INSTITUTE FOR ENVIRONMENTAL SECURITY

Dealing with energy needs in humanitarian crisis response operations

A Quick Scan of policies and best practices of humanitarian aid organizations and potential alternative energy sources and technologies

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"Dealing with energy needs in humanitarian crisis response operations" has been published as part of the FUEL – project on integrating energy needs in humanitarian crisis response operations, with the financial assistance of the IUCN– Netherlands Committee (IUCN NL). The views expressed, the information and material presented and the geographical and geopolitical designations used in this report do not imply the expression of any opinion whatsoever on the part of IUCN NL or the institutions and organisations providing IUCN NL with funds.

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Executive Summary

Background

From experience it is known that the sustainability aspect of energy needs is often not sufficiently addressed by those who provide assistance in humanitarian crisis response operations in post-conflict and post-disaster situations. Despite the fact that UNHCR and other emergency aid organizations have included substantial elements of sustainable energy supply in their policies and plans, implementation is often late or insufficient. The resulting long term humanitarian and ecological effects can be dramatic. In addition, firewood collection poses security problems for women and children, who are forced to travel large distances at the risk of being attacked or raped. There are also significant negative health consequences: exposure to indoor smoke can cause acute respiratory infections which kill many people, especially women and children, also in refugee camps[1].

An advocacy and learning project has been set up on the issue of energy use – with a focus on household fuel – in humanitarian crisis response situations, as a cooperative undertaking by the Institute for Environmental Security and IUCN-Netherlands Committee. The goal of this project is to improve the policies and practices of (Dutch) humanitarian aid organisations on fuel-related issues, and to encourage policymakers in the Netherlands to put this issue higher on the agenda.

The following two examples of recent crisis response operations demonstrate that the ecological impacts of refugee camps and settlements can have disastrous consequences for the future livelihood bases of both displaced people and host communities:

Rwandese refugees in Tanzania and DRC

The influx of Rwandese refugees in Tanzania and eastern Democratic Republic of Congo (DRC) in the mid-1990s led to an ecological disaster with huge impacts on forest and water resources, biodiversity and protected areas. In north-western Tanzania, six months after the arrival of half a million refugees, tree resources within 5 km of the camps had been cut down. One year after their arrival, the average distance for getting fuel was 10 km or more. Pastureland in the vicinity of the camps was seriously overgrazed by the thousands of cattle, sheep and goats that came along with the refugees. Another area of environmental degradation was water shortage and pollution of water resources (soil and groundwater). In some places the vegetation was completely cleared for refugee settlements[2].

The Virunga National Park in DRC, a UNESCO World Heritage Site and home to one of the last surviving mountain gorilla populations, was placed under particular threat by refugees seeking firewood, building materials and for large-scale charcoal manufacturing, since the camps were located at walking distance from the Park. As a result, the World Heritage Committee placed the park on its list of endangered natural world heritage sites[3]. The lack of adequate emergency shelter provisions meant that a lot of trees and bushes have been cut inside or on the margins of the park in order to construct basic shelters. Thatching materials have also been cut, leading to growing tensions and potential conflict between displaced people and local farmers[4].

Displaced people in Darfur, Sudan

In Darfur, where two million displaced people have been living in camps since 2003, there has been severe deforestation around the larger camps. Between 2003 and 2005, international agencies were the main consumers of construction timber as they set up the infrastructure for IDP camps. It is estimated that 1.5 million kg of firewood is needed on a daily basis to provide the 2 million people with fuel[5]. Firewood collection is effectively uncontrolled. This has led to situations where camp residents have to travel up to 15 kilometres to find wood, in some cases even up to 75 km (e.g. Kalma camp)[6]. It is reported that, due to this lack of accessible firewood, the food security of a significant number of IDP families have been threatened. In the recent past, firewood patrols have been organized to protect women and girls during firewood collection, but these have been abolished due to insecurity for patrollers and lack of any wood still remaining to be collected[7]. The vibrant relief economy is fuelling a large market for bricks and charcoal, with a dramatic impact on future livelihood options. This is often the only means of earning some income for displaced people and host communities[8].

Frontrunners on fuel-related issues

A number of organisations working on humanitarian crisis response are actively promoting fuel-efficiency and alternative energy sources and technologies. One of these frontrunners is UNHCR, who is leading the process of integration of environmental issues in humanitarian aid projects. However, the organization also admits that much remains to be done. Environmental concerns are still not dealt with in a consistent manner in refugee and returnee situations, but some promising efforts are underway. UNHCR is one of the initiators of the IASC Task Force on Safe Access to Firewood & alternative Energy in humanitarian settings (SAFE), which recently published a number of fuel-related policy guidance tools. It also resulted in the launch of the International Network on Household Energy in Humanitarian Settings (in short the "Fuel Network"), established in June 2007[9].

The World Food Programme (WFP) is the first to take the active step of beginning energy-related programming under the SAFE guidance. Together with the Women's Refugee Commission, a US-based NGO, two pilot projects will start in the fall of 2009 (in Darfur and Uganda). Some individual NGOs have taken steps in the field of fuel-related issues as well. This includes CARE, the International Rescue Committee (IRC), Oxfam GB, Norwegian Refugee Council (NRC) and the International Committee of the Red Cross (ICRC). At present their initiatives are more on a per-country basis, as opposed to trying to integrate energy needs into global operations.

Fuel-related policies of Dutch humanitarian aid organizations

Among five Dutch Humanitarian Aid agencies interviewed, there is general consensus about the severity of the environmental impacts in and around refugee and IDP camps. The problem of fuelwood shortage was highlighted by the organizations interviewed. Some organisations are actively using the Sphere Handbook[10], which includes specific guidelines on fuel and energy.

However, the response to the problem of fuel wood and energy use varies significantly from one organisation to the other. Only a few organisations are actively working on the ecosystem impacts (and thus livelihood impacts) of household fuel use. Other organisations have indicated that they are not concerned with fuel-related issues. For instance, one organisation is aware of the problem, but indicates it is not in the position to work on fuel issues because of a lack of capacity and means. Basically, it wants to remain focused on its mission, which is providing emergency medical assistance to populations in danger.

Potential alternative energy sources and technologies

There is a tremendous amount of information on the use of fuel wood and other energy sources, and on how to improve fuel-efficiency. It is concluded that firewood is the default choice; not because it is the best choice, but because it is often easiest or most obvious and often the one with which the beneficiaries are most familiar. If other safer and more effective fuels or energy technologies are easily accessible – and more importantly, mainstreamed into standard procedures and budgets of humanitarian aid agencies – firewood will not remain the default option.

Some of the most interesting alternative fuel options or technologies include:

- Improved/fuel-efficient stoves: interesting pilots of the Save80 stove and the Berkeley Tara stove developed in Darfur[11].
- Fuel Briquettes: successful experiences with the use of charcoal briquettes by Burmese refugees in Thailand[12].
- Biogas: successful pilot by UNHCR with biogas in eastern Afghanistan[13].
- Solar energy: Panel cookers have been successfully introduced in Ethiopia and Chad (interesting pilot on the use of the CooKit), while parabolic/dish cookers were successfully introduced in Nepal[14].
- Biofuels: promising pilot with ethanol stoves in Ethiopia (CleanCook Stove)[15].

Key Conclusions and Recommendations

Conclusion 1

Fuel scarcity is not only an ecological or environmental problem; it is also a significant concern from a social or humanitarian point of view. Natural resources form the livelihood basis of many refugees and local communities. Destruction of ecosystems due to deforestation – through soil erosion, soil degradation, sedimentation, loss of biodiversity, etc – can therefore lead to huge and irreversible damage to the livelihood base of these people.

Recommendation 1.1

Emergency relief should not destroy future development options for the refugees, returnees or host populations. It is crucial that the long term ecosystem impacts of the relief operations are fully taken into account from the start. Donors of emergency aid programmes must assure this approach is mainstreamed in order to avoid potentially huge development aid expenses (caused by soil erosion or lack of drinking water supply) in the future.

Conclusion 2

Fuel scarcity can cause the regeneration of (violent) conflicts between refugees, returnees and host populations. This illustrates the fact that fuel is as much an environmental issue as a security issue.

Recommendation 2.1

More attention is needed for the inclusion of a local conflict analysis and preferably a "Do No Harm" assessment before any fuel-related project starts[16]. This will prevent projects from potentially worsening a conflict instead of providing relief.

Recommendation 2.2

Environmental security should have the same weight as food security, in order to ensure that future livelihoods and human security are not endangered.

Conclusion 3

There is sufficient information available on how best to cope with fuel scarcity. Among international humanitarian agencies and NGOs, there is consensus on the need for more attention to fuel strategies in refugee camps. Many individuals within these organisations acknowledge the importance of integrating the sustainability aspect of fuel as a key component of emergency aid operations, as recommended by UNHCR and the IASC Task

Force SAFE. These individuals are aware of the urgency of this and are keen to see changes implemented. However, making this a priority within their own organizations/departments is much more complicated. On an organisational level, most agencies claim they either lack the funding and/or the technical and human resources capacity to carry them out. The problem is that the speed and scale of the coping strategies are lagging behind the urgency and dramatic scale of the problem of fuel scarcity in many protracted refugee situations. A key factor is that the fuel - ecosystem link is not mainstreamed into the operational procedures.

Recommendation 3.1

There is a need for a more structural change of mind-set towards a willingness to tackle the problems around fuel use in refugee camps, and to make sure these organisations take the necessary action to solve them. The tools and policy guidelines are readily available and it is now a matter of mainstreaming and implementing them within every humanitarian agency.

Recommendation 3.2

The budgets of relief operations should include the implementation of low impact domestic fuel supply and related staff capacity building.

Conclusion 4

Most of the training and stove distribution in refugee and IDP camps have, so far, been *ad hoc* in nature. There has been little sharing of best practices within or between agencies in the same region, leading to significant inefficiencies in programming and design. A general tendency is that emergency aid organisations (working in the acute emergency phase) focus more on the protection/security issues of fuel, while organisations that are focused on early recovery and rehabilitation focus more on the environmental/livelihood issues of fuel. Despite the difference in scope (short term vs. long term), both types of organisations are in essence striving for the same: more sustainable fuel supplies and improved livelihoods.

Recommendation 4.1

There is a strong need for better coordination of fuel-related initiatives.

Recommendation 4.2

To start with, all Netherlands based humanitarian aid agencies will be invited to engage in further dialogue on this issue. They will be challenged to take up a more holistic, integrated approach with sufficient attention for a minimised ecosystem impact of fuel supply in emergency response situations. Destroyed ecosystems (and services) will put future claims on the ODA budget with regard to fresh water supply and soil erosion.

Acknowledgements

This report was written with the help of a large number of people, who have kindly shared their insights and knowledge with us. A special word of thanks for those people who have taken the time to reply to our questions by email or in a telephone interview: Emiel Hanekamp (Partners for Innovation), Chudi Ukpabi (Chudi International advice), Tommy Garnett (Environmental Foundation for Africa), Paul Roelofsen (ZOA Ethiopia), Bert Koelewijn (MSF Holland), Piet Spaarman, Albert de Haan (both Cordaid), Rixt Bode (Oxfam Novib), Kirsten Hagon (Oxfam International), Evert van Bodegom, Marja Rijerse, Machteld Ooijens, Chiel Roelands (all ICCO & Kerk in Actie) and especially Erin Patrick (Women's Refugee Commission). Finally, this report could not have been written without the valuable feedback and additions of Mark van der Wal (IUCN National Committee of the Netherlands) and Eric van de Giessen (Institute for Environmental Security), two of the key initiators of this project.

1. Introduction

The paradigm of relief, recovery and then development needs to be enlarged to include the work to mitigate the ongoing chronic processes of environmental degradation, population growth, increased climate variability and polarisation of conflict, which act to undermine the process of development.

Quoted from Tearfund (2007), Darfur: relief in a vulnerable environment

Rural energy needs - in the form of firewood or charcoal - are among the most pre-dominant direct threats to ecosystem services and biodiversity in many developing regions. As a result, environmental degradation undermines development and stability. Fortunately, policy makers and development organizations in these regions increasingly recognize the need to provide for sustainable energy sources.

When we look at humanitarian crisis response operations[17] in post-conflict and post-disaster situations, however, we observe that energy needs are often not sufficiently addressed by most of those who provide assistance.

Notwithstanding the important positive results of humanitarian aid operations on the short term, the lack of consideration for environmental impacts removes the basis for long-term post-conflict and post-disaster reconstruction. It is widely acknowledged that disregarding the environmental aspects of aid operations can exacerbate tensions over resource access and can even lay the basis for the regeneration of future resource conflicts, within the target community as well as with potential host communities[18]. Also, large concentrations of people without any access to energy can destroy the environment to such an extent, that the ecological damage is irreversible. Although refugee camps are officially set up for a short term, in many cases they remain operational for a very long time (gradually transforming into permanent villages). This has a permanent impact on the natural resource base and related biodiversity. There are also significant negative health consequences associated with burning solid fuels indoors. Exposure to indoor smoke can cause acute respiratory infections which kill many people, especially women and children, also in refugee camps[19].

