Safe Access to Firewood and Alternative Energy in Uganda: An Appraisal Report

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List of Acronyms

AAH	Aktion Afrika Hilfe
ABEK	Alternative Basic Education Karamoja
CBPP	*Contagious Bovine Pleuropneumonia*
CP	Country Programme
CPA	Sudan Comprehensive Peace Agreement
DRC	Democratic Republic of Congo
EMOP	Emergency Operation (WFP)
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FES	Fuel-Efficient Stove
FFT	Food for Training
FFW	Food for Work
GBV	Gender-Based Violence
GFD	General Food Distribution
GoU	Government of Uganda
IAP	Indoor Air Pollution
IASC	Inter-Agency Standing Committee
IDP	Internally Displaced Person
KDDP	Karamoja Disarmament and Development Plan
LPG	Liquid Petroleum Gas
LRA	Lord Resistance Army
NAPA	National Plan of Adaptation (Uganda)
NGO	Non-Governmental Organizations
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OPM	Office of the Prime Minister
PDM	Post Distribution Monitoring
PPR	*Peste de Petits Ruminants*
PRRO	Protracted Relief and Recovery Operation (WFP)
SAFE	Safe Access to Firewood and Alternative Energy
SF	Supplementary Feeding
STF	Straight Talk Foundation
TF	Therapeutic Feeding
UGX	Ugandan Schillings
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children Fund
USD	United States Dollar
WFP	World Food Programme

Executive Summary

In 2007 WFP agreed to co-chair the Inter-Agency Standing Committee (IASC) Task Force on Safe Access to Firewood and Alternative Energy in Humanitarian Settings (SAFE) together with UNHCR and the Women's Refugee Commission (which worked under the authority of InterAction). Participation in Task Force SAFE triggered a global analysis of the protection challenges associated with the collection, provision and use of fuel for cooking – activities closely related to WFP's core mandate. As a result, WFP strengthened its commitment to work in partnership with other relevant actors to promote safe access to fuel in humanitarian settings.

Following the launch of the SAFE guidance material in April 2009, WFP decided to undertake two feasibility studies in North Darfur and Uganda, where fuel scarcity is negatively affecting WFP beneficiaries. The purpose of these studies is to better understand how beneficiaries are coping with fuel scarcity and the related consequences, to take stock of existing responses by both WFP and partners, and to propose a comprehensive approach that addresses human and environmental protection, livelihoods, food and nutrition.

1.1 Main Findings

In Uganda, over 90% of household energy is derived from biomass (firewood and charcoal). Most of it is used for cooking, at times in combination with other types of energy such as electricity. Charcoal is the predominant source of energy used in urban settings, while firewood is more common in rural areas. At the time of the mission, LPG supply and use in Uganda was very minimal and limited to middle-class town residents, mostly in Kampala.

Refugees in Nakivale and populations in Karamoja rely on woodfuel both for their household cooking requirements and as a livelihood option. In **Nakivale**, the recent increase in the population in the settlement has dramatically accelerated the pace of deforestation around the camp, and women refugees are required to walk further to collect firewood for cooking and household purposes. In addition, tensions with nationals over access to dwindling resources such as land, water and wood have increased.

The fourth consecutive year of drought in **Karamoja** has severely constrained traditional livelihood options – i.e. pastoralism and agro-pastoralism – with charcoal production being the main 'fall-back' alternative.

A recent assessment estimated that half of the population in Moroto (**Karamoja**) is engaged in the sale of forest products (firewood and charcoal) to meet their household income requirements.

In both regions, firewood collection is a household chore traditionally carried out by women and children, often associated with grave protection risks. Chasing and raping of women and children during collection was commonly reported in both Nakivale and Karamoja. Moreover, firewood collection is a time-consuming endeavour, not only because distance to the supply source is increasing, but also because women often take the opportunity of being in the bush to search for wild

foods and construction material. The longer the time spent in the bush, the higher the risk of being attacked. The dearth of agencies specialized on protection on the ground in Uganda makes it difficult to fully grasp the extent of gender-based violence associated with firewood collection. However, first-hand accounts from women in both regions suggest that humiliation and abuses have reached an alarming scale.

Harvesting firewood for cooking fuel also contributes to deforestation, soil erosion and loss of agriculture and grazing environments, with serious impacts on livelihood opportunities in agriculture and forestry.

Smoke is another issue of concern in both locations. Indoor air pollution caused by burning solid fuels such as firewood and charcoal is a major cause of death worldwide, and respiratory and eye infections were reported in both regions studied in Uganda. In addition, black carbon emissions from biomass fuels are a major source of global climate change. In Nakivale and Karamoja, the amount of smoke produced by cooking fuel was visibly higher when a three-stone fire as opposed to a stove was used.

To address the problem of wood scarcity, women often resort to negative coping mechanisms such undercooking their meals -- especially pulses and cereals that reportedly take a long amount of time to cook -- reducing the number of meals per day, and even selling part of their food ration to buy firewood.

Interventions aimed at ensuring safe access of populations to cooking fuel have been limited in both regions. Some noteworthy efforts include the dissemination of fuel-efficient stoves to households and schools, tree planting and the creation of woodlots. In addition, some programmes have focused on the creation of alternative income generation activities to reduce people's reliance on exploitation of natural resources as a livelihoods activity. To date, however, such projects have been mostly ad hoc and limited in scope.

1.2 Proposed approach

WFP proposes a comprehensive approach for ensuring safe access to cooking fuel among the populations of Nakivale and two districts of Karamoja (Moroto and Kotido). The focus will be on physical and environmental protection, and promotion of alternative (i.e.: non-woodfuel intensive) livelihoods options. The approach will seek to build upon WFP's comparative advantages in Uganda, most notably a deep field presence in both Nakivale and Karamoja and the capacity for innovation. WFP's dual humanitarian and development mandates provide a window of opportunity for increased investment in a wide array of activities, from lifesaving food distribution to restoration of the livelihoods of vulnerable populations, through, for example, construction of watershed infrastructure, tree planting and enhancement of agricultural productivity and trade.

WFP plans to adopt a **two-pronged strategy** that focuses on: 1. Reducing the vulnerability of women to protection risks through the dissemination of fuel-efficient stoves and sensitization on food preparation and energy-saving cooking practices, while reducing environmental degradation through the creation of woodlots and tree planting; and 2. Strengthening and diversifying livelihood options through food-producing activities (for e.g. cassava and sorghum multiplication and rice cultivation) and watershed management in arid zones of

Karamoja. Finally, WFP will continue engaging experts and the private sector in piloting new technologies to help communities meet basic fuel needs and to generate livelihood opportunities that are less risky and more eco-friendly.

2 Introduction

2.1 Background

The IASC Task Force on Safe Access to Firewood and Alternative Energy in Humanitarian Settings (SAFE) was created in March 2007. Its purpose was "*to reduce exposure to violence, contribute to the protection of and ease the burden on those populations collecting wood in humanitarian settings worldwide, through solutions which will promote safe access to appropriate energy and reduce environmental impacts while ensuring accountability*." The Task Force was co-chaired by UNHCR, WFP and the Women's Refugee Commission (which worked under the authority of InterAction). In addition, fourteen other IASC member and non-member agencies participated and contributed to the development of guidance material on how to develop a coordinated, multi-sectoral fuel-strategy in humanitarian settings.

During its time as co-chair of the Task Force, WFP conducted a survey of more than 20 countries across Africa, Asia and the Americas to map out how firewood and cooking fuel have an impact on food and nutrition. The survey revealed that people often resort to negative coping mechanisms to cook WFP food. These include forcing women to collect firewood in dangerous environments, exposing them to rape and other forms of gender based violence; under-cooking food to save on fuel; and/or selling part of their rations to buy firewood or pay for milling costs.

In addition to exposing people to violence – especially women and young girls – these coping mechanisms are in many cases limiting the intake and nutritional absorption of WFP rations, reducing the impact of food assistance on relieving hunger and fighting under-nutrition.

Harvesting firewood for cooking fuel can also contribute to deforestation and the loss of important natural resources. In addition to the increased distance women and children have to travel to find available firewood and the increased exposure to risk of attack, environmental degradation also limits long-term livelihood opportunities in agriculture and forestry. As the linkages between climate change and food insecurity become more evident, the sustainable use of forests and natural resources is more critical.

WFP's interest and involvement in ensuring safe access to appropriate cooking fuel has many facets: protection and safety of beneficiaries; effectiveness of food and nutrition interventions; and mitigation of and adaptation to climate change.

To address these challenges, WFP decided to undertake two feasibility studies in North Darfur and Uganda, where fuel scarcity is negatively affecting WFP beneficiaries. The purpose of these studies is to understand how beneficiaries are coping with fuel scarcity and the related ramifications in the two contexts; to take stock of existing responses by both WFP and partners; and to propose a comprehensive approach to addressing cooking fuel needs that addresses human and environmental protection and recovery, livelihoods, food and nutrition.

This report provides the basis for a WFP project on safe access to fuel and alternative energy in Uganda.

2.2 Methodology

In preparation for the mission, the team[1] conducted an extensive desk review based on the material contained on the website of a network created by the SAFE Task Force, the International Network on Household Energy in Humanitarian Settings (www.fuelnetwork.org), other studies on household energy interventions in humanitarian settings, and relevant WFP policies and guidance material. A framework of analysis and a set of questions were developed to guide focus group discussions and interviews with key informants in the field.

During the mission, meetings were conducted with WFP country and sub-office representatives as well with a wide range of relevant stakeholders, UN agencies, NGOs, donors and government representatives. Several project sites were visited, which had been identified in collaboration with the country office for their relevance to the study. In addition, the team conducted focus group discussions with women in both Nakivale and Karamoja. In Nakivale, special attention was paid to hearing from all nationalities and ethnicities present in the camp. The information laid out in this report was complemented by additional studies and reports as well as technical data gathered during the mission.

