19–20% (wet) and 25% for air-dried wood have been recorded in Kenya and Tanzania (MARGE, 2009).

17 Some women also participated. Charcoalers had a mean age of 36, 9 years below the local average.

18 Traders reported paying MK30/bag or MK600–MK2000 in bribes at the three local roadblocks.

19 Failure involved unsustainable forest use and CBFM institutions (see Zulu, 2008).

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Fig. 4. The emerging energy mix: monthly energy expenditures in Blantyre, Lilongwe, Mzuzu and Zomba cities, 2007.
Source of data: Kambewa et al., 2007.
power relations (Zulu, 2008). Instead of privileging elected committees, new strategies should develop good village leadership and empower villagers to promote participatory decision-making, transparency and accountability. Transparent, negotiated, and clear cost/benefit sharing mechanisms were also essential.

Sound record keeping and financial accountability was an indispensable part of accountability and fleeting CBFM success. It will be crucial for managing new licensing systems, and needs more attention than accorded in the BCFP. Record keeping was generally poor, creating fertile ground for committee corruption, reduced community benefits, eroded trust, and dampened participation. Twenty-two (%56%) of a sub-sample of 39 villages had incomplete, poor, or no financial records. Necessary training on financial accounting included complex material and lacked follow-ups. It should be commensurate with low education levels, emphasize a learning-by-doing approach, and include regular follow-ups.

Appropriate rules are the heart of CBFM, and their formation, scaling, and practical enforcement were critical for CBFM success. Low participation (18% of respondents) in rule formulation, and rule scaling beyond the village-level to the chieftainship level undermined local relevance and rule-enforcement (Zulu, 2008). Clear and enforceable accountability measures should be included in village rules and bylaws, including requirements for committees to present accounts to the community regularly. Findings pointed to dual-rule systems combining simple, informal customary rules and sanctioning at village level, with formal, wider-level (e.g. village-group) bylaws that bestow local and extra-village legitimacy and legal protections (Zulu, 2009a).

Lack of clarity of CBFM roles and unrealistic expectations needed redress. For instance, most committees operated as the implementers or full-time workers—many paying themselves secretly—not as leaders, coordinators, or mobilizers, as intended. Over 41% of respondents (n=352) indicated committee members or paid labor was the main source of labor (23% cited the village ‘community’—Zulu, 2009a). Initial DoF efforts to elevate elected committees over traditional leaders instead of harnessing complementarities caused conflict and undermined CBFM given the central role of these leaders over local social-cultural relations. Voluntarism or altruism as the key motivation for CBFM was also unrealistic. Communities should be encouraged to consider material compensation for committee members and other labor/service needs transparently, commensurate with village resources, in order to reduce incentives for corruption and enhance benefits. Some villages hired forest guards; others provided food, nominal cash payments, or wood for forest labor. As village head Kapalaliza noted, “no one can be motivated to work hard without pay. Committee members who appear motivated derive some underhand benefit.” Commercial woodfuel production can help communities to get beyond the baseline, communal-benefit incentives promoted in CBFM to household-level incomes, which appeared essential to sustain participation, especially among men. While technical forest management was less challenging than institution building, it will need more attention.

In 1993 the BCFP prepared a sound miombo management plan that could be adapted to other areas with significant forests, including reserves. The plan split the 12,000 ha miombo forest into three zones: ecologically sensitive areas for total protection, semi-sensitive areas limited to selective harvesting, and a utilization zone for charcoal production based on a 25-year sylvicultural rotation (i.e., it would be split into 25 equal-area compartments and one clear-harvested annually, in rotation). Trained CBFM communities exhibited impressive levels of technical Eucalyptus plantation skills, but miombo management skills, including basic resource-assessment and management-planning, were poor, as they also are in the DoF. Despite high training costs, the EU-funded Social Forestry Training and Extension Project (1997–2003) successfully trained 14 communities in participatory forest resource assessment (PFRA) and miombo management planning. Guidelines have been developed for wider application.

However, generally low productivity from ecological limitations and continuing degradation limited prospects for sustained commercial charcoal production in much of the BCFP area. Forest inventory analysis confirmed slow tree recovery. One forest (Chigunkha) produced only 3.45 m³ ha⁻¹ of standing wood (5.6 cm mean breast-height diameter) after 11 years of protection and recovery. One of the most intact and mature woodlands, Kabuluzi (620 ha) had 75.1 m³ ha⁻¹ standing wood, but no more than 10 stems per hectare of the 25–50 cm diameter trees preferred for charcoal production (Zulu, 2009b). On a 25-year rotation, each 25-ha compartment would yield 1878 m³, or 281.5 tonnes (10053 28-kg bags) of charcoal worth MK7.513 million ($US33471) or MK12,117/ha. Approximately 35% of total markup or 51% of total retail value would remain locally for Blantyre in 2008 prices ($US1=MK140.51 in second quarter, 2008), supporting 67 small producers (150 bags/producer/year).