There are several key ways of looking at the linkages between the environment and a humanitarian crisis[20]:

1. Implications of environmental issues (e.g. climate change) on the nature and frequency of natural disasters
2. Implications of environmental issues on subsequent humanitarian aid (e.g. availability of natural resources such as firewood)
3. Impacts of the disaster on the environment (e.g. loss of productive land, drought and depletion of groundwater resources)

4. Impacts of subsequent humanitarian response on the environment (e.g. deforestation for construction timber)
5. Direct and indirect impacts of environmental degradation and weak natural resources governance on conflict, leading to humanitarian crisis situations (e.g. land scarcity leading to conflict between pastoralists and sedentary farmers)

The following key questions have been answered during the research:

- Which well-documented cases of ecological damage in and around refugee or IDP camps leading to threatened livelihoods are available?
- Who are the frontrunners on integrating energy needs in humanitarian crisis response operations?
- What energy sources are potential alternatives that can be implemented relatively easily and where are these alternatives being applied?
- Which recommendations can be made to donors and humanitarian aid agencies to improve the situation?

2. Examples of ecological damage in crisis response operations

> *Deforestation already extends as far as 18 kilometres from some camps, as people go further and further to find wood. As the wood runs out, the camps eventually have to move. This is not only hugely disruptive to the hundreds and thousands of camp inhabitants, but it is also detrimental to Darfur's existing problems of drought, desertification and disputes over land-use, which were contributory factors to the conflict from the outset.*
>
> Quoted from International Alert (2007), A climate of conflict – the links between climate change, peace and war

One of the earliest documented cases of ecological damage in crisis response operations was the influx of Mozambican refugees into Malawi as a result of the civil war. Between 1985 and 1995, Malawi accommodated more than a million refugees from Mozambique. They were consuming between 500,000 and 700,000 cubic metres of wood per year for cooking and heating purposes, which led to extensive deforestation around the refugee camps[21]. In Zimbabwe, an environmental impact assessment was carried out in 1994, after Mozambican refugees had returned home. It showed a 58% reduction in woodland cover around the camps[22].

A number of well-documented cases of environmental degradation and resource conflicts are described in detail below.

2.1 Rwandese refugees in North-Western Tanzania

Ecological impacts

In 1994 a large influx of refugees from Rwanda occurred in (then) Zaire and North-Western Tanzania. In total around two million refugees fled the genocide in Rwanda in 1994. This led to an ecological disaster with huge impacts on forest and water resources, biodiversity and protected areas.

An estimated 524,000 people fled to Benaco in the Ngara area, which as a result became the second largest town in Tanzania after Dar es Salaam. In six months time, tree resources within 5 km of the four Ngara camps had been cut down. By June 1995, the average distance for getting fuel was 10 km or more. Also, much of the pastureland in the vicinity of the camps had been seriously overgrazed by the thousands of cattle, sheep and goats that came along with the refugees. Another area of environmental degradation was water shortage and pollution of water resources (soil and groundwater). According to one study, in some places the vegetation was completely cleared for refugee settlements. Over 47,000 hectares of forest reserves were overexploited. The areas most affected were Gagoya in Ngara District, Kasogeye, Nyantakaraya and Biharamulo Forest Reserves[23]. Between 1994-1996 a total of 570 square kilometres of forest in Tanzania was affected, of which 167 square kilometres was severely deforested[24].

Although estimates of fuelwood consumption rates vary significantly, one of the most reliable surveys concluded that daily per capita consumption among local people in Ngara, Tanzania, was 1.75 kg, against 2.64 kg for people in the camps[25]. Based on the total numbers of 524,000 refugees in Tanzania, this means that an amount of wood of 1,603 cubic metres was needed, or 585,000 cubic metres per year. For a sustainable off-take the radius would have to be at least 43 km. Instead the actual use was concentrated within a radius of 5-10 km, clearly indicating the overexploitation of forest resources.

According to a local government officer in Ngara District, at the beginning of the influx of refugees in the mid 1990s, the clearing of forests took place in camps, of which Benaco camp was most seriously affected. Thanks to measures against illegal wood harvesting taken by refugee agencies (including UNHCR and CARE), this problem did no longer occur in other camps in Ngara District that were set up later. However, forest clearing had moved further from the camps (10 kilometres and more) because in these areas people could still collect wood illegally . As a result, over two thirds of the forest cover in areas surrounding the camps had been cleared[26].

Figure 1: Rwandan refugee camps in Tanzania[27]

THE BOUNDARIES AND NAMES SHOWN ON THIS MAP DO NOT IMPLY OFFICIAL ENDORSEMENT OR ACCEPTANCE BY THE UNITED NATIONS.
® UNHCR Environmental Database. ® ADC WorldMap, 1996

Responses in environmental management

In Tanzania, environmental programs were introduced as soon as the impacts became clear. Compared to Ngara District, Kibondo District was less affected in terms of environmental damage. This was due to two reasons. First, the arrival of refugees was slower than in Ngara. Secondly, UNHCR, based on lessons learned in Ngara, assigned CARE to undertake an environmental management programme, including tree planting, environmental education to refugees, control of soil erosion and advice to farmers on good agronomic practise.

2.2 The impact of emergency situations in the Virunga Volcanoes Region, Democratic Republic of Congo[28]

Following the genocide in Rwanda, a long and devastating war broke out in the Democratic Republic of Congo. Millions of people were forced to leave their homes, while an estimated 4 million people have died as a result of this civil war. Despite an official peace agreement in 2003, the eastern part of the DRC is still suffering from civil unrest, with violent struggles between government forces and militias, often backed by neighbouring countries. This means that there are still a great number of displaced people in the DRC. As of June 2008 there were some 1,250,000 IDPs in eastern DRC, 68 percent of them in North Kivu province. The DRC also hosts some 173,000 refugees, mainly Angolans, Burundians and Rwandans[29].

Ecological impacts of the Rwandan refugee crisis and the civil wars in DRC

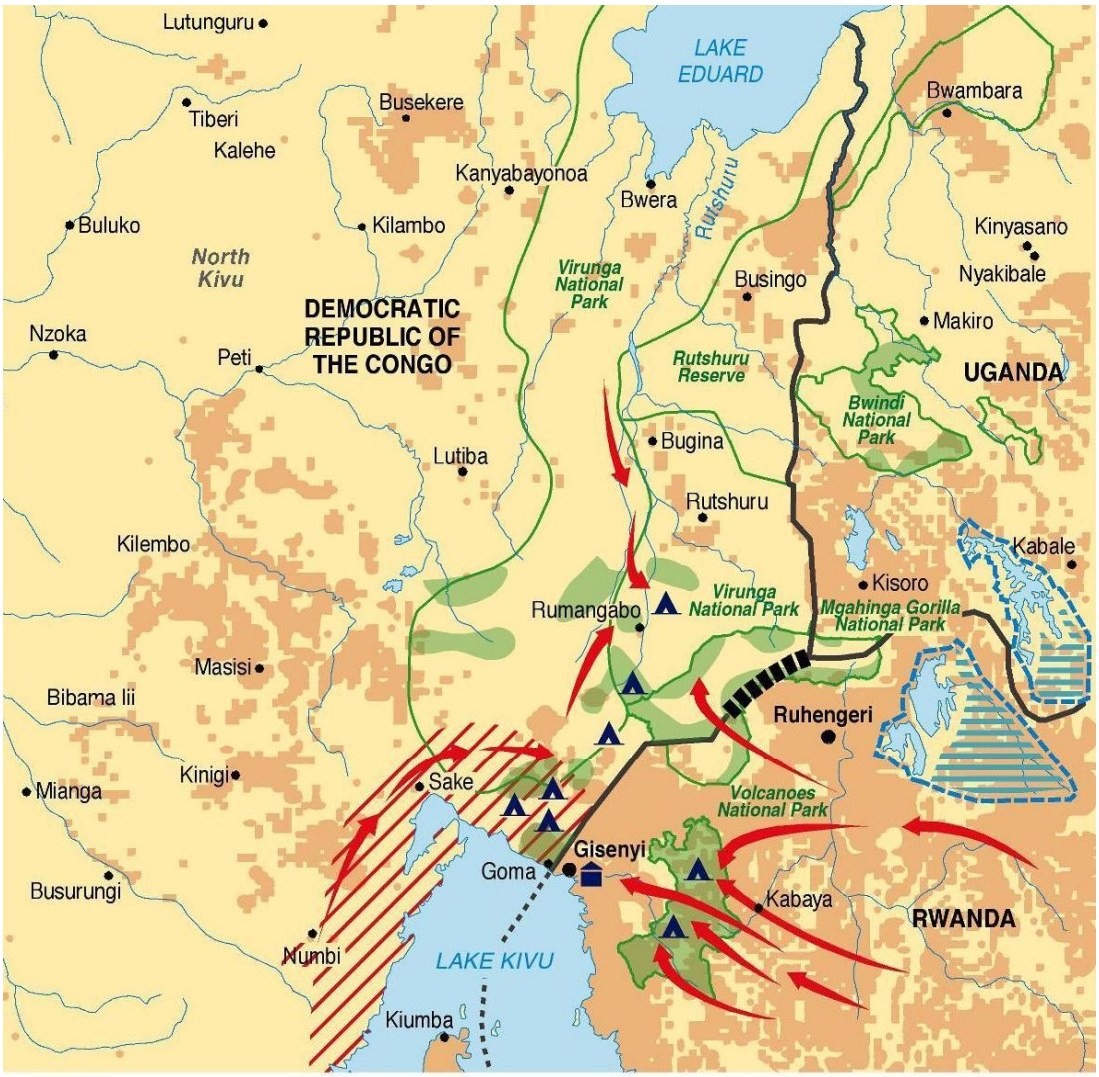
Many of the refugees from Rwanda ended up in or around Virunga National Park in (former) Zaire. From July to October 1994, some 730,000 refugees arrived in Goma (North Kivu). They were settled in three large camps (Kibumba, Mugunga and Katale), later expanded to five (Lac Vert and Kahindo). By the time environmental questions were fully considered, some irreversible decisions had been taken with regard to settlement sites, fuel supplies, shelter materials and water sources. The Virunga National Park, a UNESCO World Heritage Site, was placed under particular threat by refugees seeking firewood, building materials and for large-scale charcoal manufacturing, since the camps were located at walking distance from the Park. At the beginning of the crisis, 40,000 people on average entered the park every day in search of wood. This led to an average harvest of wood of 1,000 tons per day.

These refugees remained on the edge of the Park for more than two years. During this period 105 square kilometres of forestland had been impacted by deforestation. Thirty-five square kilometres were totally denuded. The Rwandan refugee crisis posed such an unprecedented threat to Virunga NP that the World Heritage Committee placed the park on its list of endangered World Heritage sites. In the areas surrounding the Mugunga and Lac Vert camps, the clearing of forestland was especially extensive.

Between 1996 and 2003, two successive wars broke out in the DRC, leading to a massive return of Rwandan refugees to their home areas. Many Congolese were displaced internally as a result of the civil war and because of the eruption of Mount Nyiragongo in 2002. At present (mid 2009) there are more than 1 million IDPs in DRC, the majority of which are

based in North Kivu. In 2007, there were four IDP camps close to the Virunga National Park, one was even within the gazetted boundary of the Park. The lack of adequate emergency shelter provisions has meant that significant quantities of trees and bushes have been cut from the margins of the park or from within the boundaries in order to construct basic shelters. Thatching materials, mainly banana leaves and grasses, have also been cut, leading to growing tensions and potential conflict between displaced people and local farmers.

Figure2: Impact of population displacement on natural resources in Rwanda and east DRC



Population movements

- Main refugees and displaced persons flux
- Refugee camps
- HCR Office
- Border mined in 1994

0 10 20 30 40 km

MAP BY PHILIPPE REKACEWICZ AND DIANA RIZZOLIO
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Environmental pressures

- High density of refugee population
- Population density higher than 200 hab. per km²
- Protected areas (natural parcs and reserves)
- Deforestation or illegal logging
- Marshlands
- Zone under threat of drying due to excess withdrawal and use of water (irrigation and electricity production)

Sources: Institute for Environmental Security (IES) field survey; United Nations High Commissioner for Refugees (UNHCR); International Campaign to Ban Landmines (ICBL), www.icbl.org/lm; Spatial data produced by FAO-Africover

Another issue fuelling the conflict is the large-scale sales of charcoal by armed groups, both militia groups and some segments of the national army. According to Emmanuel de Merode, director of Virunga NP, illegal trade generates sales of up to US$ 30 million per year. Most of the charcoal is obtained from Rugari in Rutshuru, 35 km north of Goma, or from Burungu and Kitchanga, 80 km west of Goma. Local loggers, charcoal burners and sellers, who are often refugees and internally displaced people, are forced to supply wood and charcoal. If they fail to do so, they risk huge fines or imprisonment by the militias. This commercial charcoal trade is contributing to even larger pressure on the forest resources and fuelling the conflict.