The specific focus of the mission was to gather information in order to facilitate the analysis of the current situation with regard to access to firewood and other household energy sources and the identification of concrete project opportunities for WFP and its partners.

Finally, the partnership with the Women's Refugee Commission and GTZ contributed valuable technical expertise and experience on household energy and possible cooking devices.

2.3 Situation analysis

Uganda is a landlocked country bordered on the east by Kenya, on the north by Sudan, by the Democratic Republic of Congo (DRC) on the west, and by Rwanda and Tanzania on the south. It has an estimated population of 32.4 million of people, whose median age is 15 years old.

Civil conflict in the Acholi sub-region in the North and continued political instability and conflict in the neighbouring countries of Sudan and DRC have led to massive displacement and significant influxes of refugees seeking asylum in the West Nile and in the Southwest regions of the country. However, the peace talks between the Lord's Resistance Army (LRA) and the Government of Uganda (GoU) in the North in 2006, coupled with the Sudan Comprehensive Peace Agreement (CPA) in 2005, have increased the prospects for peace and stability, with great potential for return of refugees to their countries of origin.

Uganda is rich in natural resources, including fertile soils, regular rainfall, oil and gas. Of particular importance to this study is the discovery of some important oil resources in the country, which paves the way for a future shift from the use of biomass to LPG as cooking energy.

[1] The team comprised Mariangela Bizzarri, independent consultant who served as team leader, Catherine Bellamy, WFP Humanitarian Policy and Transition Unit (OEDP), Erin Patrick, Women's Refugee Commission, and Christa Roth, independent consultant representing GTZ.

2.3.1 Southwest: Nakivale Refugees Settlement

Nakivale Refugee Settlement is located in Insingiro district, southwestern Uganda, at some 60 km south of the town of Mbarara. It was first established in 1959 to accommodate Rwandan refugees of Tutsi origin fleeing the ethnic cleansing initiated by the Hutus. However, since its establishment, Nakivale has been hosting refugees of diverse origins.

Nakivale is the oldest and the biggest refugee settlement that currently exists in Uganda. It consists of 84 square miles of land divided in 16 zones (76 villages) on the basis of nationality and time of arrival. Land extension and dispersed dwellings make Nakivale more similar to a rural setting than to a refugee settlement. To an inexperienced visitor, Nakivale does not give the impression of a resource-scarce territory typical of other refugee settlements. Yet, according to informants fertile land is limited, while the rest is flat and sandy.[2]

At present, Nakivale is housing refugees of nine different nationalities: Ethiopia, Somalia, Eritrea, Rwanda, Democratic Republic of Congo, Sudan, Nigeria, Burundi and Liberia, for a total estimated population of about 50.000 people (Nov 2009).[3]

According to the Office of the Prime Minister (OPM) commandant, the population in Nakivale doubled in the last two years, mainly due to influxes of refugees from Eastern DRC. At present, the Congolese are the biggest group in Nakivale with approximately 30,000 people. Reportedly, the highest influxes of new refugees occur between October-December, when harvesting takes place in Eastern Congo and rebels attack villages to gain control over resources.

Under the Uganda Refugee Law, refugees living in settlements in Uganda are entitled to receive basic assistance, including food. All refugee families living in the settlement receive a plot of land from the Government, the size of which varies depending on family size[4]. Refugees are expected to use the land for residential and agricultural purposes. In addition, construction material, other basic non-food items needed for survival, food aid, education, health care, and support for livelihood activities (such as agriculture) are also provided.

After refugees have resided in the settlement for two years, their household food security situation is further assessed and decisions are made regarding the amount of continued assistance needed. The idea is that refugees do not rely forever on relief aid but will slowly attain self-sufficiency in food production.

In Nakivale, however, not all refugees are cultivating their land. Some populations, including Somalis, Ethiopians and Eritreans, lack the skills and interest to be engaged in agricultural-related activities, as they are typically pastoralists, traders or originate from urban centres. However, while the Somalis have by and large successfully managed to rebuild their livelihoods through the support received via remittances from the Somali diaspora[5] and by taking advantage of the pre-existing trading and business skills, Ethiopians and Eritreans, mostly of urban origins and without the economic support that the Somalis have, lag far behind.

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[2] FGD with refugees women and meeting with stakeholders in Nakivale, 17.11.2009.
[3] The total refugee population in Uganda is estimated by UNHCR to be around 140,000 (June 2009).
[4] The Uganda refugee law recognizes refugees the entitlement to land. The sizes of the plots allocated in Nakivale vary between 50 by 50 metres for households with less than four members, to 50 by 100 metres for those with four or more family members.
[5] FGD with refugee women and meeting with stakeholders in Nakivale, 17.11.2009.

Differences in economic status and power among refugees in Nakivale significantly affect the relationships that currently exist between different groups in the settlement. During discussions with refugee women, Somalis were reported to be employing other refugees, mostly women and children from other nationalities, particularly Congolese and Rwandans, for domestic and other type of work.

Refugees are not the only inhabitants of Nakivale. It is estimated that about 20,000 nationals are also living in the same area and benefiting from the services that are offered there, including education and health care. There are reports of animosity between nationals and refugees, as Ugandans living in the same area feel that they have been deprived of their land in favour of the refugees and marginalized by the Government as compared to refugees. Most tension is between long-standing refugees and nationals as both struggle to find access to dwindling land, water and forest resources. It is important to note, however, that both refugees and nationals are benefiting from the current arrangement. Refugees seek to improve their livelihoods by engaging in daily labour and trade with residents, while nationals have access to the services provided in the settlement and sell their products, including firewood and charcoal, to the refugee population.

2.3.2 Karamoja Region: Moroto and Kotido Districts

Karamoja is a chronically poor and food insecure region located in northeastern Uganda, comprising the five districts of Abim, Kaabong, Kotido, Moroto, and Nakapiripirit. It is characterized by semi-arid savannah, mountains and a difficult climate, suffering from frequent drought. Climate change is having devastating effects on the already fragile environment of the region. In the past few years there has been a combination of severe drought and late rains resulting in flooding and corresponding erosion of topsoil. Erratic rainfall, even during the rainy season (generally between April and August with marked peaks in May-June), has led to increased water shortages and reduced crop yields, and resulted in more food insecurity and worsening conditions for livestock.[6]

Other challenges include persistent insecurity due to prevalence of small arms and cattle raiding[7], poor infrastructure and limited capacity and presence of humanitarian organizations.

The region is divided in three livelihood zones: 1. The agricultural zone in the west; 2. The agro-pastoral zone in the centre; and 3. The eastern semi-arid pastoral zone. It is mainly in the pastoral far eastern part of the region that adverse climate conditions are prevalent. Agriculture is mainly practiced in the green belt area, which stretches from the Northwest to the Southwest of the region, at the border

[6] Since 2007 livestock in the region has been decimated by diseases such as the *peste de petits ruminants* (PPR), or goat plague, and *contagious bovine pleuropneumonia* (CBPP). http://www.ugandaclusters.ug/karamoja.htm. Accessed 27.11.2009.

[7] Cattle raiding is a traditional activity among pastoral groups in Karamoja. It was used to redistribute wealth and food in times of scarcity, acquire bride price, and to form alliances with other families. However, unimpeded acquisition of weapons, increasingly adverse weather conditions, and livestock diseases have radically transformed the practice of cattle rustling, from a regulated tradition under the control of the elders into a violent and uncontrolled war of all against all. For additional information on the traditional lives and livelihoods of Karamojong refer to: Elizabeth Stites, Darlington Akabwai, Dyan Mazurana and Priscillar Ateyo (2007), *Angering Akuju: Survival and Suffering in Karamoja – A Report on Livelihoods and Human Security in the Karamoja Region of Uganda*, Medford, MA: Feinstein International Center.

with Acholiland. However, the majority of the population, an estimated 1.2 million people[8], still subsists through agro-pastoral or purely pastoral livelihoods.

Traditionally, people in Karamoja lived their lives between small villages (*manyattas)* and mobile cattle camps (*kraals*), following the availability of water and pasture. Mobility was not limited to the regional boundaries within Karamoja, but has included crossing into neighbouring districts and countries (Kenya and South Sudan), often resulting in violence and raids.

Among the measures promoted by the Government in response to the high level of violence caused by cattle rustling was the creation of protected kraals (38 in total as of April 2009) as a means to safeguard livestock and restrict mobility and related violence during the Karamoja disarmament exercise.[9] Protected kraals have been partially successful in reducing massive cattle raids and improving access to veterinary services. However, livestock congestion, limited movement and the distance of the kraals from the manyattas has resulted in an increase in livestock diseases, land degradation due to stress on grazing areas and lack of access by communities to the animal products.[10] Hence, in June 2009 the Government decided to disband them while strengthening police and military presence and capacity along critical corridors in the region.

Another visible effect of the widespread and prolonged insecurity on the lives and livelihoods of the Karamojong population are the agglomerates of *manyattas* that the team witnessed during travel across Moroto and Kotido, in sharp contrast with the dispersed settlements previously common in Karamoja. According to informants, in addition to insecurity, a combination of restricted movement and loss of livelihoods, also due to drought, has led people to set up villages closer together and to migrate to town settings for both increased protection and better livelihood opportunities. As a consequence of insecurity and some population migration, farming and grazing activities have become concentrated in limited areas. In addition, the increased dependency on already-stretched wood resources for firewood collection and sell and for charcoal production as main livelihoods activities, has led to a high level of environmental degradation, increased risks of pests and a reduction in agricultural outputs, particularly over the last four years.

