Destitution, distortion and deforestation

The impact of conflict on the timber and woodfuel trade in Darfur

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Layout by: N. Meith
Cover photo: The trade in bamboo has increased rapidly in recent years, shown here in Souq Ashabi in Nyala.

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Introduction

There is growing concern about the environmental impact of Darfur's conflict, now in its fifth consecutive year, in particular the impact on Darfur's forest resources, which were already being depleted at an estimated rate of one percent per annum before the conflict. This study begins to investigate these impacts by exploring how the trade in timber and woodfuel has changed since the conflict began, exploring the impact of the massive displacement of Darfur's population to the main urban centres, of the unprecedented international presence in Darfur, and of humanitarian programming. Commissioned by the United Nations Environment Programme (UNEP), this is the first study by the Environmental Technology Task Force (ENTEC), designed to inform humanitarian programming and preparation for future recovery, in relation to alternative energy and construction technologies and how to promote them.

Stakeholders and livelihood adaptations since the conflict began

Prior to the conflict, the main uses of Darfur's forest resources were timber for construction and furniture-making; firewood for domestic and some commercial use such as brick-making; charcoal production; and for grazing. Trade was integral to the first three uses, with timber traded with Central Sudan and within Darfur.

Previously trade in timber and woodfuel used to be a central component of the livelihoods of just a few. Now large numbers of people are heavily dependent on timber and woodfuel for part, if not most of their livelihood. What used to be a coping strategy for rural households in times of stress – collecting and selling firewood during drought years – has become a strategy of adaptation in the current conflict as pre-conflict livelihood options have severely contracted for almost all groups.. For example, where trade in other commodities has collapsed (e.g. in groundnuts or clothes), some traders have switched to timber, firewood and charcoal. For farmers who have become displaced and are living in large IDP camps, collecting and selling firewood in towns is one of the few livelihood options available to them. And for pastoralists who can no longer sell their livestock as profitably as they used to, collecting and selling firewood has become a valuable alternative. These changes are taking place against a backdrop of breakdown of environmental governance in many rural areas.

The construction boom and impact on brick-making

Darfur's main towns, especially the three state capitals, have all experienced a construction boom since the conflict began, driven by the influx of the international community (humanitarian agencies and peace-keeping forces). House rents have increased four to sixteen times compared to 2003. Investment in property in Darfur's state capitals and in some other towns is now one of the most secure forms of capital since the conflict began (pre-conflict, livestock was the preferred form of capital), and can also be extremely lucrative. Those working for international agencies and UNAMID (previously AMIS) enjoy salary levels that make it possible to invest in property. And as the better-off from rural areas and smaller towns in Darfur have moved into the main urban centres, this has further fuelled demand for housing. The combined impact on brick production is staggering: it has increased at least four to five times compared with pre-conflict levels.

The environmental consequences are devastating. Rough estimates indicate that the brick kilns are consuming over 52,000 trees-worth of wood per year; and since the conflict began much of this is green wood. The brick kilns are occupying and in many cases destroying valuable agricultural land by digging up clay soils around towns. As the high demand for bricks continues (especially in El Fasher where UNAMID has established its headquarters and given renewed impetus to the construction boom), and as this is one of the most important sources of daily labour for IDPs and poor urban households, the solution to the current high levels of wood use has to lie in alternative technologies to burnt bricks. Some agencies are successfully experimenting with alternative brick-making technologies. Particularly encouraging is evidence that the brick-kiln operators are interested in alternative construction technologies, and are well aware of the negative

environmental consequences and unsustainable nature of current brick-making practices.

Timber for construction

The construction boom has also triggered a big increase in demand for timber for building, from local residents, the international community and IDPs. Between 2003 and 2005 international agencies were the main consumers as they set up the infrastructure for IDP camps. This has now levelled off as agencies shift from construction to maintenance. Nevertheless, demand for timber in Darfur's main towns is estimated to have increased two to three times since the conflict began. Trade in eucalyptus dominates Nyala market as NGOs buy narrow poles for shelter and latrine construction. In El Geneina and Zalingei a wider range of timber is being traded.

There has been a dramatic surge in demand for bamboo since the conflict began, favoured for its termite- termite-resistant and durable qualities, and because of the scarcity of other types of timber. The border areas of Um Dafooq and Um Dukhn are the main sources of supply of bamboo which grows wild and is said to be regenerating sustainably, although this requires follow-up.

For many other types of timber Jebel Marra has long been the main source of supply. Trade routes were badly disrupted early in the conflict, when FNC's plantations were destroyed and because of insecurity. Since 2005 these trade routes have more or less recovered as local production in private woodlots has increased to at least partially replace FNC's share of the market and as some local level agreements between different ethnic groups serve to protect areas of supply and to allow trade to resume. However, transport and transaction costs have rocketed. There are now 30 checkpoints between Jebel Marra and Nyala and a journey that used to take 3 hours now takes 8 to 10 hours.

The shortage of timber is most acute in El Fasher, reflecting high levels of deforestation in North Darfur. El Fasher's dependence on South Darfur for supplies of timber has accelerated since the conflict began. As timber prices have risen many town residents are replacing traditional timber construction with metal angle bars and zinc sheeting.

Of all markets, the timber market has probably attracted the greatest number of new traders. It is now highly competitive and profit margins are severely squeezed (apart from those fortunate enough and large enough to win contracts from the international agencies). New timber markets are springing up in some IDP camps, which are *de facto* tax havens, such as Abu Shouk camp outside El Fasher.

Although international aid agencies are increasingly aware of the potentially negative impact of some of their building practices on the forest resource of Darfur, there are still few that use alternatives to timber, such as metal angle bars. The latter are usually more expensive with implications for budgets and donor funding.

Sawmills and carpentry workshops

The number of sawmills in Darfur's main towns has increased substantially, driven by the construction boom which has increased demand for sawn wood, and because of uncontrolled and opportunistic felling of trees. Increased demand for furniture from the burgeoning urban population, especially salaried staff with greater purchasing power, but also from IDPs buying poorer quality furniture, has encouraged the rise in the number of carpenters. Both sawmill operators and carpenters are struggling to survive in a crowded market. Once again those in towns face a heavy tax burden compared with those in the IDP camps, and a number have gone bankrupt.

Firewood and charcoal

The rapid and forced process of urbanization since the conflict began has triggered a sudden and large increase in demand for firewood. Although IDPs in most camps used to collect their own firewood, this has become increasingly risky as they now have to travel much greater distances. From Kalma camp it used to be possible to find firewood just 15 km distance; now IDPs travel up to 75 km or more, and a round trip takes more than 24 hours. Growing numbers now buy their firewood, and are selling a higher proportion of their food aid rations to do so as the price rises. IDPs who still collect and sell firewood are usually the stronger able-bodied men who have their own horses and carts; IDP trad-

ers from Abu Shouk camp say it now takes them seven days to collect one cart-load of firewood. In El Geneina and Zalingei pastoralists dominate the supply of firewood to the respective markets to an unprecedented extent. There is some military involvement in selling firewood; they have an immediate economic advantage as they are exempt from taxes, and have free access to military trucks.

The deepening firewood crisis has been apparent throughout the conflict years. Initially this was addressed as a protection issue, triggering initiatives like firewood patrols, but the issue of scarce forest resources and the need to invest in regeneration has tended to be overlooked, despite efforts to draw attention to this. Some town residents, especially in El Fasher where firewood shortages are most severe, have begun to switch to natural gas. But high transport costs from Khartoum make the price unaffordable for all but the better-off, and supply routes can be unreliable. Alternative energy programming by international agencies, still at an early stage, needs to be scaled up and to pay attention to the energy requirements of large urban populations as well as IDPs.

Bakeries

The number of bakeries has increased in all towns and there are numerous small bakeries in the IDP camps. Although a consequence of increased population and therefore increased demand, it is also to do with changing food habits. Those on higher incomes choose to eat bread rather than *asida*, and as the cost of firewood escalates, some find it more economical to buy bread rather than firewood and millet to make *asida*. Bakeries are another significant source of demand for firewood. Here too there is a worrying trend in the increased supply of green wood. As with the brick-makers, the bakers interviewed for this study expressed interest in exploring energy-saving technologies.

The implications for Darfur's forest resources and for deforestation

A consistent theme in many interviews for this study was how forest resources are becoming increasingly scarce in certain areas, especially in North Darfur. Firewood for brick-making emerges as one of the major causes of deforestation, followed by timber for construction. The issue now is the unmanaged and unregulated felling of trees; traders, carpenters and sawmill operators all complain of the poor quality of wood being brought into the market compared with the pre-conflict years. But as many of those collecting firewood are desperate to earn a living, short-term survival attitudes prevail and encouragement not to cut green wood are unlikely to succeed in an environment where there are few alternatives. Firewood for domestic consumption, however, is not a direct cause of deforestation because it uses dead wood. The issues here are to do with diminishing availability close to the towns, greater distances to find firewood and associated insecurity.

As agriculture and livestock production have fallen, timber and firewood resources have become much more important livelihood sources, especially as demand has soared in urban markets. This in turn intensifies competition between livelihood groups over access to forest resources, especially between pastoralists who usually have greatest access and IDPs/urban dwellers for whom access is severely constrained. In large areas different pastoralist groups have become *de facto* custodians of forest resources; this reality must be grappled with in efforts to protect forest resources. Monitoring which groups have access to forest resources is often indicative of relations between them, and of local level agreements that may have been forged, sometimes between groups that were recently hostile to each other.

FNC forest reserves have been badly damaged during the conflict. A number of reserves have been completely destroyed, for example the mahogany-rich Kunduwa Forest near Nyala. The fate of private woodlots, mostly in the Jebel Marra area, is mixed. Some have been destroyed while others have expanded to replace FNC production and because trees are a strong symbol of land ownership and less vulnerable to being burned than certain crops. In short, the worst areas of deforestation are around the main towns. This has additional knock on effects as shelter belts are lost and useful farmland is degraded. In other more remote, depopulated and / or insecure areas there are anecdotal reports of significant regeneration.

The policy context and external assistance

FNC taxes and royalties, set at federal level, account for around 75% of formal taxes imposed on traded timber and woodfuel in Darfur, and state and locality taxes account for the remaining 25%. Both have increased substantially since the conflict began. But this crippling tax burden is only imposed on a proportion of traders – those within the urban markets, most of whom are struggling to survive with minimal profit margins in a highly congested market. This creates strong incentives to trade outside the main urban markets, especially in IDP camps, although here too the market is very competitive.

Informal taxes and levies have also risen, including checkpoint fees. And there are cases of double taxation as traders move from rebel-held to government-held markets. However, two groups appear to be *de facto* exempt from formal taxation and regulation: pastoralists who are often armed and the military, creating market inequities.

International humanitarian agencies need to accelerate their engagement with the environmental implications of the new and concentrated settlement patterns that the conflict has created in Darfur, and with the environmental implications of their own activities. The tide now seems to be turning and momentum is building to find ways of protecting the environment and developing alternative construction and energy technologies.

Conclusions

The conflict has led to a distorted process of urbanization, fuelled by massive displacement, and the large and unprecedented presence of the international community as they respond to the humanitarian crisis. The construction boom has caused brick production to surge. The use of firewood in the brick kilns is the most damaging source of deforestation, followed by timber for construction. While brick-making is having the most extensive impact in terms of deforestation, the illegal felling of hardwoods for furniture is probably having greatest impact in terms of the destruction of particular species such as mahogany and gimbeel.

Although the overall message from this study is a pessimistic one, there are sparks of hope. Concern about deforestation and willingness to reverse the trend are widespread. There are a number of opportunities for international agencies to support and partner private sector actors to introduce and promote alternative construction and energy technologies. International agencies and UNAMID have an urgent responsibility to ensure that their own practices and the infrastructure they use are not fuelling unsustainable demand for timber and woodfuel. Some agencies are already leading the way. Their examples of good practice must be built upon, to promote this urgent agenda.

Chapter 1

Darfur timber and woodfuel study

1. Introduction

1.1 Background

Concern about the environmental impact of the conflict in Darfur[1], now in its fifth consecutive year, is growing. This has raised questions about the impact of the unprecedented international presence in Darfur and of the massive humanitarian response[2]. The consequences for Darfur's forest resources are central to this concern. All of this, however, is superimposed on a chronic process of devastation of Sudan's forestry reserves[3]. The rate of deforestation in Darfur has been estimated as more than 1% per annum between 1973 and 2006 (UNEP, 2007), which means that significant areas of Darfur faced a woodfuel deficit by 2000 (FAO 2005). However, the gap in the analysis has been in understanding what impact the conflict has had on this scenario of increasingly scarce forest resources, both direct and indirect.

This study begins to fill the gap through the lens of trade. It explores how trade in timber and woodfuel[4] in Darfur has changed since the conflict began. It assesses the main stakeholders in timber and woodfuel trading now compared with the pre-conflict period, how demand for timber and woodfuel has changed, and what this means for sources of supply and deforestation. It reviews the current policy context for trade in timber and woodfuel in areas still controlled by the government, for example where the Forestry National Corporation (FNC) has access, and in some areas where it does not, particularly in the camps for internally displaced persons (IDPs). It begins to investigate the impact of the presence of the international community and of international humanitarian response programming. Based on this analysis, the study recommends actions to be taken and further areas to be explored in order to protect Darfur's fragile environment as a means of supporting Darfur's core livelihood systems.

This study was undertaken by UNEP as the first of the Environmental Technology Task Force (ENTEC) studies. The ENTEC agenda was borne out of the environmental analysis undertaken concurrently by the D-JAM and by Tearfund in Darfur in 2006. ENTEC's central concern is to introduce and scale-up alternative construction and energy technologies in Darfur to reduce both the current rate of deforestation and projected deforestation in the future when IDPs eventually return and reconstruction begins. ENTEC is managed by a committee of UN agencies, members of Darfuri civil society, NGOs and donors (see Annex 6 for more information on ENTEC).

The purpose of this ENTEC study is:

> ''to inform humanitarian programming and the preparation for future recovery in Darfur of how to promote large scale uptake of alternative energy and construction technology, by providing an overview of the timber and woodfuel trade and by identifying entry points in the private sector for these technologies'.

It will be followed up by some more in-depth work on the economics of alternative energy and construction technologies, and the implications for livelihoods associated with the trade in timber, to ensure that the process of scaling up the use of alternative environmental technologies is informed by a broader understanding of the socio-economic context.

The urgency for carrying out this study was endorsed by a scoping exercise in November 2007, exploring how trade and markets – Darfur's lifeblood – had been affected by the conflict (part of Tufts University's livelihoods research programme in Darfur, Buchanan-Smith and Fadul, 2008). This showed some alarming trends in terms of increasing demand for

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[1] Throughout this report 'Darfur' refers to the wider region incorporating the three states of North Darfur, West Darfur and South Darfur.

[2] Concerns have been raised by Tearfund (2007), by UNEP's Environmental Post-Conflict Assessment (UNEP, 2007), by the Darfur Joint Assessment Mission (DJAM)'s work in 2006, and directly by Ban Ki Moon, UN Secretary-General (Washington Post 15 June 2007).

[3] For example, the majority of the forest cover in the Northern States has been lost leaving these areas heavily dependent on imports for energy and construction, particularly from Southern Sudan but also from Darfur until recent years.

[4] Woodfuel refers to all types of biofuels originating directly or indirectly from woody biomass, including firewood and charcoal.

timber since the conflict began and expansion of the market as the regulation and management of forest resources collapsed. Indeed, trade is an important indicator of deforestation in Darfur as timber and woodfuel consumption often takes place some distance from areas of production, and can thus reveal where demand may be outstripping supply.

1.2 Methodology

Fieldwork for this study was carried out in May / June 2008 by a six-person multi-disciplinary team, bringing together forestry and environmental experts with knowledge and expertise on Darfur's trade and markets. Fieldwork was carried out in the three state capitals of Darfur where demand for timber and woodfuel is highest as a result of the swollen population of each town: Nyala in South Darfur, El Geneina in West Darfur and El Fasher in North Darfur. Members of the team also visited Zalingei in West Darfur which is close to one of Darfur's main areas of forest resources – Jebel Marra. This enabled us to explore issues of production and supply as well as demand in the urban centres. Due to logistical constraints, however, the team was unable to visit areas of timber production or markets in rebel-held parts of Jebel Marra.

At the outset, the team carried out a stakeholder analysis of Darfur's trade in timber and woodfuel (see Section 2.2). This guided the selection of stakeholders to be interviewed: mainly those trading in forest resources and the principal users of timber and woodfuel in each of the markets visited. Some producers (owners of private woodlots) were also included. See Annex 1 for a list of the stakeholders interviewed in each location.

As far as possible, traders to be interviewed were selected by team members or by others who knew them. As became apparent in the earlier Tufts marketing study, in the current conflict environment personal relations and trust are essential ingredients to ensure that key informants speak openly and frankly and share their experience and knowledge. The team is grateful to a number of colleagues and agency staff for helping us make contact with traders, IDPs and businessmen. Semi-structured interviews were usually held with two or three individuals together (from the same stakeholder group), guided by a series of checklists drawn up in advance for each stakeholder group to ensure consistency.