Box 1: Fuel-related initiatives in eastern DRC

Various programs have been set up in response to the environmental damage by refugee camps. An emergency environmental programme was started by GTZ focusing on Kahindo camp (DRC) which bordered the Virunga National Park. The Red Cross (IFRC) later expanded the initiative to include Kibumba camp. GTZ also provided a local NGO with technical and financial support for environmental measures in Lac Vert camp in 1995. Together these camps housed 365,000 refugees. The focus was on energy efficient systems and fuel-saving technologies and cooking techniques. An extensive environmental awareness programme reached more than 70% of the refugees. The GTZ experience highlighted an important aspect of improved stove programmes with refugees, i.e. that the promotion of better cooking techniques was found to be highly valuable.

An environmental program was set up by UNHCR in Goma in 1995. This included protection of the forest resources, as well as distribution of wood, charcoal and improved stoves, as well as energy-saving techniques. This led to a slowing down of wood cutting from 350,000 kg per day to about 4,500 kg per day in the southern sectors of Virunga National Park, a decrease of more than 70-fold. As a result of firewood-saving techniques, per capita wood consumption fell from 2 kg per day to app. 1 kg per day.

A few years ago, WWF started a programme for the provision of firewood to IDPs around Virunga NP. WWF is working in close collaboration with UNHCR and has planted mainly eucalyptus trees specifically for this purpose. However, some female IDPs are still searching for wood, because the firewood is not enough to satisfy their cooking needs. This exposes them to sexual and gender based violence from armed men.

In May 2009, the Africa Conservation Fund started a project on training, production and marketing of non-woody biomass-briquettes around Virunga National Park. Biomass briquettes are made from leaves, grass, coffee husks, sawdust, and scrap paper. They are pressed into briquettes using simple wood presses that can be made anywhere with a minimal amount of tools. Biomass briquettes are a low-tech alternative to the production of charcoal, and thus not only helps to reduce poverty and create local employment in this war-torn region, but also helps to slow down deforestation in the Virunga National Park[30].

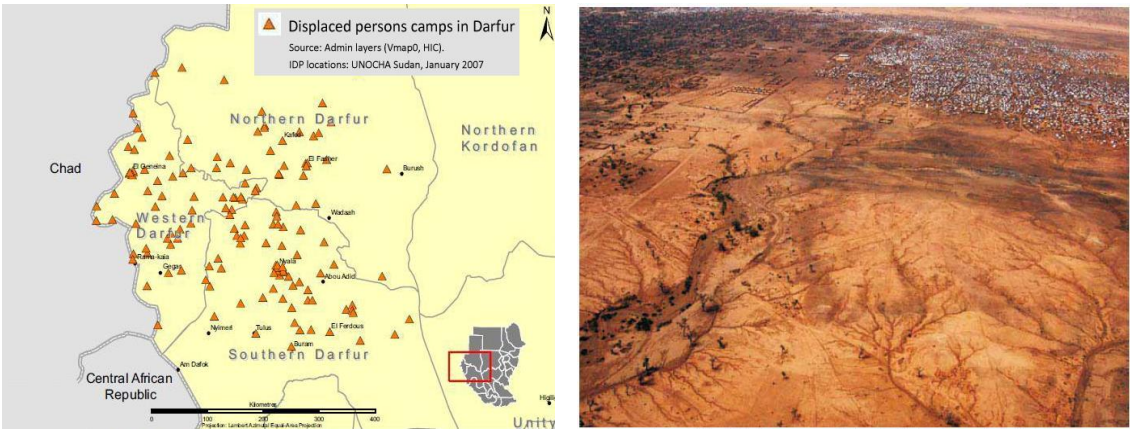
2.3 Deforestation and the fuelwood crisis in Darfur, Sudan

Over five million internally displaced persons (IDPs) and international refugees live in rural camps, informal settlements and urban slums in Sudan. It has led to major environmental damage, caused by the scale of the displacement problem and the vulnerability of the dry northern Sudanese environment. This is aggravated by the long period over which IDP camps exist, which can last for more than a decade (e.g. in Khartoum and Port Sudan). In Darfur, large camps appeared in 2003 and are still increasing since the intensification of the conflict in 2006. At present, almost 2 million people are staying in IDP camps in Darfur[31].

Firewood needs of displaced people

One of the most significant environmental impacts of displaced population settlements is the severe deforestation around the larger camps. This is related to the scale of the camps and the standard of aid provision for IDPs. Since they have not crossed any border, most IDPs do not qualify for assistance from UNHCR. According to a report by UNEP (2007), people living in IDP camps in Darfur are forced to find timber and fuelwood in the surrounding areas, as fuel is not provided for. Also, as a means to generate income, wood is collected to fuel brick kilns. Manufacturing bricks by burning wood can require up to 200 trees per day in some camps in Darfur. These practices are sometimes encouraged by development organisations[32]. Between 2003 and 2005, international agencies were the main consumers of construction timber as they set up the infrastructure for IDP camps[33]. It is estimated that for 2 million IDPs (or approximately 300,000 households), 1.5 million kg of firewood is needed on a daily basis[34]. If there is no widespread adoption of alternative construction methods in Darfur the loss of trees during the reconstruction phase will be considerable. Assuming a displaced population of 2 million people, there would have to be an estimated 12-16 million trees cut for reconstruction alone, without taking into account the fuelwood needs of the returnees[35].

Figure 3a and 3b: Concentrated exploitation of natural resources in displaced persons camps in Darfur have a major impact on already scarce vegetation [36]



Environmental impacts

Fuelwood collection is effectively uncontrolled. This has led to situations where camp residents have to travel up to 15 kilometres to find wood. In 2007, UNEP reported extensive deforestation as far as 10 km from the camps. Most collection sites are between three and six hours' walk in each direction, some of them leave early in the morning and often do not return until mid afternoon[37]. A more recent UNEP study[38] finds that travel distanced for firewood collection have increased from 15 km to up to 75 km or more from Kalma Camp. A round trip takes more than 24 hours. Some camps in Darfur will exhaust virtually all viable fuelwood supplies within walking distance, resulting in fuel shortages and rising fuel prices. Increasingly, women and girls collecting firewood are prime targets of government security and military forces and the Janjaweed militia, committing sexual assault and mass rape. In the case of Darfur, fuel is as much an environmental issue as it a security issue.

Uncontrolled deforestation has been enabled by the context of conflict in Darfur. For instance, there have been cases of large-scale felling of trees by pastoralists (especially camel herders) in valleys, where previously there was no tree felling. Also, illegal logging has increased because of a lack of governance. This makes it even harder for IDPs to find wood resources. The relief effort is constrained by the depletion of environmental resources on which it depends. It is reported that a significant number of IDP families missed meals due to a lack of firewood. There are instances of very considerable destruction of a protected forestry reserve such as Kasab camp outside Kutum, and the Kunduya forest near Kalma camp outside Nyala[39].

Responses in environmental management

Several NGOs as well as UN agencies have developed training programs on fuel-saving technologies to reduce the amount of wood needed. This should – in theory - reduce the frequency of women's wood collection trips. However, women and girls are still leaving the camps to collect firewood nearly as often as before to sell a sizeable portion of what they collect. The vibrant relief economy is fuelling a large market for bricks and charcoal. This is often the only means of earning some income.

The peacekeeping mission AMIS (African Union Mission in Sudan) started organizing firewood patrols in 2005. The goal of these patrols is simple: small convoys of AU soldiers and civil police accompany and watch over women and girls while they collect wood. However, misunderstanding of mandates, lack of clarity as to the level of involvement of Sudanese police in the patrols, and mistrust of uniformed men in general have limited the effectiveness of the patrols[40]. Another problem was that the women kept returning to the same areas because the patrols would take them there. These areas were soon depleted of its trees, leading to wood scarcity and conflicts with the local community that relied on the same wood. As a result, firewood patrols have been abolished due to insecurity for patrollers and lack of any wood still remaining to be collected[41].

The need for coordination of fuel-related initiatives is more acute in Darfur than in nearly any other displacement situation. This is caused by the aridity of the environment combined with the serious protection concerns associated with collection of firewood, leading to a wide and diverse variety of actors to become engaged in fuel-related programming for many different reasons and with varying results. A report by Tearfund[42] concludes that in Darfur, environment is not adequately integrated in the relief programme and suffers from a lack of technically skilled personnel. More and more relief agencies have begun focusing on fuel without taking into account what other agencies are doing and without considering the multi-sectoral implications of their work[43]. This has led to situations in which some projects implemented to reduce protection concerns are unwittingly contributing to environmental degradation[44]. Many of the agencies do not have prior experience with fuel-related projects and therefore may not always be implementing in the most effective way. They may also not know how to effectively monitor the impact or evaluate the outcomes of fuel-related projects. For example, in 2006 stoves and stove trainings were independently supported by a whole range of organisations: FAO, WFP, IRC and other INGOs, local NGOs and by UNHCR for a variety of purposes, including promotion of food security and as a protection tool. This is not very efficient, and it is therefore recommended to increase coordination, including sharing of information and lessons learned regarding fuel-related programmes.

Sometimes fuel-related projects may lead to new local conflicts. For instance, it was reported that an NGO working in Chad helped Sudanese refugees to plant trees. However, they were not aware that the local inhabitants viewed planting trees as claiming land ownership (as in many parts of Africa). Several people were killed in the ensuing conflict between the refugees and the host community[45].

Over the last five years, Darfur and Chad have become laboratories for innovative practices in fuel-efficient stoves and alternative energy provision. See Box 2 below.

Box 2: Review of fuel-efficient stove (FES) programmes in Darfur[46]

In 2008, an evaluation was carried out on the use of fuel-efficient stoves by the Darfur Fuel-Efficient Stove Working Group (FESWG), administered by CHF International. A need for the review was prompted by the growing investment being made in fuel-efficient stove (FES) programmes by a large number of organisations. However, it was not clear if these programmes were meeting their objectives.

In a nutshell, while the review found wholesale support for the FES programme at all levels of engagement, there are a worrying number of issues which need to be urgently addressed from the programmatic side. Many of these are “big picture” issues, such as inadequate planning, poor coordination, an almost total lack of monitoring and project evaluation and poor investment in longer term sustainability and uptake of fuel-efficient stoves. Some of the main issues include:

- There is widespread support for a fuel-efficient stove initiative and the recorded uptake of at least certain models of stoves is very positive and encouraging
- Despite there being many other FES designs and models all over greater Darfur, the improved mud stove happens to be that with the highest uptake so far. Of the people targeted by the FES projects, 80-99 percent use them frequently. In economic terms there is at least a 50 percent cash saving made on fuelwood (charcoal or wood) purchase when a fuel-efficient stove is used.
- Women – the primary gatherers of fuelwood across Darfur – generally report a significant reduction (up to 57%) in the frequency of collecting fuelwood per week with the use of some of the fuel-efficient stoves.
- On the subject of inter-agency collaboration, there is room for improvement, or at least a streamlining of approaches and intentions.
- Monitoring and evaluating the impacts of FES-related activities is very poor, with virtually no element of community participation.
- There is also a dismal record of knowledge management in relation to FES activities, and possibly broader programme elements. In more than 80 per cent of FES-related projects – even when there has been residual evidence that a similar project had been implemented in the same sampled location – implementing agencies merely start all over again, ignoring the lessons of the previous implementers.
- There is no deliberate capacity building strategy embedded in any of the FES projects.
- In terms of sustainability, the fact that in some projects implementing agencies currently provide everything for the IDPs to produce stoves is not contributing to the persistence of the technology when they return home. For long-term persistence of the technology and transfer of the technology to the country-side, more emphasis should be put on training with a strong component of construction materials acquisition.

2.4 Resource conflicts and refugees in Ethiopia

During the past four decades hundreds of thousands of refugees from Somalia, Sudan and other countries of origin have fled to Ethiopia. Today, Ethiopia hosts over 90,000 refugees from Sudan, Somalia, Kenya and Eritrea in camps around the country and a smaller number of urban refugees from several other countries in, Addis Ababa[47]. This has led to considerable pressure on the environment, in particular forest resources. In turn, this created local conflicts around access and control over natural resources. The following Box describes how these problems, in particular fuelwood shortages, can be tackled by using an integrated approach.