In recent years, some attempts have been made to address these challenges. Disarmament operations by the Government of Uganda, which began on a voluntary basis in 2001 and forcibly in 2006, experienced a new impetus with the launch of the Karamoja Integrated Disarmament and Development Plan (KDDP) in 2008 and the deployment of an increased number of security forces.[11] Meanwhile, greater attention to the region by both the Government and the international community, coupled with the decreasing needs in the neighbouring districts, has

[8] Source: WFP Karamoja.
[9] See below for more information on this.
[10] For further details on the opportunities and challenges of protected kraals see the findings of an inter-agency assessment conducted in April 2009 in: OCHA Special Report No. 4: Focus on Karamoja – January to June 2009. Also, for an analysis of the impacts of the disarmament process on the lives and livelihoods of the population in Karamoja see: Elizabeth Stites and Darlington Akabwai (2009), *Changing Roles, Shifting Risks: livelihood Impacts of Disarmament in Karamoja, Uganda.* Medford, MA: Feinstein International Center.
[11] In July 2009, the estimated number of police officers in the region reached 1,200, with expectations for a further increased in 2010. In addition, the 3rd division of the UPDF is headquartered in Moroto with full military brigades in four of the six districts of the region. OCHA (2009), *Regional Brief – Karamoja*, Kampala: OCHA. See also: OCHA Special Report No. 4: Focus on Karamoja – January to June 2009..

led to an increase in programmatic efforts and support for Karamoja.[12] Other important measures include increased support for agriculture-related interventions, provision of both static and mobile health and nutrition services to match the nomadic lifestyle of the population in Karamoja, and improved access to education.

In spite of these efforts, the situation in Karamoja is still that of an emergency. Arms continue to flow into the region, for example from neighbouring Kenya, fuelling insecurity. According to WFP estimates, 80 percent of the population (970,000 people) is highly food insecure.[13] The situation is expected to further deteriorate in 2009 due to the four consecutive years of drought in the region, and resulting reduction in crop yields and livestock productivity. Moreover, insecurity persists both in the form of cattle rustling and attacks during and after food distribution.[14] Of particular concern for this study are reports of women and children being chased and subjected to sexual assaults and other forms of violence during firewood collection, which will be discussed in more details in section 4 of this report.

To date, Karamoja is the only region in Uganda where armed escorts are required for movements along some insecure corridors.

2.4 Overview of WFP's assistance

WFP in Uganda is supporting an estimated 1.4 million people under its emergency, relief and recovery and development programmes.[15] The strategic framework of WFP's work in the country is outlined in a five-year Country Strategy (2009-2014), the overarching goal of which is to align with and support Government priorities as well as to empower communities to reach the hunger target of MDG1 and ensure long-term solutions to hunger in Uganda. The Strategy also reflects the approach of the WFP Strategic Plan (2008-2011), in particular the changing nature of WFP from a food aid to a food assistance agency, with a more nuanced and market-sensitive set of tools to address hunger.[16]

The emergency operation (EMOP) addresses the immediate and critical needs of drought-affected people in the poor and chronically food insecure region of Karamoja. Karamoja is the largest WFP's relief operation in Uganda and targets an estimated 1,130,000 people (about 94% of the entire population in the region). This is also the only region in which WFP continues its support to school-aged children through school feeding programme, currently under the framework of the WFP country programme.[17] The relief operation encompasses not only general food distribution but also supplementary and therapeutic feeding for moderately and severely malnourished individuals respectively.

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[12] At the time of the mission, GTZ was opening its office in Moroto, while other organizations, both UN agencies and NGOs, were considering increasing their presence and operational capacity throughout the region.
[13] WFP (2009), *EMOP 10811.0 – Background Document for Consultation on WFP's Portfolio in Uganda*, Kampala: WFP.
[14] For a more detailed account of protection concerns in WFP operations in Karamoja see: WFP (2008), *Protection in WFP Operations: Analysis of Activities in Karamoja, Uganda.* Rome: WFP.
[15] It is worth mentioning though that according to WFP staff in the country, this number is going to be drastically reduced in the coming months.
[16] WFP (2009), *Country Strategy for WFP in Uganda (2009-2014) – Third Draft.*
[17] WFP (2009), *Uganda Country Programme 10807.0 – Supporting Government-led Initiatives to Address Hunger in Uganda*, WFP.

The relief and recovery operation (PRRO)[18] focuses on internally displaced people (IDPs) and refugees in the northern and southwest parts of the country. WFP has been assisting IDPs since 1996 and refugees since 1988 through a combination of general food distribution and a wide range of food-for-work (FFW) and food-for-training (FFT) activities. The objective is to enhance people's resilience to shock and to restore lives and livelihoods.

Finally, the Country Programme (CP) concentrates on food and nutrition security, as well as agricultural and market support to small-scale farmer groups and the above-mentioned school feeding in Karamoja.

3 An overview of the current situation with regard to fuel in Uganda

This section analyses the main sources of cooking fuel, their availability and accessibility, including trade and prices, in both Nakivale refugee settlement and Karamoja. In Uganda, over 90% of the household energy is derived from biomass (firewood and charcoal).[19] Most of it is used for cooking, at times in combination with other types of energy such as electricity. Charcoal is the predominant source of energy used in urban settings, while firewood is more common in rural areas. At the time of the mission, LPG supply and use in Uganda was very minimal and limited to middle-class town residents, mostly in Kampala.[20]

3.1 Firewood

All women in **Nakivale** refugee settlement reported using firewood for cooking, with the exception of the Somalis who can afford to purchase charcoal.

Cutting trees is prohibited in Nakivale, and refugee women were very careful in reporting that they will only collect dead wood, such as for example branches of eucalyptus that are affected by termites. Some women reported trying to plant trees to replace exhausted resources.

> *It is impossible to cut trees, thus we wait for the wood to dry. Now, however, there are so many refugees that firewood collection is becoming difficult.*[21]

The price of firewood in the settlement varies between 3,000 and 5,000 UGX (about 1.60-2.60 USD) per bundle (about 10 sticks), which lasts for about 2-3 days, depending on the family size. Women generally collect their own firewood and they resort to purchasing it only when the amount collected is not enough to cover the family's cooking needs or when, for various reasons, they are unable to collect it (due to illness or injury, for example). Collecting firewood is a chore traditionally carried out by women and girls on a weekly basis along the valleys and in the remaining natural woodlots, averaging about a 2-3 hour walk from the villages.

[18] WFP (2009), *Protracted Relief and Recovery Operations – Uganda 10121.3*, WFP. WFP/EB.1/2009/9-A/2
[19] Meeting with the Ugandan Ministry of Energy and Mineral Development and Ministry of Water and Environment, 24.11.2009. Also, Uganda Bureau of Statistics: http://www.ubos.org/?st=pagerelations2&id=14&p=related%20pages%202:Energy. Accessed 25.11.2009.
[20] Ibid.
[21] FGD with women in Nakivale refugee settlement, 17 November 2009.

Prior to displacement, women reported using a variety of cooking devices ranging from a three-stone fire, to metal stoves, to the more sophisticated electric cooker, depending on their social and economic background and the country of origin.

The majority of new arrivals (for most part Congolese) reported cooking exclusively on three-stone fires, while those refugees who have been residing in the settlement for a longer period of time are more likely to use some kind of stove, often in combination with the three-stone fire. More observations on the dissemination, efficiency and uptake of stoves in both Nakivale and Karamoja are provided in the section on fuel-efficient stoves below.

In **Karamoja,** wood is a highly valued commodity primarily used for construction of manayattas and kraals and for cooking.

> *We use wood for fencing our animals and to protect them.*[22]

Wood is also a primary source of income. Impoverishment in the region, mainly due to physical insecurity and adverse climate conditions, has increased the reliance on natural resource exploitation, including woodfuel (both firewood and charcoal), water and wild foods. A bundle of firewood in Karamoja costs between 1,000 to 1,500 UGX (0,53-0,80 USD). Collection typically occurs at least twice a week, though some women in Moroto reported collecting firewood on a daily basis. In contrast to Nakivale, none of the women interviewed in Karamoja reported buying firewood. The women all collect it both for their own use and to sell.

3.2 Charcoal

Charcoal production is taking a terrible toll on the environment in both Nakivale and Karamoja. Charcoal brings valuable short-term income to people in rural areas, where access to and dependency on natural resources for livelihoods is higher. However, it is urban dwellers who are the main consumers of charcoal.

In **Nakivale**, it was reported that only nationals are engaged in charcoal production[23]. According to informants however, this in reality is most likely not the case, and refugees are variously involved in the activity as well. Charcoal producers are responsible for a considerable loss of natural forests in the area around Nakivale. Charcoal is made from greenwood and there is a licensing system that regulates both production and trade. This system in theory presents an impediment to the formal (and legal) engagement of refugees in this business. However, since law enforcement is admittedly problematic in Nakivale, it is difficult to know whether the licensing system is really followed, and by whom. What is important to mention, however, is the high level of awareness among women on existing regulations with regards to natural resource management and use. Women in focus group discussions expressed their fear of being arrested if caught cutting trees or producing charcoal.

Moreover, while indicating charcoal as their preferred cooking fuel as it is less smoky and does not cause respiratory problems to themselves and their children, women repeatedly said they are not using it, as its cost in the settlement is prohibitive. The licensing system, compounded with the increase scarcity of

[22] FGD with women in Karamoja, 21 November 2009.
[23] FGD with women and stakeholders in Nakivale refugee settlement, 17 November 2009.

charcoal due to reduced forest cover, may be responsible for the increase in the price of charcoal registered in the recent months.

In **Karamoja,** lack of livelihood options makes dependency on the selling of firewood and charcoal higher than in other parts of Uganda. The price of charcoal in Moroto and Kotido districts varies between 10,000 to 12,000 UGX (about 5-6 USD) per sack, peaking in the rainy season, when people engage in other activities and supply of charcoal diminishes. According to women, until a few years ago, selling firewood and charcoal mostly took place in the dry season. After four consecutive years of dry spells, however, it has been adopted as the main (if not the only) survival strategy.

Insecurity and poor road conditions make movement of commodities difficult in Karamoja, and most of the charcoal is sold within the region, with limited quantities transported to the neighbouring Soroti.