Although woodfuel extraction per se did not cause significant deforestation and is potentially renewable unless followed by conversion to agriculture, as has been found in Mozambique, Tanzania and Zambia (SEI, 2002), and globally (Geist and Lambin, 2002), cycles of woodfuel extraction had by 2003 changed the species composition and reduced forest structure largely into scrublands under 1.5–3.0 m tall. Remote sensing analysis with Landsat satellite imagery showed that net deforestation in the BCFP area was only 1.7% between 1989 and 2002 while 44% of the area had degraded (thinned) considerably (Zulu, 2009b). Villagers would have to wait 15 or more years for the forest to recover before producing charcoal, a tall order, as one village’s (Malekano) quip illustrates: “do you expect me to work today so I can enjoy the money when I am dead?” However, many community forests were smaller and more degraded than Kabuluzi, undermining viability of sustained charcoal production. Here, value-adding based on minor forest enterprises and a focus on forest rehabilitation and tree growing make more sense. So, CBFM in not the panacea, and charcoal production would be more viable only for areas with significant, contiguous forest resources.

8. Policy implications and recommendations

If the charcoal ‘ban’ and woodfuel policy are clearly not working, why do they persist? The status quo ignores the socio-economic importance of woodfuels as Malawi’s major energy source despite growing demand and without providing a real alternative, criminalizes a MK15.5 billion industry that employs...

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20 Powers of village heads have to be moderated, too, so chiefs are not too weak or overbearing.

21 Nearly 83% of respondents (n=377) had no formal, or never completed primary, education.

22 The plan was not implemented. The DoF now recommends leaving behind mature trees covering 20–30% of harvested compartments for seed/regeneration and timber (IFMSLP, 2007).

23 MARCE (2009) reports 60–123 m³ ha⁻¹ in mean standing wood for deciduous miombo, while Frost (1996, p. 24) reports stocks as low as 14 m³ ha⁻¹ in Malawi, and 117 m³ ha⁻¹ in Zambia.

24 Details of the changes in species and structural diversity are covered elsewhere (Zulu, 2009b).

25 Some 9.2% of forest converted to non-forest, including agriculture; 5.6% of non-forest area became forest, mainly in BCFP Eucalyptus plantation and some forest recovery.

26 From 15 ha in the BCFP, 1111 registered forests in Lilongwe ranged from 0.1 to 70.0 ha.
the government potential tax revenues for conservation and other priorities as public funding dwindles, and promotes corruption—all without reducing deforestation. Diverse interests helped to maintain the selective devolution of commercial woodfuel production rights under otherwise progressive forest laws. They included government social redistribution considerations in favor of the ‘urban poor;’ DoF self-preservation or fear of the “professional disempowering” effect of CBFM (Blaikie, 2006) and mistrust of communities; vested interests of some senior government officials and politicians; a bad image associated with the charcoal business; and discordant support of civil-society elements for a clampdown on charcoal, combined with DoF resource constraints and usual bureaucratic resistance to change.

Charcoal is the most political natural resource after land, and the current policy paralysis (ban) allows access to a lucrative charcoal business and political patronage for government and political elites. Similar self-interests and lackluster DoF support also recently scuttled efforts to privatize forest plantations after 4 years of donor-funded preparation (DFID, 2006), thereby maintaining low wood prices and privileged access to timber-sawing permits by elites. Recent interviews (June–July, 2009) of senior DoF officers revealed that no one was willing to be associated with the politically sensitive decision of publicly lifting the charcoal ‘ban.’ Similar bans were revoked in Chad and Tanzania after causing social upheaval, and two decades of a continuing ban in Uganda has not replaced charcoal as the major urban fuel (MARGE, 2009).

Mitigating these vested political, economic, and professional interests to create space for realistic woodfuel policies is a challenge requiring bold action. In Uganda and Senegal vested interests have allowed forest bureaucracies to retain authority over commercial forest/woodfuel rights—hence sidelining communities—despite permissive CBFM laws (Ribot, 2009; Ribot and Agrawal, 2006). The Malawi DoF has historically limited the standard forestry principle of wood harvesting for sustained and enhanced regeneration and productivity to planted exotic species, and prescribed preservation for indigenous forests. The use of pilot projects, such as the EU-funded Improved Forest Management for Sustainable Livelihoods Project, IFMSLP (2006–2012), at least debunks the ‘taboo’ of tree-harvesting in forest reserves and can hopefully demonstrate sustainable forest harvesting under CBFM. The IFMSLP gives forest licensing rights to 12 reserves covering 150,000 ha (16% of total) to neighboring communalities under co-management agreements between the DoF and organized communities based on agreed forest rules, a forest management plan and an enterprise-development plan (IFMSLP, 2007).