The team also drew on secondary data and information sources, for example from the FNC, from the World Food Programme/ Vulnerability Analysis and Mapping (WFP / VAM) (for price data) and from the wider literature on Darfur's environment, forest resources and livelihoods. Throughout this report trees are given their Arabic (or sometimes English) name, and their Latin name in brackets the first time the tree name appears. See Annex 2 for a glossary of the main tree species found in Darfur, with their Arabic, Latin and English names.

On completion of the fieldwork the first stage of analysis was carried out collectively by all team members to draw out the principal findings and the main recommendations. There followed more detailed analysis of the interview notes and of price and other data for the writing of this report.

Chapter 2

An overview of trade in timber and woodfuel in Darfur, and the impact of the conflict

2.1 Forests and trade pre-conflict

Many studies have reported upon the rate of deforestation in Darfur before the conflict began. This is variously attributed to policy neglect of Darfur's traditional agricultural and livestock sectors, drought, and the breakdown in environmental governance, specifically communal management and stewardship of forest resources[5]. The long-term concern is that the population of Darfur has reached the point of consuming more wood than is being replaced through natural forest growth (World Bank, 2007) (see Annex 3 for a note on Darfur's forest resources).

The main uses of Darfur's forest resources pre-conflict were timber for construction and furniture-making; firewood for domestic use (and some commercial use e.g. brick-making and bakeries); charcoal production; and for grazing. Trade is integral to the first three. Timber is the main material used in all traditional forms of building in Darfur and there has long been a thriving trade in timber, both within Darfur and to Central Sudan. In each of the three state capitals there were between three and six market areas designated for timber trading before the conflict began, see Annex 4. Most traders specialized in timber for construction and hardwoods for furniture, and the larger traders exported to Omdurman and Central Sudan (especially hardwoods). Trees were usually cut green and left in the bush to dry before being transported to market in this lighter form. Timber was supplied from private woodlots, for example in the Jebel Marra area, by farmers managing trees on their land, from FNC plantations and from areas of natural forest. In order to fell hardwoods such as mahogany (*Khaya senegalensis*) and gimbeel (*Cordia africana*) a licence had to be obtained and paid for from the FNC. Only dead trees could be legally felled for furniture-making.

Although firewood needs are often blamed as a cause of deforestation, this may be misleading as it is almost always deadwood that is collected for firewood. Pre-conflict, many rural households collected their own firewood for domestic use. However, firewood was also sold in all rural and urban markets. It was usually brought to market in small quantities, by the donkey or camel load, by farmers and in some areas also by pastoralists. In drought years when agricultural production fell, this was an important coping strategy to raise cash, usually engaged in by women. Commercial users of firewood are the brick kiln operators and bakers, many of whom collected their own firewood in the bush, usually by truck; others bought firewood from traders or pastoralists by the donkey or camel load, for example in Zalingei.

Charcoal is traditionally made in Darfur by certain ethnic groups, for example the Turjam in South Darfur and the Kineen in North Darfur, and by some pastoralists[6]. This is usually made from green wood in the bush and brought to the roadside in rural areas in sacks. Truck drivers and traders buy the sacks and bring them to the main urban and other markets for sale to domestic consumers. The main use of charcoal in Darfur is for tea-making; it is not used for domestic cooking except by better-off households.

2.2 Trade in forest resources – the main stakeholders pre-conflict

From this brief overview, it is apparent that the main stakeholders of Darfur's trade in timber and woodfuel fall into four broad groups as follows:

(1) **Producers, collectors and suppliers of timber and woodfuel:** these range from the better-off farmers who have their own private woodlots, to smaller-scale farmers managing trees on their land, to communities managing the forest resources in their area. A distinction should be made between those who are producing and supplying timber and woodfuel as a consistent and more secure part of their livelihoods (e.g. woodlot owners) and those who are collecting and supplying timber and woodfuel as a coping strategy and / or supplement to a meagre livelihood (e.g. poorer rural households). FNC is also a producer of timber with its own gazetted

[5] *See, for example, UNEP, 2007; Tearfund, 2007; World Bank, 2007; the findings of the D-JAM process*
[6] *Usually the men make the charcoal and the women bring it to town to sell.*

Figure 1. Brickworks like this one in Kass are a major source of demand for firewood

reserves and plantations; felling and tree-planting on both is strictly regulated and managed.

(2) **Traders:** most of these specialize in trade in timber for construction and furniture-making, and / or sell charcoal. These traders range from small-scale traders operating between markets to large-scale timber traders with their own timber yard within one of Darfur's main towns. The latter were not that numerous before the conflict, for example there were around 35 such traders in Nyala.

(3) **Users:** all of Darfur's population are users of timber and woodfuel for domestic purposes. Those in rural areas collected most of their own timber and woodfuel pre-conflict. The better-off and those living in towns were more dependent on the market to meet their needs. Those purchasing timber for commercial use include carpenters and furniture-makers, sawmills and building contractors. The main commercial demand for firewood is from brick-kiln operators and bakers.

(4) **Government policy-makers and regulators:** FNC is the main regulator of the trade in timber and woodfuel, collecting royalties on timber felled and on firewood sold, and issuing licences. The rates are set nationally by FNC in Khartoum. In addition, taxes and fees are levied on traders by local authorities.

In terms of environmental management and protection of forest resources, most of this responsibility fell to the producers and to local communities pre-conflict. This is how traditional environmental governance operated, according to how local communities managed their forest resources and also to how different livelihood groups interacted, particularly farmers and pastoralists who may have had demands on the same resources.

2.3 An overview of the impact of the conflict on trade, and a guide to this report

The main ways in which the conflict has had an impact on the trade in timber and woodfuel in Darfur are the following, all explained in greater detail in later sections of this report:

(1) First and foremost, supplying and trading timber and woodfuel has now become a key part of the **livelihood strategies** of much greater num-

bers of people from all livelihood groups as other livelihood options falter and disappear. This is explained in Section 3 below.

(2) The **demand for timber and woodfuel** has increased substantially in all of Darfur's towns that have experienced population growth since the conflict began, partly because of the influx of the displaced from rural areas, partly because of the presence of the international community, and also because of the construction boom that has taken place in many of Darfur's towns. This is explained in Sections 4 to 8, that cover respectively the growth of the brick industry; demand for timber for construction; the use of timber by sawmills, carpenters and furniture-makers; firewood and charcoal for domestic use; and the use of firewood by bakeries.

(3) This has placed great strain on **sources of supply** close to Darfur's main urban centres where forest resources have been mostly badly depleted. This in turn is exacerbated by the scale of displacement which means that local communities and farming households are no longer present in many rural areas to manage forest resources and environmental governance has broken down. The overall impact is summarized in Section 9.

(4) At the same time, **security and competition over resources severely constrains the access** of many to Darfur's forest resources, especially IDPs who have been displaced to camps and towns from rural areas, urban dwellers, and rural communities who can no longer venture far from their villages in safety. Sometimes insecurity is such a threat that no groups have access to forest resources. More often access by some groups is now controlled or prevented by others, resulting in payments having to be made and the risk of carts and loads being confiscated or stolen. The groups who control access to rural areas should be seen as new stakeholders in the fuelwood livelihood system, with their own objectives in seeking income by exploiting forest resources (see Section 7 in particular).

(5) The **policy environment** has changed dramatically. As documented in a recent report on trade and markets, there are essentially now two trading regimes operating alongside one another in Darfur (Buchanan-Smith and Fadul, 2008). In the towns trade is heavily controlled and regulated by government; in these markets there have been large increases in taxes and fees since the conflict began (see Section 10). Markets within IDP camps, however, operate beyond the reach of government and are *de facto* tax havens. There is thus a strong incentive for traders to move into this more informal trading environment. Less is known about the policy trading regime in rebel-controlled parts of the three Darfur states, although the timber trade is being taxed in some of these areas. FNC has little access outside the main towns in Darfur that are still under government control, including the three state capitals. Thus, its sphere of influence and regulation has contracted dramatically.

Chapter 3

Timber, woodfuel and livelihoods

One of the most striking findings from this study is how timber and woodfuel have become a significant component of the livelihoods of so many different groups in Darfur. Whereas this used to be a central component of the livelihoods of just a few, for example poor rural households for whom collecting firewood was an important source of income, charcoal producers, and the main timber traders, there are now large numbers of people heavily dependent on timber and woodfuel for part, if not most of their livelihood. What used to be a coping strategy for rural households in times of stress – collecting and selling firewood, for example during drought years – has now become a strategy of adaptation in the current conflict. This is explained below:

1. **IDPs and poor urban households.** Wherever possible some members of IDP and poor urban households are collecting firewood (and some other non-timber forest products – see Annex 5) to sell in camp and urban markets as a source of income. The extent to which this is possible varies from one geographical location to another, according to security and access to forest resources as well as availability[7]. For example, around El Fasher forest resources are now so severely depleted close to the town that only the strongest IDPs (mostly men) with horses and carts can travel the distances necessary to collect firewood (see Section 7). Many IDPs collect small quantities of firewood which they sell directly to consumers, or they are hired by traders to go into the bush with trucks and armed escorts, for example from El Geneina in West Darfur. A few IDPs, usually those with carts and horses or donkeys, and / or those who used to supply timber to the market before the conflict, have set up as small-scale traders. Labouring on brick kilns is a key source of income for many IDPs living in and around Darfur's main towns and for poor urban households. In 2006, this was the second most important source of livelihood for IDPs in Kebkabiya town and in Kass, after relief food aid (Buchanan-Smith and Jaspars, 2006). Indirectly this too is dependent on firewood to fuel the kilns (as described in Section 4 below).

2. **Pastoralists[8].** Although some pastoralists have always been suppliers of firewood to the market (especially women and the more settled agro-pastoralists in the Zalingei area who are *Baggara* or cattle-herding pastoralists[9]), their dependence on this as a source of income appears to have increased substantially since the conflict began; other pastoralist groups are now dependent on this source of livelihood for the first time since the conflict began, particularly some *Abbala* (camel-herding) groups. This is due to a combination of responding to the increased demand for firewood in Darfur's main towns because of the hugely inflated population, and because other components of pastoralist livelihood strategies have contracted. The transhumant seasonal movement to different grazing areas has become severely constrained by the conflict for many pastoralists; this in turn means that the condition of their livestock has deteriorated and yields have fallen. Especially in the dry season, selling firewood has become an important source of income. It is perceived by some to be an easier livelihood strategy than other activities such as agricultural labouring. In certain areas pastoralist groups now also control access to forest resources, especially in West Darfur and parts of South Darfur, charging others to use those resources. As noted above, this introduces a new dimension for this particular stakeholder group.

3. **Traders of other commodities pre-conflict.** A number of these traders have now switched to trading timber. During the fieldwork for this study we came across two different examples of this. First, there are the more sedentary traders who are principally operating out of one market but who can no longer successfully trade in their

[7] *In 2006 collection and sale of firewood was the most important livelihood source for IDPs in Kassap camp in Kutum when the AU was running regular firewood patrols (Buchanan-Smith and Jaspars, 2006).*

[8] *The term pastoralist refers to a diverse range of groups, including both Baggara (cattle herding) pastoralists and Abbala (camel-herding) pastoralists, some of whom are more sedentary than others. This paragraph is partly based on data collected by Tufts University in May 2008 during fieldwork with the Rizaygat Abbala for their study on pastoralism (Young, Osman et al., 2008), and partly based on data collected during fieldwork for this trade study.*

[9] *This includes the Khottiya, the Khuzan and the Beni Hussein – all baggara.*

original commodity so are now trading in timber or charcoal and firewood. Often these traders have moved to one of the state capitals or to a larger town[10]. Second, there are traders who used to move between markets, between different rural markets or between rural and secondary markets[11] trading in a range of commodities (this type of trader is known as *umdawarwar*). A number of them have now switched to trading almost exclusively in timber and forest resources because production of other commodities such as groundnuts has collapsed. Sometimes the *umdawarwars* have now become settled traders because of the security risks and high transaction costs associated with moving between Darfur's markets since the conflict began. Entering the market as a small-scale trader in timber or firewood requires relatively little capital, especially if transactions with suppliers are made on a credit basis which is no longer an option for many other commodities. All of this means that the timber market has now become very crowded and competitive, negatively affecting the turnover and profit margins of established timber traders who were in the business before the conflict began. Indeed, some established timber traders have left the business and / or gone bankrupt, as documented in Section 5 below.

4. **Carpenters and sawmill operators.** Partly reflecting the increase in demand for timber for construction and for furniture, and partly reflecting the now limited range of other business opportunities, many new sawmills have opened in Darfur's main urban markets since the conflict began. There are also more carpenters. Once again, this has become increasingly competitive since the conflict began; carpenters who had established businesses pre-conflict are now struggling to make a living. To try and increase their turnover and income some carpenters have extended their business by establishing their own small sawmills. But this has not necessarily provided a viable solution; many are still struggling to earn a living and some have gone out of business. See Section 6 below.

5. **Private sector entrepreneurs.** A similar story applies to a number of businessmen. As Darfur's economy has contracted they are now competing over a limited range of viable options. One of the most lucrative appears to be brick-making[12]. As documented in Section 4, demand for bricks has rocketed, encouraging a number of businessmen who used to be engaged in other parts of the private sector to switch to brick-making. The relevance to this study is that brick-making is now one of the main sources of demand for firewood.

6. **Militias and the military.** There is growing evidence that soldiers from the Sudan Armed Forces (SAF) and members of militia groups have started trading in timber and woodfuel in Darfur. The cutting down of trees is often justified on security grounds, to remove hiding-places for rebel groups, but in practice extends beyond this. Militias and the military have access to areas that others may not be able to access, and often have use of trucks free of charge. Reports of soldiers selling firewood and charcoal in the main urban markets are captured in Section 7. More concerning are reports of higher ranks in the military involved in the felling of some of Darfur's valuable hardwood trees (especially gimbeel and mahogany) for sale in Omdurman and Khartoum for furniture-making. This practice was well-established during the long-running north-south civil war and contributed to serious deforestation in some areas, including parts of Southern Kordofan.

The picture that emerges is of pre-conflict livelihood options severely contracting for almost all groups, and reduced profitability for the livelihood options that are still available. This is the case for farmers who can no longer cultivate because of insecurity

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[10] *In Zalingei this was the case for a trader whose business used to be clothes and another whose business used to be spices. In El Fasher, two traders in Simajarad market reported how they had switched to timber from vegetables and sheep respectively.*

[11] *Darfur has a three tier market network. Most rural village markets are primary markets, held on a weekly basis, where farmers bring their produce to market to sell to small traders and agents of larger traders. Secondary markets are intermediate town markets, often held twice per week, where small traders trade with larger traders. The major town markets – urban markets – operate on a daily basis and are also the point of export for many of Darfur's agricultural commodities and livestock. (See Buchanan-Smith and Fadul, 2008)*

[12] *A recent technical appraisal of brick-making commissioned by Mercy Corps indicates margins of around 45% on brick-making (COMAC Ltd, 2008).*

and who have become displaced, for pastoralists who can no longer sell their livestock as profitably as they used to, and for traders whose commodities and markets have dried up, both from the supply side because of the collapse of agricultural production and on the demand side because of the collapse of the rural market network. Collecting and selling forest resources is an obvious alternative, or last resort for many, IDPs in particular, who risk high levels of insecurity and harassment to earn income in this way. Others – such as businessmen and some traders – have responded to the construction boom documented below, in an economy where there are pitifully few alternative areas of growth.

As almost all sections of the population face these stresses, some livelihood groups are making local level agreements, often between ethnic groups that have been in direct conflict with each other in the last few years. There are many dimensions to these local level agreements, ranging from secure access to markets to protection of assets. Access to forest resources and / or protection of private woodlots appear to be a part of some of these agreements.

Figure 2. A massive area of brick kilns on the edge of El Fasher

Chapter 4

Construction boom in Darfur's main towns: the surge in demand for bricks

4.1 A construction boom fuels the demand for bricks

Most of Darfur's main towns have experienced a massive construction boom since the conflict began. There are a number of reasons for this. First and foremost was the influx of the international community from 2004 – humanitarian agencies but also the African Union Mission in Sudan (AMIS) and now UNAMID (the United Nations and African Union Mission in Darfur). This was accompanied by unprecedented demand for high quality housing to rent. In an economy where other business opportunities were becoming increasingly limited, property owners rushed to upgrade their houses and rents soared. See Box 1. This had a knock-on effect on Darfuris attempting to rent accommodation; as rents became unaffordable, those who could do so, purchased land in order to build. Meanwhile the better-off from rural areas and small towns in Darfur moved their families and businesses to the relative safety of Darfur's state capitals, further fuelling the demand for housing. Traditionally, wealth in Darfur has been held in the form of livestock. This became a high-risk form of capital when the conflict began because of the threat of insecurity and looting and because of restricted movement to seasonal pastures. Investing in buildings and houses in the main towns quickly became an attractive and more secure alternative. For those working for international agencies and for UNAMID, they earn a reliable and good salary, part of which is often invested in property. All these factors combined have triggered an unparalleled rate of construction in Darfur's state capitals and main towns.