Charcoal takes between 4 to 7 days to be produced, depending on the quantity and distance to the location of burning. Both men and women produce charcoal in Karamoja. Men's contribution is critical in felling the large trees and following up the carbonization process. Insecurity impedes long staying in the bush, thus charcoal producers travel back and forth every day until the burning is completed and charcoal is ready for transport and selling. As charcoal production is an almost daily activity in the region, families produce an average of 3 bags of charcoal (50kg) per week.[24]

Women in Karamoja primarily use firewood for cooking and preserve charcoal to sell.

3.3 Liquefied Petroleum Gas (LPG)[25]

The supply and use of LPG in Uganda is minimal. While originally the gas was only available in Kampala, the combined efforts of the Government and of petroleum companies to encourage its use have contributed to greater availability of LPG in other areas of the country. More specifically, measures to promote the use of the gas in Uganda have included removing existing taxes, selling gas burners together with the LPG cylinder, and providing cylinders of different capacities. However, due in part to short supply, LPG remains unaffordable for most.

Like other petroleum products in Uganda, LPG is imported from Kenya. The gas is transported by road from a refinery in Mombasa to a depot in Kampala, from where cylinders are distributed to other areas. Transport costs are high and account for most of the final price, thus impeding a wider use of the gas. There are no major price differentials between the cost of LPG in Kampala and in other parts of the

[24] FGD with stakeholders in Moroto, 20 November 2009.

[25] LPG is a hydrocarbon gas popularly used as cooking fuel in many rural areas and developing countries. It comes in portable canisters of varying size, which can be re-filled from a main tank or at a refill station. LPG is typically well liked by its users, as it burns very cleanly (much more so than kerosene) and the temperature can be easily adjusted. In many areas, LPG is considered a high-status fuel. However, it is a pressurized gas and as such can be dangerous if improperly stored or used. Significantly safety and usage trainings and awareness-raising on risks associated with the use of gas-based fuels are required if LPG is to be introduced to populations that are not familiar with them. In areas where LPG is not locally produced, it is quite expensive. Transportation, storage and distribution costs can add to the total price. Source: SAFE TOT Trainers' Guide. For additional information on LPG's origin, production and uses refer to: http://en.wikipedia.org/wiki/Liquefied_petroleum_gas. Accessed 26.11.2009.

country, as most of the cost is determined by the transport from Kenya. At present, the refilling of a 15 kg cylinder is about 60,000 UGX (about 32 USD), while the price of the whole LPG appliance (cylinder and burner) is around 300,000 UGX (about 160 USD).[26]

At the time of the mission, two international oil companies, **Tullow Oil** and **Heritage Oil**[27], completed the exploration of newly discovered supplies of oil (and related synthesised gas, LPG) in the Lake Albert Rift Basin spanning Uganda and the DRC. A commercial development plan is now under development, which involves the establishment of a mini-refinery along Lake Albert and a pipeline for the transport of oil and gas to Kampala. Oil for local and regional energy and fuel requirements will be prioritized, while export is planned for the later phases, when a full basin development with a potential pipeline could be considered.[28] Activities are conducted on a "build-on-transfer" basis, according to which once the costs sustained by the companies for exploration, processing, infrastructure building and distribution are recovered; the rights to exploit the oil reserves will be transferred back to the Government.

Findings from the exploration process are encouraging. According to the companies' estimates, supply exceeds the overall fuel requirements of the Ugandan population (though it is not yet known for how long), with positive prospects of a shift to LPG for domestic use in the near future.[29]

4 Implications of the collection, supply and use of cooking fuel in Uganda

This section explores the concerns associated with the collection, supply and use of cooking fuel in Uganda. More specifically, emphasis has been placed on the following facets: protection and safety of beneficiaries; effectiveness of food and nutrition interventions; mitigation and adaptation to climate change; and promotion of sustainable and safe livelihoods options. These aspects have been selected for their relevance to WFP's programming and as entry points for possible future interventions by the organization.

4.1 Protection risks during firewood collection

Chasing and raping of women during firewood collection was commonly reported in both **Nakivale** and **Karamoja**. The distance women and children have to walk to reach the collection areas in both locations exposes them to risk of assault.

Women in **Nakivale** experienced incidents of robbery, sexual assaults and beating of themselves and their children during firewood collection. According to the refugee women interviewed, nationals are the primary perpetrators of such violence. Although tensions with nationals over access to the diminishing natural

[26] Ibid.
[27] 50% of the interest holds by Heritage in the region has been recently bought by the Italian Oil Company ENI, which will also take over the operatorship in the area. http://www.eni.com/en_IT/media/press-releases/2009/11/2009-11-23-Eni-buy-Heritage-interest-blocks-Uganda.shtml. Accessed 26.11.2009.
[28] http://www.tullowoil.com/tlw/operations/af/uganda/. Accessed 26.11.2009.
[29] Meeting with the Ugandan Ministry of Energy and Mineral Development and Ministry of Water and Environment, 24.11.2009.

resources have increased, it is difficult to independently assess whether attacks have been used purposely to prevent women from accessing available forest resources (or as a deterrence factor). Moreover, there is no evidence of any systematic targeting or monitoring of women's movement in around the settlement. Rather, according to respondents, attacks arise primarily as a result of perpetrators taking advantage of women's vulnerability and exposure while away from their villages and traditional protection mechanisms.

According to GTZ and International Medical Corps (IMC), out of the 10-11 cases of GBV reported in the settlement every month, 2-3 occur during firewood and water collection. Given the dearth of agencies specialized in protection issues on the ground in Uganda and their often limited capacity, it is difficult to quantify the precise level of GBV that is taking place in either Nakivale or Karamoja. In Nakivale for example, IMC has only 3 staff working on this issue, thus it is reasonable to expect the number of cases reported to be lower than the actual number of occurrences.

Moreover, reporting on GBV varies greatly between new arrivals (about 20.000 people) and long-standing refugees. One of the reasons for this discrepancy may be that new arrivals are often not aware of the reporting and referral mechanisms in place in the settlement and they have not yet been sensitized on GBV issues. As a result, the reporting rate from new arrivals is usually low.

According to government officials, most GBV cases are not reported. This was further corroborated by women in the settlement who expressed fear of reprisal and even repatriation if reporting cases of assault perpetrated by nationals. Impunity and lack of follow-up by the authorities are further impediments to greater reporting.

In **Karamoja**, a growing number of people are exposed to the risk of assault as dependency on firewood, charcoal and wild foods increases as a function of poverty and food insecurity.[30] This fact, coupled with the loss of defensive capacity that followed the disarmament exercise and the lack of adequate provision of protection and security by the state, has led to an increase in both actual and perceived insecurity.

In the region, most of the burden of constructing *manyattas*, as well as fetching water and firewood, falls on women and children. Firewood collection is a time-consuming endeavour, not only because distance to the supply source is increasing, but also because women often take the opportunity of being in the bush to search for wild foods and construction material. Hence, the longer the time spent in the bush, the higher the risk of being attacked.

Attacks are mainly perpetrated by cattle rustlers during or after raiding to take revenge for thefts carried out by opposing groups.

> *When they (cattle rustlers) get you on their way they either rape you or kill you.*[31]

[30] Elizabeth Stites and Darlington Akabwai (2009), *Changing Roles, Shifting Risks: livelihood Impacts of Disarmament in Karamoja, Uganda.* Medford, MA: Feinstein International Center, p. 32. This finding was further corroborated by focus group discussions with women in both Moroto and Kotido, 20 and 21 November 2009.
[31] FGD with women in Kotido, 21 November 2009.

According to the women interviewed, risk of assault is higher after a failed cattle raid. Women and girls are targeted by men in opposing groups to humiliate the men of the women's own communities. In the aftermath of an attack, reprisal by family and community members is also very common and contributes to the perpetuation of a vicious cycle of violence.[32] Some women have been asked by their assailants to disclose the location of their cattle herds under the threat of being killed. Others, for example in Kacheri (Kotido district), were released after being stripped naked as a way to humiliate the men from their village.[33] Although these patterns point to revenge and existing tribal tensions as the main factors behind sexual assaults in Karamoja, recent studies also indicate basic survival needs as a factor contributing to the sharp rise in criminal activity.[34]

Whatever the reason, the extent of GBV during firewood collection is alarming. According to the women interviewed in Karamoja, incidences of GBV are occurring on a bi-weekly basis. While for the mission team this frequency and regularity sounds significant, women's perceptions of it was clearly very different:

> *It [sexual assault] does not happen very often. However, if nothing happens for three/four times in a row [two weeks-worth of collecting], then we expect something to happen the next time.*[35]

One last aspect worth mentioning is that, in addition to the risks faced by women and children (the main gatherers of firewood) when they venture into unsafe environments in search of firewood, wood scarcity also creates tensions at the household level. According to WFP staff in Kotido, at times, children required to bring firewood to their schools for cooking have no other choice but to secretly fetch wood from the heavily protected wood-fences of their *manyattas*, causing the fury of their parents.

To address these concerns and to better monitor the situation with regard to access to fuel, the WFP sub-office in Moroto has integrated some firewood-related questions in the post-distribution monitoring system covering, among others, security risks during collection trips, average distance to collection points, and food preparation and cooking practices. In addition, schools are being targeted with fuel-efficient stoves and related cooking utensils (see section on existing responses below) to decrease the need for firewood collection. At the same time, at least one WFP-assisted school is encouraging girls to board at the school as a form of protection. Finally, some informants advocated for an increased presence of military forces as a way to provide greater protection and decrease GBV incidences.

