

## 4. Analysis of fuelwood production systems in Guyana

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### INTRODUCTION

In 1999, it was estimated that 1.9 billion m<sup>3</sup> of wood was burned for cooking to provide heat or to manufacture charcoal for later burning (FAO, 1999). Globally, there is a marked trend for developed countries to have a high per capita usage of energy as a whole, of which wood is a minor component, compared with developing countries with a low per capita energy input but a high proportion consisting of woodfuel (fuelwood and charcoal). Global fuelwood consumption is dominated by Asia and Africa (> 75% total volume production) with South America ranking third at 10%. Five countries: China, India, Indonesia, Nigeria and Brazil, account for about half the fuelwood and charcoal produced and consumed each year (Matthews, 2000).

High fossil fuel prices together with new energy and environmental policies are making woodfuel an essential ingredient of energy policy in both developed and developing countries. In developing countries, wood is already the primary source of energy for heating and cooking: in Africa, almost 90 percent of all wood removals are used for energy. With ever higher fuel prices, there will be even more pressure on forests and trees outside forests to provide energy in the poorest countries (FAO, 2007). Unfortunately, analyses of woodfuel consumption are complicated by a dearth of current, comprehensive data. The FAO woodfuel data, for example, are based largely on estimates derived from scattered 1960s household consumption surveys, which are updated annually in line with population and income growth. These estimates substitute for information on actual woodfuel consumption in most developing countries (Matthews, 2000).

In poor rural areas of developing countries, fuelwood is usually obtained directly by felling trees or collecting fallen wood. International trade in woodfuels is expected to increase in some regions, including Central and South America. Woodfuel production and export could become key ingredients for the development and expansion of forest activities, although it is not likely that this trend will have a direct impact on poverty. However, these activities may contribute to deforestation and forest degradation if policies are not implemented to avoid negative impacts.

In global terms, Guyana, with its small population (< 1 million), tropical climate and readily available fossil fuels for cooking, is not a major producer or consumer of firewood. However, the production, transport, sale and use of fuelwood do constitute a small but locally significant source of energy and income. Furthermore, despite the country's high forest cover (> 75%), the source of the wood raw material and the production units are rather localized along the main road transport arteries in the near interior. It is therefore critical to assess the sustainability of the current fuelwood production cycles and develop long-term policies to mitigate any negative impacts. The environmental and socioeconomic impacts of fuelwood production are intertwined and this study uses published statistics and reports, where available, on fuelwood to provide a baseline from which further work can provide more in-depth information to identify issues related to fuelwood production.

## OBJECTIVES

The specific objectives of this study are:

- To identify supply sources for fuelwood.
- To describe process units involved with fuelwood production and analyse production statistics.
- To identify and discuss the key environmental, socioeconomic, cultural, institutional and legal aspects associated with production of fuelwood.
- To make recommendations for future actions.

## FIREWOOD PRODUCTION IN GUYANA

### *Production cycle and statistics*

According to the GFC definition, woodfuel encompasses both fuelwood and charcoal and is “wood in the rough, from trunks and branches of trees, to be used as fuel for purposes such as cooking, heating and power production” (GFC, 2006). Fuelwood is classified as a raw material as no processing is involved and includes parts of trees made up into bundles or loads, or cut in a manner in which it is usual to cut wood for burning and all refuse wood generally, but does not include straight logs or poles of any kind (GFC, 1999; 2006).