Brick kiln operators interviewed for this study consistently reported how this triggered a surge in demand for bricks in 2004/ 05, either because the town's residents were upgrading their properties to rent as

Box 1. Rental increases in Darfur's state capitals

There have been steep rental increases in each of Darfur's state capitals, as illustrated below for El Fasher and El Geneina. This is most striking for first class housing where rents have at least quadrupled compared with 2003, and have increased more than ten times as compared with 2000 prices. In Zalingei the increases are even more staggering; monthly rents for first class housing have increased more than sixteen times their pre-conflict levels. In all towns this is a direct result of the presence of the international aid community and of the international peace-keeping forces.

Table 4.1. Increase in house rents since the conflict began.

		Rent per month		
Year		El Fasher	El Geneina	Zalingei
2000	First class housing	SDG 200-250	SDG 150-200	SDG 75
	Second class	SDG 100-150	SDG 75-100	
2003	First class housing	SDG 300-350	SDG 500-750	SDG 150
	Second class	SDG 200-250	SDG 250 -300	
2007/8	First class housing	SDG 1500-3000	SDG 2000-3000	SDG 2,500
	Second class	SDG 350-550	SDG 400-500	

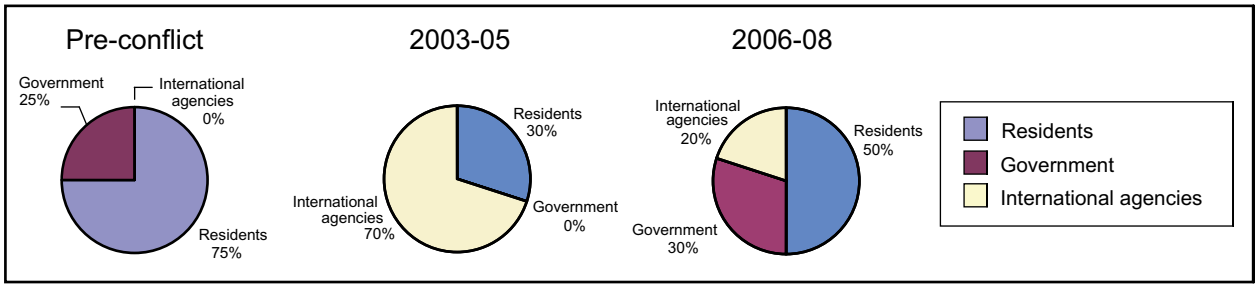
Source: team members

described above (for example in El Geneina), or because the international agencies and AMIS were buying bricks directly for construction (for example in El Fasher). Interestingly, by 2008, the main source of demand for bricks in Nyala and Geneina is for government-funded construction. This is related to a new government initiative, *Emar Addar* – rehabilitation using private sector contractors. In contrast, in 2008 in El Fasher the town's residents have become the most important source of demand for bricks. See Figure 4.1. This is undoubtedly to do with the establishment of the UNAMID Darfur headquarters in El Fasher. Close to the UNAMID camp numerous large private villas are being built, presumably to take advantage of the spin-off rental opportunities. The potential impact of UNAMID's arrival in Darfur was also evident in Zalingei during fieldwork for this study in May 2008. The mere rumour that UNAMID was about to place an order for one million bricks for its Zalingei base triggered a sudden surge of brick production.

FNC, with responsibility for monitoring and taxing fired bricks, provides some indication of how brick production has escalated during the conflict years. Table 4.2 provides figures on brick production in Nyala which increased more than 5-fold between 2004 and 2008. Yet the recent figures are still an under-estimate of total brick production as FNC is unable to monitor and tax all the brick kilns, particularly those around the IDP camps where they have little access.

In Zalingei, the brick kiln operators estimate that brick production increased four times or more, from 1 to 2 million bricks per annum before the conflict to 7 to 10 million bricks per annum in 2008. This tallies with FNC's figures; in 2007 they recorded brick production of nearly 5 million bricks but estimate that they are only reaching 50% of the brick kilns and bricks being produced. FNC figures for West Darfur show a 400% increase in brick production in just three years, between 2004 and 2007.

Figure 3. Growth in demand for bricks during the conflict years – estimates by brick kiln operators in El Fasher



Source: interviews with brick kiln operators, El Fasher

Table 4.2. Number of bricks produced and taxed by FNC per annum

Year	Nyala	El Geneina	El Fasher
Pre-conflict		9,045,000	7,500,000
2004	2,359,000	1,215,000	
2005	27,735,000	29,970,000	9,600,000
2006		82,620,000	
2007	129,630,000	40,780,000	15,200,000

Source: FNC, Nyala; FNC, El Geneina; FNC, El Fasher

Table 4.3. Price of bricks (SDG per 1000 bricks)[15]

Year	Zalingei	El Geneina	El Fasher
Pre-conflict	50	30-40	NA
2008	75-80	110-120	105-130

Source: brick kiln operators

Table 4.4. Increasing number of brick kilns in Darfur's 3 state capitals and in Zalingei

Year	Nyala	El Geneina	El Fasher	Zalingei
Pre-conflict	Approx 300	677	90	Less than 10
2005		2005 – 222 2006 – 612	120	
2008	Approx 700	416	190 commercial brick kilns, plus private kilns set up for individual house construction	More than 200

Source: data for El Geneina was provided by FNC. Data for other towns provided by brick kiln operators

The increased demand for bricks has not surprisingly translated into much higher prices. See Table 4.3. This has been exacerbated by escalating production costs as explained below.

The large number of brick kilns on the outskirts of Darfur's main towns has become a prominent feature of the landscape since the conflict began. The increased number of brick kilns compared with the pre-conflict years is startling.

In the case of Geneina the number had increased nine-fold by 2006, when brick production appears to have peaked[14] , but there are still six times as many brick kilns in 2008 as there were in 2002 – see Table 4.4. It is now common for one brick kiln operator to be running more than one kiln, especially since the demand for bricks is now so buoyant[15]. Whereas pre-conflict most brick kiln operators ran one firing (or cycle of production) per year, many are now running two.

[13] *Table For all cost and price data presented in this study it is difficult to calculate the real increase or change as there are no recent figures for the inflation rate in Darfur, and it is certainly higher than the national rate of around 9%.*
[14] *Daily wage rates for casual labour working in the brick kilns had doubled between 2003/04 and 2006, bearing out this trend.*
[15] *Some brick kiln operators interviewed in Zalingei now run three brick kilns per annum whereas they used to run only one. A number of brick kiln operators in Zalingei used to be involved in tobacco curing some fifteen years ago. When the tobacco company closed they switched to brick production instead.*

Figure 4. A brick kiln for the new villas being built in El Fasher

There is some evidence that the rate of growth of brick production is slowing in some towns, for example in El Geneina where the number of brick kilns has fallen since 2006. But this is not the case in El Fasher where several huge new brick kilns have been set up in the north-west part of the town, close to UNAMID headquarters, to produce bricks for the new villas being constructed. These kilns have added some 20% to the brick kiln capacity around El Fasher.

4.2 Demand for firewood and environmental consequences

The environmental consequences of this huge growth in brick production are devastating. The firing of one brick kiln to produce 100,000 bricks requires 40m^3 of firewood, approximately 35 trees (5 to 10 years old). If the brick kilns recorded in Table 4.4 for 2008 go through only one production cycle in the year, they will burn over 52,000 trees-worth of firewood; this is undoubtedly an underestimate. More alarming still, almost all the brick kiln operators interviewed for this study reported using greenwood during the conflict years, which burns more slowly and therefore can reduce the amount of firewood needed by up to 5 m^3 per kiln. Pre-conflict when brick production was much lower, most were only using dead firewood.

In peaceful times the majority of the brick kiln operators used to collect their own firewood, sometimes supplemented with firewood bought from traders. Because of the insecurity now associated with traveling to the bush, most brick kiln operators are now buying all their firewood supplies. In Geneina, El Fasher and Nyala this usually means buying it from traders, many of whom may have bought the firewood from IDPs first, or hired IDPs to collect it for them. Brick kiln operators in Nyala are still venturing out to collect firewood when they can, but now only once per month compared with twice per month in the pre-conflict years.

In Zalingei the brick kiln operators are supplied with firewood by IDPs directly and by pastoralists (usually pastoralist men because of the large quantities that are being delivered, often by cart).

The distance traveled to reach areas where firewood is available has increased substantially. The El Fasher brick kilns used to be supplied from areas

Table 4.5. Cost of firewood used by the brick kilns

Year	El Geneina	El Fasher	Zalingei	
			Dried wood	*Green wood*
Pre-conflict	SDG 800 per 20 m^3	SDG 1,200 per 20 m^3	SDG 10 per donkey cart	SDG 4 per donkey cart
2005	SDG 2,200 per 20 m^3	SDG 3,300 per 20 m^3	SDG 10 per donkey cart	SDG 4 per donkey cart
2008	SDG 3,200 per 20 m^3	SDG 3,300 per 20 m^3	SDG 30 per donkey cart	SDG 15 per donkey cart

Source: Interviews with brick kiln operators

such as Dar Es Salaam and Tawila, 50 and 70 km away respectively; the firewood is now coming from South Darfur, from Hamada forest and Manawashi, 150 and 180 km away respectively. From Geneina it used to be possible to collect firewood for the kilns from Sisi and Goker, about 15 to 25 km from the town; this is no longer possible. Although some firewood is still being collected from close by Geneina, it is also now coming from areas such as West Mornei and Beida at much greater distances, some 50 to 75 km from the town.

The type of wood being burned has also changed during the conflict years. In El Fasher and El Geneina the main change has been the use of kitir (*Acacia mellifera*) since the conflict began instead of sunut (*Acacia nilotica*). Heglig (*Balanites aegyptiaca*) has been used throughout. In Nyala the change in the type of wood used is even more concerning. Whereas it used to be sunut, sahab, sayal, arat (*Acacia nilotica, Anogeissus leiocarpus, Acacia tortilis, Albizia amara* respectively) and dom (*Hyphane thebaica*), now hardwoods such as mahogany and neem (*Azadirachta indica*) are being used – the remnants of Kunduwa forest (see Section 9 below).

Not surprisingly, the cost of firewood has increased considerably during the conflict years. See Table 4.5. Other costs of production have also risen. In El Fasher the cost of water is almost double what it used to be between October and April; from May to July it is five times the pre-conflict cost. Somewhat surprisingly in view of the plentiful supply of IDPs on the labour market, labour costs have apparently also risen. (Both men and women IDPs provide labour to the brick kiln operators. Unusually, in Geneina town the IDP labourers in brickmaking are almost all women).

In summary, although there has been a phenomenal growth in demand for bricks during the conflict years and an increase in price, production costs have also risen substantially and many businessmen have invested in brick-making as one of the few lucrative opportunities available. Further investigation is needed to establish the economics of current forms of brick-making.[16]

The negative environmental consequences of brick production are not only to do with firewood, but are also to do with the land that is being used for the brick kilns. It is usually valuable agricultural land on the outskirts of the town that would otherwise be used for agriculture or horticulture; renting this land to brick kiln operators is now more lucrative. But the digging of clay soils is proving very destructive, especially where the sites are not being flooded and re-silted each year by the *wadi*. This is especially the case in El Geneina where mango groves are rapidly being destroyed, and in other towns where the shelter belt is being, or has been destroyed. The clay pits fill up with water and become a breeding ground for mosquitoes causing malaria, and for snails causing Schistosomiasis (bilharzia); they are also treacherous for children and there have been a number of deaths by drowning.

4.3 Interest in alternative technologies

The implications of all of this are clear: the current form of brick-making is having a disastrous impact on Darfur's fragile environment. Yet there

[16] *Indeed, in El Geneina there are reports of some brick kiln operators having gone bankrupt in the last couple of years because of bad debts as demand for bricks has begun to fall. Meanwhile research by Mercy Corps indicates quite substantial profit margins – see footnote 12. ENTEC is planning a further study specifically on the brick-making industry.*

Figure 5. A mango grove in Nyala being destroyed for the production of bricks

is high demand for bricks for construction, and brick-making is one of the most important sources of employment for IDPs. The solution has to lie in alternative construction technologies that do not require firewood. A number of agencies are beginning to experiment with alternative brick-making, for example Tearfund with stabilized soil blocks (SSBs) in West Darfur, and Mercy Corps recently carried out a feasibility study on alternative brick-making technologies in Zalingei which indicate that construction using either SSBs or sand cement blocks is at least 25% cheaper than using burnt bricks[17]. Other possibilities include the use of green bricks with a water proof rendering, rammed earth technology or increased use of masonry. Most encouraging of all, a number of brick kiln operators interviewed for this study showed great interest in developing and being supported with alternative brick-making technologies. For instance, one from Zalingei had seen the use of animal dung in brick kilns in central Sudan, in Gezira, and was interested in pursuing this further. Most are very aware that the current rate of brick production is unsustainable and is having negative environmental consequences.

Overall, UN-HABITAT is providing technical leadership on alternative construction technologies, in collaboration with the ENTEC committee. ENTEC has identified different strategies to scale up alternative construction technologies. For example, for buildings procured directly by UN agencies and NGOs, scale-up should be achieved by a policy of active promotion of technology transfer. Meanwhile, to prepare for eventual reconstruction in Darfur without causing massive deforestation, work with the private sector needs to start now in order to build capacity. Livelihoods programming with IDPs can play a part in this, beginning to introduce new technologies and marketing some of these products. This work will be supported by the remaining ENTEC studies, one of which is designed to address the relative merits of these technologies (see Annex 6).

[17] *Initial feedback from Tearfund's work with SSBs is also positive, both in terms of reduced costs of construction compared with fired bricks, and in terms of feedback from most members of the community. In Masteri, the local brick-makers have expressed interest in pursuing alternative technologies. The findings will be confirmed when the pilot buildings have been completed.*

Chapter 5

Timber for construction

5.1 Demand for timber and the international community

The construction boom that has triggered the huge increase in brick-making has likewise triggered an increase in demand for timber for building, especially poles for roofing. Local residents, the international community and IDPs have all been large consumers. The presence of the international community has a direct impact in boosting demand for timber for shelter projects, latrine-building, for schools, centres, offices and other basic infrastructure in IDP camps, but also an indirect impact through buoying up the rental market creating demand for housing and boosting the economy of a wealthy middle class of humanitarian workers and businessmen who are able to invest in housing to meet this demand. See Box 2. The biggest surge in demand from the international community appears to have been in the early years of the conflict, between 2003 and 2005 when most displacement happened and the IDP camps were being set up. It has since leveled off as international agencies shift from construction to ongoing maintenance. According to timber traders in Ashabi market in Nyala, between 2003 and 2005 international agencies were their main customers; now local residents are ranked number one. A similar picture emerged in Geneina.

This means that the early and large surge in demand for timber has mostly tailed off, but with some exceptions. In Zalingei, timber traders are still reporting increased demand, in this case from local residents and from IDPs (the former are able to afford higher quality timber than the latter) rather than from the international community. A number of timber traders were of the view that, on average, demand for timber had increased two to three times in the main towns since the conflict began. As explained below, this varies according to the different types of timber used in construction.

5.2 Types of timber being traded and sources of supply

Types of timber being traded

In Nyala, trade in ban (*Eucalyptus*) dominates the market since the conflict began, not surprisingly as this is one of the main types of timber used by NGOs for construction in the IDP camps (see Box

Box 2. Latrine construction and the provision of shelter: two case studies

Latrine construction is one of the main uses of timber by the international aid community in Darfur. In IDP camps around Nyala, for example, CARE is constructing around 5,000 latrines a year: 3,000 new ones and 2,000 replacement latrines. The most common model for construction (as used by CARE) is 8 wooden poles per latrine for the super-structure. These are usually eucalyptus poles of 7.5 to 10cm diameter. They can be expected to last a year before termite damage sets in. *Shagania* (rush mats) are used for the walls of the latrine super-structure, seven in total, attached to the wooden poles and held in place by bamboo. The *shagania* usually lasts 6 to 7 months. (Weaving *shagania* has thus become an important income generating opportunity, for rural residents as well as for IDPs, and is being supported by some NGOs, for example CHF in Nyala's IDP camps).

CHF is the main international non-governmental organization (INGO) involved in **shelter construction** in North and South Darfur, and also in Kass. Between July 2007 and May 2008, for example, they have provided more than 25,000 emergency shelters to IDPs. Early on in the conflict these were predominantly timber-based structures, using sahab and eucalyptus. For a while CHF experimented with steel reinforcement bars – 'rebars' – as an alternative to timber, but the metal was usually sold by the IDPs because of its high market value. In the last couple of years CHF has switched to bamboo, grass mats and plastic as environmentally friendly alternatives. Each shelter now uses ten 4 metre bamboo poles, and costs around $40 (compared with a cost of around $60-70 if metal rebars are used).