4.2 Environmental impact

Refugee settlements such as **Nakivale** put pressure on trees, water, land and wildlife. Although Nakivale does not appear as the typical resource-scarce area, the

[32] Unfortunately, this is not the only form of abuse women are subjected to in the Karamojong culture. For example, strict gender roles prescribe widows' inheritance by brothers-in-law, even against the will of the woman, while rape is a common element of traditional courtship. For further details on widowhood and marriage in the Karamojong cultures refer to: Elizabeth Stites, Darlington Akabwai, Dyan Mazurana and Priscillar Ateyo (2007), *Angering Akuju: Survival and Suffering in Karamoja – A Report on Livelihoods and Human Security in the Karamoja Region of Uganda*, Medford, MA: Feinstein International Center.
[33] FGD in Moroto and Kotido, 20 and 21 November 2009.
[34] Elizabeth Stites and Darlington Akabwai (2009), *op. cit.*, p. 26.
[35] FGD with women in Kotido, 21 November 2009.

soil is reportedly not as good for agriculture as compared to other parts of the region, and depletion of natural resources has occurred at an alarming rate.[36]

According to existing legislation, only dead trees can be legally felled for domestic and other uses, while a licensing system regulates production and trade of charcoal. For this reason, UNHCR has been providing construction material to refugees upon arrival.

While firewood needs are often blamed as a cause of deforestation, it is important to mention that normally only deadwood is collected for firewood. However, as resources become increasingly scarce and the density of the refugee population increases, women are forced to travel longer distances and at times resort to green trees and digging roots, with devastating impacts for the environment. Charcoal production is without doubt a more pressing cause of deforestation as it relies entirely on green wood. Reportedly, every year Uganda cuts seven million tons of wood to make charcoal.[37]

To address these issues, the Office of the Prime Minister (OPM) launched in 2009 an ambitious tree-planting initiative the objective of which is to have 1 million trees replanted in the settlement. To date, however, only 150,000 trees have been planted by the NGO Aktion Africa Hilfe (AAH) through funds from UNHCR.

In the semi-arid climate of **Karamoja**, vegetation is characterized by woodland, semi-evergreen and deciduous thickets, riparian and grass steppe, while forests are only found in localized patches on the sides of hills and mountains. The biofuel-bearing *moringa oleifera*[38] is also present in patches. Wood is used for multiple purposes, including building fences and huts, lightening and cooking. Construction of *manyattas* and *kraals*, although only done every few years, is probably the most wood-exhausting activity in the region. In addition, the nomadic lifestyle still practiced by some groups means that additional quantities of wood are needed every time people move and new settlements are built.

The fourth consecutive year of drought in Karamoja has severely constrained traditional livelihood options – i.e. pastoralism and agro-pastoralism – with charcoal production being the main 'fall-back' alternative. In addition, the Government-led ban on the migration of livestock into neighbouring districts has had the unwanted side-effect of increasing pressure on existing land and water resources.[39] Shifts in livelihood strategies in response to the loss of animals has translated into greater exploitation of natural resources, with a negative impact on the environment, especially around towns and main trading routes, further deteriorating people's livelihoods in the forms of soil erosion and infertility, desertification and loss of grazing and cultivation environments. Moreover, the lack

[36] Meeting with Government officials, 17 November 2009.
[37] Straight Talk Foundation is a health communication Ugandan NGO based also responsible for the publication of the Tree Talk newspaper, which aims to sensitize people in Uganda, particularly the youth, on tree growing and environmental conservation. For more information on current charcoaling methods refer to: http://www.scribd.com/doc/20420261/Tree-Talk-September-2009, Accessed 27.11.2009.
[38] *Moringa oleifera tree* is an exceptionally nutritious vegetable tree typical of semi-arid, tropical and subtropical climates that has a variety of potential uses, including woodfuel. It is a fast-growing, drought resistant tree that grows best in dry sandy soil. http://en.wikipedia.org/wiki/Moringa_oleifera#Other_uses, accessed December 2009. Further information on the properties and uses of Moringa tree can be found in the technical fact sheet attached. Moreover, a technical fact sheet on *Pigeon Pea* is also attached.
[39] WFP (2009), *EMOP 10811.0 – Background Document for Consultation on WFP's Portfolio in Uganda*, Kampala: WFP.

of diversification of income sources that is typical of the region jeopardizes people's resilience to uncertain weather conditions and contributes to greater environmental degradation.

While people are generally aware of the adverse effects of their activities on the environment, they feel they could not do otherwise.

> *You talk to us about protection of the environment, we are looking for money to survive, money to feed our families, to send our children to schools, and to pay for medicines.*[40]

Another practice that is further damaging the environment in Karamoja is the uncontrolled burning of land by pastoralists to prepare for the next grazing and, according to their traditional beliefs, to prevent the spread of animal diseases. To address this issue, some informants were discussing promoting awareness raising initiatives targeted to pastoralists on the use of grass for animal feeding (a practice that currently does not exist in Karamoja) and on natural resource management and conservation.

Also, black carbon emissions caused by, among other factors, burning biomass, are increasingly indicated as an important contributor to climate change. As with all the non-CO2 pollutants, the precise contribution of black carbon to climate change is subject to a great deal of investigation. However, some scientists have estimated that black carbon is responsible for 18 percent of global warming, compared with 40 percent for carbon dioxide.[41]

4.3 Implications for food, nutrition and health

Cooking takes place both indoors and outdoors, with minor differences between Nakivale and Karamoja, where stoves were also found in the extremely dark and highly sealed space of the *manyattas'* huts. Some women in Nakivale had their *Lorena Rocket* stove, the model currently being promoted by AAH, built under the shed right outside their houses.

Smoke is the first issue of concern observed by the team during the visits. In both locations, the amount of smoke was visibly higher when a three-stone fire as opposed to a stove was used. Of particular concern to the team was the view of a high concentration of three-stone fires in the cooking space at the registration centre in Nakivale, where new influxes of refugees are gathered and first receive assistance upon arrival. In the reception centre, cooking is done by refugees themselves using WFP's food in a common sheltered space. At the time of the visit no stove was built in that space and women were using multiple three-stone fires, all burning at the same time. Although the kitchen consisted merely of a tarpaulin shed with significant ventilation provided though holes in the tarps, the amount of smoke produced by the fires was unbearable. Children were both playing around and tending the fires, as per the picture below.

There are many different possible models of fuel-efficient stoves, not all of which reduce pollutant emissions to the same degree. User behaviour can further impact

[40] FGD with women in Karamoja, 20 and 21 November 2009.

[41] Black carbon – also known as soot – has been identified as one of the leading sources of global climate change – along with carbon dioxide. Black carbon is basically the smoke that comes out of diesel vehicles and biomass burning. New York Times, "Third-World Stove Soot is Target in Climate Fight", April 16, 2009.

the overall efficiency of the stove. For example, stove models that include small pot rests or small holes on the top rim of the stove (where the pot sits) allow for improved air circulation and therefore produce less smoke. In some cases in Nakivale, the research team observed women using small stones on the rim of the stove to allow the hot air and smoke to exit. Other, less efficient stoves were also observed in use.

Some concerns were raised by stakeholders about people cooking in the same place where they sleep as one of the major causes of respiratory infections such as asthma, coughing, and even death.[42] Women in Nakivale were aware of the negative health outcomes caused by smoke and regretted not having enough construction material to build additional, outdoor cooking shelters.[43]

Indoor air pollution is a major cause of death worldwide. In addition, its black carbon emissions are a major source of global climate change. According to the World Health Organisation (WHO),[44] the smoke produced by biomass cooking fuel kills 1.5 million people per year – mainly women and children – a mortality level that is higher than malaria and almost as high as poor water and sanitation.[45]

Therefore, reducing the amount of black carbon emissions through the dissemination of energy-efficient/low-emission cookstoves can have significant benefits on both health and the environment.

As far as food and nutritional intake are concerned, women reported adopting negative coping mechanisms to address wood scarcity, including undercooking their meals -- especially pulses and cereals that reportedly take a long amount of time to cook --reducing the number of meals per day, and even selling part of their food ration to buy firewood.[46]

Food processing is another issue that deserves greater attention. Despite the efforts by WFP to make awareness raising on food preparation an integral part of any food aid activity[47], very few women both in Karamoja and in Nakivale reported soaking their legumes before cooking as a way to reduce cooking time and save on firewood. As a result, those who cannot afford several hours' worth of firewood often resort to undercooking legumes and eating them half-crude. Moreover, in the settlement women indicated very little knowledge about energy-saving cooking practices and techniques such as using lids or heat retainers such as the *haybox*[48],

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[42] Meeting with stakeholders in Nakivale refugee settlement, 16 November 2009.
[43] In the settlement, construction material is provided by UNHCR to avoid refugees cutting trees and further degrading the natural environment. However, women reported that the material is hardly enough to build one shelter. FGD with women in Nakivale refugee settlement, 17 November 2009.
[44] WHO (2006), *Fuel for Life – Household Energy and Health,* Geneva: WHO, p. 4.
[45] Alex Evans, "How to slash global warming AND save 1.6 million lives a year", Global Dashboard, http://www.globaldashboard.org/2009/05/21/black-carbon/, accessed December 2009.
[46] Focus group discussions with women in both Nakivale refugee Settlement and Karamoja region, 17, 20 and 21 November respectively. The same coping mechanisms were reported by women during WFP's Post Distribution Monitoring (PDM) in Moroto district.
[47] According to WFP staff in Karamoja, since February 2009 awareness raising activities on food preparation and storage have been conducted by WFP in conjunction with general food distribution (so called GFD+) through speaker messages, singing and on-site demos. GFD+ should be an integral part of WFP's activities throughout Uganda.
[48] *Haybox* is an insulated container where food is put after being heated to the boiling point to complete the cooking process using the heat captured by the food itself. This allows saving a significant amount of cooking fuel. Haybox is so called because hay or straw are the most commonly used insulators together with banana leaves or other organic material. More information on its use can be found in: Women's Commission for

also known as a fireless cooker or heat retention device. Hayboxes allow for completion of the cooking process without additional heat, by insulating the pot and making use of the heat that has been generated during cooking.

4.4 Trade and livelihoods

Impoverishment and food insecurity in Karamoja has contributed to an increased reliance on natural resource exploitation.