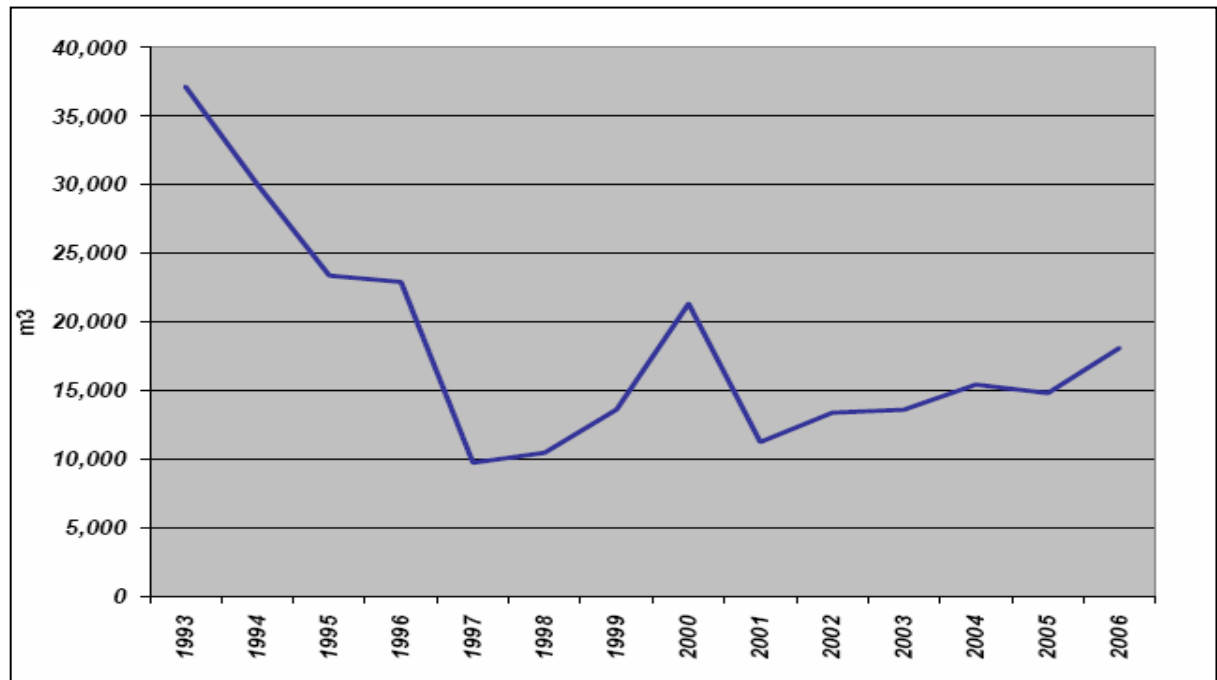
Fuelwood becomes available from direct forest harvesting, timber industry waste, slash and burn operations associated with land clearing for agriculture and from self-gathering (GoG, 2002). Fuelwood is collected for personal use and for commercial purposes. In the latter case, wood is cut from the forest, typically of Wallaba (*Eperua spp.*) or Dakama (*Dimporphandra conjugata*) and then further cut into lengths (typically 4') after all the stems and branches are removed. These fuelwood billets are then loaded onto a truck and removed for sale.

Fuelwood was a large industry three decades ago when fossil fuels were in short supply and, even though volume production is much less now, it remains an important item. Although nationally it only accounts for 7% of energy usage, its share as a consumer good is larger, since the 67% share of petroleum and 26% bagasse (a by-product of sugar production) are industrial forms of energy. Industries like sugar refining and mining account for 90% of primary energy usage. A few timber enterprises generate power from wood waste but many sawmills do not have a ready market for firewood and simply dump off-cut wood (Hunter, 2002).

In 2006, approximately 18 000 m<sup>3</sup> of fuelwood for commercial purposes was recorded by the GFC. Fuelwood for personal use does not require to be declared and it is almost certain that some fuelwood collections go unrecorded. The commercial volume represented a 22.2% increase on 2005 (14 823 m<sup>3</sup>) and is the highest production for the past six years (GFC, 2006) though it is only half the production of 1993 (Figure 1). Firewood production in Guyana peaked in 1980 when 40 000 tonnes were recorded (approximately the same in m<sup>3</sup> assuming the majority was wallaba and was weighed between green and air-dry condition). Production in 2006 was evenly distributed between the first and second semesters of 2006, with clear peaks during the main dry seasons (Figure 2). Fuelwood production continues to represent a small portion of total primary timber production. For example, in the fourth quarter 1997 it