Box 3: Resolving resource conflicts around Sherkolle Refugee Camp, Ethiopia[48]

Sherkolle is a relatively small refugee camp, established in 1997, which hosts around 16,000 Sudanese refugees from different ethnic tribes who have fled fighting and insecurity in the Blue Nile province of the Sudan. The camp is located in a sparsely populated area in western Ethiopia around 50 km from the Ethiopian-Sudanese border.

In 2001, ZOA Refugee Care undertook an assessment into access and control over natural resources and found high levels of potential conflict between refugees and locals in accessing fuelwood. Actual and potential levels of conflict between refugees and hosts differed from one fuelwood collection area to another, depending on the distance from the area to the nearest Berta village. High levels of conflicting interest were found in the area directly bordering the refugee camp, as the camp is set amidst local villages and the Berta did not like to see the refugees collecting fuelwood in the forests around their villages.

Fuelwood collection is seen as a very demanding activity by both refugees and local women. In 2001, refugee women spent an average of 28 hours a week gathering fuelwood whereas local women spent 27 hours a week on this. The latter group, however, combined it with some agricultural activities. Since the arrival of the refugees, Berta women say they find it harder to collect fuelwood. The findings of the assessment highlighted that the system of access to and control over resources has resulted in increasing frustration and tension. The local Berta were becoming increasingly concerned about the loss of forest cover in their area. The refugees for their part were frustrated and agitated by what they saw as an unfair system of resource control. It seemed just a matter of time before serious conflict would erupt. The refugees knew that this might threaten their stay at the camp and they did not look forward to returning to insecurity at home.

In consultation with the local and refugee communities, ZOA Refugee Care designed the Agri-Environmental Education and Protection programme. Assessments taking into account the perspectives of the refugees and the Berta, the local and regional government as well as the perspective of UNHCR and its government counterpart have created the basis for change. The programme is made up of the following four interrelated components:

- Awareness raising
- Establishing structures
- Demonstrating appropriate practices (e.g fuel-efficient stoves, stove and fire management, fuelwood plantations)
- Indigenous resource management systems

The Environmental Working Groups form the heart of the programme. They are community-based organisations that develop natural resource management plans with limited outside facilitation and assistance. Awareness-raising about resource base degradation and the demonstration of sustainable resource management practices are central to the Environmental Working Groups.

So far the experience with Environmental Working Groups in and around Sherkolle refugee camp has been encouraging. Awareness raising and the demonstration of appropriate practices and techniques have become more and more under the control and responsibility of the Environmental Working Groups themselves. New technologies that save fuelwood or develop fuelwood resources are being adopted. Concerns of women related to the collection of fuelwood are now taken seriously and are being addressed, for example by agreeing on safe access paths to fuel collection areas for refugee women. Rules and regulations have been agreed upon to prevent tree cutting and to access fuelwood, grazing lands and water sources. A situation that had the potential to escalate into serious conflict has been defused.

2.5 Organized fuel supply for Bhutanese refugees in Nepal

In 2006, approximately 105,000 Bhutanese refugees lived in camps in eastern Nepal. The majority of the refugees arrived in Nepal in the early 1990s, fleeing increasing harassment of ethnic Nepalis in Bhutan. Most refugees have been living in the camps for over a decade. This has caused serious damage to natural forests and commercial wood plantations. In turn this led to resentment from local communities, who had to compete with refugees for limited energy supplies. Many people fear the locally hired "forest guards" who are sometimes harassing and raping refugee women and girls collecting firewood outside the camps. However, sexually based attacks on refugee women and girls outside the camps in Nepal occur less often than in many other refugee or internally displaced persons (IDP) settings. This is in part due to UNHCR's long running direct fuel provision scheme, which is described in Box 4 below.

Box 4: Refugee camps in Nepal: a cooking fuel laboratory[49]

In an effort to stave off a worsening of the tensions between the refugee and local populations, UNHCR began providing a weekly kerosene ration to all Bhutanese refugee families in 1992-93. The programme had wide support of both refugees – as it provided them with a cheap alternative energy source - and local people - because it supported the protection of their natural resources. However, though kerosene was in the words of UNHCR "cheap, available and easy to obtain" when the distributions began, the price has more than doubled in the early 2000s, and strikes and blockades imposed as a result of the Maoist insurgency in Nepal caused frequent scarcities of the fuel and delays in transporting it.

The rapid rise in the price of kerosene led UNHCR and its main implementing partner, the Lutheran World Federation (LWF), to embark on a major alternative fuel development program in 2005, with an abundance of different initiatives in various stages of development. Because of these wide-ranging, intensive efforts, Nepal can be seen as a sort

of "cooking fuel laboratory." The camps present a unique opportunity to carefully study a wide variety of different fuel options, and to weigh their respective advantages and disadvantages.

The alternative fuel solutions included:

- Biomass briquettes (made from charred forest waste, filler and a binder such as clay or molasse)
- Compressed coal dust briquettes
- Parabolic solar cooker program (supported by the Vajra Foundation)

Despite efforts by UNHCR and LWF to supply people with these alternatives for kerosene, in 2005 there was little willingness on the part of refugees to actually use such fuels. This was partly because kerosene is easy to use and satisfies many of the refugee women's preferences for cooking fuel, namely, speed of cooking, ability to cook indoors and flexibility of cooking time and temperature. Moreover, refugees were highly reluctant to accept the introduction of alternative fuels because they relied on the sale of kerosene as a key source of income. They then collected or purchased firewood to use as cooking fuel. It has been recommended to use a combination of fuels, and to carefully introduce new fuels to refugees to avoid potential misunderstandings about collection and production of such fuels[50].

3. Policy challenges and measures

The neglect of environmental mitigation in relief programming in Darfur demands a review of environment in relief more broadly.

Quoted from Tearfund (2007), Darfur: relief in a vulnerable environment

3.1 Integration of environmental issues in humanitarian aid, with a focus on fuel-related initiatives

UNHCR and the Environment

UNHCR is mandated to lead and co-ordinate international action to protect refugees and resolve refugee problems worldwide. Its primary purpose is to safeguard the rights and well-being of refugees. The organization is well aware of the need to take environmental considerations into account. Back in 1995, UNHCR established an Environment Unit. In 1996, the first version of the UNHCR Environmental Guidelines was released. Since then, much has happened in terms of translating this policy into practice. However, the organization also admits that much remains to be done. Natural resource management is not a straightforward process in many situations. As a result, the full range of environmental concerns or possibilities is not always addressed, while environmental concerns are still not dealt with in a consistent manner in refugee and returnee situations. This includes uncontrolled fuelwood collection leading to strong pressure on ecosystems, including in protected areas and UNESCO World Heritage Sites (see Chapter 2: case study on Virunga National Park). In 2000, UNHCR produced a booklet with key principles for decision-making on refugee operations and environmental management[51]. One of these principles is that "Environmental management is more than providing stoves and planting trees". It stressed that the potential of energy-saving cooking stoves should not be over-estimated and promotion should be at a scale commensurate with the likely impact. Also, the promotion of familiar fuels and cooking systems should take priority over unfamiliar items.

In 2005, an updated version of the Environmental Guidelines was published[52]. It states that UNHCR has a primary responsibility for integrating environmental considerations into all of its decisions and activities affecting the protection and well-being of refugees. A number of key principles have been identified to help reduce the impacts of refugees and returnees on the environment:

1. Integrated approach: it is more effective to incorporate environmental concerns into interventions being planned from the beginning of an operation.
2. Prevention before cure: this includes environmentally sound site selection and an appropriately planned layout of refugee camps/settlements and returnee housing arrangements.
3. Cost-effectiveness: it is crucial that values (monetary or otherwise) are placed on environmental assets and services at risk during refugee and returnee assistance operations.

4. Local participation: to deal with conflicting demands on local resources by refugees and the local population, participation of all parties concerned in the refugee assistance operations and local resource management practices is crucial.

In the Guidelines, a large number of measures are included on fuelwood and energy use during the emergency and care & maintenance phase (see Annex B). UNHCR has also produced a series of specific environmental manuals for use in refugee situations, designed for programme and technical staff of UNHCR and its implementing partners. This includes a guide on "Cooking Options in Refugee Situations", which gives a summary of practical ideas for the domestic energy sector in refugee situations[53]. Another useful guide related to fuel-issues is called "Forest management in refugee and returnee situations"[54].

The FRAME Project and Toolkit

In 2001, UNHCR initiated a project known as FRAME – Framework for Assessing, Monitoring and Evaluating the Environment in Refugee-related Operations[55]. The project was designed specifically to develop, test and deliver a series of tools to a wide range of users, primarily UNHCR managers and field staff, but also implementing partners government authorities and others working on environment-related support projects or programmes.

The toolkit was developed in collaboration with CARE International. Its goal is to ensure that environmental assessments, monitoring and evaluation are carried out in a more systematic manner, along proven guidelines, through appropriate means and approaches. It aims at ensuring that the information obtained in the environmental assessments is put to good use for improved environmental management and livelihood security of displaced persons and hosting communities. The toolkit can help to obtain a clearer picture on fuel-related issues (see Box 5 below).

Box 5: Use of the FRAME Toolkit in Sierra Leone[56]

An Environmental Assessment study of the proposed expansion of the Jimmi Bagbo refugee camp in Sierra Leone was undertaken by a team of environmental specialists from the Environmental Foundation for Africa (EFA), supported by a UNHCR consultant.

Early application of an environmental assessment in this situation, where a planned expansion for an enlargement to an existing settlement was being considered, allowed a number of important issues to be highlighted, including the fact that:

• the rate of forest cover loss outside the camp and its accompanying ripple effects could result in a serious and significant situation where the carrying capacity of the environment is exceeded in terms of sustainable utilization of certain vegetation resources;

• when the refugee population reaches its climax, there is the potential for key resources to become unobtainable for both refugees and the host communities;

• at this stage, the entire sustenance of the camp will depend on UNHCR, with no input from the refugees – even fuelwood may not be available. When this situation becomes apparent to the host community, local people may become hostile to the refugees;

• inside the camp the current and continuing removal of vegetation will have potentially serious implications in terms of microclimate change, soil fertility and quality of life for the refugees; and

• the likely adverse health impacts are also quite significant. If the impacts identified are not appropriately mitigated, there may an outbreak of an epidemic like cholera and consequent illnesses and, perhaps, loss of life.

Early identification of these issues allowed appropriate measures to be taken, the options being to either find an alternative site on which to locate additional refugees or to identify measures which needed to be put in place to prevent these likely impacts from happening.

The Sphere Handbook[57]

The Sphere Project was launched in 1997 by a group of humanitarian NGOs and the Red Cross and Red Crescent movement in an effort to improve the quality of assistance provided to people affected by disaster and to enhance the accountability of the humanitarian system in disaster response. A Humanitarian Charter was framed and Minimum Standards formulated in each of the five key sectors of disaster assistance: water supply and sanitation, nutrition, food aid, shelter and health services. Over 400 organizations in 80 countries have contributed to the development of the Minimum Standards. The project has developed several tools, the key one being the handbook, the latest version of which has been published in 2004. Currently, a process of revision is ongoing. The next edition of the Handbook is expected in 2010[58].

Environment is included in the Sphere Handbook as a cross-cutting issue and has been incorporated into the relevant sections of each key sector. The Handbook contains a number of Indicators and Guidance Notes for household energy-related interventions.[59]

According to one expert, these specific standards are not sufficient nor are they widely understood or implemented. The Women's Refugee Commission (see below under Fuel and Firewood Initiative) is currently participating in the global Sphere revision process, into which they are incorporating many more specific and cross-cutting fuel-related standards (pers. comm. Erin Patrick).

Camp Management Toolkit[60]

The Camp Management Project began in Sierra Leone in late 2002, as a response to the inadequate quality of assistance and protection in many of the country's camps for displaced persons. Under the coordination of the Norwegian Refugee Council (NRC), the Camp Management Toolkit has been developed by six member organisations – the Danish Refugee Council (DRC), the International Rescue Committee (IRC), the Norwegian Refugee Council (NRC), UNHCR, UNOCHA and the International Organization for Migration (IOM). The 2004 Camp Management Toolkit was updated in 2008. The Toolkit is intended for both refugee and IDP situations resulting from either conflict or natural disasters. It defines key messages and issues in relation to the roles and responsibilities of the camp management agencies and provides practical advice for camp management staff. The Toolkit is written as a complement to existing sector guidelines and standards such as the Sphere Handbook, UNHCR Handbook for Emergencies, and other technical handbooks.