According to a food security and livelihoods assessment conducted by Samaritan's Purse in July 2009, in Moroto district 50% of the population is engaged in the sale of forest products (firewood and charcoal) to meet their household income requirements.[49]

> *We fetch firewood because of hunger*. *If we had more cultivation, we would not rely on firewood. Originally we cut a few, but now because of hunger we cut more. Firewood and charcoal are the only actual sources of income; you sell it and use it for paying schools, hospitals.*[50]

Livestock rearing, on the other hand, contributes to an average of only 8.4% of household livelihoods activities. Livestock are rarely sold; typically only in times of hardship. Traditionally, and even more now, the sale of animals was a means of coping with shock at the household level, while most of the household income was secured through other activities such as collection and selling of natural resources, agriculture and milking, mostly conducted by women. Yet, loss of livestock resulting from the combined effects of adverse climate conditions, insecurity and the spread of animal diseases, has now caused a further shift away from livestock and, to a certain extent, agriculture as the key means of sustaining households, towards activities such as firewood and water collection and sale, and charcoal production and sale.

Households in Karamoja are engaged in a range of additional livelihood strategies, including agriculture, casual labour such as brick making, stone collection and selling, and trade. However, the combination of frequent natural disasters, unpredictable weather and severe environmental degradation, and consequent reduced crop yields has eroded people's capacity to cope and left them more vulnerable to hunger. For this reason, WFP has been supporting agricultural-based activities for people in Karamoja, with particular focus on drought-resistant crops such gum arabic and aloe vera, along with already existing cultivations such as sorghum, sesame, and millet.

Some exceptions to the above were observed in Kacheri town in Kotido district. There, informants reported that most of their income comes from selling water, primarily to UPDF soldiers. Water collection earns more income than firewood or charcoal, as it is often done on a daily basis at 100 UGX (0.05 USD) per jerry can of which they sell about 10 per day. This quantity might be explained by the proximity of the water point to the trading centre where water is sold (3 km only) as opposed to the greater distance of firewood supply.

Refugee Women and Children (2006), *Beyond Firewood: Fuel Alternatives and Protection Strategies for Displaced Women and Girls*. New York: Women's Commission, p. 20-21.

[49] Samaritan's Purse (2009), *Food Security and Livelihood Assessment Report, Moroto District, Karamoja*, Moroto: Samaritan's Purse.

[50] FGD with farmers in Moroto, Karamoja, 20 November 2009.

The main market for firewood and charcoal are trading centers in towns and neighbouring districts. Woodfuel is sold to *businessmen*[51], government officials, soldiers, and general town dwellers that do not to fetch firewood or burn charcoal on their own. Humanitarians are also among the main consumers of charcoal in Karamoja.

The proceeds are used to purchase basic goods such as soap, clothes, medicines, and salt, and to meet other needs such as health care and education.[52]

Dependency on wood for livelihoods is so high in Karamoja and the value attached to natural resources so tangible (including culturally) that people lamented the loss of trees caused by the recently-started FFW activities on cassava cultivation and asked WFP's support for replenishing the resources that have been cut during land clearing.[53]

In **Nakivale**, selling fuel is less important as an income source than in Karamoja. According to informants, the amount of firewood collected is barely enough to cover household cooking requirements, while fear about the growing tensions with nationals over access to and collection of forest resources is another major impediment to refugees' engagement in the trade of fuel. Thus, there is no evidence of women selling woodfuel for income, rather women at times have no other option but selling part of their food rations to buy firewood.

5 Existing fuel-related responses

This section of the report analyses some key fuel-related interventions undertaken by various humanitarian actors in response to the concerns outlined above. It is not intended to be an all-inclusive account of all fuel-related projects currently in place in Uganda, rather it provides an overview of the major initiatives, their opportunities and challenges, to determine options for future programming.

5.1 FES and alternative energy

According to some studies,[54] while the traditional three-stone fires use only 15% of the energy given off by the wood, a simple mud stove, when used correctly, can increase the energy efficiency rate by at least 20% (i.e. 35% of the fuel energy is used to cook)[55]. Moreover, the carbon footprint of mud stoves, even the most basic models, is lower than traditional open fires, where about 85% of the fuel turns into harmful smoke and heat radiation, thus contributing to indoor air pollution and overall global warming.[56]

Therefore, mud stoves have the advantage of using fuel more efficiently and emit less black carbon; hence they are also a more environmentally friendly option.

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[51] This term was used by women during focus group discussion to refer to those running a commercial activity.
[52] FGD with women in both Moroto and Kotido, Karamoja, 20 and 21 Novemeber 2009.
[53] FGD with farmers in Moroto, Karamoja, 20 November 2009.
[54] UNHCR (2002), *Cooking Options in Refugee Situations – A Handbook of Experiences in Energy Conservation and Alternative Fuels*, Geneva: UNHCR.
[55] According to some studies, the actual savings could be up to 50%, if stoves are used correctly and consistently, depending on the type of stoves and availability of proper cooking utensils.
[56] It has been proven that decreasing carbon emissions, for example, by using fuel-efficient stoves, would be a relatively cheap inexpensive way to contribute to the mitigateion of global warming. New York Times, "Third-World Stove Soot is Target in Climate Fight", April 16, 2009.

In both **Nakivale** and **Karamoja** the team observed attempts by various actors to disseminate and promote the use of fuel-efficient technologies at both household and institutional levels. In **Nakivale**, for example, the NGO Aktion Africa Hilfe (AAH), with funds from UNHCR, began a programme to train refugee women on the production of the Lorena Rocket two-pot stove (photo … below). Although the original plan was to support the construction of about 2500 Lorena stoves by the end of 2009, at the time of the visit only 500 were actually built and the likelihood of the project meeting its target is quite slim.

The main cause(s) of this likely failure to meet the 2500-stove target are unclear. Based on the research team's observations and experiences with stove programmes in other settings, however, some reasons could include:

- The Lorena model may not be the most appropriate for the population/setting. It is a large, fixed-model stove which, observations showed, are typically constructed outdoors. The stoves are therefore subject to damage from moisture and termites and cannot be used consistently during the rainy season. To protect them from the rain, they are generally constructed under the roof right outside the huts, but being bulky they take up a lot of the limited space available.
- Family sizes in the Nakivale settlement are relatively small (averaging 4-6 members at most), and the two-pot model may be more/larger than needed. Moreover, only one pot is distributed by UNHCR upon arrival, thus the other pot needs to be purchased. If only one pot is used in a two-pot stove, the empty pot-hole significantly reduces the efficiency of the stove.
- Focus group discussions found that, prior to displacement, most of the women interviewed used either three-stone fires and/or small, portable metal charcoal stoves. The large, fixed mud stove was unfamiliar, and may require more community sensitization than AAH has been providing.
- As has been shown in previous studies on adoption of FES technologies in displacement settings[57], proper training of stove-makers and sensitisation of users on proper cooking techniques are critical to ensuring the uptake and success of stove programmes. However, AAH is understaffed and has a large mandate in the settlement including not only the promotion and dissemination of fuel-efficient stoves, but also agricultural and food security interventions and environmental protection activities such as tree planting. It is possible that the amount of time and staff capacity dedicated to the FES programmes are insufficient for reaching the 2500-stove target.

The training and dissemination process for the Lorena Rocket stoves is as follows: three groups of 10-12 artisans each, trained by AAH, run demonstrations for approximately 10-14 people each at the village level. Participants for the trainings are chosen by the community leaders of each village. Trainings cover construction techniques, maintenance, and fuel-efficient cooking techniques.

The artisans then support women on the construction of the stove. In some cases, the trainees themselves will construct the stove; in other cases, the artisan does so.

[57] USAID (2007), *Fuel Efficient Stove Programs in IDP settings – Summary Evaluation Report, Uganda*, USAID; and ProAct, (2008), *Assessing the Effectiveness of Fuel Efficient Stove Programming – A Darfur Wide Review*, Geneva: ProAct.

After follow-up monitoring to ensure the quality of the stove, AAH provides the stove-maker with 1000 UGX (approximately USD 0.52). Participation in the trainings is voluntary and is based on the capacity of the household to obtain the necessary construction materials, which include clay, water, straw and/or cut grasses. Availability of the construction materials and water were indicated as two major constraints.

While beneficiaries generally acknowledged the benefits of the newly built Lorena stove, the project has been somewhat patchwork and resulted in limited uptake and usage of the new device. Of all the households visited in Nakivale with the Lorena stove, none was using it.[58]

To be efficient, two different size pots need to be placed on the stove at the same time, so some women used the second (smaller) pot to boil water. Finally, AAH staff admitted that no assessments were conducted either to determine the most appropriate model of stove for the beneficiary population (based on their cultural customs/habits; types of foods cooked and cooking methods; family size; indoor-outdoor cooking preferences, etc.) nor to gauge whether the Lorena model in fact adequately responds to women's needs and cooking habits. Rather, it appears the Lorena model was chosen by AAH because a different NGO in a neighbouring district was promoting it there, and local knowledge on construction techniques for that model (and no other) was therefore available.[59]

In **Karamoja**, some women have been trained on fuel-efficient stove making within the framework of the Ministry's programme of Alternative Basic Education for Karamoja (ABEK).[60] Contrary to Nakivale, uptake and usage of the stoves promoted by ABEK appeared higher.[61] Since 2006, when the project was implemented, the women interviewed by the research team reported consistently using the stove and were able to repair and build new ones.

Overall, while all women interviewed acknowledged that less firewood is needed when a stove is used, they generally could not quantify the actual savings.

5.2 Institutional FES

Contrary to most parts of Uganda where WFP is handing over its school feeding activities to parents and communities, in Karamoja persistent food insecurity and an extremely low school completion rate has led WFP to continue its support to school-aged children.[62]

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[58] Women's experience with stoves varied greatly in Nakivale. Some reported buying stoves (various models) either from former refugees leaving the camp (for approximately 1000UGX or 0,52 USD), or at the nearby market. Others paid professionals to build a stove for them after seeing other women using a stove. Not all women however, had the money to buy a stove or to have it built, and the majority was heavily dependent on the three-stone fire for their cooking.