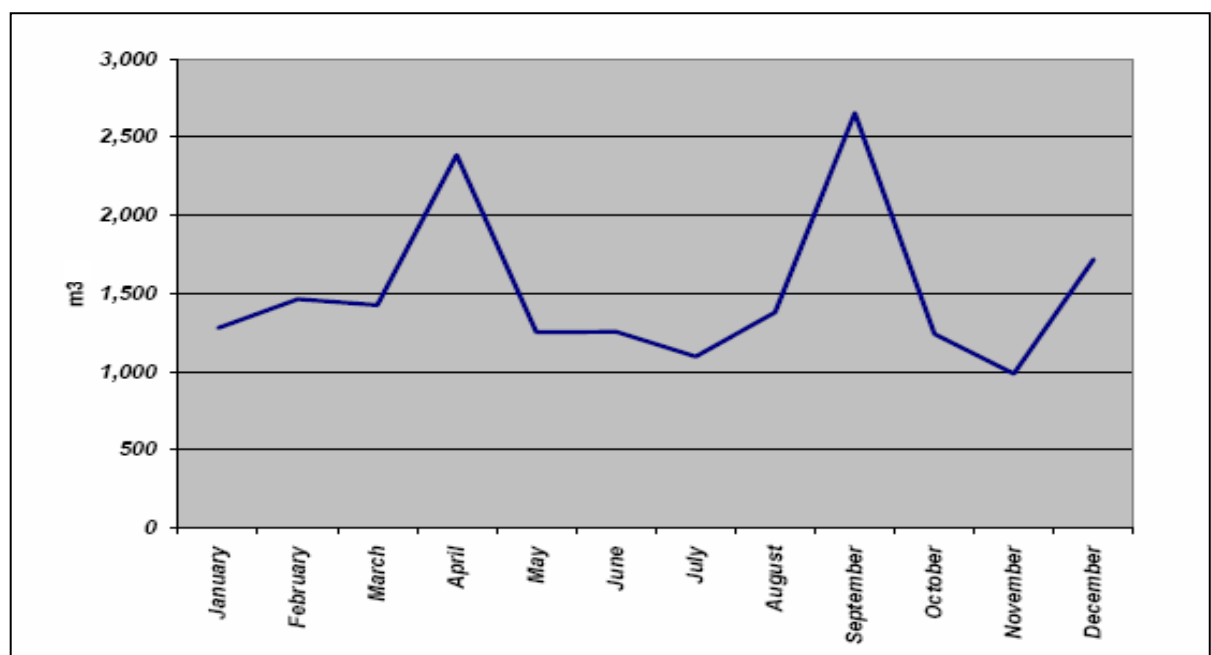
accounted for 1.3%; in 1998 it grew to 4.5% (in the fourth quarter) but by 1999 (in the fourth quarter) it had fallen 3.5 % (GFC, 1999). By 2006, fuelwood volume as a proportion of total timber production was at approximately this latter level.

**Figure 1. Firewood production in Guyana**



Sources: 1993-2002. GFC Market Report 2003: 2003-2006, GFC pers. comm.

**Figure 2. Monthly firewood production in 2006**



Source: GFC pers. comm.

**Figure 3. Map of Guyana showing main roads (thicker line denotes metalled surface), Wallaba and Dakama forest (green) and key settlements.**



*Source: Map produced by G Clarke – roads and vegetation data courtesy GFC.*

### ***Location of Raw Material and Production Units***

Fuelwood collection is concentrated in the white sand forests of the near interior and, especially for domestic use, the coastal mangrove forests. Soesdyke forest station was the main source of fuelwood reported in 2006, with 13 188 m<sup>3</sup> (72.8%), followed by Supernaam with 4 416 m<sup>3</sup> (Table 1). In both 2005 and 2006, nine fuelwood dealer licences were issued (four in Essequibo, two in Berbice, one on the East Coast Demerara, one on the East Bank Demerara and one in Georgetown [GFC, pers. comm.]). Most commercial cutting is done by persons who sell on to dealers. The majority of the cutting is done on private lands, agricultural leases and state forest permissions.

**Table 1. Firewood production recorded by forest station, 2006**

Station (by period)	2006 Firewood Production (m <sup>3</sup> )			
	Jan-Jun	July-Sept	Oct-Dec	Total
Georgetown	21		0.00	21
Linden	410		29.00	439
Mabura	0.00		0.00	0.00
Soesdyke	6,506	33,805	2,875	13,188
Parika	50.75	0.00	0.00	51
Supernaam	2,061	1,318	1,035.97	4,416

Sources: GFC, pers. comm.

