6. Socio-economic impacts

Woodfuel has a wide range of uses, ranging from use in traditional cooking stoves, to co-firing with coal, to dedicated biomass power plants (including combined heat and power). The socio-economic impacts of woodfuel use vary depending on a range of factors including the country, feedstock and end use. This section summarizes the likely social, economical and livelihood impacts of biomass use at various scales.

HEALTH IMPACTS

In many African households, the use of woodfuels for cooking is a major source of indoor air pollution. The inefficient and incomplete combustion of woodfuels releases a number of hazardous pollutants, including carbon monoxide, sulphur and nitrogen oxides, and particulate matter. In many households, poor ventilation exacerbates the effects of these pollutants, and women and children are often exposed to them at significant levels for 3 to 7 hours each day (Bruce, Perez-Padilla and Albalak, 2002). Such prolonged exposure has been implicated in an increased incidence of respiratory disease.

The causal relationship between high concentrations of particulate matter and acute respiratory infections (ARIs) has been established in a number of studies and is reviewed thoroughly in Smith *et al.* (2000a). Accounting for an estimated 10 percent of disease-related deaths in Africa (Bruce *et al*., 2002), ARIs pose a major threat to women and children in developing nations. Children are particularly susceptible to acute lower respiratory infections (ALRIs), a specific type of ARI; ALRIs are the leading cause of death among children younger than five (Bruce *et al.*, 2002). A study by Ezzati and Kammen (2001) of 55 rural Kenyan households that relied primarily on fuelwood and charcoal quantified the exposure–response relationship between the incidence of ARI and the indoor concentration of particulate matter, showing it to be a concave curve that increases with exposure. The potential to reduce exposure – and, by proxy, ARIs – is significant: a follow-up study (Ezzati and Kammen, 2002) found that a complete transition to charcoal as a feedstock would reduce the incidence of ARIs by up to 65 percent. Cleaner cooking fuels offer the potential for even greater reductions. Gas-burning stoves, for example, emit up to 50 times fewer pollutants than biomass-burning stoves (Smith *et al.*, 2000b); the incidence of ARIs in Africa would likely drop considerably as a result of a major shift towards the use of gas-burning stoves.

Several other diseases have been attributed to exposure to indoor air pollution from solid-biomass fuels. Smoke produced in the combustion of fuelwood, for example, deposits carbon in the lungs and is known to cause chronic bronchitis, emphysema and chronic obstructive pulmonary disease. Several studies have also

linked childhood exposure to fuelwood smoke with asthma, although others have concluded that there is no association between the two.

SOCIAL IMPACTS OF WOODFUEL COLLECTION AND USE

IEA (2006) reported that the average load of fuelwood in sub-Saharan Africa was 20 kg. The task of collecting fuelwood has become increasingly onerous as deforestation and forest degradation have increased the distances that must be travelled to obtain sufficient supply. In addition, fuelwood collection in remote and politically unstable areas poses significant safety risks to women. The amount of time spent and distance travelled in the collection of fuelwood vary between regions, but most studies have found that women spend a significant portion of their days collecting fuelwood. A survey of 30 households near Lake Malawi, for example, found that the mean distance to a viable fuelwood resource was 2.1 km, the average trip time was 241 minutes and the average time spent collecting wood per day was 63 minutes (Biran, Abbot and Mace, 2004). A study of three villages in northern Kenya suggested that women there spent an average of 70 minutes per day collecting fuelwood (McPeak, 2002). In Tanzania, the roundtrip distance for fuelwood collection varied from just over 1 km to 10.5 km (IEA, 2002).

In developing countries the use of woodfuel from residues and by-products is an additional consideration in some non-industrial plantings. Farmers seldom plant trees solely for fuelwood: rather, fuelwood is often a secondary product. The woody biomass may be used in a variety of forms (e.g. twigs, stems, branches and leaves) and may also come from a range of sources, such as natural and planted forests, trees outside forests, and shrublands (Mead, 2005).

The main socio-economic concerns related to the use of biomass for energy include labour conditions and land-related issues (Table 37). Some initiatives to develop standards for biomass production and use include social criteria. A number of international bodies, including the OECD and the EU, are actively looking at the potential of biomass. The use of biomass and by-products for energy purposes should consider economic, environmental and social sustainability and develop future policies and market approaches. International standards and codes of practice can help maximize the environmental benefits (ADAS, 2006).

Most forest certification schemes (see Chapter 8) address biodiversity conservation, soil management (including the application of fertilizers and pesticides), water management and land tenure. Land tenure has important implications for the production of liquid biofuels in some developing countries.

ECONOMY: LOCAL AND REGIONAL LINKAGES

Markets for biomass for energy are developing rapidly and becoming more regional and international. The trading of biomass has increased significantly in recent years (IEA, 2009a).

The PISCES project (Practical Action Consulting, 2009) used case studies in developing countries to examine market developments at a regional level that might help to promote the sustainable use of biomass. In Senegal, for example,

TABLE 37
Potential socio-economic impacts of biomass production and use

Phase of production or use	Potentially adverse impacts	Potentially beneficial impacts
Biomass production (farm)	Health and safety – e.g. pesticide application, use of harvesting machinery	Rural employment and income generation
	Freedom of association and collective bargaining	Infrastructure development
	Working hours and remuneration/ benefits	Economic leakage
	Migrant labour	
	Child/forced labour	
	Land ownership/access to land	
	Food security – quantity and price	
	Access to water resources	
	Land/water contamination and associated health implications	
	Impacts on landscape	
	Foreign control and imbalance of economic benefit	
	Community and cultural dilution	
Biomass/fuel transport (road/sea)	Frequency/ intensity of access	
	Conflict over land tenure – road building	
	Local health impacts from transport emissions	
	Potential for marine spills – impacts on local industry and landscape	
Biomass pre-treatment and conversion (factory)	Health and safety – machinery risk, fire safety, contamination and hazardous substances	Rural employment and income generation
	Working hours and remuneration/ benefits	Infrastructure development
	Discrimination/abuse	Economic leakage
	Child/forced labour	
	Foreign control and imbalance of economic benefit	
Residue disposal	Land/water contamination and associated health implications	

Source: PricewaterhouseCoopers, 2006.

access to fuelwood for cooking is constrained by a reduction in quotas for biomass energy production and a reduction in forest area. A government–private-sector initiative called PERACOD in the city of Saint-Louis is manufacturing char briquettes from recycled low-value charcoal dust, boosting the local economy and reducing deforestation. Over a period of eight months (November 2007 to June 2008) the initiative produced about 18 000 kg of briquettes, of which 15 000 kg were sold, giving the company a turnover of around €2 850. This is a significant enterprise in the city, which is marked by high unemployment.

COMMUNITY MANAGEMENT OF COMMERCIAL WOODFUELS

Two community-based approaches of relevance to the sustainable use of woodfuels are community-based woodfuel production (CBWP) and forest replacement associations. Both address commercial woodfuel production to supply large markets – where the potential for forest degradation and ultimately deforestation is high. CBWP engages communities in forest management on community-owned or publicly owned lands, a common land-tenure category in parts of sub-Saharan Africa, whereas forest replacement associations engage private farmers in forest management on privately owned lands, which is common in Latin America.

After nearly 20 years of experience in transferring forest management rights to local populations, CBWP has proven the feasibility of the sustainable production of woodfuel; in case studies in Niger and Senegal, for example, a considerable annual increase in the forest stock was achieved after local communities assumed responsibility for the management of their forest resources. The results from forest replacement associations in several Latin American countries have been mixed but, on average, positive (ESMAP, 2010).