[59] More information on the stoves currently in use in Nakivale refugee settlement can be found in the technical fact sheet attached.

[60] ABEK is an initiative promoted by the Ministry of State for Karamoja Affairs, the district education authorities and Save the Children Norway to provide children (and also adults) with alternatives to the formal education in line with the Karamojong lifestyle and livelihoods. Subjects include livestock education, crop production, peace and security, human health and others.

[61] Though it should be noted that the research team only conducted a focus group on this topics in one location (encompassing three villages) in Kotido District. It is unclear whether the ABEK programme was as successful in other villages and districts in the region.

[62] According to WFP, in four of the five districts in Karamoja, completion rates for primary education range from 6 to 10 percent, compared to an estimated 82 percent for the whole country

Cooking fuel poses a heavy burden on both schools and schoolchildren, who are required to contribute firewood to their schools on a daily basis. At times, this requirement is serves as an impediment to their attendance.[63]

To address these challenges, WFP's school-based interventions in Uganda have been quite comprehensive, involving school gardens, woodlots and fuel-efficient kitchens, including provision of institutional-capacity fuel-efficient stoves and cooking utensils.

To date, in Karamoja only, WFP has provided 110 schools with stoves, while 172 more are yet to receive support. Since stoves have been introduced, schools have been able to save up to fifty percent of their fuel requirements. According to a school principal:

> *I even told kids to stop bringing wood to school as, for the first time, the amount of firewood was beyond what was actually needed.*[64]

WFP/GTZ's[65] provided fuel-efficient industrial stoves (*Jiko*, pictured below) are locally produced and have a significantly lower carbon footprint than the more traditionally used stoves - such as the large, open fire version[66] – which are widely used in Uganda.

5.3 Environmental protection and regeneration

In line with the 2007 National Action Plan of Adaptation (NAPA), WFP has been placing specific emphasis on climate change adaptation and the protection and regeneration of natural resources. Efforts in this direction include the restoration of forest cover through tree planting in both Karamoja and Nakivale, and the construction of watershed infrastructure in Karamoja.

Of particular relevance is a school tree-planting project (also known as *Tree Talk Plus*) conducted in partnership with the Straight Talk Foundation (STF) in the north and northeast districts of Uganda in 2006. The project followed WFP's support to the STF tree seed distribution in 2005, and was targeted to a total 230 schools. The project aimed to create 1-acre woodlots for fuel wood, and to provide amenity trees in areas where pressure on biomass resources reached an alarming scale, while at the same time building the capacity of children and school personnel on natural resource management and conservation. Unfortunately, activities were not sustained due to funding shortages.

Woodlots are an integral component of WFP's school assistance programmes and, along with school gardens, are meant to provide schools with sustainable wood sources. On the other hand, school gardens have a primarily educational purpose,

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(http://www.unicef.org/infobycountry/uganda_statistics.html#52). WFP (2009), *Uganda Country Programme 10807.0 – Supporting Government-led Initiatives to Address Hunger in Uganda*, WFP.

[63] Though this is not happening in all locations, in Kotido there were reports of tension between parents and children as these last at times had no other choice but to secretly fetch from the heavily protected wood-fences of their *manyattas*, causing the fury of their parents. Moreover, particularly poor schools can only rely on kids providing firewood to cook WFP's school meals.

[64] Visit to school in Kacheri sub-county, Kotido district, 21 November 2009.

[65] GTZ has been involved in the field of household energy for more than twenty years. During this period some twenty projects have been carried out with a range of partners, involving the development, production and distribution of around 1.5 million stoves worldwide, including at the institutional levels.

[66] UNHCR (2002), *Cooking Options in Refugee Situations – A Handbook of Experiences in Energy Conservation and Alternative Fuels*, Geneva: UNHCR.

and are meant to teach children and their families the importance of growing vegetable and of dietary diversity.

Overall, the tree planting exercise provided a beneficial contribution to the regeneration of the environment in areas around schools. In addition, school woodlots are expected to be ready for utilization in the next year or two, thus enhancing schools' wood self-sufficiency.[67]

Another effort in this area, already discussed, is the OPM-led tree planting initiative in Nakivale, which is yet to reach its stated goal of 1 million trees planted.

5.3.1 Sustainable charcoal production

To address the problem of land degradation due to excessive harvesting of trees for charcoal production, various actors in Uganda have been placing increased efforts on the promotion of improved charcoal production methods. Among others, UNDP in 2008 launched a project on land management and sustainable charcoal production. The project is aimed at building the capacity of rural communities in both Kamuli and Nakasongola districts (central-eastern Uganda) on more efficient and sustainable ways of producing charcoal, thus contributing to better land management and tenure.

Additional efforts in this regard have been undertaken by STF. The September edition of Tree Talk newspaper consisted of improved charcoaling and energy-efficient cooking guidelines.[68] These include step-by-step guidance on the charcoal production process, including sustainable methods for cutting trees, efficient carbonization techniques, and cooking practices. In addition, reference is made to the Government guidelines on suitable tree species for charcoaling.

According to field-based experts, while right now inefficient cutting and burning techniques result in the use of only 20% of the tree, if improved charcoaling methods are used, efficiency could be raised to 40%. In addition, sensitization on tree species that are suitable for charcoaling, as well as on more efficient cooking practices and provision of alternative income generation activities, are critical components of these projects.[69]

Given Karamoja's high dependency on charcoal production as a livelihoods activity and the scarcity of trees, the potential for extension of these projects in the region (including potentially through support from WFP), should be considered.

5.4 Community-based coping mechanisms

In both the regions visited, women reported that they have no way to defend themselves from attacks. The only – and most common - protective measure adopted by women to mitigate the risk of attack during firewood collection is travelling in groups. This requires them to consult with each other in order to align their needs and priorities and agree on a common travelling time and day. The size of the groups varies between 4-5 women per group in Nakivale to 10-20 in the Karamoja region. While travelling back and forth to the collection point is usually

[67] For more information on the impact of the project, refer to: STF/WFP (2007), *Tree Talk Plus Project in Northern & North-Eastern Uganda – Evaluation Report*.
[68] http://www.scribd.com/doc/20420261/Tree-Talk-September-2009. Accessed 27.11.2009.
[69] Meeting with UNDP in Kampala, 11 November 2009.

done in groups, once in the bush, women generally spread out in search for scarce firewood and wild foods, and the risk of attack is then higher.

Moreover, while women's perception of safety is generally higher when travelling in groups, in reality this is often not enough to deter attacks. In **Karamoja** for example, discussants reported seeing groups of women running back from the collection point as a result of an attack.[70] In the aftermath of an attack, women reported avoiding the location for few days, until needs force them to go back.

Interestingly, in Karamoja, the community decides on the location of firewood collection. As the attacks are mostly related to inter-tribal tensions and revenges, community leaders assess the security situation of various locations and select the areas where they feel collection is less risky for their women and children. Decisions are reviewed based on past incidences and the location of opposing groups.

Accompaniment by men during firewood collection does not seem a viable option. In the words of women interviewed by the research team:

> *For men is more risky than for women, as men can only be killed.*[71]

Moreover, cultural taboos strictly confine firewood collection to women and children.

5.5 Livelihoods diversification

Diversification of livelihoods is key to reducing dependency on natural resource exploitation as a source of income and reducing exposure to violence. This is particularly relevant in Karamoja, where reliance on firewood and charcoal selling is highest. Some efforts in this regard have been made by the NGO Samaritan's Purse in Moroto district. The most positive response on alternative income generating activities has been on jewellery making, and in particular necklaces, bracelets and traditional Karamojong belts. The proceeds are used as start-up capital for women to continue being engaged in this activity. The project recently started and to date is limited to Moroto town.

Other activities observed during the mission include WFP-supported cassava cultivation in both Moroto and Kotido, while fishing and rice cultivation are currently under consideration by WFP sub-office in Mbarara. The International Rescue Committee (IRC) is also working on the creation of livelihood options in Karamoja, mostly agricultural. The need for additional efforts on the creation of alternative livelihood options is highlighted in the strategy below.

[70] Meeting with NGOs in Moroto, 20 November 2009.
[71] FGD with women in Moroto and Kotido, Karamoja 20 and 21 November 2009.

6 Conclusions and ways forward: options for an integrated approach to safe access to firewood and alternative energy in Uganda

6.1 Why WFP?

WFP's comparative advantages in promoting a coordinated, multi-sectoral fuel strategy in Uganda include its mandate, the scale and reach of its operations, and a network of experienced field-based partners. WFP's commitment to the work of the SAFE Task Force stemmed from the recognition of the complexity and multi-faceted implications of access to fuel in emergency contexts. This is in the Strategic Plan, which calls for WFP operations to be carried out in ways that contribute to the safety and dignity of beneficiaries, including protection from gender-based violence.

Moreover, WFP's Gender Policy sets forth a framework for the organization's work on addressing gender-related protection challenges, including those arising from firewood collection. More specifically, it commits WFP to mobilize resources to provide safe access to fuel, including the provision of fuel-efficient stoves, to the most vulnerable women.[72]

At present, WFP is the agency with the greatest access and presence, either directly or through its partners, and the one with the longest standing operations in Karamoja. Its dual humanitarian and development mandates provide a window of opportunity for increased investment in a wide array of activities from lifesaving food distribution to restoration of the livelihoods of vulnerable populations through, for example, construction of watershed infrastructure, tree planting and enhancement of agricultural productivity and trade.

WFP is in a unique position at the moment to act and advocate across partner agencies, including in the United Nations humanitarian system, and to devise and implement a concrete plan of action. As they are both key vulnerabilities to GBV and have large-scale food/nutrition and environmental implications, support for alternative livelihoods activities and promotion of safe access to appropriate fuel sources are the two key interventions on which to focus.