### ***Fuelwood markets***

The vast majority of fuelwood cut in Guyana is for consumption within Guyana. Commercial fuelwood is mainly consumed in steam boilers used on the sugar estates (GFC, 1999). Lesser amounts are used by bakeries and for the purposes of cremation. Fuelwood is used for cooking though this is concentrated in rural areas and is mainly derived from personal, non-commercial cutting. Given Guyana's tropical climate, wood is not required for domestic heating purposes. The small amount of fuelwood exported in 2005 and 2006 went to islands in the Caribbean (**Table 2**)

**Table 2. Fuelwood exports: years 2005– 2006**

Region/Country	2005 (m3)	2006 (m3)
St Vincent & the Grenadines	10.15	37.68
<b>Total</b>	38.58	37.68

### ***Regulatory requirements***

Licences are required on annual basis for fuelwood dealers. These licences are available at the GFC headquarters and from the main satellite forest stations. The following documents must accompany the application for a fuelwood dealer's license:

- proof of ownership of the land lease, tenancy agreement, concession agreement etc.,
- no objection letter from Central Housing & Planning Authority,
- no objection letter from the Environmental Protection Agency,
- permission letter from the Town Council or Neighbourhood Democratic Council or Regional Democratic Council,
- public Health & Safety Certificate and
- in the case of an individual applicant, national identification number, or for a company, certificate of registration or articles of association.

The majority of persons cutting fuelwood are people who are owners of agricultural lands or private lands so they do not directly fall under the jurisdiction of the Guyana Forestry Commission. However, when the produce is removed, a removal permit is required from the GFC. Persons are advised, if they are doing this on a regular basis, to apply for a SFP for state forest land.

## ANALYSIS OF KEY ASPECTS

### *Socioeconomic, cultural and environmental*

Firewood is sold at around US\$20/m<sup>3</sup> and royalty is charged at G\$30.35/m<sup>3</sup> (equivalent to US\$0.15/m<sup>3</sup>). Total royalty income is very small and, between 1999 and 2003, only exceeded US\$ 2 000/year once (Table 3).

**Table 3. Royalty income from fuelwood, US\$ equivalent**

YEAR	ROYALTY (US\$)
1999	1 505
2000	1 595
2001	1 705
2002	2 035
2003	1 905

*Source: GFC pers. comm.*

There are no figures available for employment specifically in the commercial fuelwood sector (the GFC figure of 4 369 in 2006 for the “other” forestry sub-sectors include activities in furniture, building components, craft, utensils/ornaments, fuelwood, charcoal and conservation).

According to Hunter (2002), the re-growth (secondary) forest along the Linden Highway is a relic of fuelwood's day in the sun during the seventies and eighties. This is only partially true, as fuelwood exploitation of these most accessible areas has been going on for a century and still continues. Recurrent fires are a feature of these degraded white sand forests which contribute to their inability to fully recover to what can be assumed to be their natural condition.

The main species of these forests is Soft Wallaba (*Eperua falcata*) though Dakama (*Dimorphandra conjugata*) is dominant at early pioneering stages following severe disturbances such as repeated logging, land clearing for agriculture, fires (caused by nature or man) and woodfuel cutting for fuelwood or charcoal. The white sand forests represent a globally unique ecosystem and are especially vulnerable to overuse because they are located immediately inland from the coast, where most of the population resides, they are easily accessed via the main highway system (GoG, 2001) and exist on excessively drained soils with very low nutrient content.

Mangrove forests make up a belt of up to 80 000 ha, mostly along the North-western Atlantic coast and have traditionally been exploited for fuelwood and for bark

tanning. The mangrove forest is important for the local economy and for customary uses. On the socioeconomic front, mangroves are used as a fuel source, fulfilling the requirement of many rural households. The Mangrove Forest type (*Rhizophora mangle* and *Avicenia nitida*) of the marine ecosystem provides protection to the shoreline against marine erosion. The mangrove is also a rich source of fauna species that has great potential to generate revenue through tourist activities, etc.

The most important effect on the mangrove fringe at present is the practice of cutting for fuelwood. This occurs in all areas and is carried out both on an artisan and commercial scale. The removal of the mangrove results in risks for the sediment stabilization, shoreline anchoring, flood control, production and food chain support, wildlife habitat, fisheries, fuelwood, etc. The vulnerability and risk of the biological diversity of mangrove resources is also highly critical for fishes and sea turtles.

### ***Legal and institutional***

Fuelwood is recognized as a bona fide forest produce in the Forests Act (1953). However, it is not subject to any specific regulation beyond declaration of removal and payment of royalties. The draft regulations of 2005 state that the holder of a timber concession may cut and use within the concession area such timber as may be required for the construction of stelling, ramps, roads, bridges, buildings and tramways, or as fuelwood. Fuelwood is not specifically mentioned in the Poverty Reduction Strategy Paper, the Draft Forest Policy (1997) or the National Forest Plan (2001).