Figure 6. The trade in bamboo has increased rapidly in recent years, shown here in Souq Ashabi in Nyala

2 above). However, a distinct difference from the pre-conflict years is that smaller poles are now being traded, of 7 to 10cm diameter which is all that is needed for small shelters and latrines, whereas poles of 15 to 17 cm diameter used to be traded pre-conflict when eucalyptus was principally used for houses and larger construction works. This means that eucalyptus is now harvested younger. For the traders who have won procurement contracts from the international agencies (usually large-scale traders who have sufficient capital to survive not being paid in advance) it is not uncommon for their sales of eucalyptus to have doubled since the conflict began. For many others, their turnover has often fallen quite substantially, indicating that the benefits of trading with international agencies are not evenly spread (and because of the greater competition in the timber market, described in Section 5.3 below). It is also worth noting that commercial trade in hardwood timber with Central Sudan appears to have stopped since the conflict started (although there is evidence of the military exporting hardwoods to Central Sudan – see Box 4 below). Darfur used to export eucalyptus and saru to Omdurman, but reduced supplies (especially of saru – *Cupressus lusitanica*), but high transport costs and associated risks have put a halt to this trade.

In El Geneina and Zalingei, a wider range of types of timber are being traded, including sahab (*Anogeissus leicarpus*), jugan (*Diospyros mespiliformis*), kitir (*Acacia mellifera*), and in Zalingei also kada (*Dichrostachyos cinerea*), abanoos (*Dalbergia melanoxylon*), nabak (*Ziziphus spina-christi*) and Heglig (*Balanites aegyptiaca*). Traders report little change in this compared with pre-conflict, but do comment that the timber now tends to be poorer quality and is usually brought green to the market. This is a significant change in all timber markets from the pre-conflict years. It is now too risky to leave greenwood drying in the bush so it is brought directly to the market in this heavier state which also affects how much can be brought in one load.

In El Fasher, the demand for timber from IDPs is for kitir and sidir for temporary constructions and shelter, and for himeid (*Scelerocarya birrea*) for carts. Interestingly, many residents in the town are beginning to switch from traditional timber construction using poles such as sahab, to metal angle bars

Table 5.1. Transport costs for timber: Jebel Marra area to Nyala

Route	Transport costs pre-conflict - 2002	Transport costs – May 2008
Nyertete to Nyala	SDG 250-300 per truck	SDG 700 per truck
Thur to Nyala	SDG 250-300 per truck	SDG 700 per truck
Beldong/ Gollo to Nyala	SDG 400 per truck	SDG 1,000 per truck

Source: interviews with timber traders from Jebel Marra

and zinc sheeting as the availability of timber falls and prices rise.

One of the most striking features in the timber market in the last couple of years is the significant increase in demand for bamboo. Traded in very small quantities before the conflict, and hardly at all in North Darfur, it is as if this termite-resistant and durable material has just been 'discovered' by Darfuris for its many different uses. It is now being used for fencing (often replacing millet stalks or mats), for *racoubas*[18], latrines and for shelters. Timber traders in Geneina and Nyala report that that they are selling between three to five times as much bamboo as they used to pre-conflict. Souq Ashabi, established on the southern outskirts of Nyala during the 1984 drought, has grown from around 20 traders to 100 in the last couple of years, almost entirely due to this burgeoning demand for bamboo. Whereas there used to be 2 to 4 trucks per week supplying bamboo to Souq Ashabi in 2002, traders say this has now increased to 11 to 12 trucks per week. Indeed, this has now become one of the main bamboo markets in Darfur, supplying other timber markets in Nyala and beyond, as far as El Fasher.

Sources of supply

The border areas of Um Dafooq (where South Darfur borders the Central African Republic) and Um Dukhn (on the border between West Darfur and Chad) are the main areas of supply for bamboo, which grows wild. This probably means that some is coming from across the border as well. Indeed, this is clear in El Geneina market where bamboo is also coming from Karfi in Chad. During this study we were repeatedly told that the bamboo is regenerating and that this is therefore a sustainable use of resources. This may indeed be the case as it is such a fast growing plant. However, regeneration depends upon the bamboo being cut correctly; this deserves some follow-up in the main areas of supply.

For the other types of timber, especially eucalyptus and sahab, Jebel Marra is one of the main sources of supply for Nyala (Souq El Geneina and Souq El Fasher) and for El Fasher's timber markets. These trade routes were badly disrupted in the early years of the conflict, by the destruction of FNC's plantations which used to supply around 50% of the eucalyptus to Nyala's markets before the conflict, by insecurity and by government restrictions on the movement of timber. Since 2005, trade routes from Jebel Marra have more or less recovered as local production in private woodlots has increased to at least partially replace FNC's share of the market, and as some local agreements have been made between different ethnic groups (usually also different livelihood groups) to protect areas of supply and to allow the timber trade to resume. However, traders are now facing very high transport and transaction costs, as illustrated in Table 5.1 below. There are more than 30 checkpoints between Jebel Marra and Nyala, and payments have to be made at each, ranging from SDG 2 to SDG 15 per checkpoint. On top of that is a very heavy tax burden (see Section 11 below). As a consequence, traders are making the journey only twice a month now as compared to four times per month before the conflict. It used to take 3 hours; it now takes 8 to 10 hours.

For the timber markets in El Geneina, the sources of supply appear to have changed little and timber

[18] *As documented by Buchanan-Smith and Fadul (2008), a new form of racouba has started to be constructed in Darfur since the conflict began – the kurnok – made of latticed bamboo walls covered with mats and a sloping roof. Costing around SDG 150-200 each, the structure is highly mobile, can be built in the market and then transported to where it is needed, suiting the needs of IDPs and others.*

still comes from areas such as Habila, Fora Boranga and Wadi Saleh. But it is apparent that deforestation is having an impact in some places. For example, traders report that supplies of sahab have been depleted in the Kass area that used to supply Nyala (these have been replaced by supplies of sahab from Rahel El Berdi). North Darfur is most severely affected by deforestation, a process that began before the conflict. The timber markets in El Fasher have been dependent on supplies from South Darfur for some time. This trend has simply accelerated since the start of the conflict, with the exception of palm (*Nakheel*) for roofing which still comes from Kutum, and nabak which comes from Abusuckeen and Kulkul[19]. Overall, traders widely reported that timber is being transported from increasing distances and with less frequency (not least because of the high transport and transaction costs).

Although some pre-conflict trade routes, like the Jebel Marra ones, have semi-recovered in recent years, others have not. For instance, timber is no longer supplied to El Fasher market from Kebkabiya and Jebel Si. And some areas of bush / forest resources are heavily controlled by certain groups and cannot be accessed by others. This is the case around Nyala which has prevented kitir being brought to the market.

The main supplies of timber are brought by traders with trucks. Although this has always been an important means of transport, it has now become one of the few ways for town traders to access the bush. In El Geneina, in order to ensure their protection the traders must take two or three armed men, usually from the Border Defence Forces and must pay for access, ranging from SDG 280 to SDG 500 per trip. According to one trader, supplies of timber are brought into Geneina market in the following proportions:

- 65% by local trucks
- 15% by relief trucks returning empty from rural areas
- 15% by military trucks
- 5% by donkeys and camels

As IDPs have entered the timber market there are significant numbers using horses and carts to bring in timber supplies, especially to Nyala. However, they have to travel further and further afield to reach adequate supplies. It is not uncommon for horses and carts to travel up to 70 km from Nyala (over 8 hours of traveling) to collect a load of building poles, such as Y-shaped hashab (*Acacia senegal)* poles. This is also the case for firewood, described below.

The timber market in Zalingei is a different case again. Whereas it used to be supplied almost entirely by FNC, this source has now disappeared as FNC plantations have been destroyed or are no longer accessible. Instead, pastoralists have become the main suppliers of timber, which is felled in the forest and brought to market by camel. Timber traders report that up to 10 camels bring building poles (10 large poles or 30 small poles per camel load) once to twice per week.

Not surprisingly, the price for almost all timber has increased during the conflict years. Table 5.2 gives some examples. Price increases range from around 25% to 100% or more depending on the shortage of the wood.

5.3 Growth of the timber markets

Of all markets, it is probably the timber market that has seen the biggest growth in the number of traders (see also Buchanan-Smith and Fadul, 2008). This is a direct consequence of the contraction of other economic opportunities, the growth in demand for timber described above, and the convenient practice of trading on credit between timber traders and suppliers[20]. Thus, it is a much more accessible market to enter, and numerous IDPs have done so. Once a trader has become established, even on a small scale, they are more likely to be able to borrow from one another, a valuable facility not available to all. Table 5.3 shows just how many new traders have entered the market:

At a first glance at this very active timber market in Darfur it is tempting to assume that traders are

[19] *Nabak is an important resource in that area, symbolic of land ownership even if households have migrated or are no longer permanently living there.*

[20] *Thus, trade is not constrained by cash flow. Interestingly, trading on credit also extends to trade between IDP timber traders and Abbala pastoralists supplying them, for instance in Zalingei, although there has been hostility between these groups.*

Table 5.2. Examples of price increases in timber during the conflict years – prices paid by traders to suppliers

Type of timber	Pre-conflict - 2002	May/ June 2008
Bamboo – Souq Ashabi, Nyala	SDG 800 per 1000 poles	SDG 1,300 per 1,000 poles
Delaib – Souq Ashabi, Nyala	SDG 7-8 per pole	SDG 15 per pole
Eucalyptus – Souq El Geneina, Nyala	SDG 4-5 per pole	SDG 10-12 per pole
Kitir – Souq El Geneina, Nyala	SDG 1.5 per pole	SDG 8 per pole
Himeid, Hajar Gado, El Fasher	SDG 5-6 per pole	SDG 8 per pole
Heglig – Khorsayal, El Fasher	SDG 8 for 8 pieces	SDG 10 for 8 pieces

Source: Interviews with timber traders

Table 5.3. Increase in number of timber traders, selected markets

Market	Pre-conflict number of traders	Number of traders in 2008
Souq El Geneina, Nyala	3	27
Souq Ashabi, Nyala	approx 20	approx 100
Sharg El Musteshfa, Geneina	3	18
Hager Gado, El Fasher	2	50
Simajarad, El Fasher	15	35
Souq Toro, Zalingei	no market	18
Abu Shouk camp, El Fasher	no market	approx 200

Source: Interviews with traders

doing well and making handsome profits. A closer investigation and discussions with some of the long-established timber traders reveal that this is not the case. The influx of new traders has made this a highly competitive business; turnover for a number of established traders has fallen and profit margins have been squeezed. In a few instances traders have gone bankrupt and / or left the market, especially from the most regulated timber markets in the centre of town where the tax burden is usually highest, like Souq El Fasher in the centre of Nyala. Others now find it takes longer to sell a truck load of timber; this was reported by a number of traders in Geneina, in Sharg El Musteshfa market[21].

The establishment of new timber markets in some of the IDP camps is striking, and is perhaps most marked in the case of Abu Shouk camp outside El Fasher where a large and vibrant timber market has now taken root. As mentioned above, these IDP camps are de facto tax havens and thus provide an attractive trading environment. However, the extent to which the town's residents can use them depends upon how strictly movement of timber between the camp and the town is regulated. Movement of timber between Abu Shouk camp and El Fasher appears to be somewhat easier than between Kalma camp and Nyala, or Hamadia camp and Zalingei.

5.4. Increasing use of alternative technologies?

There is encouraging evidence of the increasing use of construction technologies that use alternatives to wood. Not surprisingly, this is most evident in El Fasher where timber supplies are scarcest. Some traders actually reported falling demand

[21] *One trader reported that he used to be able to sell a truck load in two months; now it takes three months because of increased supplies by IDP traders and from pastoralists, some of whom sell directly to consumers, house-to-house.*

for eucalyptus and sahab as the residents of the town (especially the better-off) use metal angle bars and zinc sheeting instead. There has been a corresponding increase in the number of traders dealing in steel construction, from 4 to 5 before the conflict to around 40 now. At least one timber trader interviewed for this study in El Fasher is switching his business to metal and zinc sheeting.

International aid agencies are increasingly aware of the potentially negative impact of some of their building practices on the forest resources of Darfur, but there are still few pursuing alternative technologies. Those few include CRS now using bamboo and metal poles, Oxfam using metal angle bars for latrines, and CHF in Nyala as shown in Box 2 above. Initial indications are that these alternative construction technologies may cost more than timber construction, with implications for donors and funding proposals, but with positive environmental consequences. There is an opportunity here for the international community to show leadership in introducing alternative technologies through the work they are funding. UNEP's Post Conflict Environmental Assessment report makes recommendations for demonstration projects to be undertaken by UN agencies using technology already established in Sudan (UNEP, 2007 – see recommendation 6.4).

Chapter 6

Sawmills, carpenters and furniture-making

The number of sawmills operating in the main towns of Darfur is known to have increased substantially[22]. Fieldwork for this study confirmed this. Table 6.1 gives figures provided by the sawmill operators themselves. Although many of the newcomers are IDPs, most of these figures do not include sawmills that have now opened in the IDP camps, for example in Kalma camp. These are usually small saw-mills using saws of much smaller diameter; in Kalma camp, however, there is evidence of some much bigger sawmills in operation. FNC used to be a significant actor in this business, but has now closed some of its sawmills in areas which are no longer accessible to FNC staff. This also means that it has opened some new sawmills, for example in Zalingei, which has introduced unwelcome competition to the commercial sawmills; FNC is not saddled with a heavy tax burden and is therefore able to undercut commercial prices.

There appear to be two main reasons for the rapid increase in the number of sawmills. First, this is related to the construction boom described above which has increased demand for sawn wood. Second, it appears also to be related to the uncontrolled and opportunistic felling of trees as groups and individuals try to benefit from the lawlessness that pervades much of Darfur's countryside. An example of this is the opening of new sawmills in Tuur, in the Jebel Marra area where there used to be just one FNC sawmill. Now there are five sawmills: the FNC one, two operated by the military (which are now the largest sawmills in the area), and two privately-owned sawmills.

The number of carpenters has also increased, shown in Table 6.1, again associated with construction but also with increased demand for furniture as the urban population has grown. The best quality furniture is being bought by those with greatest purchasing power, usually salaried staff working for international agencies or government. As the carpenters in Zalingei explained, 'it used to be all sectors of the community, now it is only those with a regular income'. But there is also demand for more basic furniture from IDPs, who will often go to great lengths to raise cash to buy wedding furniture. Carpenters in Nyala described the main sources of demand for sawn timber as the following:

- NGOs e.g. pallets for storage
- Roofing
- Office furniture
- Horse and donkey carts
- Furniture for local people

Although demand has increased overall, a similar picture emerges as in the timber market, of increased competition and reduced profitability per trader as ever more people try to make a living out of the same activity[23]. Thus, established sawmill operators and carpenters from before the conflict report a substantial decline in business during the

Table 6.1. Growth in number of sawmills and carpentry workshops

	Nyala		El Geneina		El Fasher		Zalingei	
	Sawmills	Carpentry workshops	Sawmills	Carpentry workshops	Sawmills	Carpentry workshops	Sawmills	Carpentry workshops
Pre-conflict	10-13	NA	10	65	3	10	3	NA
2008	30	NA	17	120	15	30	21 (incl IDP camps)	17

Source: Interviews with sawmill operators and carpenters

[22] *See, for example, figures produced by the D-JAM team.*
[23] *Indeed, as carpentry is one of the few remaining viable business opportunities, in El Geneina youth have been trained up by the Community Development Association to become carpenters.*

conflict years. One carpenter in Geneina used to buy 40 *kutla* (blocks) of mahogany per month before the conflict began for furniture-making; now he buys just 7 to 8, a fifth of his previous business. Sawmill operators and carpenters in Zalingei (often now running both businesses together as explained above) seem to be facing a particularly tough time, as illustrated in Box 3.

Some sawmill operators and carpenters used to source timber themselves in more peaceful times. In Zalingei they went out two to four times per month with labourers and trucks or camels, usually returning with 3 tree trunks per trip, of mahogany or gimbeel (for which an FNC licence was required to fell the tree). Insecurity means they can no longer venture out except with an armed escort which is unaffordable. They are now buying wood directly from the pastoralists in the area. However, they are no longer supplied with mahogany or gimbeel which is said to be finished in this area since the early years of the conflict. A general complaint from carpenters and sawmill operators in all of the towns visited for this study is about the poorer quality of wood now being brought into the market, usually greenwood which is harder to work with; pre-conflict more of it was dead wood.

Some of the established timber yards that used to trade in wood for construction now also trade in hardwood for furniture; they are thus a good source of information on how these supplies have changed. Two timber traders in the long-established timber market of Souq El Fasher in Nyala explained how the supply of hardwoods from Jebel Marra really collapsed when the conflict began. Supplies of mahogany fell to 10 to 20% of their former volume, and gimbeel to around 30%; prices shot up. This brought to a halt the export of hardwood for furniture-making to Khartoum. The supply of hardwoods to the timber market in El Fasher town, also traditionally from Jebel Marra as well as *Wadi* Saleh, has similarly dried up. (There are reports of the SLA – Sudan Liberation Army – protecting some forest resources in the Jebel Marra area. This requires follow-up). However, the carpenters are particularly concerned about supplies of saru. Those who managed and supplied this resource in the past have become displaced and there is real concern that there is no managed regeneration of this valuable tree.