6.2 Proposed approach

To address the above-mentioned issues, WFP will promote a comprehensive approach for ensuring safe access to cooking fuel among the populations of Nakivale and two districts of Karamoja.[73] The focus will be on physical and environmental protection, and promotion of alternative (i.e.: non-woodfuel intensive) livelihoods options. The approach will seek to build upon WFP's

[72] WFP (2009), *Promoting Gender Equality and the Empowerment of Women in Addressing Food and Nutrition Challenges*, Rome: WFP, p. 10. WFP/EB.1/2009/5-A

[73] The focus will be on the districts of Kotido and Moroto. These districts have been chosen because where women and children face the highest risk in the collection of firewood and the environment has been the most severely degraded.

comparative advantages in Uganda, most notably a deep field presence in both Nakivale and Karamoja[74] and its capacity for innovation.

WFP plans to adopt a **two-pronged strategy**[75] in order to tackle the problem: reducing the vulnerability of women to protection risks while reducing environmental degradation, and providing alternatives to firewood and charcoal selling as a primary source of household income.

The first component will include training on and/or dissemination of fuel-efficient stoves at the household level and of institutional stoves in schools (Karamoja only). In addition, targeted beneficiaries will be sensitized on energy-saving practices, including cooking practices and techniques, correct use of cooking utensils such as lids, pots and pans, and food preparation (for e.g. soaking or the use of a retained-heat cooker).

Establishing woodlots close to households can minimize the need for women and girls to walk long distances in order to collect firewood, thereby reducing their protection risks. Recognizing this, WFP and its partners will promote the establishment of woodlots at community and schools levels in both Nakivale and Karamoja.

The second component of the approach will entail support to vulnerable households to diversify and strengthen their livelihoods opportunities, thus breaking their dependency on natural resource exploitation. Activities will include food-producing livelihoods (for e.g. cassava and sorghum multiplication and rice cultivation) and watershed management in arid zones of Karamoja.

Finally, WFP will continue engaging experts and the private sector in piloting new technologies (for example, briquette-making and sustainable charcoal production as well as exploring the potential for wider distribution and use of LPG) to help communities meet basic fuel needs and to generate livelihood opportunities that are less risky and more eco-friendly, with the ultimate aim of wide-scale dissemination.

[74] WFP is currently providing emergency food assistance to the refugee population in Nakivale, as well as various forms of relief and development assistance to the population of Karamoja

[75] For a detailed description of the activities encompassed in the SAFE approach for Uganda refer to the attached project proposal.

Annex 1: *Moringa oleifera*: one of the world's most useful trees providing food, fuel and medicine for people and livestock

Moringa oleifera, (Order: Brassicales, Family: Moringacea) is an exceptionally nutritious vegetable tree with a variety of potential uses. The tree itself is rather slender, with drooping branches that grow to approximately 10 m in height. In cultivation, it is often cut back annually to 1 meter or less and allowed to re-grow so that pods and leaves remain within arm's reach. The new shoots can be used as fuelwood.

The Moringa tree is considered one of the world's most useful trees, as almost every part of the Moringa tree can be used for **food** or has some other beneficial property. The new shoots provide an appropriately sized **fuelwood** for use in improved stoves. In the tropics, it is used **as forage for livestock**, and in many countries, Moringa is used as a **micronutrient powder** to treat diseases. It has potential to improve nutrition, boost food security, foster rural development, and support sustainable land-care, especially in areas with erratic rainfall due to climate change. It is an ideal plant to mitigate adverse effects of climate change for the resident population.

The "Moringa" tree grows mainly in semi-arid, tropical, and subtropical areas, corresponding in the United States to USDA hardiness zones 9 and 10. While it grows best in dry sandy soil, it tolerates poor soil, including coastal areas. It is a **fast-growing, drought-resistant** tree that is native to the southern foothills of the Himalayas in northwestern India. Today it is widely cultivated in Africa, Central and South America, Sri Lanka, India, Mexico, Malaysia, and the Philippines.

General Nutrition

The leaves are highly nutritious, being a significant source of beta-carotene, Vitamin C, protein, Iron, potassium and allegedly zinc, calcium and phosphorus. The leaves are cooked and used like spinach or eaten fresh as salad. Fresh leaves taste similar to rocket. The leaves are commonly dried and crushed into a powder that can be used in soups and sauces or as medicinal food additive, especially for HIV-patients or other people suffering from malnourishment.

The immature green pods called "drumsticks" are commonly consumed in India and are generally prepared in a similar fashion to green beans and have a slight asparagus taste. The seeds are sometimes removed from more mature pods and eaten like peas or roasted like nuts. The flowers are edible when cooked, and are said to taste like mushrooms. The roots are shredded and used as a condiment in the same way as horseradish. Root use is though not encouraged, as it will damage the tree.

The Moringa seeds yield 38–40% edible oil (called ben oil from the high concentration of behenic acid contained in the oil). The refined oil is clear, odourless, and resists rancidity at least as well as any other botanical oil. The seed cake remaining after oil extraction may be used as a fertilizer or as a flocculent to purify water.

Cultivation

The plant is propagated by planting limb cuttings 1–2 m long, preferably just at the beginning of the rainy season. The plant starts bearing pods 6–8 months after planting, but regular bearing commences after the second year. The tree bears for several years. It does not tolerate freeze or frost. It can also be propagated by seed. As with all plants, optimum cultivation depends on producing the right environment for the plant to thrive. Moringa is a sun- and heat-loving plant. Seeds are planted an inch below the surface and can be germinated year-round in well-draining soil.

When planted with limb cuttings, it is ideal for the establishment of live fences or live shelters around latrines and bathrooms.

Source; Wikipedia – the free encyclopedia, edited by Christa Roth, Food-and-fuel consultant November 2009

Annex 2: *PIGEON PEAS - The forests of the future? A versatile Food and Fuel crop for arid climates and poor soils*

Pigeonpea [*Cajanus cajan* (L.) Millspaugh] is a short-lived perennial shrub that is traditionally cultivated as an annual crop in developing countries. It is the most versatile grain legume for smallholder farmers even in areas affected by climate change. They are drought tolerant, can be intercropped with maize and other staple crops, their woody stalks can be used as **fuel-wood**, their leaves and fruit can be used as **protein-rich food** or **livestock feed**, they can be used to demarcate field boundaries and **live fences** against livestock invasion. Moreover they can **improve soil fertility and diversify local production, income and diet**. It is a hardy, widely adapted crop with a large temporal variation (90 – 300 d) for maturity. These traits allow its cultivation in a range of environments and cropping systems. Globally, pigeon pea area has recorded a 56% increase in area since 1976. It is currently grown on 4.8 m ha. In Asia, India (3.58 M ha) is the major pigeonpea growing country. In Africa, Kenya (196,261 ha), Malawi (123,000 ha) and **Uganda** (86,000 ha) are the most important growers, supplying ca. 20% of the 0.15 million tons of pigeon pea currently imported by India as the largest consumer. The peas are nutritious with protein contents ranging between 21% to over 25%, often ranking second after dry beans as most relevant source of non-animal protein.

Invariably, the traditional pigeon pea cultivars and landraces are long duration types grown as intercrops with other more early maturing cereals and legumes. In addition to its main use as de-hulled split peas, its immature green seeds and pods are also consumed fresh as a green vegetable. The crushed dry seeds are fed to animals while the green leaves form a quality fodder. In rural areas, dry stems of pigeon pea are used for fuel. In a cropping season, pigeon pea plants fix about 40 kg/ha atmospheric nitrogen and add valuable organic matter to the soil through fallen leaves. Its roots help in releasing soil-bound phosphorus to make it available for plant growth. With so many benefits at low cost, pigeon pea is an ideal crop for sustainable agriculture systems in rain-dependent areas.

Pigeon peas are thus an excellent resource to provide both, **food and fuel**, in semi-arid environments. They are adequately grown in pure-stand or intercropped, because they are slow growing and have deep root systems accessing deeper moisture levels unavailable to shallow-rooting crops. This means they prove little competition for the main crop and the peas grow to maturity well into the dry seasons using residual soil moisture. Complete crop-failure is rare and is mostly due to extreme dry-spells directly after planting, if seed does not germinate at all. This risk can be minimised by using the plants as perennial crop, coppicing it at 30-60cm above ground. Otherwise once the plant is established, prolonged dry-spells might prevent flowering and fruiting, but the woody stems can still be harvested as fuel. Serere Agricultural and Animal Research Institute (Soroti) has accumulated knowledge also on short-maturing varieties optimally suited for erratic rain regimes and arid conditions.

The pigeon peas are a "bonus crop" because they require very little extra labour from the farmer and they can be grown with rudimentary farming skills. They seem therefore a suitable crop for former pastoralist communities like in Karamoja. The woody stems can be easily used as firewood, especially in improved stoves. Dry matter biomass yield can vary greatly between varieties and ecological conditions. Figures from trials in Serere state weights per plant ranging from 12 g/plant to 260 g/plant for local varieties. In Mulanje (Southern Malawi) one stem exceeded 800 g (photo), totalling an equivalent to 5,400 kg of dry stems/ha after 4 weeks of drying. Some farmers intercropping maize with Pigeon Peas on less than 2 acres can satisfy their fuel needs for cooking entirely by agricultural residue throughout the year when using energy-efficient cook-stoves. Pigeon pea stalks provide the bulk of cooking fuel, followed by sorghum stalks and maize cobs. Pigeon pea stalks are easy to use; they don't require cutting or splitting and have similar energy values than firewood. To cook a meal for 5 people required 628 of firewood (pine) or 648 g of pigeon pea stalks, according to tests carried out in October 2008 in Mulanje (Malawi).

Text compiled by Christa Roth based on http://www.icrisat.org/PigeonPea/PigeonPea.htm; Schulz, M (2001): The Potential of Pigeon Pea - Cotton Inter-cropping System in Uganda; reports from Chitedze Research Station and http://www.naro.go.ug/technologies/saaritechn.htm, and own experiments in Mulanje in 2009.