The most relevant sections for fuel-related issues are Chapter 6 on Environment and Chapter 13 on Food Distribution and Non-Food Items. The Toolkit contains practical suggestions such as a maximum site size of 20,000 persons with one-day walk between camps – in part to reduce environmental damage. The section on domestic energy focuses on the use of fuel-efficient stoves. An important message is that experience has shown that for fuel-efficient stoves to work in a camp environment there ideally needs to be a local shortage of fuelwood. This can be induced artificially through tighter control over the free collection of wood. Users also need time to become familiar with the stove design and knowledgeable about its upkeep.

Another key message is that free-of-charge collection of fuelwood organized by humanitarian organisations or local administrations may lead to additional collection of wood and sales on markets or making charcoal out of it. The Camp Management Agency should monitor the camp populations' use of firewood and the availability of fuelwood and charcoal on nearby markets.

Cluster Approach

It is widely acknowledged that significant gaps to humanitarian response exist in certain sectors where there is no clearly mandated lead agency. The Humanitarian Response Review (HRR) recommended assigning responsibilities by sector to lead organisations and developing clusters of relevant partners to develop preparedness and response capacity. Recognizing this, in 2005 the Inter-Agency Standing Committee (IASC) agreed to designate global "cluster leads" specifically for humanitarian emergencies in nine sectors, including camp coordination/management, agriculture, health, logistics and protection[61]. The cluster approach aims to improve the predictability, timeliness, and effectiveness of humanitarian response, and pave the way for recovery. It also aims to strengthen leadership and accountability in certain key sectors.

Within the Cluster Approach, there is no fuel or energy cluster, and thus any fuel-related programming is necessarily dealt with as a cross-cutting issue. There are six cross-cutting issues, one of which is the environment. The lead agency for environmental issues is UNEP (Post-Conflict and Disaster Management Branch). So far, environment has received fewer resources than other cross-cutting themes, such as gender[62]. Specific mechanisms for implementing cross-cutting activities within the clusters are still in discussion and are still a source of controversy[63]. Currently, a Review Team led by UNDP is working together to develop a comprehensive approach to integrating crosscutting issues within the cluster approach.

Fuel and Firewood Initiative

In 2006, the US-based NGO Women's Refugee Commission (WRC) started the Fuel and Firewood Initiative. Its starting point was the assessment that although risks associated with firewood collection have been well-known for years, few effective strategies are in place to combat the problems. The original aim of the project was to investigate methods for reducing vulnerability of displaced women and girls to gender-based violence during the collection of firewood. The project set out to assess alternative fuel options, firewood collection techniques and other protection strategies, appropriate to the local context in all phases of an emergency. Based on a desk review and field studies in Darfur, Sudan and in the Bhutanese refugee camps in eastern Nepal, the report "Beyond Firewood" was published[64].

The report concluded that dealing effectively with the issue of gender-based violence during firewood collection requires a multi-faceted response. This includes physical protection strategies (e.g. firewood patrols) and development of alternative sources of cooking fuel. Also, the development of alternative fuel sources must go hand in hand with development of successful income generation activities. On the issue of fuel efficiency, it was concluded that most trainings and stove distributions in refugee and IDP camps have, so far, been *ad hoc* in nature. There has been little sharing of best practices within agencies or among agencies in the same region, leading to significant inefficiencies in programming and design. A number of recommendations were made, including a call for better coordination of fuel-related initiatives.

As a follow-up to the 2006 report, the WRC organized an international research conference on fuelwood in December 2008[65]. Key findings from the conference were:

- There is a profound need for greater communication and coordination between humanitarian aid agencies and technical experts.
- Cooking fuel in humanitarian settings is a multi-sectoral issue: more than one type of fuel or energy technology may be needed in certain situations.
- The evidence base for fuel-related interventions in humanitarian settings must be strengthened, and doing so will be challenging.
- Working with beneficiaries on project and program design is key to long-term sustainability.

IASC Task Force SAFE

It is recognized that inter-agency coordination is central to delivering the benefits of environmental integration. The Inter-Agency Standing Committee is the major coordination mechanism for humanitarian aid[66]. It was established in 1992 and consists of UN agencies and the major international humanitarian NGO consortia. The secretariat of IASC is based in the OCHA office in Geneva.

There have been specific Task Forces on cross-cutting issues, one of which is the Task Force on Safe Access to Firewood & alternative Energy in humanitarian settings (SAFE). The Task Force SAFE was initiated in 2007 by UNHCR, WFP and the Women's Refugee Commission. WRC was working under the authority of InterAction, an NGO consortium), and was also holding the secretariat of the Task Force. The Task Force was technically dissolved in 2008 after its work was endorsed by the IASC Working Group, which is standard procedure for IASC Task Forces. There have been three main outputs:

1. Creation of the International Network on Household Energy in Humanitarian Settings (in short the "Fuel Network")

The Fuel Network was established by WRC in June 2007, and formally endorsed by the IASC Task Force SAFE in December 2007. The website www.fuelnetwork.org went on-line in April 2008. In April 2009, Task Force SAFE officially handed its work over to the Fuel Network.

The purpose of the network is to be a key multi-sectoral mechanism for NGOs, researchers, technical experts, international organizations, the private sector, government agencies, donors and others to share, receive and discuss information regarding household energy-related initiatives and technological innovations for use in humanitarian settings worldwide, including both conflicts and natural disasters. As such, it will help identify and institutionalize solutions to the security, environmental, technological, health and other concerns that arise around firewood collection and household energy use and supply in humanitarian settings worldwide.

The Network has just received funding to continue its work and will begin a major push to enhance Network capacity beginning in September/October 2009. This includes the development of standards and Monitoring & Evaluation frameworks in general, including but not limited to those for stoves[67].

2. Publication of "Matrix on Agency Roles and Responsibilities" (2009)[68]

The Matrix is targeted to field-based actors from a range of humanitarian response sectors, including camp coordination/management, emergency shelter, environmental/natural resource management, livelihoods/development/food security and protection. Its goal is to provide a practical tool for determining the priority activities that must be undertaken in the development of an effective, multi-sectoral fuel strategy, as well as the specific agencies with responsibility for ensuring that these activities are indeed taken. Given the cross-

sectoral nature of an integrated and holistic strategy on household fuel supply, UN OCHA, where present, also has the responsibility for ensuring that fuel-related issues are considered by the relevant sectoral coordination bodies.

On the issue of coordination, WRC has changed its viewpoint from recommending one designated agency for all fuel-related issues – as recommended in the 2006 "Beyond Firewood" report - to an inter-agency approach. According to WRC, the multi-sectoral nature of the issue requires the expertise and specific mandates of a wide variety of agencies/global clusters, and cannot truly be effectively addressed by a single agency or cluster acting alone. Thus, in the Matrix the responsibilities are specified to ensure that specific fuel-related activities are undertaken across the eight key issue areas on which the Task Force focused[69].

The Matrix is currently being disseminated to humanitarian agency field offices worldwide, concurrent with a series of Women's Refugee Commission-led workshops and trainings on how to use the SAFE guidance, in order to promote its uptake and implementation over the long term[70]. The field-based workshops are planned for October-December 2009. In addition, two pilot projects will start this fall, one in North Darfur and one in Uganda (focusing on DRC refugees). They will be organized by WFP, with assistance from WRC, with the purpose of testing the new guidance tools developed for safe access to cooking fuel[71].

3. Decision Tree Diagrams on Factors Affecting Choice of Fuel Strategy in Humanitarian Settings (2009)[72]

The goal of these diagrams is to address the range of and difference between fuel-related needs in the field. It is recognized that there is no single energy technology appropriate for use in all humanitarian contexts. The diagrams cover two phases: acute emergency and protracted settings. They are published and distributed to assist camp managers and project staff working on fuel-related projects.

3.2 Policies on fuel-related issues of Dutch humanitarian aid organizations

Environmental, "Greenpeace-like" activities should be carried out by environmental organisations, let us focus on our job - providing emergency medical assistance.
Interview with Dutch humanitarian NGO, August 2009

Based on interviews with a selected number of Dutch organisations working on humanitarian assistance, a number of observations can be made. This is followed by some specific remarks per organisation (see table 1 on page 35).

Concern

Within all organisations, there is general consensus about the severity of the environmental impacts in and around refugee and IDP camps. Especially the problem of fuelwood shortage is experienced by the organizations interviewed. Some organisations are actively using the Sphere Handbook, which includes specific guidelines on fuel and energy. Most – if not all – Dutch humanitarian aid organisations have endorsed the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief[73]. Principle 8 states that:

All relief actions affect the prospects for long term development, either in a positive or a negative fashion. Recognizing this, we will strive to implement relief programmes which actively reduce the beneficiaries' vulnerability to future disasters and help create sustainable lifestyles. We will pay particular attention to environmental concerns in the design and management of relief programmes.

Responses

However, the response to the problem of fuelwood and energy use varies significantly from one organisation to the other. There are only a few organisations actively working on fuel-related issues. ZOA Refugee Care is probably most active in this respect. In their field operations in Ethiopia, ZOA has been working on the improvement of fuel efficiency for several decades. This includes promotion of improved stoves as well as solar cooking. In Darfur, ZOA Refugee Care also has a specific programme on energy provision. ZOA also manages a fuel-efficient stove training program for Burmese refugees in Thailand. More details can be found in Box 6 on the next page. Cordaid, who is active in both the Emergency and in the Reconstruction phase, is supporting projects with fuel-related components, e.g. on the provision of fuel-efficient stoves in DRC and Sri Lanka.

A number of organisations have indicated that they are not directly working on fuel-related issues. An example is Doctors Without Borders / Médecins Sans Frontières (MSF). Although they are aware of the problem, they are not in the position to work on fuel issues because of a perceived lack of capacity and means. Basically, they want to remain focused on their mission, which is providing emergency medical assistance to populations in danger. A related problem that they are facing is the construction of latrines; this requires large

amounts of timber and competes with the local demand for firewood. If this is the case, MSF procures its own timber from elsewhere. Also, the issue of firewood collection has relevance to MSF as a health/protection issue, because of the risks for women and girls to be attacked and/or raped during their search for firewood.

Box 6: ZOA's involvement in fuel-related issues in Ethiopia[74]

ZOA Refugee Care has been active in Ethiopia since 1993. There are 95,000 refugees and approximately 400,000 displaced persons in Ethiopia. ZOA Ethiopia works in six of the seven refugee camps in the country, with refugees from Sudan, Eritrea and Somalia, internally displaced persons and with local guest communities. ZOA focuses on peace building, career training and improving the use of natural resources.

ZOA has been working on the improvement of fuel efficiency for cooking for several decades. It is promoting two types of improved stoves:

- Improved traditional stoves (based on traditional Anyak stove)
- Combined ceramic/metal stoves (concrete rings on ceramic stove), originating from Northern Ethiopia

The choice for a particular solution is based on local context. It usually starts with a small pilot of 12 families and is then scaled up to larger numbers. An important component is capacity building of refugee communities to build technical skills for construction of stoves. Apart from stoves, ZOA is also working on environmental awareness raising (e.g. on the importance of forest conservation).

Solar cooking pilot projects are taking place in different areas of the country. The "CooKit," a cooking utensil with foil inside that reflects the sunlight, was introduced through a Dutch NGO (Foundation Solar Cooking Netherlands). A local NGO called PISDA is providing the kits, which cost 300 birr a piece (approximately 20 euros). ZOA is looking into the possibilities to construct the kits locally. One of the disadvantages is that it is sensitive to wind (risk of collapsing and heat is blown away). Another problem is that foil is hard to obtain locally. Other types of solar cookers have been tried, but they did not work well.

A reason for organisations such as Oxfam Novib and ICCO & Kerk in Actie not to work on fuel-related issues is that they are not implementing field projects themselves, but through local partner organisations. Some of their sister organisations are more involved in implementing emergency aid projects. As an example, Oxfam America has supported the provision of fuel-efficient stoves in Darfur, including kerosene-fuelled stoves[75]. Also in Darfur, ICCO & Kerk in Actie's sister organisation Norwegian Christian Aid (NCA) is leading the implementation of a major emergency programme called DERO, which has a specific environmental component in its programme. In 2008, this included the planting of 80,000 trees in and around IDP camps for firewood provision and construction material[76].

The Dutch organisations involved in emergency aid are united in the SHO (Cooperating Aid Organizations)[77]. At present the SHO has 8 members: Oxfam Novib, Nederlandse Rode Kruis, Kerk in Actie, Cordaid Mensen in Nood, Tear, Unicef Nederland, Save the Children and World Vision Nederland. The SHO provides a useful platform for joint activities around fuel-related issues. In the table below, an overview is given of the Dutch organisations interviewed and their involvement in fuel-related policies. A division has been made between two types of organisations involved in humanitarian aid:

1. Directly implementing organisations, such as Médecins sans Frontières, the Red Cross and ZOA Refugee Care;
2. Organisations working through local or international partner organizations, such as Oxfam Novib and ICCO & Kerk in Actie.