The source of hardwoods supplied to El Geneina market from West Darfur appear to have changed less. Gimbeel, the main hardwood, as well as

Box 3. Zalingei carpenters struggle to make a living

Zalingei sawmill operators and carpenters are struggling under a heavy tax burden which most have been unable to pay. This resulted in a recent court case with the FNC over a backlog of seven months' unpaid fees. As a consequence at least two have gone out of business. The others are struggling to compete with sawmill operators and carpenters in the IDP camps, who are *de facto* exempt from taxes and licences, and are thus able to provide sawn planks of timber at less than half the price of the sawmill operators in town. The new FNC sawmill that opened in 2005 is also able to undercut their prices by at least 25%. Few expect to be able to stay in business. In their words, 'the future is gloomy'.

Table 6.2. The increasing tax and regulation burden faced by sawmills and carpenters in Zalingei

	2002	2008
Licence (paid to locality)	SDG 35 pa	SDG 75 pa
Fees paid to FNC	SDG 12.5/ mth	SDG 50/mth
Zakat	SDG 65 pa	SDG 100 pa
Taxation dept	10% of income	supposed to be 10%. Most unable to pay
Rent for area	SDG 15-20/ mth	SDG 100-150/ mth
Fire department	SDG 75 pa	stopped since fire dept integrated into police

Source: Sawmill operators and carpenters, Zalingei

mahogany, mango, kabreet (*Ailanthus excelsa*) and siso (*Dalbergia siso*) all still come from *Mukjar*, *Wadi* Saleh and Jebel Marra, just as they did before the conflict. The *umdawarwars* are important suppliers now that they have switched from trading in other commodities (as described above). But just as in other markets, prices have increased substantially, by 100 to 200%. See Table 6.3. These increases are passed onto consumers buying furniture; prices have mostly doubled compared with pre-conflict levels. (It is also worth noting that imported furniture is becoming more popular in Sudan generally, including Darfur. This usually has a better finish than locally made furniture and is favoured by the better-off and for office furniture).

Table 6.3. Increasing price of hardwoods in El Geneina and El Fasher markets

	El Geneina	El Fasher
Pre-conflict (2002)	Gimbeel - SDG 25 per kutla Mahogany-SDG 15 per kutla	Gimbeel - SDG 20 per kutla Mahogany-SDG 40 per kutla
May/ June 2008	Gimbeel - SDG 70 per kutla Mahogany-SDG 40-50 per kutla	Gimbeel - SDG 50 per kutla Mahogany-SDG 100 per kutla

Source: interviews with carpenters and timber traders

Chapter 7

Firewood and charcoal for domestic use

7.1 Firewood

One of the consequences of the rapid process of urbanization forced on Darfur's main towns by massive displacement, is a sudden and large increase in demand for firewood from the surrounding areas. The better-off town residents can usually afford the largest quantities of firewood per household. But as the conflict has continued, increasing numbers of IDPs across Darfur are having to resort to buying firewood as supplies of deadwood close to the towns and camps run out and as access to the bush remains highly insecure. For those with lowest purchasing power this may mean buying one stick at a time[24]. Indeed, as the price of firewood rises, IDPs are having to sell larger proportions of their food rations in order to buy wood. Some INGOs estimate that this may be as much as 50% of their ration. IDP timber and firewood traders from Kalma camp estimate that around 70% of the wood sold in the camp is for firewood compared with 30% for construction. For IDPs around Geneina, however, the risks of collecting firewood have always been extremely high and therefore very few IDPs collect and sell firewood as a source of livelihood.

Pre-conflict, either households collected their own firewood from the bush, or people in rural areas – usually women – collected firewood and brought it to the nearest town to sell or sold it to truckers and traders on the roadside. This has changed completely with displacement and insecurity. Although many IDPs used to try and collect their own firewood, this has become increasingly risky as they have to travel greater distances to find any (see below). From Zalingei's Hamadia camp, IDP women are now more or less forbidden by their menfolk to collect firewood because of the risk of attack and sexual violence. Thus, one of the few livelihood options available to IDPs – collecting and selling firewood – has become too high-risk. IDPs who are still selling firewood are usual the stronger able-bodied men who have their own carts and horses or donkeys. They will often move in groups and have to pay other groups to gain access to forest resources, but they still face the strong threat of having their carts and animals stolen. Two IDP traders from Kalma camp interviewed for this study had both lost their horses and carts a year ago. IDP traders in Zalingei reported that there are incidents of donkeys and carts being stolen up to four times per month. In the case of the Kalma traders, they have had to adapt their practice, now buying firewood in Belayl, close to the camp, from those who do have access to forest resources – in this case the people of Um Kurdous and Um Kumulti – and then selling it again in Kalma. Not surprisingly, this way of trading carries a much lower profit margin.

The increasing distances that have to be traveled from the towns in order to find firewood are very striking. From Kalma it used to be possible to find firewood just 15 km away. Now IDPs must travel 75 km – a round trip takes more than 24 hours, walking through the night[25]. Even in the more forested environs of Zalingei, IDP traders say that they must now travel 30 to 50 km to find timber and firewood. The situation is worst in North Darfur around El Fasher. IDP traders from Abu Shouk camp say that it now takes seven days to collect one cart-load of wood. The area around the camp is heavily controlled, so IDPs only really have access to the north, to SLA-held territory around Korma, Mellit and west of Mellit. Only the strongest can undertake such a venture.

Firewood patrols to protect IDPs were launched in some areas from 2005 onwards. The idea is that AMIS, now UNAMID, accompany groups of IDPs (usually women) to areas where they can collect firewood and thus provide protection. The record has been mixed depending on the vigilance, commitment and flexibility of the individual patrols[26]. But as the distances the IDPs have to travel become greater and the expeditions longer, the viability of the patrols is more questionable as they will usually only stay for eight hours at a time. Questions have been raised around the environmental impact of firewood patrols; although they do fulfill a protection function if done well, they have the potential to accelerate loss of forestry in the area patrolled

[24] *Reported by IDP timber and firewood traders in Abu Shouk camp, El Fasher.*
[25] *Staff of an INGO involved in firewood and protection say that the distance travelled from Kalma camp to collect firewood has increased by 45 minutes just between January and April 2008.*
[26] *See, for example, Women's Commission (2006).*

and are not matched by efforts to renew forest resources. Thus, appeals have been made for a more integrated approach to natural resources, livelihoods and protection (Tearfund 2007; Young et al., 2007).

In West Darfur – Geneina and Zalingei – pastoralists now dominate the supply of firewood to the respective markets to an unprecedented extent. Traders in El Geneina estimate that there are now 300 to 350 camels per day bringing firewood to the market, mostly sahab and abanoos. Although pastoralists using donkeys and camels have always supplied Geneina market with firewood and timber, this has never been on such a large scale. Similarly, pastoralists dominate the supply of firewood to Zalingei. Although *baggara* women have always brought charcoal and firewood (dead wood) to sell, the difference now is that the *Abbala* are also engaged in firewood collection and sale using their camels[27].

There is increasing dependence on trucks to bring firewood into the main towns. As described in Section 5.2 above, this has become a costly exercise in El Geneina where access to the bush is heavily controlled and armed escorts have to be paid: traders report that the cost of taking a truck into the bush to collect one load of firewood has increased five times since the conflict began because of the additional payments that have to be made and the higher price for renting a truck. Traders in El Fasher are also bringing firewood by truck, although their preference is to offload in Zamzam or Abu Shouk IDP camps to avoid paying taxes and fees. IDPs in Direij and Otash camps outside Nyala report that they also now rent trucks collectively in order to collect firewood; IDPs go out for five days or more to collect wood and then meet with the truck to bring back their load.

Military involvement in selling firewood was reported in El Fasher, where they are also involved in brick-making, and in Nyala. Armed groups aligned to the government usually have preferential access to urban markets and do not have to pay taxes. Nor do the military have to pay taxes or pay for their use of military trucks. Thus, they are able to undercut the prices of other traders; they usually sell from house to house.

Table 7.1. Price of firewood – Abu Shouk camp, El Fasher

2004	SDG 25-30 per *rahal* (bundle of 40 pieces of firewood)
2005-06	SDG 30-36 per *rahal*
2008	SDG 40-50 per *rahal*

Source: IDP traders, Abu Shouk camp

As it becomes scarcer, the price of firewood has been rising during the conflict years, see Table 7.1. The types of wood being collected for firewood are also changing. Poorer quality wood is increasingly being used, such as arad (*Albizia amara*) and mukheit. Even toxic wood like usher is sometimes being collected.

The deepening firewood crisis has been apparent throughout the conflict years. (See, for example, Women's Commission [2006]). Initially this was seen as a protection issue mainly concerning IDPs, which is indeed the case. This triggered initiatives like the firewood patrols and also the large-scale introduction of fuel efficient stoves. A recent evaluation of the latter provides some encouraging findings. Now widely used by IDPs, fuel-efficient stoves cut firewood consumption by 30 to 60% (ProAct Network, 2008). However, the issue of scarce forest resources and the need to invest in regeneration has been somewhat overlooked, despite the Tearfund report drawing attention to this in 2007.

For at least a couple of years agencies have been urged to explore alternative energy sources to firewood (ibid). At last some have started to experiment. Practical Action, for example, has started to distribute natural gas to small numbers of IDPs and resident rural households in and around El Fasher. Oxfam GB is planning to introduce propane as part of a pilot project that will also involve communal kitchens in IDP camps as a way of reducing energy needs[28]. Meanwhile town residents, especially in El Fasher where firewood shortages are most severe,

[27] *This is corroborated by the recent Tufts study on Rizeygat Abbala pastoralists (Young et al, 2008).*
[28] *It is worth noting that the Sudanese Environmental Conservation Society (SECS) have valuable experience of promoting the uptake of butane gas cookers and cylinders in Khartoum, Blue Nile, Northern Kordofan and White Nile, that could usefully inform programme design in Darfur.*

have begun to switch to the use of natural gas. See Box 4. However, some of the logistics of this will need to be addressed before it becomes a widespread practice. High transport costs from Khartoum make the price unaffordable for all but the better-off, and supply routes can be unreliable as a direct consequence of the conflict. Energy programming by international agencies needs to broaden its focus, to pay attention to the energy requirements of large urban populations, not just IDPs. This approach will encourage programming to reflect the complex interaction of IDP, urban and rural livelihoods, energy demands and protection risks to vulnerable groups (Tearfund, 2007; Women's Commission, 2006).

7.2 Charcoal

The demand for charcoal in the main towns has also increased, although less than for firewood because charcoal is mainly used for tea-making, and only in small quantities for cooking by middle class households. To some extent charcoal is still made by those who used to produce it before the conflict, for example the Turjam in South Darfur, and in West Darfur the residents of the south-west corridor who have not been displaced. Around Zalingei it is still made by (semi-settled) pastoralist men and sold by the women in the market. But others who were involved in charcoal production before the conflict who no longer have secure access to the bush have had to abandon this livelihood source. This includes the Fur, Birgid and Dajo around Nyala, and the Kineen south-west of El Fasher in North Darfur.

However, some new groups searching for a livelihood have entered this domain. This includes some pastoralist groups who are now making charcoal for the first time – the *Abbala* in South Darfur and pastoralists around El Geneina, some of whom are apparently employing labourers. Where possible, IDPs from the Nyala camps are producing charcoal, usually going into the bush in groups for protection for 7 to 10 days at a time. Access to the bush around Nyala, however, appears to be under control of the *Abbala*, the Turjam, Beni Rashi and Beni Mansoor and they will often bring the charcoal (as well as firewood) directly to Nyala themselves. In West Darfur, IDPs are joining residents in producing charcoal in areas such as Habila, Beida, Mornei and Sisi.

Box 4. Increasing use of natural gas in El Fasher

As the prices of firewood and charcoal have risen, the use of natural gas in El Fasher town has increased substantially, even before the conflict. Nile Gas and Abercy Gas are the two main suppliers of gas, gas cylinders and appliances. The figures below show how consumption of gas has increased, despite the fact that it is around three times as expensive as in Khartoum; the fall in monthly sales in 2008 has been due to transport problems between El Fasher and Khartoum. Nile Gas distributes through six dealers; a further six agents take gas from the company on credit to sell to consumers.

Table 7.3. Average monthly sales of 25 kg of gas by Nile Gas in El Fasher

2004	150-200 cylinders
2005	200-250
2006	300-350
2007	360-450
2008	250-300

Abercy Gas, the second company, distributes around 50% of the quantities that Nile Gas is distributing per month.

The high price of gas in El Fasher is principally due to transport costs which account for 60% of the final price, as shown below. In Zalingei the price has reached SDG 52 per cylinder, again because of high transport costs.

Table 7.4. Cost of bringing gas to El Fasher

1. Price in Khartoum	SDG 8.5 (including loading)
2. Transport Khartoum/Fasher	SDG 20.0
3. State levies	SDG 0.75
4. VAT	SDG 0.25
Total cost	SDG 29.5
Selling price in El Fasher to consumer	SDG 33.0

Source: interviews with Nile Gas

One of the consequences is that there is no longer a seasonal variation in the price of charcoal. Whereas farmers used to get involved in this activity only in the dry season, thus causing the price to rise in the rainy season, so many people are now unable to farm that there is no longer an opportunity cost during the rainy season and charcoal production continues throughout the year. Indeed, charcoal production is regarded as being less risky than farming because it is possible to run and hide more easily if there are threats of attack compared with farming.

Charcoal is still brought into the towns by trucks (including empty food aid trucks and military trucks), usually in quite small quantities, around eight to ten sacks per truck. However, truckers will often choose to offload in the IDP camps on the outskirts of town to avoid taxes, from whence the charcoal is brought to town by IDPs with their donkeys. This is now a common practice from Zamzam camp (where there were almost 30 charcoal traders by 2007) into El Fasher (El Fateh, 2007). It also happens between Direij and Otash camps and Nyala. Following the patterns described above, the number of charcoal traders in most urban markets has increased as IDPs and others seek to earn a living. In Ardamata camp in El Geneina, for example, the number of charcoal traders has risen from 2 to 11. However, most of the charcoal traders are now IDPs selling house to house from their donkeys, which again avoids taxes having to be paid.

Figure 7. Charcoal production near Masterei

As with all other commodities, the price of charcoal has risen during the conflict years, doubling as shown in Table 7.5.

Table 7.5. Price of charcoal during the conflict years

	Nyala	El Geneina
Pre-conflict – 2002	SDG 8-10	SDG 7-8
May / June 2008	SDG 15-16	SDG 12-17

Source: interviews with charcoal traders

UNEP's Post Conflict Environmental Assessment (UNEP, 2007) recommended action to scale up the use of liquid petroleum gas (LPG), to substitute for charcoal as an urban fuel source. Rather than subsidizing the LPG, which would distort the market, the report suggests subsidizing LPG cylinders.

Figure 8. Forest nursery, University of Zalingei

Chapter 8

Firewood for bakeries

The number of bakeries has increased in all towns and there are now numerous bakeries in the IDP camps, often operating on a small-scale. Timber traders from Kalma estimate that there are around 100 small bakeries in the camp. Part of the reason is obviously to do with increased population, and an influx of people from outside Darfur (from other countries working for international agencies, and from other parts of Sudan) for whom bread is the preferred staple. But it is also to do with changing food habits. Those on higher incomes are choosing to eat bread rather than traditional food like *asida* (millet porridge); and as the cost of firewood escalates, some find it more economical to buy bread rather than firewood and millet to make *asida*.

Bakeries are another important source of demand for firewood. Many of the trends are the same as those described for brick-making in Section 4 above, albeit on a smaller scale. Thus, some bakers used to collect their own firewood, or buy from the FNC in the case of Zalingei. These options are no longer available so bakers must now buy from traders, from pastoralists in some places (Zalingei and Geneina) and from IDPs (e.g. in Nyala).

As with brick-making, there is a worrying trend in the increased supply and use of green wood rather than dead wood, although unlike the brick-makers for whom there is an advantage to slow-burning green wood, this is not the case for making bread because it takes much longer to cook.

In terms of production costs, bakers are under pressure from the rising cost of flour as well as from the increasing costs of firewood documented above. Both have forced up the price of bread. One baker in Nyala compared the pre-conflict price of bread of SDG 1 for 5 pieces to the current 2008 price of SDG 1 for 4 pieces – a 20% increase.

As with the brick-makers, the bakers interviewed for this study are interested to explore alternative energy-saving technologies. In Zalingei three bakers have already started to use different types of bricks which hold the heat better, apparently cutting their consumption of firewood by half. In Nyala a couple of bakeries have started to use oil or gas as their source of energy. (Indeed, Saygo Flour has launched a 'green bakery programme' to help bakeries convert from firewood to gas nationwide).