This study has shown that large-scale energy switches to electricity and other alternatives expected under the National Energy Policy (2003) are unrealistic in the short-medium term, and woodfuels will still dominate the energy scene. Woodfuel demand will actually increase, and energy policies should reflect this reality.27 Even wealthier, more urbanized African countries facing nothing like Malawi’s low urban incomes; limitations on electricity access, quality and quantity of supply; and out-priced paraffin and LPG alternatives (Fig. 3), have not achieved the full energy transitions posited under energy-ladder theory. Instead, as the case of Maun in Botswana illustrates, energy mixes emerge from constrained energy transitions reflecting factors beyond incomes, including choice of certain fuels for specific uses or times, convenience, and insurance against unreliable energy supply (Hiemstra-van der Horst and Hovorka, 2008). The dominant transition is firewood to charcoal (Fig. 2) because charcoal is more convenient, cleaner (less smoke), easier to store without degradation, has double the energy content of firewood and more specialized uses. However, the switch leads to higher wood consumption because energy losses in conversion from firewood to charcoal generally outweigh end-use efficiency savings from going one rung up the energy ladder. Every person converting from firewood to charcoal used 0.63 m³ (43%) more wood annually than before despite 20–44% in end-use efficiency gains from the higher energy content and improved-stove use, depending on whether one used traditional or improved stove before or after, based on 2008 per capita consumption estimates (MARGE, 2009).

Given its dominance in the energy sector, more attention should be given to efficient production and supply of woodfuels. CBFM offers a very good opportunity not as the panacea, but as a major component of sustainable woodfuel production. Although mixed CBFM performance justifies caution and socioecological factors limit the viability of commercial woodfuel production under CBFM to diminishing areas with significant forest resources, socioeconomic, efficiency, conservation, and social justice arguments, and failure of centralized approaches support CBFM. Currently, there is no real alternative to CBFM. As Lund and Treue (2008) also argue, most CBM challenges arise from implementation rather than conceptual problems that can be corrected. Lessons from the BCFP suggest that instituting transparent accountability and decision-making processes, including required regular financial reporting to communities, mechanisms for equitable cost/benefit sharing, and developing leadership skills of village heads to balance the exercise of power among CBM actors could mitigate the major CBFM problem of elite captures (see Zulu, 2008). A simple village licensing system tried by Kabuluzi Village in W. Blantyre shows feasibility of community production-side licensing for common-access forests while the IFMSLP illustrated viability under forest-reserve co-management. Given recent shifts to forest reserves as major sources of illegal charcoal (Kambewa et al., 2007), and limited DoF capacity to reverse them, permitting charcoal production in reserves under the IFMSLP would be an excellent entry point for proactive regulated charcoal production already provided for in the 1997 Forest Act.28 The IFMSLP has a revenue-sharing formula: 60% to communities, 30% to government, and 10% to a reserve-wide oversight association. Government tenure of forest reserves facilitates relative control over licensing and forest harvesting, while the relative security of supply allows viable introduction of more energy-efficient kilns, e.g., the half-orange brick kiln successfully tested in the Viphya plantations, to reduce wood wastage. As for the Viphya Charcoal Project, supply-chain analysis has illustrated that transportation is not as prohibitive a factor as previously believed, especially for charcoal. Conveyance permits could tax wood from non-CBFM or non-regulated sources more than CBFM/regulated sources (see also MARGE, 2009) to encourage conservation.

Though CBFM-dependent commercial woodfuel production policies are relatively new, yet Malawi can learn from other countries. Several African countries use a combination of CBFM agreements and concessions supplemented with checkpoints on major urban feeder roads and varied taxation systems, although levels of commercial rights devolved to communities vary (Table 5). Organizing charcoal producers into some umbrella charcoal association(s) as done in Zambia and Sudan could streamline licensing to associations, which would further license others and regulate activities of their members (see Mugo

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27 BEST projections put biomass dependence in 2020 at 83%, not 50% (MARGE, 2009).