Table 1: Overview of Dutch organisations' involvement in fuel-related policies

Organisation	Mission	Policy on fuel-related issues	Examples of projects related to fuel
1. IMPLEMENTING ORGANISATIONS			
MSF Holland http://www.artsenzondergrenzen.nl/	Independent, medical, emergency relief organisation that provides assistance to people worldwide. The Dutch organisation 'Artsen zonder Grenzen' (MSF-Holland) is a member of the international organisation 'Médecins Sans Frontières'; a network of 19 sections, each based in a different country.	No specific policy on fuel, but actively lobbying other organizations working in the same regions to work on improving fuel efficiency and alternative fuel. MSF is well aware of environmental impacts, indirectly through the security and health risks associated with fuelwood collection, and directly through the lack of construction materials for latrines and other facilities in the camps.	-
ZOA Refugee Care http://www.zoa.nl/worldwide	International NGO, operating in more than 10 countries worldwide. ZOA Refugee Care supports (former) refugees, internally displaced persons (IDPs), returnees and others who are affected by conflict or natural disasters in their transition from instability and lack of basic needs towards a situation in which conditions enabling a process of structural development have been (re-) established.	On a country level, there are fuel-related programmes. ZOA Refugee Care acknowledges that fuelwood is a major problem in refugee and IDP camps. Therefore ZOA is actively involved in this, by exploring alternative energy technologies and promoting fuel-efficient cooking.	Ethiopia: • Fuel-efficient stoves programme • Pilot programme on solar cooking (with Dutch Solar Cooking Foundation) • Exploration of potential of biogas (with SNV)
Red Cross NL http://www.rodekruis.nl	The Netherlands Red Cross helps, protects and takes care of people that are victims of war, conflict and disaster, and those who need assistance because of other circumstances. It is part of the international Red Cross and Red Crescent Movement	In the Red Cross/Red Crescent Code of Conduct, there is specific mentioning of environmental concerns in the design and management of relief programmes. Unfortunately, no interview could be held to find out more about the Netherlands Red Cross' policy on fuel-related issues.	-

Organisation	Mission	Policy on fuel-related issues	Examples of projects related to fuel
2. ORGANISATIONS WORKING THROUGH LOCAL OR INTERNATIONAL PARTNER ORGANIZATIONS			
Cordaid http://www.cordaid.nl/	International development organisation with a network of almost a thousand partner organisations in 36 countries in Africa, Asia and Latin America. Its counterpart organisations work on various themes, including participation, emergency aid and reconstruction, health and well-being and entrepreneurship.	In relation to the Emergency phase, Cordaid's policy is to help people relocate as quickly as possible to their home communities. There is some attention for fuel-related issues in the Emergency Unit. In the Reconstruction Unit, especially in the context of the African Great Lakes region, there has been a lot of attention for fuel issues. Cordaid is using the Sphere Handbook in its operations. Coordination with other NGOs has much improved over the last years, e.g. in response to the tsunami.	• Provision of fuel-efficient stoves in DRC and Sri Lanka • Supply of combustibles and forest management in Ngara, Tanzania
Oxfam Novib http://www.oxfamnovib.nl/	Oxfam Novib, a member of Oxfam International, is fighting for a just world without poverty. Oxfam Novib works with 830 counterparts in 60 countries worldwide.	Oxfam Novib is aware of the problems related to firewood and charcoal, but indicates that it is not directly working on fuel-related projects. This is mainly due to the fact that Oxfam Novib is not directly involved in the management of large refugee camps (cases in which dealing with fuel needs and the pressure on the environment are most urgent.) Some of Oxfam Novib's sister organisations, e.g. Oxfam GB, are working on fuel-related issues.	-

Organisation	Mission	Policy on fuel-related issues	Examples of projects related to fuel
ICCO & Kerk in Actie www.icco.nl	The mission of ICCO & Kerk in Actie is to work towards a world in which people live in dignity and prosperity, a world where poverty and injustice are no longer present. ICCO & Kerk in Actie is committed to providing access to basic social services, bringing about fair economic development and promoting peace and democracy. ICCO & Kerk in Actie is active in 55 countries in Africa, Asia, Latin America and Eastern Europe.	ICCO & Kerk in Actie is not implementing its own emergency aid projects in developing countries, but is always working with local partner organisations and, in case of an emergency, also through the ACT International Network (Action by Churches Together). At this moment, ICCO & Kerk in Actie is not involved in fuel-related projects, but underlines the importance to pay attention to fuel and energy strategies in emergency projects. In the regular development projects, attention is paid to aspects of climate change as part of the programme Fair Climate. ICCO & Kerk in Actie has adopted the Red Cross Code of Conduct and is using the Sphere Handbook.	• Darfur Emergency Relief Operation (DERO) programme, implemented by Norwegian Church Aid and local ACT partners, is involved in a tree planting programme in and around refugee camps. • ICCO & Kerk in Actie is supporting the Thailand Burma Border Consortium (TBBC) programme in Thailand. The TBBC programme includes fuel-related activities (supplying cooking fuel and fuel-efficient stoves) to lessen environmental damage caused by refugees gathering wood from the surrounding forests.
CARE Netherlands http://www.carenederland.org/	CARE is one of the world's top three aid agencies, fighting poverty and injustice in over 70 countries around the world and helping 55 million people each year to find routes out of poverty. Its mission is to create lasting change in poor communities, putting money where it is most needed.	CARE Netherlands, focusing on disaster risk reduction and peace building, is very interested in this topic. Unfortunately, no interview could be held to learn more about CARE Netherlands' policy on fuel-related issues in emergency response operations.	-

3.3 Constraints and opportunities for successful implementation of fuel-related policies

This review reveals that most humanitarian NGOs recognize the need for more attention to fuel projects in refugee camps. However, they either lack the funding and/or the technical and human resources capacity to carry them out. It is primarily a matter of obtaining more resources for implementation of fuel projects and capacity building of staff to carry out these projects.

Many individuals within humanitarian NGOs are up to speed in this process: they are aware of the urgency and ready to take it further. However, getting it internalized within their organizations/departments is much more complicated. Since the policy guidance by the Task Force SAFE, (dealing with integrating energy needs within humanitarian assistance) has been finished, it is now a matter of internal advocacy within NGOs and UN agencies, including UNHCR[78].

From this review, it appears that there are different approaches to the problem of fuel scarcity:

1. Fuel scarcity as an environmental/livelihood issue: large concentrations of refugees or IDPs result in the overexploitation of natural resources (trees and shrubs), which in turn leads to environmental degradation, decreasing livelihood options and potential conflicts between host communities and refugees.
2. Fuel scarcity as a protection/security issue: there are high risks associated with firewood collection, because of increased vulnerability and threats to women and girls as they have to venture further away from the camp to fetch wood.

A general tendency is that emergency aid organisations (working in the acute emergency phase) focus more on the protection/security issues of fuel, while organisations that are focused on early recovery and rehabilitation focus more on the environmental/livelihood issues. This distinction is important because the two types of organisations need to be approached differently in terms of lobby and advocacy.

A third approach that has not been dealt with in this review is related to the health risks associated with indoor air pollution as a result of the use of solid fuels. Many organizations are promoting cleaner burning fuels to reduce indoor air pollution and therefore chronic respiratory diseases. The World Health Organization (WHO) has played a leading role in these efforts[79].

Another issue that deserves more attention is the inclusion of a local conflict analysis and preferably a Do No Harm[80] assessment before any fuel-related project starts. This will prevent that projects actually worsen a conflict instead of providing relief.

4. Potential alternative energy sources and technologies

I never thought that you could use the sun to cook. From the beginning I felt like doing more with it.

Marie-Rose Neloum, chairperson of local NGO Tchad Solaire[81]

4.1 Overview of alternative energy sources and technologies[82]

Traditional three-stone fire

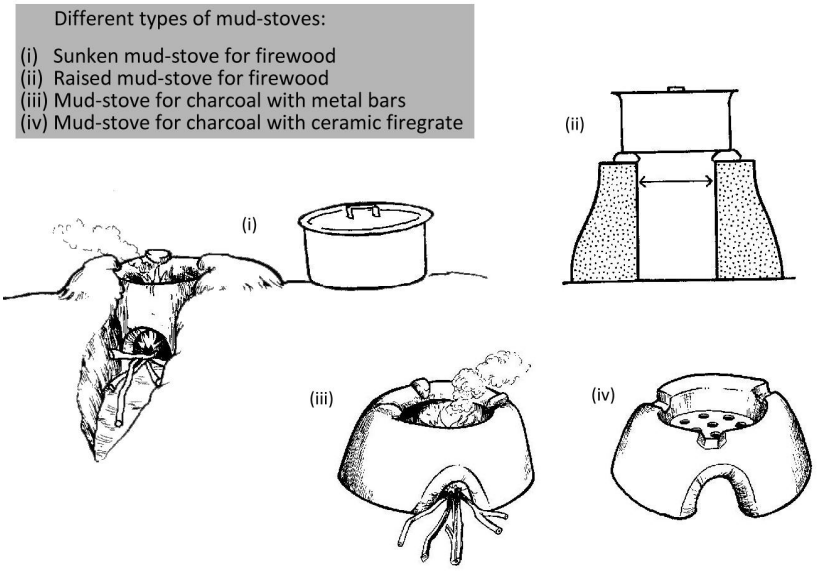
Traditionally, many people in developing countries, including refugees, use open wood fires for cooking. The traditional 3-stone fire is also used as a source for heat and light. However, the method is wasteful of energy and produces a lot of smoke that negatively affects people's health. Energy efficiency of the traditional three-stone fires is typically about 15% – meaning that only 15% of the energy released from the fuel actually enters the water or food inside the pot. The use of the traditional wood fire is a major cause for the current fuelwood crisis in many parts of the world.

Improved or Fuel-Efficient Stoves

To increase fuel-efficiency, improved stoves or fuel-efficient stoves (FES) have been in use for a long time. Improved stoves are the most common fuel-saving measures in refugee situations. Depending on the quality of the stoves produced and the way they are being used, improved stoves can achieve efficiencies of at least 20%, which is an energy efficiency gain of 5% compared to open fires. The following stove designs are most common:

- Mud stoves: hand-made stove, combination of clay, sand straw/grass, ash and/or animal dung. A well-known example is the "Jiko sanifu" (improved stove) of Mwanza, or the "Kilakala" stove from Morogoro (both in Tanzania). In Uganda people use the 2-pot "Lorena" stove, while in Central America the "Apprevecho" is well known.

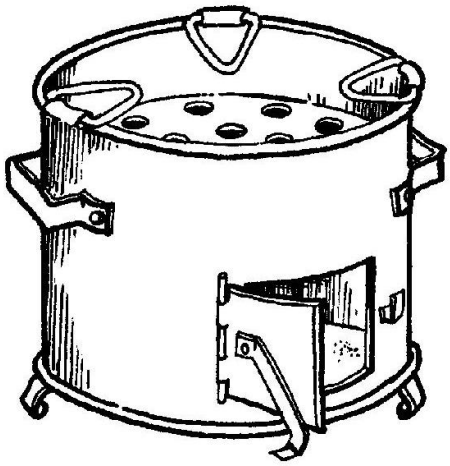
Figure 4: Different types of mud stoves[83]



- Prefabricated stoves: more sophisticated cooking devices that can be fabricated locally. Examples include "all-metal stoves" (made from scrap metal – Tara stove or Berkeley Darfur stove), "fired clay stoves" (made from fired clay – Rocket stove) or "combined clay/metal stoves" (made from a clay liner with an external metal cladding). Well-known examples of the clay/metal stoves include the Thai bucket and the Kenya Ceramic Jiko. Another example is the UPESI (maendeleo) stove, a ceramic liner stove set in a mud platform or clad in metal for portability[84]. Another example is an improved woodstove designed by multinational Philips. It contains a long-life, brushless fan that forces a controllable flow of air through the stove from below. A field trial in India in late 2005 showed that, when used properly, the Philips woodstove typically reduces fuel consumption to 1/3 of that used by traditional, three-stone fires[85].

Figure 5: Illustration of clay-metal stove[86]

A clay-metal stove is portable, durable and efficient.



There are a number of preconditions for the promotion of improved stoves, including:

- Users should be in a situation of fuel shortage, so there is an incentive to conserve energy.
- Fuel should be a market commodity, so that buying an improved stove will save them money.
- The stoves should have multiple benefits and be locally adapted to suit cultural preferences and needs, including family size, cooking habits/staple foods, etc.
- In situations where the stove is made from materials other than mud, there should not be a strong re-sale market for the raw materials, or else the stoves may be sold for their scrap value.