Chapter 9

The implications for Darfur's forest resources

A consistent theme running through many of the interviews for this study was about forest resources becoming increasingly scarce in certain areas. This was strongest in North Darfur, from interviews in El Fasher with reference to firewood and timber for construction. It was also reported in South Darfur, for example how supplies of sahab have run out in the Kass area. In the more forested area around Zalingei, concern was expressed about how the unregulated and unlawful felling of hard woods is depleting valuable resources. Some talked of tensions emerging between the resident population and IDPs in some of the more crowded towns like Gareida and Kass over the destruction of natural resources. Although it is clear that IDPs have few livelihood options, the resident population is only too aware of the long-term impact of the destruction of shelter belts and forest resources. Indeed, the shelter belts around Darfur's towns have been badly affected not only by the presence of IDP camps but also because of the felling of trees by the military early in the conflict, ostensibly for defensive purposes. IDP camps near the towns often occupy valuable agroforestry land (Tearfund, 2007).

As far as firewood for domestic consumption is concerned, the issue is principally to do with the diminishing availability of deadwood and the greater distances that IDPs and others have to travel from the towns. This may exacerbate protection issues that have been present since the beginning of the conflict. Whilst availability of firewood for domestic use is negatively affected by reduced forest cover, it is not a direct cause of deforestation.

In contrast, firewood for brick-making *is* a major cause of deforestation, because it is predominantly green wood and is now being consumed in very large quantities. (The harvesting of greenwood did not happen on a significant scale pre-conflict). Although timber for construction is almost always harvested green, at least this was partially managed and regulated pre-conflict. Since the fighting began it has been almost completely unregulated

Figure 9. Trees ringed so they will die and can be used for firewood

and much of Darfur's forest resources are now unmanaged. Thus, this too, is a cause of deforestation[29]. The most desperate signs of destruction of forest resources are when trees, usually in close proximity to IDP camps, are 'ringed'[30] to bring about their premature death. Traders, carpenters and sawmill operators all complain of the poorer quality of wood now being brought into the market. As many of those who collect firewood for the brick kilns are desperate to earn a living in an environment where there are few alternatives, encouraging them not to cut green wood for the brick kilns is unlikely to work as long as there is a market for it and few other opportunities[31]. This short-term survival attitude came through clearly in discussions with IDPs in Zalingei. In their words: 'we die today or we die tomorrow'. In the absence of other viable alternatives, they do not have the luxury of harvesting forest resources sustainably. For others who have lost so much during the conflict, including family members, there is little incentive to do so. When IDPs around Nyala have been challenged about cutting green wood, their response has been: 'how can you compare trees with people in terms of what we have suffered?' When faced with widespread destitution, uncontrolled deforestation does not seem such an unreasonable choice.

In short, timber and firewood resources have become much more important resources since the conflict began as agriculture and livestock production have fallen, and not least because of the high demand for timber and firewood in urban markets. Competition over access to these valuable resources is more acute than it has ever been, especially between pastoralists – who have greatest access to the natural forest in many parts of West Darfur, around Zalingei, and in parts of South Darfur – and IDPs/ town residents for whom access is severely constrained. Monitoring which groups have access to forest resources is also indicative of relations between them. For example, about a year ago the *Abbala* started to allow Fur IDPs more access to the bush north and west of Nyala, a significant change from the early years of the conflict when there was deep hostility between these groups. But access to the Turjam, traditional charcoal producers, was severely constrained as conflict flared up between the Turjam and *Abbala* in 2007. In parts of Darfur where displacement of farmers has been highest, and in large swathes of land around the towns, different pastoralist groups have become the *de facto* custodians of forest resources. This is the reality that has to be grappled with in efforts to protect forest resources. Danish Refugee Council (DRC) is planning an attitudinal survey of pastoralists (as well as others) around Zalingei with respect to forest resources. This is a welcome initiative which could usefully be repeated in other areas.

Wood from FNC reserves has more or less disappeared from the markets of Darfur although this used to be a significant source of timber for construction pre-conflict. The extent to which FNC reserves have been destroyed during the conflict, demonstrated in Table 9.1, is shocking. The destruc-

Table 9.1. Extent of destruction of FNC forest reserves during the conflict years: examples from South and West Darfur

FNC reserve	Estimated percentage loss
South Darfur	
Kunduwa Forest, Nyala	100%
Gareida	50%
Kass	20%
Tullus	heavy although figure unavailable
West Darfur	
Murtagellow	100%
Golol	100%
Kayangat, El Geneina	100%
Sisi	100%
Western Kaja	100%
El Geneina green belt	50%
Mornei	50%
Nyertete	20%

Source: FNC, Nyala, El Geneina and Zalingei

[29] The extent to which charcoal production is a cause of deforestation has been harder to gauge during this study. Although it also uses greenwood, charcoal production is often carried out farther from towns where forest resources are more plentiful.

[30] In other words a large amount of bark is stripped off the tree low down and in a ring around the trunk.

[31] When IDPs and other urban dwellers go out to collect firewood, there is a strong incentive to collect as much as possible from one location, not least because of the security risks and time required to move to other locations. This also encourages the cutting of green wood.

tion of Kunduwa Forest is one of the most extreme cases – see Box 5. Involvement of the military and aligned militias in felling FNC plantations and selling the timber early on in the conflict are quite widely reported. Forest reserves which are said to be still more or less intact are in areas such as Idd El Fursan, Rahed El Birdi, Shearia, and parts of Ed Daein.

Jebel Marra is the main area for private woodlots, mostly dominated by eucalyptus. The story of how these woodlots have fared during the conflict years is mixed. On the one hand a number of owners have had their woodlots destroyed, or have been killed. On the other hand, we were told that the number of private woodlots has actually increased in response to growing demand for eucalyptus, to make up for the lack of FNC's eucalyptus production for the market, and because trees are a strong symbol of land ownership and land use and are less vulnerable to being burned than crops such as millet. Nevertheless, traders and woodlot owners told us of regular attacks on woodlots in the Jebel Marra area and burning of trees during the first few years of the conflict. This seems to have more or less stopped in the last year as local level agreements to protect resources have been reached between different groups. One of the problems that the private woodlot owners now face is lack of inputs, such as polythene bags for seedlings, watering cans, pesticides, spraying equipment and pumps.

In conclusion, as this study demonstrates, the worst areas of deforestation are around the main towns and where there has been deliberate destruction of resources such as FNC plantations. In some other areas which have been depopulated and are far from the towns and/ or very insecure, there are anecdotal reports of significant natural regeneration, corroborated by the recent Tufts study on pastoralism (Young et al., 2008). All of this requires much greater investigation to confirm the areas and extent of deforestation and of natural regeneration.

Box 5. The tragedy of Kunduwa Forest, Nyala

Kunduwa forest, an area of just over 3,000 feddans, was planted in colonial times on the edge of Wadi Nyala[32]. It mainly comprised mahogany trees and a number of other hardwoods. Its destruction is regarded by many as a tragedy that could have been avoided. By all accounts the felling of trees in Kunduwa began in 2005/ 06 but really accelerated in late 2006/ 2007.

Although this unlawful felling of trees is widely blamed on IDPs from nearby Kalma camp, eye witnesses report that military and security personnel were involved and that IDPs collected smaller pieces of wood when the main tree trunks had been removed. Military involvement was acknowledged and taken up in 2007 by South Darfur's then Minister of Agriculture who tried to prevent it but was unable to.

It appears that most of the high value hardwoods, including mahogany, were transported to Khartoum for furniture-making. The remnants were used by IDPs in brick kilns (confirmed by the brick kiln owners in Nyala – see Section 4.2 – and for making charcoal). FNC is attempting to replant Kunduwa Forest, but probably with different tree types because of water shortages, and it will take some decades for the economic productivity and natural splendour of the forest to be restored.

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[32] *Kunduwa forest site can be seen from the right hand side of a plane approaching Nyala airport from the South*

Chapter 10

The policy context and external assistance

10.1 The policy context

FNC is the main government institution responsible for setting and implementing policy related to the production, management and trade in forest resources. It is also the main body responsible for collecting taxes on traded timber and woodfuel. This is done by collecting 'royalties', the level of which is set at federal level. FNC also collects taxes to support its own functions. Combined, these usually account for 75% of taxes imposed on traded timber and woodfuel. In addition, there are state government taxes, and taxes and fees collected by the locality (which vary from place to place), accounting for the remaining 25%.

In reality, FNC has extremely limited access outside the main government-held towns of Darfur since the conflict began, and has no access at all to Darfur's main area of production – Jebel Marra[33]. Thus, since the conflict began, FNC's function is almost entirely constrained to taxation and collecting royalties in the limited areas to which it does have access. This translates into a very heavy tax burden imposed on just a proportion of all traders – those who trade in the main urban markets but not those trading in the IDP camps. This income is supposed to pay for FNC salaries and transport, and also for forest support services, for example running nurseries and maintaining shelter belts. However, FNC officials in Darfur told us that they struggled to even cover salaries during the rainy season and had to be supported by FNC in Khartoum. With the funding they have in Darfur, they appear to be unable to engage in any developmental activity, even funding seedling production. In Zalingei, for example, all seedling production by FNC is currently being funded by international agencies. Many of their officials in Darfur are frustrated – wanting to do more, especially to protect forest resources, yet severely constrained by lack of funding as well as lack of access.

Almost all traders we interviewed raised the issue of soaring taxes since the start of the conflict, a phenomenon affecting trade in all of Darfur's main products (see Buchanan-Smith and Fadul, 2008). Indeed, when timber traders from Jebel Marra, which has been badly affected by insecurity, were interviewed about the impact of the conflict on their business, the first issue they raised was not insecurity but the increase in taxes (both formal and informal) and the loss of the 1996 concession that was supposed to exempt producers of agricultural produce (including timber) from tax. Their experience clearly illustrates the wider problem – see Table 10.1. Not only have formal taxes and levies increased dramatically, with many new taxes being imposed at the locality level, but there is also double taxation as both SLA and the government collect taxes on traded timber, and there are numerous informal payments that have to be made at checkpoints to ensure safe passage. Most traders interviewed were extremely disenchanted that they receive almost no benefits or support from government in return for these large payments.

For timber traders operating out of a fixed location, usually their own timber yard inside the town, not only have taxes risen but also the licences they must pay the locality and their rents. It is common for the licences to have at least tripled (as reported by traders in Souq El Musteshfa in Geneina). Box 3 in Section 6 above illustrates how a crippling tax burden now affects carpenters in Zalingei, forcing some of them out of business. This pattern is repeated elsewhere. Indeed, carpenters interviewed in El Fasher say they are considering forming a union in order to strengthen their negotiating power with government specifically on taxation issues. Interestingly, sawmill operators in Geneina have managed to negotiate down the licence they pay to the locality. Although it is still four times higher than the licence fee pre-conflict, it used to be eight times higher in 2005.

As traders of all types and sizes struggle with this huge tax burden, there is inevitably a lot of 'informal trading' and cheating of the system. This ranges from IDP traders recycling waybills amongst themselves as they bring timber into urban markets,

[33] *A number of FNC guards protecting FNC reserves were killed early in the conflict, at which point most others were withdrawn.*

Table 10.1. Formal and informal taxes and levies charged on timber traded from Jebel Marra to Nyala

	Pre-conflict – 2002	May 2008
Tax to FNC	SDG 0.25 per pole	SDG 2 per pole
Payments to the locality:		
Taxation office, Nyala		SDG 250 per truck of 500 poles
Zakat		SDG 250 per truck
Security support		SDG 250 per truck
Injured soldiers' tax		SDG 250 per truck
Sub-total		SDG 1,000
Payment to SLA		SDG 150 per truck
Checkpoint fees		SDG 100-300 for passing 30 checkpoints
Payment to the state (borsa)		SDG 200 per truck

Source: Interviews with timber producers and traders from Jebel Marra

to a number of IDP traders operating under one licence, to concealing timber when it is brought to market by truck. Some traders have even moved from the town to the IDP camps to escape taxation (from Nyala to Kalma camp, and from El Fasher to Abu Shouk camp). There can be a trade-off from such a move: as Zalingei IDP traders explained, a cartload of firewood sells much more quickly in town where purchasing power is higher than it does in the camp. Nevertheless, the incentives to trade outside the main urban markets are strong. For timber brought to El Fasher, truckers prefer to offload in Abu Shouk camp or in Mewashie on the outskirts of the town to avoid taxes. As a consequence, some markets in the centre of town have started to contract, for example Ummdufasou and El Wakala in El Fasher, and in Nyala the old timber market of El Fasher Souq.

As described above, pastoralists have now become important actors in trading timber and woodfuel. Apparently many of them are *de facto* exempt from tax and regulation. The reason is to do with the extent to which they are armed and have used their arms to threaten FNC officials who have approached them. FNC officials also say it would be impossible for them to take the pastoralists to court for defaulting on taxes. This creates unequal access to the market. Where the military have been involved in timber extraction, they too are de facto exempted from taxation and can fell trees with impunity.

10.2 An overview of relevant external assistance

Early in the conflict international humanitarian agencies were alerted to the insecurity and harassment that IDPs and others were facing when they ventured out of the towns and camps to collect firewood and other forest resources. This triggered much concern about protection although in practice there have been few successful initiatives to address the issue. This is when the African Union (AU, now UNAMID) firewood patrols were launched, and when the introduction of fuel efficient stoves began. As mentioned above, agencies have been slower to concern themselves with the environmental implications of the very new and concentrated settlement patterns that the conflict has created, or with the environmental implications of their own actions, presence and programming despite being urged to do so (e.g. Women's commission 2006, Tearfund, 2007). Two recommendations that came out of the Tearfund report in 2007 were first, that greater links should be made between international agencies and Darfuri organizations, including the universities, to make the most of the very significant level of expertise that exists in Darfur; some agencies appear to have heeded this call and to have strengthened their analysis and programming. Second, the report recommended that protection, livelihoods programming and natural resource programming be integrated, as interventions in any one of these areas alone has the potential to be counterproduc-

Figure 10. A Stabilized Soil Block (SSB) press of the type being promoted by UN-HABITAT in Darfur

tive in another; rather less progress has been made in response to this recommendation.

However, the tide seems to be changing and momentum is now building within the international aid community to find ways of protecting the environment; forest resources feature prominently in that concern. As mentioned above, a number of NGOs are leading the way, for example running pilot programmes to provide alternative energy sources, and piloting alternative construction technologies. ENTEC exists to make links between these activities and initiatives, and is particularly well-placed to draw attention to examples of good practice in the interests of encouraging their wider dissemination and take-up. Finding ways of supporting reforestation and regeneration have similarly taken time to generate interest and attention, but a number of agencies are now supporting forest nurseries and seedling production, mostly in and around the main towns. The next step is to find ways of extending these efforts to more rural areas. The UN's Humanitarian Coordinator has requested that environment and livelihoods be made two strategic themes for the UN's work plan in 2009. UNEP is leading the environmental initiative and has proposed a three step approach of (i) identifying the negative environmental impacts of programming, (ii) mitigating these impacts by changing the project design, and (iii) identifying opportunities for environmental enhancement that can be achieved under the project.

Chapter 11

Conclusions and recommendations

11.1 Conclusions

One of the key findings of this study is how critical timber and woodfuel have become to so many different groups of people in Darfur struggling to make a living. For some it makes a direct contribution as they collect firewood and timber to sell, or as they trade in timber and woodfuel in the market. For even more it makes an indirect contribution, for the hundreds of IDPs and poor urban residents who provide labour to the brick kilns and to the construction industry, both of which rely heavily on firewood and timber respectively.

What was once a coping strategy for many rural households in Darfur during years of drought and food insecurity – collecting firewood and other forest resources – has now become a strategy of adaptation to the conflict, particularly for IDPs but also for pastoralists who are now depending on timber and woodfuel to a much greater extent than before; for some pastoralist groups, it is an entirely new conflict-related livelihood strategy. Many of those who were earning a reasonable living before 2003 by trading timber and woodfuel, or as carpenters and sawmill operators, are now struggling in the face of intense competition, as many turn to timber trading as their pre-conflict livelihoods collapse. The market has become very crowded as there are few barriers to entry and little capital is needed to set up as a trader. Indeed, in an economy that has severely contracted since the conflict began, this has been one of the few growth areas. The contradiction, however, is that the turnover for most established timber traders has fallen compared with pre-conflict levels and some have gone out of business as they struggle to compete with new IDP traders and with those who have switched from trading in less profitable alternatives to timber.