28 Legally, IFMSLP communities can choose charcoal production but the DoF, which approves management plans, has not encouraged them for reasons discussed earlier.
Mozambique and Senegal levy a forest restocking fee or equivalent which goes into a national forestry fund. Malawi should reactivate the Forest Development and Management Fund provided for in the Forest Act 1997 (Part IX). A semi-autonomous unit dedicated to woodfuel regulation (transportation, licensing, trading, standards, and demand/supply assessment), as in Sudan, could enhance woodfuel supply and regulation. Management agreements should include production quotas for monitoring supply, as in Senegal (Post and Snel, 2003). Finally, two studies covering 15 Tanzanian villages showed that village-based taxation and regulation of commercial forest utilization (including charcoal) increased revenues and covered forest management costs, with a surplus (18%) for village development, controlled utilization effectively, achieved wood growth in excess of harvesting, and enhanced transparency and accountability over village funds and decision-making (Lund, 2007; Lund and Treue, 2008). However, safeguards are needed for the poor because regulations and taxes made the poor worse off (also see Fisher, 2004).

Ultimately, CBFM should be combined with other interventions to meet urban/rural, household/industrial woodfuel demand and support rural livelihoods sustainably. They include enterprise based rural tree-growing and conservation to support livelihoods and harness the importance of trees outside forests; expansion of the relatively successful stoves program for urban households and industrial barn/boiler energy conservation, and improvements in electricity access, reliability and generation capacity, and graft minimization measures that could include collection of woodfuel taxes by the Malawi Revenue Authority. Improving agricultural productivity, e.g. through agroforestry and irrigation, is a major part of the long-term solution.

9. Conclusion

This article has argued that a holistic examination of supply and demand-side woodfuel dynamics, including quantities, sources, production relations, geographic patterns, trading,
demand and energy-use patterns provided a nuanced understanding of the woodfuel situation and realistic policy options. While there is a partial shift in urban-energy use from firewood to charcoal, expected large-scale transitions from woodfuels to electricity are currently unlikely.

Transitions are constrained by low incomes and lack of or low income growth, complex fuel-allocation decisions by household users, and limited access, unreliable supply, and low generation capacity for electricity given unsustainable electricity subsidies that undercut capital improvements. Thus, urban woodfuel demand continued to rise rapidly relative to supply within an enduring energy mix of firewood, charcoal and electricity, dominated by woodfuels. Policies should therefore reflect the reality of a woodfuel-dominated energy sector rather than unrealistically wait for energy switches while banning the major energy source, without providing real alternatives. This article further argued that the commercial woodfuel ‘ban’ is anachronistic, ill-informed by a crisis discourse that erroneously reduces deforestation to fuel-wood extraction and by overdependence on energy-transition theory. It is therefore counterproductive, and untenable. It should be removed in a measured manner that produces more win–win situations reflecting the economic importance of woodfuels and their ecologically sustainable supply while fighting poverty.

The community participation and decentralization genie has been out of the bottle since the mid-1990s, and as Blaikie (2006) notes, CBFM appears to be here to stay. It is time to use lessons that have been learnt in Malawian and elsewhere to improve CBFM. The article has argued for proactive regulation of commercial firewood and charcoal production under CBFM not as a wholesale panacea, but carefully targeted to customary-land areas with adequate wood and market linkages and to selected forest reserves under co-management agreements with communities and concession arrangements with private producers. This offers more realistic promise toward meeting woodfuel demand, contributing to rural livelihoods, and ecologically sustainable utilization than the status quo of policy paralysis. CBFM constitutes a realistic response to recent shifts in urban charcoal-wood supply from customary lands to reserves. However, instead of a one-size-fits-all approach, CBFM should be part of a differentiated but coordinated energy policy integrating supply and demand dynamics. There is need for promoting smallholder and private tree growing and conservation given that mismanagement and growing demographic pressures promote continual forest fragmentation and degradation, limiting areas of viable commercial charcoal production from indigenous wood under CBFM. Expansion of energy conserving stoves for urban households and barn/boiler technologies for small industries, and improvements in electricity access, reliability, and generation are also important in the short-medium term. Future improvements in agricultural productivity are needed to undercut the real major cause of deforestation (forest conversion to farmland) and increasing economic dependency on woodfuels.

This study also illustrates challenges of implementing otherwise progressive forestry laws within a neo-patrimonial politicized environment. It contributes to debates and praxis on deforestation, woodfuel supply/crisis, and energy policy options in the context of poverty and environmental and political decentralization reforms. However, more data and research are needed, including updating the national forest-cover and biomass assessment incorporating trees outside forests, understanding long-term household responses to, and allocation of resources during, wood scarcity, and improved modeling of woodfuel demand scenarios.

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