A key consideration when choosing a stove model is availability – the stove should either be locally producible, from locally available materials (e.g. mud stove) or easily, cheaply and quickly transported. Stainless steel models can cost upwards of US$ 50 per stove and must be transported long distances, making them an impractical choice in remote, insecure regions such as Darfur. In comparison, basic mud stoves can cost less than US$ 1 per stove[87].

Box 7: Examples of interesting initiatives of improved stoves

- A pilot by UNHCR of the "Save80" stove (small stainless steel stoves) with refugee and host populations in Chad started in 2005. The name of the stove comes from its goal of saving 80% of firewood needed for a traditional three-stone fire. However, the stoves are partly manufactured in Germany, resulting in high costs per stove (US$ 57)[88].
- With support of USAID/OFDA, an improved stove called the "Berkeley Tara stove" was designed and tested in 2005 and 2006. This stove is based on the Indian-made multi-fuel, metal fuel-efficient Tara stove. It has promising potential because it can be produced locally from sheet metal at low cost (US$ 10). It was demonstrated to save 50% fuel over a 3-stone fire[89].
- Burmese refugees in Thailand adapted the Thai bucket charcoal stove to suit their tradition of burning firewood by cutting a hole in one side and adding a protruding shelf for feeding firewood. This meant that it could be widely used as a multi-fuel stove instead of being rejected as a technology suitable only for those who could afford charcoal.

Apart from firewood and charcoal based stoves, a number of alternative biomass fuel options are available, which are presented below.

Fuel Briquettes

Residues can also be compacted into more energy-rich and user-friendly briquettes. Plant waste or sawdust can be turned into fuel pellets or compressed fuel blocks by a process of compaction, charring and/or carbonisation. Three well-known types are:

- Densified briquettes: compressed fuel blocks combined with a binding material such as molasses or resin. A well-known example is the "honeycomb" or "beehive" briquette, currently used in Nepal. They are made from a combination of forest products (weeds or scrub bushes) or agricultural waste (rice husks), soil or sand and a binding material. They can be made locally, or in a more industrialized way using charring drums and screw-press machines.
- Charred briquettes: e.g. briquettes from rice husks used by Burmese refugees in Bangladesh in the mid-1990s.
- Charcoal briquettes: fuel pellets of higher energy content that have been carbonised prior to compaction, or compacted first then carbonised (see Box 8).

The experience from Thailand (see Box below) suggests that refugees previously accustomed to firewood are generally willing to accept briquettes as alternatives. Briquettes can be handled in a similar manner to firewood, so no major behavioural changes are required. Charcoaled briquettes are actually somewhat superior to firewood, because of their higher energy content and longer burning time. Thus, they may be a viable alternative to firewood if long-term funding is obtained and

if re-sale can be effectively restricted and if they can be sourced and manufactured in an environmentally sustainable manner. Charcoal typically takes more energy to manufacture than it actually gives off during use. Charcoal should not be promoted without clear attention being paid to its potential environmental ramifications[90].

Box 8: Fuel briquette supply to Burmese refugees in Thailand[91]

An interesting initiative is a fuel supply programme in Thailand. An estimated 140,000 Burmese refugees have been staying in Thailand for more than 25 years. This led to serious environmental damage by refugees gathering wood from the surrounding forest, as many of them were settled inside forest reserves. The Thailand Burma Border Consortium (TBBC) initiated fuel supply on a small scale in 1995 by using charred briquettes made from sawdust. The charred briquettes were not very popular with refugees, who found them smoky and difficult to light, and a switch was made to charcoal briquettes.

TBBC supplied refugees with carbonised briquettes derived from sawdust, produced by a number of Thai private companies. Other briquettes were derived from raw material already carbonised before being transformed into briquettes, e.g. charcoaled bamboo waste from industrial operations in central Thailand. Both types of briquette had a much higher value than firewood and hence cooked more quickly and conveniently. They were popular with the refugees, who adapted their traditional stoves to use the briquettes alongside firewood that they were already gathering.

More and more camps in Thailand were supplied with cooking fuel each year with different types of charcoal being tested. Since 2000, all camps have been provided with 'full' rations. The current ration is set at about 8 kg per person per month depending on family size. By this time, over 8,500 tonnes of briquettes were being supplied, at an annual cost of US$ 2.1 million. However, because of the high costs and the need for constant monitoring of suppliers and prices, it was decided to switch again in 2001, this time to firewood from eucalyptus plantations. It is unknown whether this has led to an improvement in fuel efficiency or not.

The TBBC experience is interesting because it is one of the few examples worldwide of projects distributing charcoal briquettes. It also includes the distribution of fuel saving "bucket" stoves, the so-called Thai buckets. TBBC conducted a survey in all camps in November 2005 which established that approximately 90% of households were using bucket stoves.

Wastes & residues

In case of firewood shortage, some refugees turn to loose wastes and residues collected around the camps or in agricultural plots. This may include maize cobs, rice husks, cotton stalks, cow dung, twigs and leaves. Most of these materials are considered inferior to wood and charcoal because they have much lower energy content and are harder to burn. Another disadvantage is that some of them are

normally used as soil improvers. Their use as a fuel may disturb the nutrient balance of the soil. They are considered as supplementary energy options, useful as a fallback option in times of firewood shortage.

Grass-burning stoves

In situations of shortage of trees, it makes sense to look at other plant resources that can serve as a source of energy, one of which is grass. Two refugee-hosting areas with an abundance of grass are northern Uganda and western Tanzania. This prompted the introduction of a new type of cooking stove in the mid-1990s designed to burn bundles of locally cut grass. The original grass stove was a free-standing, portable device made from sheet metal. It became known as the "peko pe", meaning "no problem" in the Acholi language of Uganda. The stove involves significant labour on the part of the user for harvesting, drying and bundling before it can be used. It also has a short burning time and needs a change in cooking habits. Grass is an inferior fuel to firewood and charcoal with a 20% lower energy content per unit of weight. As a result, the introduction of the grass stove by several agencies in Tanzania and Uganda was unsuccessful, and it is now no longer considered a viable alternative.

Peat Stoves

Peat is a form of organic matter that develops as a result of incomplete decomposition of wetland vegetation under conditions of excess moisture and oxygen deficiency. Its energy value exceeds that of firewood. It has been a traditional fuel in high altitude regions for centuries. One refugee programme in which peat has been tested was in Kagera region in Tanzania (see also Chapter 2.1). It involved peat extraction from swamps along the river, for which refugees received daily incentive rates. Peat appeared to be an acceptable fuel supplement to firewood, with an adoption rate by Rwandese refugees of 98% in 1996. The sustainability of this programme can be doubted, since it was completely dependent on cash incentives. Based on tests in Rwanda and Tanzania, it was determined to be both unsustainable and environmentally degrading[92].

Kerosene

Kerosene is a high-quality cooking fuel with a much higher energy value compared to firewood and charcoal. However, kerosene is not an affordable option for refugees using their own resources. It has been introduced in the 1990s for use by Bhutanese refugees in Nepal, but this has been abandoned in 2006 due to the doubling of kerosene prices (see Box 4 in Chapter 2). Its use carries a number of risks, including the re-sale by refugees for cash. It can also be dangerous to users without prior experience. A kerosene supply testing programme in Darfur in 2004 was quickly stopped after a series of fires and explosions[93].

LPG

Liquid Propane Gas (LPG) has been discussed as a possible fuel source for refugees, particularly in countries with large natural gas resources and/or gas pipelines. However, it is typically too expensive for large-scale distribution and cannot be considered a viable alternative in refugee situations[94].

Biogas

Biogas is a methane based fuel created from the fermentation of human or animal waste (manure, sewage, green waste, landfill waste) which can be used for cooking or lighting/heating purposes. The leftover slurry can be used as fertilizer[95]. If human waste is used, ten families are needed to supply the gas needs of one beneficiary family. Bio-digesters can cost up to US$ 1,700 depending on their size and materials used. There are also plastic bio-digesters that cost only US$ 45 per unit[96]. Worldwide, there is considerable experience with biogas for local communities, especially in India, China and Nepal. In some countries, cultural barriers have prevented biogas from being used as a cooking fuel, as people consider the use of biogas to be unclean. This is particularly the case in some parts of Africa.

UNHCR has mixed experiences with biogas projects in refugee situations. A biogas project in Nepal was prompted by a communal health problem. It took off well because it acknowledged the community based nature of the sanitation problem. However, it produced only small amounts of gas and fertilizer for the benefit of a few people. In a biogas project in eastern Afghanistan, a saving on firewood of 2.5 tonnes per household per year was attained, implying a total saving of 250 tonnes across all beneficiaries. The biogas technology was well accepted and widely taken up, mainly due to a family-focussed approach and cost-sharing mechanism, and by ensuring that user rights and responsibilities were well defined[97].

Given the high investment costs and the need to build permanent structures, the use of biogas would only make sense in protracted situations. If host populations would benefit from the installations, the chances of success would strongly increase. Another important advantage is that biogas is a cleaner source of energy that does not degrade the environment or health, and that it produces fertilizer. It would be useful to do more research on the development of cheaper underground biogas digesters and to explore possibilities for household level biogas production[98]. Another option is to link up to the Biogas for Better Life programme, an African initiative supported by a range of partners including the Dutch Ministry of Foreign Affairs, SNV, HIVOS and the Shell Foundation[99].

Solar energy

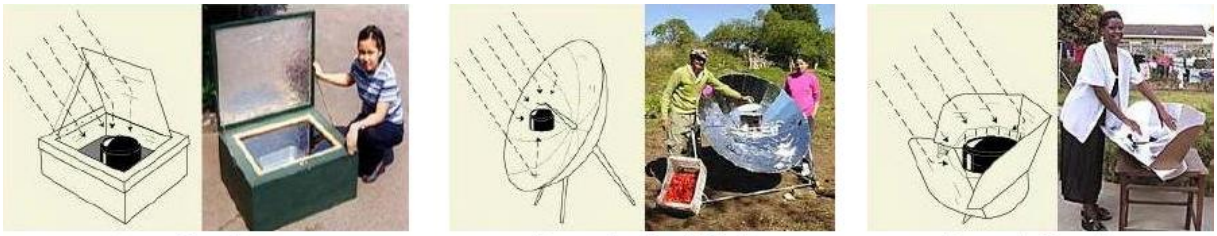
Solar energy is captured in many ways, such as solar cooking, Solar Photovoltaic (PV) power and Concentrated Solar Power (CSP). For the purpose of this review, only solar cooking devices are described, as these are the most relevant options for refugee situations as an alternative to firewood. There are basically three types of solar cooking devices: panel cookers, box cookers and parabolic/dish cookers.

1. Panel cookers: they consist of a large piece of cardboard, covered with aluminium foil, and can often be made on site, including in camp settings. Well-known examples include the CooKit panel cooker, which is promoted by Solar Cookers International[100]. They are relatively inexpensive (US$ 10-12 per unit), they rarely burn food and can be made locally. However, CooKit panel cookers are fragile, especially in a windy environment, and must be frequently replaced. They also cook slowly and cannot be used to fry food. The CooKits have been used on a larger scale in Kakuma Camp in Kenya and Aisha Camp in Ethiopia, and have been introduced successfully in Chad (see Box 9).

2. Box cookers: they consist of a wooden box lined with a reflective mat on the bottom, insulated sides and an adjustable glass top. A black-painted pot is placed inside the box. Disadvantages include the facts that they are large and cumbersome to move and store, and the cookers are prone to breakage. They also cook food slowly and are more expensive than the panel cookers (between US$ 30-70 per unit)[101].

3. Parabolic/Dish cookers: they are made up of large interlocking reflective plates, mounted on a rotating frame. A black-painted pot is suspended in the centre of the dish in order to absorb the maximum amount of solar energy. Parabolic devices cook much quicker than the Panel or Box cooker models – a full family meal can be prepared in roughly 45 to 60 minutes. In addition, they can fry food. Disadvantages include the fact that they are labour-intensive in use (they must be turned every 5-10 minutes) and the high price (US$ 150-200 per unit). They are difficult to transport because of their large size and are often shared by several families because of the high cost. Parabolic cookers have been successfully used in Nepal for many years. The Dutch-Nepali Vajra Foundation has supported the use of solar cookers in a Bhutanese refugee camp in Nepal since 1998, covering more than 75% of the camp population in 2006[102].

Figure 6: Types of solar cookers



Box 9: Solar cooking for Darfur refugees in Chad[103]

Since 2005, Solar Cookers International has introduced CooKits in refugee camps in Chad in cooperation with Dutch NGO KoZon and local NGO Tchad Solaire. Solar cooking training and materials were provided to Darfur refugees living in Irimidi camp since 2005. In 2008, 85% of the 12,000 refugees prepared their meals using the CooKit. In the nearby Touloum camp, where Tchad Solaire has been working since July 2007, 55% of the refugees use solar cookers.