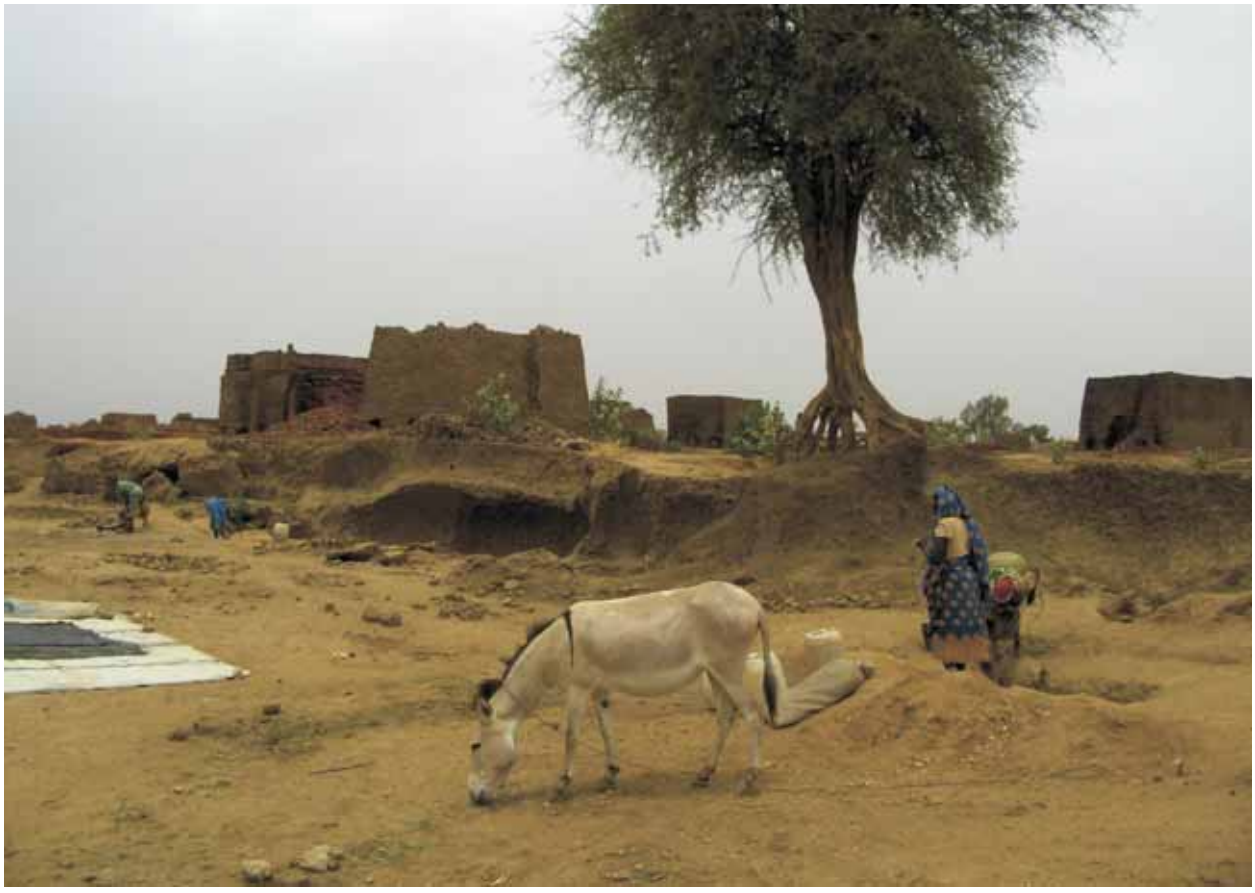

Figure 11. These brickworks in Kebkabiya are causing environmental degradation but are an important source of livelihood for people with limited opportunities since the onset of the conflict

During the fieldwork the team asked a number of key informants (including traders) to rank the ways in which wood is currently being used in Darfur according to the most dominant use. The following is one of the rankings that emerged from local staff working for UN agencies and NGOs (others, for example a group of sawmill operators, carpenters and bakers in Nyala, switched the order of 1 and 2):

1) Firewood for domestic use

2) Firewood for brick-making

3) Timber used directly in construction

4) Timber for carpentry and furniture

Although a guesstimate, the ranking agrees with the impressions gained by team-members during this study. In each of these four areas (as well as in the use of firewood by bakeries), demand has soared in Darfur's three state capitals and in Zalingei. This is indicative of what is happening in all other towns in Darfur that have experienced an unnaturally large and rapid growth in population.

Although consumption of firewood for domestic use in urban areas is ranked as the number one use of forest resources, it actually has the least impact in causing deforestation because of the use of dead wood. Of course as the live trees disappear and the circle of deforestation around the main towns ripples outwards this also reduces the amount of dead wood within easy proximity. However, the main issues here are to do with the rising cost of firewood as it comes from more distant sources, so that IDPs are having to sell a higher proportion of their rations, and the threat of insecurity as IDPs and others have to travel further to collect firewood.

Instead, brick-making is unquestionably having the most damaging impact in terms of deforestation, not only because of the amount of firewood consumed but also because so much of it is supplied and burned as green wood and is thus directly destroying Darfur's trees. The rapid growth in brick kilns and associated demand for firewood is entirely to do with the distorted and rapidly accelerated process of urbanization that has unleashed an unprecedented construction boom in Darfur's main towns. Indeed, the surge in brick production and proliferation of brick kilns is one of the more dramatic features of Darfur's urban economy since the conflict began. Timber for construction comes in second in terms of its negative environmental impact, affecting some tree species such as sahab and saru particularly badly. Where this is at least partially offset is where eucalyptus is being provided to the market to meet inflated demand from privately managed woodlots, and where bamboo is replacing demand for other forms of timber that are much slower to regenerate. Hardwood for furniture is probably third in terms of its negative environmental impact. However, while we can conclude that brick-making is having the most *extensive impact in terms of deforestation*, the illegal felling of hardwoods is having the *greatest impact in terms of the destruction of particular species*, especially mahogany and gimbeel, that will take many years to replace.

Because of the scale and intensity of the humanitarian crisis, unprecedented numbers of international humanitarian agencies and peace-keeping forces are operating in Darfur. Their presence has strongly affected all of these uses of timber and woodfuel. It has directly fuelled the construction boom, especially in the early years of the conflict. The arrival of UNAMID and the construction of its new headquarters and sites have given renewed vigour to the construction industry in 2008, especially in El Fasher. However, it is not just the presence of the international agencies that has had an impact, humanitarian programmes such as shelter provision, latrine building and school construction have all been hungry for timber, and sometimes also for bricks. Although this was most acute when the infrastructure for the IDP camps was first being established between 2003 and 2005, ongoing programming and maintenance requirements mean that humanitarian aid agencies are still important consumers of timber. Whilst some of these changes are directly related to the extent and scale of displacement and population movement since the conflict began, more action is needed by those responding to the humanitarian crisis to mitigate these impacts.

Another distortion of the conflict years is how purchasing power is concentrated in the hands of a few, especially those that are salaried. (National staff members working for international agencies usually earn three to four times as much as their government counterparts). Investing in property is

one of the main livelihood strategies of this group; returns are high and this is a less risky alternative to the traditional way of holding capital in Darfur – in livestock. This group is also able to afford higher quality furniture.

The extent of deforestation around each of Darfur's state capitals and around its other main towns is highly visible. This includes the loss of shelter belts as IDP camps were established and apparently for security reasons. The broader geographical impact of the increase in traded timber and woodfuel during the conflict years is harder to gauge. So far most reports of deforestation are anecdotal. There is a clear need for this kind of analysis to be more rigorous and systematic, and to include an assessment of the extraction and destruction of particular tree species.

The overall message that this report conveys is a pessimistic one – how the struggle against destitution and the market distortions that rapid urbanization and the presence of the international community have created have fuelled deforestation. Yet there are sparks of hope. Concern about deforestation and willingness to reverse the trend are widespread, and this was apparent during the fieldwork for this study, in interviews with brick-makers, bakers, timber traders, woodlot owners, carpenters, sawmill operators and government officers. Some of these groups, if well-supported, can take action to support regeneration, for example if private woodlot owners are provided with inputs and extension, if new woodlots are established, and if the FNC increases its nurseries and seedling production. Other groups can be supported to develop alternative construction technologies that do not depend upon timber and firewood, and to develop alternative energy sources. This is where the international community can make a substantial difference, if it intervenes strategically and on a sufficiently large scale.

There are exciting opportunities to partner private sector actors such as the brick-makers and bakers, and to work with the suppliers of natural gas, in other words to support the positive changes and adaptations that people are already making. As this report makes abundantly clear, international aid agencies *and* UNAMID have an urgent responsibility to take action to ensure that their own practices and the infrastructure they are using are no longer fuelling unsustainable demand for timber and woodfuel. This level of environmental awareness is long overdue and changes need to happen quickly to reverse some of the most negative trends. Some agencies are already leading the way. Their examples of good practice must be built upon, and others must be encouraged to follow suit. In all of these changes the livelihoods of the poorest need to be borne in mind, to ensure that they are able to benefit from alternative technologies that are introduced.

11.2 Recommendations

Understanding deforestation and promoting regeneration

1) In order to move on from anecdotal reports of rates of deforestation (and even of regeneration in some areas), and analysis through secondary dynamics such as trade, there is a need for more systematic and rigorous assessment of how forest cover has been affected by the conflict. Quantitative studies of the changes in biomass should be carried out in selected areas to understand better the impact of the conflict on forest resources, to document trends, and to provide a point of comparison for future years.

2) This report explores some aspects of the policy environment that affect forest management and trade in timber and woodfuel, including taxation. A more thorough review of natural resource management policies is needed, to identify where these can be supported, what adaptations are appropriate for the current context, and ultimately how natural resource management can be strengthened, reforestation promoted and existing forest resources protected. This policy review should also look at what needs to be done to promote the uptake of alternative technologies.

3) The switch from using traditional timber species to using bamboo for many different construction purposes appears to be a positive change in Darfur in recent years because of the rapid regeneration capacity of bamboo. However, this needs to be verified in the main areas of supply such as Um Dukhn and Um Dafoq, to establish if this is indeed a sustainable source of timber, and to check that it is being harvested correctly to maximise regeneration.

4) Where private woodlots are still functioning, for example in the Jebel Marra area, there needs to be follow-up and extension support to farmers by providing some basic inputs such as polythene bags for seedlings, watering cans and spraying equipment, to help them develop and sustain these woodlots. Where possible, new private woodlots should be established as one of the more effective ways of ensuring regeneration.

5) Although pastoralist livelihoods have also been threatened and have contracted since the conflict began, they have been less likely to be recipients of humanitarian assistance because of their mobile lifestyle and because of living in more remote locations. Yet as the *de facto* custodians of large areas of natural and previously managed forest (especially in West Darfur) because of their greater access to these areas, it is essential to engage with certain pastoralist groups to understand better the significance of trading in timber and woodfuel in their livelihood strategies since the conflict began, and their attitude to forest resources. This may reveal ways in which they can be enrolled in the process of reforestation and protecting forest resources whilst the conflict continues. Although this raises sensitive issues around access to forest resources and land 'occupation', it is too important to be ignored.

Developing alternative technologies

6) The intervention that may have greatest potential in reversing current deforestation trends is the introduction of alternative brick-making technology that is not firewood dependent. Early indications from those pioneering SSBs appear positive. Additional analysis and awareness-raising are needed on the relative merits of using rendered green-bricks, masonry and other new technologies that are being pioneered. More pilot projects need to be introduced, information and experience exchanged, and the socio-economics of alternative brick-making technology carefully assessed to ensure that it will provide a comparable level of employment for IDPs and others currently dependent on brick-making for a living. There are exciting opportunities for humanitarian agencies to engage with and to support private sector actors, including the brick-makers themselves.

7) Similarly, new initiatives to introduce alternative sources of energy should be supported and explored. This is still at the pilot phase for only a handful of NGOs, but the time is long overdue to experiment more widely and to start to introduce alternatives that will cut the need for firewood for domestic use. Once again, there are opportunities to engage with and support private sector actors, for example suppliers and distributors of natural gas, who are already responding to increased demand in some urban areas.

8) Environmental awareness raising campaigns should be launched, particularly targeted at better-off town residents who are amongst some of the biggest investors in property. As well as warning of the implications of the continued use of timber and woodfuel, these campaigns should promote the use of alternative construction and energy technologies. Incentives to encourage this group to use alternative technologies should be explored, in consultation with traders and suppliers. A possible starting point would be to raise awareness of these issues amongst UN and NGO workforces, many of whom are moving into property as a result of their new employment opportunities.

Supporting livelihoods

9) Although it is a constant struggle to find new ways of supporting livelihoods in the current context, in particular IDP livelihoods in a highly saturated labour market, successful interventions will help to reduce the fallback strategy of collecting and trading in timber and woodfuel. One option to explore is large-scale cash-for-work projects that provide temporary employment and much needed cash. Such projects could help to build and maintain urban infrastructure that is creaking under the pressure of such rapid and unplanned urban growth, and could be used to regenerate Darfur's environmental resources. Building awareness and capacity to use alternative energy and construction technologies during the current crisis should also be built into programming with a view to supporting future return and reconstruction.

10) Building on the work begun by the D-JAM process, as far as possible interventions to support livelihoods in Darfur need to be planned with a

long-term strategic perspective that will guide short term programming. This requires a fundamental change of perspective away from short-term planning frames, to simultaneously pay attention to longer term dynamics. Eventually, a strategy that takes account of longer term processes of climate change, reconstruction and urbanization needs to be developed in order to support livelihood adaptations.

Practices of international organizations

11) Responsible international organizations have a duty to assess the environmental impact of their practices, both in terms of their presence in Darfur and infrastructure requirements (e.g. buildings), and in terms of their programming. This should include assessing the impact of their current practices on demand for timber and woodfuel using the analysis provided in this report to understand the most damaging sources of deforestation. They should make use of alternative technologies (both construction and energy) as much as possible, and should ensure that they are taking action to replace the forest resources they are using. This recommendation applies as much to UNAMID as it does to international humanitarian agencies[34].

Environmental governance

12) There are a number of local level agreements between different livelihood / ethnic groups, often negotiated to sustain livelihoods and to gain access to key resources, whether it is grazing, forest resources, or access to markets. These agreements should be sensitively explored to understand the implications for environmental governance, how much this has been a driver behind seeking agreement, and the extent to which these agreements may offer the seeds for future and sustainable environmental governance. In view of the fragility of these agreements, yet the crucial role that they can play, this kind of research must be done very carefully and responsibly, initially on a low key basis. Other ways of promoting inclusive dialogue between livelihood groups currently competing for access to forest resources must be explored. Once again this requires great sensitivity and skills, excellent local analysis to ensure inclusiveness, and long-term commitment to find ways of promoting future sustainable forest management in Darfur.

Although this is a demanding list of recommendations, they must be seen against the consequences of further deterioration of the natural resource base that supports Darfur's economy. Many Darfuri stakeholders are ready to act and are looking for support. As the international community becomes more aware of the environmental consequences of the conflict and of their own actions, the time is ripe to move on to a better-informed and better-funded programme of action that will halt the environmental degradation currently taking place.

[34] This is immediately relevant to the strategic themes that are to be prioritised in the 2009 UN work plan, as mentioned above.

Acronyms

AMIS	African Union Mission in Sudan
DFID	Department for International Development (UK)
ENTEC	Environmental Technology Task Force (Darfur)
FNC	Forestry National Corporation
IDP	internally displaced person
(I)NGO	(international) non governmental organization
LPG	liquid petroleum gas
RCO	Resident Coordinators Office (UN)
SAF	Sudan Armed Forces
SECS	Sudanese Environmental Conservation Society
SLA	Sudan Liberation Army
UNAMID	United Nations and African Union Mission in Darfur
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNJLC	UN Joint Logistics Centre
UNOPS	UN Office of Project Services
VAM	Vulnerability Analysis and Mapping (WFP)
WFP	World Food Programme

References

Bromwich, B. (2008) "Environmental degradation and conflict in Darfur: implications for peace and recovery" in *Humanitarian Exchange*, June http://www.odihpn.org/documents/humanitarianexchange039.pdf

Buchanan-Smith, M., and Fadul, A.A. (2008) *Adaptation and Devastation: the Impact of the Conflict on Trade and Markets in Darfur,* Tufts University, http://fic.tufts.edu/?pid=83

Buchanan-Smith, M., and Jaspars, S. (2006) *Conflict, Camps and Coercion: the Continuing Livelihood Crisis in Darfur*, Report for WFP, Khartoum, June

COMAC Ltd (2008) *Alternative Building Technologies for Darfur. A Technical Appraisal/ Assessment Report,* April

Couteaudier, T.Y. (2007) *Export Marketing of Sudanese Gum Arabic*, Multi Donor Trust Fund-National, MDTF-N-3, World Bank, Khartoum. http://siteresources.worldbank.org/INTAFRMDTF/Resources/gum_arabic_policy_note_final.pdf

El Fateh Osman Adam (2007) *Interagency Livelihoods Assessment in Abu Shouk, Al Salam and Zamzam IDP Camps. North Darfur – El Fasher. Final report.* Coordinated by North Darfur Assessment Task Force, November

Morton, J. (1985) *A Darfur Compendium. A Review of the Geographical, Historical and Economic Background to Development in the Region*, HTSPE, reissued 2005

ProAct Network (2008) *Assessing the Effectiveness of Fuel Efficient Stove Programming: a Darfur-wide review*, report prepared for CHF International, July, Draft

Tearfund (2007) *Darfur: Relief in a Vulnerable Environment,* www.Tearfund.org/darfurenvironment

UNEP (2007), *Sudan Post-Conflict Environmental Assessment*, http://postconflict.unep.ch/publications.php?prog=sudan

WISDOM–East Africa, *Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) Methodology, Spatial Woodfuel Production and Consumption Analysis of Selected African Countries*, prepared by R. Drigo for the FAO Forestry Department – Wood Energy, August 2005, www.fao.org/docrep/009/j8227e/j8227e00.htm