## **CONCLUSIONS AND RECOMMENDATIONS**

### ***Status and impact of firewood production in Guyana***

Commercial fuelwood production remains a small sub-sector of the forest industry in Guyana, accounting for around 3.5% of total timber production by volume in 2006 (and negligible export earnings). Nevertheless, from the limited statistics available, fuelwood production does appear to have local socioeconomic significance, especially in rural areas where alternative livelihoods are limited. The environmental impact of current levels of fuelwood production is difficult to quantify though it is widely acknowledged that, over the decades, the sub-sector has contributed to the degradation of certain forest types. Since these forests are typically relatively fragile, have wider ecological value and are generally quite accessible, the proportionate impact may be quite significant.

### ***Topics for further in-depth studies***

There is a need for further baseline studies on the current socioeconomic and environmental status of fuelwood production in Guyana. Important questions that need to be addressed are the exact location of raw material sources, the amount of fuelwood cut for private domestic purposes, environmental impacts of current production levels and regeneration of the white sand forests and mangroves after exploitation, importance and value of fuelwood production to local communities and individual livelihoods and costs and revenue associated with a typical fuelwood operation. Though fuelwood does not currently play a major part in the security or economy of Guyana, thought could be given to drafting a fuelwood energy policy which would consider, as suggested by FAO (1987), the present size and

characteristics of the wood resource and its future development, the present consumption pattern of fuelwood and charcoal and probable future development, how the present supply is produced and distributed and what the possibilities are for its rationalization and improvement. The policy framework could lay the foundations for a national management plan for fuelwood production.

Specifically for the white sand forest areas, as recommended by the Climate Change Action Plan (2001), possible actions could include exploring the possibilities of establishing reserve areas for the conservation of this unique ecosystem and at the same time safeguard the water supply, the rehabilitation of the forest cover and recovery of site productivity and development of a plan for forest fire protection. A similar approach could be taken towards mangrove forests in conjunction with the existing national mangrove management plan (GFC, 2001b). Possible actions for the mangrove forest are mapping the resource, reforestation and protection of the mangrove forest under the Integrated Coastal Zone Management, alternative sources of fuelwood and replanting programmes and the involvement of the communities themselves in the sustainable management of the resource (GoG, 1997; 2001). The NDS recognizes the importance of mangrove ecosystems and states that operations in the coastal mangrove areas will be carefully monitored and felling in these ecosystems absolutely banned.

In the medium term, subsequent to further baseline studies and development of a policy and plan, criteria and indicators for fuelwood production areas should be developed along with protocols for monitoring and feedback.

## **REFERENCES**

- FAO.** 1987. *Simple technologies for charcoal making*. FAO Forestry Paper 41.
- FAO.** 1999. *The state of the world's forests*, 1999. FAO, Rome.
- FAO.** 2007. *The state of the world's forests*, 2007. FAO, Rome.
- GFC.** 1999. *Forestry in Guyana market summary 1998*. GFC report.
- GFC.** 2001a. National Forest Plan.
- GFC.** 2001b. National Mangrove Management Action Plan.
- GFC.** 2006. Forest sector information report – year 2006 review. GFC report.
- GoG.** 1997. Guyana National Development Strategy.
- GoG.** 1997. National Forest Policy Statement.
- GoG.** 2001. Climate change action plan. Supplement to the Initial Communication to the UNFCCC.
- GoG.** 2002. *Guyana Poverty Reduction Strategy Paper*.
- GoG.** 2002. Initial national communication. Report in response to Guyana's commitment to the UNFCCC.
- Hunter, L.** 2002. *The forest sector in Guyana*. Consultant's report for GFC.
- ITTO.** 2003. Achieving the ITTO objective 2000 and sustainable forest management in Guyana. Report to ITTC by the Diagnostic Mission.



- Matthews, E.** 2000. *Undying flame: the continuing demand for wood as fuel*. Excerpted from *Pilot Analysis of Global Ecosystems: Forest Ecosystems*. World Resources Institute.
- Thomas, R., Macqueen, D., Hawker, Y., & Mendonca, T.** 2003. *Small and medium forest enterprise in Guyana*. Discussion Paper, GFC/IIED.