In conclusion, solar cookers have many advantages and could provide an environmentally friendly alternative to firewood and other biomass fuels. In some cases, it makes sense to promote panel cookers in a camp setting. Since solar cookers always need to be combined with at least one additional fuel source, it may be wise to choose the least expensive solar cooker model. However, there are mixed experiences with the acceptance of panel cookers by refugees. The most common complaint is the slow cooking time. Parabolic cookers seem to address the speed of cooking, but they

are very expensive. Even though parabolic cookers cost more up front, over the long run - if they are highly valued and used consistently - they might be more effective than panel cookers. Generally, solar cooking is only an option in areas with regular sunshine, which also limits its application. For these and other reasons, it is always very important to discuss with the potential beneficiaries before starting up any solar project.

There is significant private support for solar energy, channelled by NGOs such as Solar Cookers International and Solar Household Energy Inc. This means that in situations where these private funds are available, solar cookers should be considered for use in combination with other fuels or fuel technologies, such as improved stoves or briquettes. A possible solution would be the development of a solar cooker model "in between" the large and expensive, yet flexible and fast-cooking parabolic model and the small and cheaper, yet inflexible and very-slow cooking cardboard solar cooker model[104].

Biofuels

Biofuels are increasingly promoted as an alternative to fossil fuels. In refugee settings, there have been some small-scale efforts to introduce biofuels for cooking. This includes:

- Ethanol stoves: in Ethiopia, the CleanCook Stove is distributed by the Gaia Association, an Ethiopian NGO[105]. This Swedish designed stove runs on ethanol produced from molasses, a by-product of the local sugar industry. UNHCR and Gaia distribute ethanol fuel to some 17,000 users of the stoves in several Somali refugee camps throughout eastern Ethiopia. At the time of writing, the program is expanding very quickly due to the influx of Somali refugees[106]. The stoves are healthier and more efficient than traditional wood stoves or open fires. Local manufacture is expected to start soon, while UNHCR plans to expand the project to other refugee camps in Ethiopia. According to UNHCR, the use of this new stove has led to a reduction of 90-95% of environmental pressure in this arid and semi-arid region, reducing local tensions between refugees and host communities.
- Jatropha oil: Jatropha curcas is planted throughout the tropics as a source of biodiesel. Jatropha oil can be used to generate energy in biogas installations, and it can be used directly to power diesel engines. The presscake can be used as fertilizer. So far, Jatropha has never been tested in humanitarian settings[107]. It is inappropriate for use in crisis settings that are relatively quickly resolved, such as natural disasters. However, Jatropha would be worth exploring in protracted settings, since the plant requires at least two years to give seed. The potential of other biofuels (second generation) could also be explored as a long term option.

4.2 Conclusions

There is a tremendous amount of information on the use of fuelwood and other energy sources, and how to improve fuel-efficiency. At an international conference on alternative fuels and energy technologies in humanitarian settings, held in December 2008, many useful insights were generated from which this report has benefited[108]. It was concluded that firewood is the default choice not because it is the best choice, but because it is often easiest or most obvious and often the one with which the beneficiaries are most familiar. If other, safer and more effective fuels or energy technologies are easily accessible to humanitarian aid agencies, firewood will not remain the default option.

It is striking that some emergency situations have become testing grounds for new and innovative technologies. In Darfur and Chad for instance, many efforts are ongoing to find a solution to the increasing firewood scarcity, including successful efforts with solar cooking in Chad. Refugee camps in Nepal have become a "cooking fuel laboratory" because of the need to find alternatives for kerosene. In Ethiopia, promising pilots have started around ethanol stoves, while the full potential of biofuels is yet to be explored in humanitarian settings.

In general, fuel scarcity is less of a problem in forest rich areas; as a consequence most fuel-related projects are undertaken in dry and forest poor regions (e.g. Darfur, Ethiopia). Fuel-related projects are also initiated in situations where refugees are nearby or inside areas of high conservation value (e.g. Virunga National Park, DRC). The appropriateness of energy sources and alternative technologies depends very much on the climatic and ecological conditions. In savannah or desert land, solar energy has high potential, but in a more humid environment, solar cooking does not make sense.

A significant improvement in answering the question on the most appropriate fuel source or technology has come in April 2009, when the "Decision Tree Diagram for Choosing a Cooking Fuel Strategy in Acute Emergencies" was published by the IASC Task Force SAFE[109]. In this diagram, a number of fundamental questions are raised, which are intended to help camp managers and project staff to determine which fuel type is best used under which circumstances. However, it remains to be seen whether this Diagram is practically applicable, and how helpful it is to field staff, given its complex nature and the limited time available during humanitarian crisis response situations. The series of workshops organised by the Task Force SAFE, taking place in the last quarter of 2009, is an important step in testing the usefulness of the tool.

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[57] Source: http://www.sphereproject.org/

[58] See: Proposal for the revision of the Sphere Handbook, 2008 (http://www.sphereproject.org/). Contact person for environmental issues in the revision process is Anita van Breda, Director Humanitarian Partnerships, WWF US (anita.vanbreda@wwfus.org).

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ANNEX A

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ANNEX B

UNHCR Environmental Guidelines: specific guidelines on fuel-related issues

Specific guidelines on fuelwood and energy use:

- Supplies and logistics:
  - supply of other, more environmentally friendly materials such as foods requiring little cooking and fuel.
- Food:
  - provision of appropriate cooking energy (e.g. fortified, blended food such as corn soya blend and fresh vegetables);
  - provision of energy saving cooking sets and stoves;
  - promotion of energy-saving cooking methods (e.g. pre-soaking beans or whole grain maize) and energy saving utensils (e.g. pots with tight fitting lids);
  - Supply of food items that require the least amount of energy for cooking (e.g. flour instead of grain).
- Domestic energy:
  - Promoting energy efficiency by all users (domestic, institutional, business, agency) through fuel-efficient stoves for refugees, biogas plants and solar cookers/water heaters for camp institutions and agency housing, and photovoltaic power, wind generators or micro-hydro power for small businesses;
  - Ensure that fuelwood is harvested in a more sustainable manner, by controls over the way in which refugees harvest fuel or through an organised fuelwood supply programme;
  - Supply alternative fuels to refugees.
- Forestry:
  - Controlled wood extraction (e.g. by painting marks on trees indicating which trees may be cut and which should be protected);
  - Establish fuelwood plantations;
  - Reforestation of affected areas.

ANNEX C

Key Indicators and Guidance Notes on Household energy-related interventions in the Sphere Handbook[109]

The most relevant chapters of the Sphere handbook for household energy-related interventions are Chapter 3 on Food Security, Nutrition and Food Aid; and Chapter 4 on Shelter, Settlement and Non-Food Items (all text is from the 2004 edition).

Chapter 3: Food Security, Nutrition and Food Aid

Part 2: Minimum Standards in Food Security – Food Security Standard 1, General Food Security

Key Indicator: food security responses have the least degradative effect on the environment

> Guidance Note 3 - Risks associated with coping strategies: over-use of natural resources reduces the availability of natural capital (i.e.:….collection of firewood); travel to insecure areas to …gather food or fuel exposes people (especially women and girls) to attack.
>
> Guidance Note 6 – Environmental impact: Impact on the surrounding environment should be considered during assessment and the planning of any response. For example, people living in camps require cooking fuel, which may lead rapidly to local deforestation. The distribution of foodstuffs which have long cooking times, such as certain beans, thus also potentially affecting the environment. Where possible, responses should aim to preserve the environment from further degradation.

Part 2: Minimum Standards in Food Security – Food Security Standard 2, Primary Production

Key Indicator: The introduction of inputs …does not exacerbate vulnerability or increase risk, e.g. by increasing competition for scarce natural resources

Part 4: Minimum Standards in Food Aid, Section i). Food Aid Planning

Introduction: initial assessment and analysis of an emergency situation should identify people's own food and income sources, as well as any threats to those sources.

Food Aid Planning Standard 1, Ration Planning

Key Indicator: the ration distributed reduces or eliminates the need for disaster-affected people to adopt damaging coping strategies

Food Aid Planning Standard 2, Appropriateness and Acceptability

Key Indicators:

- When an unfamiliar food is distributed, instructions on its preparation in a locally palatable manner, with minimum nutrient loss, are provided to women and other people who prepare foods, preferably in the local language;
- People's ability to access cooking fuel and water, and the duration of cooking times and requirements for soaking, are considered when selecting commodities for distribution;
- When a whole grain cereal is distributed, recipients either have the means to mill or process it in a traditional home-based manner or have access to adequate milling/processing facilities reasonably close to their dwellings

Guidance Note 1 – Familiarity and Acceptability: …when there are acute survival needs and there is no access to cooking facilities, ready-to-eat foods must be provided.

Guidance Note 2 – Fuel Requirements: …a fuel assessment should also be undertaken to ensure that recipients are able to cook food sufficiently to avoid adverse effects to their health, and without degradation of the environment through excessive collection of fuelwood. When necessary, appropriate fuel should be provided or a wood harvesting program established that is supervised for the safety of women and children, who are the main gatherers of firewood. In general, items should be provided that do not require long cooking times or the use of large quantities of water. The provision of milled grain or of grain mills will reduce cooking times and the amount of fuel required.

Part 4: Minimum Standards in Food Aid, Section ii). Food Aid Management

Food Aid Management Standard 1, Food Handling

Key indicators:

There are no complaints concerning difficulties in…preparing [or] cooking…the food distributed
Every household has access to appropriate cooking…fuel

Guidance Note 3 – Household Items and Fuel: each household should have access to…adequate fuel for food preparation. If access to cooking fuel is limited, foods requiring a short cooking time should be distributed. If this is not possible, then external sources of fuel supply should be established to bridge the gap.

Chapter 4: Shelter, Settlement and Non-Food Items

Part 2: Minimum Standards in Non-Food Items: Clothing, Bedding and Household Items – Non-food items Standard 4, Stoves, Fuel and Lighting

Key indicators:

- Each household has access to communal cooking facilities or a stove and accessible supply of fuel for cooking needs and to provide thermal comfort
- Where food is cooked on an individual household basis, each household has a stove and fuel to meet essential cooking and heating needs
- Environmentally and economically sustainable sources of fuel are identified and prioritized over fuel provided from external sources
- Fuel is obtained in a safe and secure manner, and there are no reports of incidents of harm to people in the routine collection of fuel

Guidance Note 1 – Stoves: …Energy-efficient cooking practices should be promoted, including firewood preparation, fire management, food preparation, shared cooking, etc. This could include possible changes to the type of food to be prepared, such as any rations provided by food assistance programs e.g. pulses require considerable cooking and hence fuel, Where displaced populations are accommodated in mass shelters, communal or centralized cooking and heating facilities are preferable to the provision of individual household stoves, to minimize fire risks and indoor smoke pollution.

Guidance Note 2 – Ventilation: If used inside an enclosed area, stoves should be fitted with flues to vent exhaust gases or smoke to the exterior…[and to] minimize the risk of indoor pollution or respiratory problems. Stoves should be designed to minimize the risk of fire and of indoor and outdoor pollution.

Guidance Note 3 – Sustainable sources of fuel: sources of fuel should be managed, and measures taken to replenish and regenerate resources to ensure sustainability of supply.

Guidance Note 4 – Collecting fuel: women should be consulted about the location and means of collecting fuel for cooking and heating to address issues of personal safety. The demands of collecting fuel on particularly vulnerable groups…should be addressed.

Dealing with energy needs in humanitarian crisis response operations

"Deforestation already extends as far as 18 kilometres from some camps, as people go further and further to find wood. As the wood runs out, the camps eventually have to move. This is not only hugely disruptive to the hundreds and thousands of camp inhabitants, but it is also detrimental to Darfur's existing problems of drought, desertification & disputes over land-use, which were contributory factors to the conflict from the outset."

International Alert (2007)
A climate of conflict - the links between climate change, peace and war

"The neglect of environmental mitigation in relief programming in Darfur demands a review of environment in relief more broadly."

Tearfund (2007)
Darfur: relief in a vulnerable environment

"The paradigm of relief, recovery and then development needs to be enlarged to include the work to mitigate the ongoing chronic processes of environmental degradation, population growth, increased climate variability and polarisation of conflict, which act to undermine the process of development".

Tearfund (2007)
Darfur: relief in a vulnerable environment

"Environmental, "Greenpeace-like" activities should be carried out by environmental organisations, let us focus on our job - providing emergency medical assistance."

Representative of Dutch humanitarian NGO, Interview August 2009

"I never thought that you could use the sun to cook. From the beginning I felt like doing more with it."

Marie-Rose Neloum, Chairperson of local NGO Tchad Solaire

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