Women's Commission for Refugee Women and Children (2006), *Finding Trees in the Desert: Firewood Collection and Alternatives in Darfur*, New York: Women's Commission www.womenscommission.org/pdf/df_fuel.pdf p1

World Bank (2007) Darfur. *Dimensions of Challenge for Development. A Background Volume*, June

Young, H., A. M. Osman, et al. (2005). *Darfur - Livelihoods under Siege*, Medford, Feinstein International Famine Center, Tufts University. http://fic.tufts.edu/downloads/darfur_livelihoods_under_seige.pdf

Young, H, A.M. Osman, Buchanan-Smith, M. and Bromwich, B (2007). *Sharpening the Strategic Focus of Livelihoods Programming in the Darfur Region. A Report of Four Livelihoods Workshops in the Darfur region* http://fic.tufts.edu/downloads/DarfurLivelihoods.pdf

Young, H. A M Osman et al. (2008) *Livelihoods, Power and Choice: the Vulnerability of the Northern Rizaygat of Darfur, Sudan*, Feinstein International Famine Center, Tufts University

Annex 1. Stakeholders interviewed

Stakeholder	Nyala	El Fasher	El Geneina	Zalingei
Timber merchants	X	X	X	X
Firewood/ charcoal merchants	X	X	X	X
IDPs trading in timber/ firewood/ charcoal	X Kalma and Direij camps	X Abu Shouk	X Abuzar camp (Kayongat market)	X Hamadia camp
Owners of brick kilns	X	X	X	X
Owners of bakeries	X			X
Owners of sawmills and carpentry workshops	X	X	X	X
FNC and other government officers	X	X	X	X
Staff of NGOs and UN agencies	X	X	X	X

Annex 2. Darfur's main tree species, their uses and distribution in Darfur

Species	Vernacular names	Uses	Major distribution areas
Anogeissus leiocarpus	Sahab(A), Dairo (F)	Construction, firewood, charcoal	Jebel Marra, Wadi Salih, Mukjar, Zalingei, Buram and Dein
Acacia senegal	Hashab (A), Saei	Gum arabic, fire wood, charcoal and construction	All over Darfur
Balanites aegyptiaca	Heglig (A), Daei (F)	Furniture, charcoal, firewood, fruits and fodder	Wadi Salih, Nyertete, Zalingei, Mukjar, Kass and Umdukhun
Combretum spp.	Habeel(A), Dofei (F)	Building poles and firewood	Jebel Marra
Ziziphus spina-christi	Sidir or Nabak (A), Numang (F)		Jebel Marra, Wadi Salih, Mukjar, Zalingei and Habila
Terminalia laxiflora	Daroat (A),	Building poles, fumigation, firewood	Jebel Marra, Adeela and Dein
Acacia nilotica	Sunut (A), Fedden (F)	Furniture, firewood, charcoal and fruits	South and West Darfur
Cordia africana	Gimbeel (A), Nanoo (F)	Furniture	Jebel Marra, Wadi Salih, Mukjar, Zalingei, Bindisi and Sulo
Khaya senegalensis	Mahogany (A), Buru (F)	Furniture	Jebel Marra, Wadi Salih, Mukjar, Zalingei, Garsila, El Geneina, Sulo,
Ficus sycomorus	Gimaiz (A) Buro (F)	Furniture, fodder and fruits	Jebel Marra and Wadi Salih
Albizia amara	Arad (A), Numtie	Charcoal and firewood	All over West Darfur
Dalbergia melanoxylon	Abanoos(A), Sambil (F)	Furniture, firewood and building poles	SouthDarfur, Jebel Marra and Donkey Diresa
Acacia polyacantha	Kakmoot	Firewood and building poles	Jebel Marra, Bindisi and Sulo
Terminalia brownii	Subag (A), Difoan (F)	Building poles, fumigation and firewood	South and West Darfur
Dichrostachyos cinerea	Kada (A), Gereng(F)	Firewood, charcoal, building poles	Jebel Marra, Zalingei, Garsila
Azanza garckeana	Jugjug (A), Merrah (F)	Fruits, firewood	Jebel Marra
Acacia albida	Haraz (A), Gurul (F)	Furniture, fodder, fruits	West and South Darfur
Acacia seyal	Taleh (A), Tari (F)	Gum, firewood, charcoal and poles	Jebel Marra, Wadi Salih, Mukjar, Zalingei, Garsilia, El Geneina, Sulo,
Diospyros mespiliformis	Jugan (A) Durri (F)	Furniture and poles	Jebel Marra, Wadi Salih, Mukjar, Zalingei, Garsila, and Bindisi,
Cupressus lusitanica	Saru	Furniture and building poles	Jebel Marra
Albizia aylmeri	Surooj (A)	Furniture	Jebel Marra
Oxytenanthera abyssinica	Genna	Construction	Umdukhun
Sclerocarya birrea	Himeid (A) Tua (F)	Furniture, fodder and fruits	South Darfur and Jebel Marra, Buram
Commiphora africana	Gafal (A), Beeri (F)	Furniture	Jebel Marra and East Darfur
Adansonia digitata	Tabaldi (A)	Fruits and robes	South Darfur
Hyphane tebaica	Dom (A)	Fruits, building poles, robes	South Darfur (Kass and Nyala)
Tamarindus indica	Ardeib (A) Bari (F)	Fruits	West and South Darfur
Borassus aethiopium	Delaib (A)	Building poles and fruits	Kabar, Umkhair, Bindisi
Grewia tenax	Gideim (A) Sabul (F)	Fruits	Kass and Shataya
Boswellia papyrifera	Rutrut (A) Durtu (F)	Furniture, agriculture implement handles, gums	Jebel Marra, Zalingei, Garsila, Mukjar, Garsila and Goz dango
Psedocedrella kotchyii	Sandal rodom (A)	Furniture, firewood and fumigation	Buram, Kateela and Radom
Magnifera indica	Mangoes	Furniture and fruits	Zalingei, Wadi Salih, El Geneina,Jebel Marra, Morni
Eucalyptus sp.	Ban or Kafoor	Furniture, building poles and firewood	Jebel Marra, Zalingei, Mukjar, Umdukhun, Sulo and El Geneina
Azadirachta indica	Neem	Furniture, building poles	All over Darfur
Acacia mellifera	Kitir (A)	Firewood and charcoal	South and West Darfur
Acacia tortilis	Sayal	Firewood, charcoal, building poles	North Darfur
Ailanthus sycomorus	Arkaweet (A)	Picture frames, paper industry, ply wood and firewood in extreme scarcity	Exotic tree, but almost naturalized in Darfur
Ailanthus excelsa	Kebreet (A)	Mainly used as sawn timber for doors and window frames by poor people (not durable and therefore less expensive). Also used in paper industry and for plywood etc.	Exotic tree now naturalized in Sudan and widely distributed in all 3 states of Darfur
Dalbergia sisso	Siso (A)	Timber for furniture due to its decorative look	Native tree of India, introduced as a plantation tree in Jebel Marra, around Zalingei and also south-west Nyala

(A) Arabic, (F) Fur. Source: Dr Abuelgasim Abdulla Adam, University of Zalingei

Annex 3. A note on Darfur's forest resources

The extent and coverage of Darfur's forest resources are directly related to rainfall. Thus, broadly speaking they are more abundant in the south than in the north. At a greater level of complexity, the D-JAM divided Darfur into six major ecological zones with a number of sub-zones which determined land use patterns and livelihood strategies before the conflict. These also determine the extent and type of forest resources. However, as documented by numerous studies and authors, forest cover across Darfur has been greatly affected by human activity, especially by the extension of agricultural cultivation.

Morton (1985) explains how this can make the difference between grassland savannah where there is little or no bush or tree cover remaining (for example in some *qoz* areas around El Fasher or Mellit in North Darfur), to thorn and woodland savannah. In thorn savannah there are larger acacia species such as kitir (*Acacia mellifera*) and hashab (*Acacia senegal)* (for example, in the Shearia area north of Nyala); in woodland savannah there are also broad-leaved tree species such as darawt (*Terminalia maxiflora*) (for example in the south-west of South Darfur). Jebel Marra, the volcanic massif that greatly influences Darfur's weather patterns, has its own specialized ecology on account of its altitude and higher rainfall. This is classified as montane woodland savannah (ibid), and as noted above, is one of the main areas of forest resource in Darfur.

Annex 4. Main timber markets: Nyala, El Geneina, El Fasher and Zalingei

Town	Pre-conflict - 2002	2008
Nyala	Souq El Fasher (oldest established timber market) Souq El Geneina Souq Ashabi (established 1984) Zareba Elmawashi Eljabel	Same as pre-conflict in town. NB Souq El Geneina and Souq Ashabi grown most New markets in IDP camps
El Geneina	Sharq Musteshfa* Souq Ardamata* Souq Aljamia Souq Alestat Al Reyad (also called Alzareiba) Souq Um Jamaina * main timber markets	Same as pre-conflict New markets in IDP camps: • Kayongat camp (forestry reserve market) • Al Reyad camp • Ardamata camp • Kerinding camp
El Fasher	El Mewashie – timber for building – main market Ummdufasou Khorsayal (moved from Hajar Gaddo in 2006; now a livestock and timber market) El Wakala – charcoal & firewood	Same as pre-conflict New markets in IDP camps: • Abu Shouk camp (now 2nd biggest timber market) • Zam Zam camp – especially firewood and charcoal
Zalingei	No timber market. Timber trading managed by FNC	Souq Toro Markets inside IDP camps

Annex 5. A note on livelihoods and non-timber forest products

The collection, domestic use and sale of non-timber forest products have long been part of the livelihood strategies of different groups in Darfur, especially the rural poor. This includes cutting grass for thatch, and collecting fruits, gums, resins and medicinal plants. For example, the fruits of mukheit (*Boscia senegalensis*) and haraz (*Faidherbia albida*) are used as flour to prepare assida (millet porridge) in Darfur.

Other wild fruits that are widely harvested and sold in local markets include jugjug (*Azanza garckeana*), gimbeel (*Cordia Africana*), heglig (*Balanites aegyptiaca*), sidir (*Ziziphus spina-christi*), humeid abeyad (*Ximenia Americana*), giddaim (*Grewia tenax*) and ardeib (*Tamarindus indica*), in addition to resin tapping especially from rutrut (*Boswellia papyrifera*).

Exploring the role that these non-timber forest products now play, since the conflict began, in the livelihoods of rural people was beyond the scope of this study. Overall, it is highly likely that the collection and use of wild fruits and medicinal plants has fallen as so many of the displaced and those living in towns and villages now have limited access to rural areas. However, there is evidence that those who have some access to rural areas have become increasingly dependent on collecting and selling grass as a source of livelihood (see, for example, Buchanan-Smith and Jaspars, 2006). Some of the important species of grass are buruni (*Hyparrhenia spp.*) and marhabeib (*Cymbopogon spp.*) which are used for thatching huts and making mats; mugshasha (*Pogonarthria squarrosa*) is used for making brooms for sweeping.

Gum arabic from the hashab tree (*Acacia senegal*) has been one of Darfur's most important exports for many decades. Even before the conflict, however, production and exports had been declining for many years, partly due to the marketing arrangements for gum arabic in Sudan which have had a negative impact on producer prices, and partly due to lack of investment in research and other activities to boost production (Couteaudier, 2007). The impact of the conflict has crippled Darfur's production and trade in gum arabic (Buchanan-Smith and Fadul, 2008).

Annex 6. ENTEC studies, members and strategy

The ENTEC studies have been developed collaboratively in order to produce a strategy for technology transfer with strong Darfuri ownership and good technical leadership drawing on local and international best practice. The studies are as follows:

1. Review of existing Darfuri alternative construction programming
2. Assessment of options for introduction of new construction technology
3. Social and economic study for new energy and construction technology
   a. Cost analysis
   b. Livelihood analysis
   c. Trade analysis (this study)
4. Assessment of options for introduction of new energy technology
5. Assessment of scale up LPG as an alternative to woodfuel
6. Stakeholder database of organizations work in on ENTEC agenda
7. Legal framework for alternative construction technologies

For all the studies the scope is Darfur except for study 5 which will be a nation-wide study. UN-HABITAT are leading work on studies 1, 2, and 7. UNEP are leading on studies 3, 4 and 5. RCO are maintaining the database for study 7. This study (3c) is the first study to be completed.

ENTEC is co-chaired by UNEP (energy lead) and UN-HABITAT (construction lead). Other regular members of the group include:

- University of Al Fasher
- University of Zalengei
- Nyala University Peace and Development Centre
- Sudanese Environmental Conservation Society
- UNDP
- RCO
- UNJLC
- UNOPS
- DFID
- Practical Action

The overall strategy of ENTEC is to:

- undertake studies and develop guidelines for best practice
- partner with Darfuri organizations to implement pilot demonstration projects
- raise awareness and provide technical support through workshops and appropriate literature
- collaborate with NGOs, local organizations and the private sector for extension work and scale up.

The strategy for the brick industry has been developed around the identification of four discreet sectors within the construction industry.

Construction industry category	Opportunities	ENTEC Strategy
1. Construction directly procured by UN / NGO	UN / NGOs could specify alternative construction used in procurement contracts	Complete studies, advocacy for code on best practice for UN/NGOs in Darfur
2. Current thriving private sector	Many IDPs employed on casual basis – a group that can be trained and have current economic incentive for activity Unparalleled presence of livelihood programming capacity in Darfur	Livelihoods programming to train IDPs & private sector in construction with alternative technologies
3. Future construction industry at time of village reconstruction	Opportunity exists to train population in these technologies while displaced and working on categories 1 & 2	Aggressive promotion of technology in categories 1 and 2. Awarin order to build capacity for category 3
4. Temporary shelter.	International presence to support promotion of best practice for environmental management of camps	IAwareness raising Advocacy

Annex 7. List of Contributors and Acknowledgements

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Margie Buchanan-Smith is an independent consultant and policy researcher. She worked with the Darfur Regional Government for two years between 1987 and 1989, as Agricultural Economics Adviser to the Agricultural Planning Unit, during which time she initiated and designed a drought early warning system for North Darfur and carried out a study of the grain market throughout the region. She led a WFP livelihoods study in 2006 (*Conflict, Camps and Coercion: The Continuing Livelihoods Crisis in Darfur*), and in 2007 co-facilitated with Tufts University a series of workshops in Darfur on livelihoods programming. With Dr Abduljabbar she carried out a scoping study in 2007/ 08 of the impact of the conflict on trade and markets in Darfur (*Adaptation and Devastation: the impact of the conflict on trade and markets in Darfur*). Margie has held research fellowships at the Institute of Development Studies, University of Sussex, and at the Overseas Development Institute where she was also Coordinator of the Humanitarian Policy Group. In the mid-1990s she was Head of the Emergencies Unit at ActionAid. A number of her other publications focus on Darfur. In 1995 she co-authored a book on *Famine Early Warning and Response—the Missing Link*.

Abuelgasim Abdalla Adam is Dean of the Faculty of Forestry Sciences and Associate Professor of Forestry, University of Zalingei. He holds a PhD from the University of Khartoum where his thesis was 'Some Aspects of Ecology and Management of Boswellia papyrifera Del. (Hochst) In Jebel Marra Mountain area, Darfur; Sudan', and a Master's degree from the Dresden University of Technology where his thesis was 'Ecological Aspects and Dynamics of selected Woody Plant Formations in Jebel Mountain area, Darfur; Sudan'. During 2000 and 2001 he was Director of the Centre for Peace and Development Studies (CPDS), University of Zalingei. His work on recent studies in the humanitarian context includes "Darfur: relief in a vulnerable environment" Tearfund 2007, and coordinating field research for a major assessment of fuel efficient stove programming with ProAct Network and CHF awaiting publication. Prof Dr Abuelgasim has led and participated in numerous workshops and seminars including: Protection, assistance and training to the displaced women of Darfur UNDP and CPDS, January 2006; Adaptation to climate change HCENR, February 2005; Rule of law and human rights IRC/UNDP, March 2005; Conflict Resolution and Peace Building, Zalingei UNDP and CPDS, May 2005; National forum on Combat of Desertification, Institute of Desert Studies and Desert Cultivation, University of Khartoum, March 2004.

Brendan Bromwich coordinates UNEPs work on environment and water resources in Darfur. The work includes a combination of field research, analysis, advocacy and technical support to the wider UN led humanitarian response. His work on Darfur includes contribution to UNEP's Sudan Post Conflict Environmental Assessment, co-authoring "Water resource management in humanitarian programming in Darfur: The case for drought preparedness" UNEP 2008, "Darfur: relief in a vulnerable environment" Tearfund 2007 and "Sharpening the Strategic Focus of Livelihoods Programming in the Darfur Region" in collaboration with Tufts University in 2007. He established a task force for the introduction of alternative construction and energy technologies in Darfur comprising Darfurian universities, UN and NGOs. Brendan has worked on or in Darfur since 2004 initially on the delivery of community-based water and sanitation projects. Prior to his work in Darfur he has worked on strategic planning, environment and water engineering in China, Central Asia, Oman, UK and Ireland. He holds a Master's degree in Civil and Environmental Engineering from Imperial College London.

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