
Chapter 10

Humanitarian Response and Natural Disasters

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Experience shows that in times of emergency, there are often direct links between human suffering and environmental harm—and that both can be eased by early attention and pre-planning.

Chapter 10.1 Humanitarian Response

Brief Description of the Sector

The United States has a long history of providing humanitarian assistance to the victims of man-made and natural disasters, as well as to development assistance programs aimed at improving food security for vulnerable populations in developing countries. This assistance is provided through USAID's Office of Food for Peace (FFP) of the Bureau for Democracy, Conflict and Humanitarian Assistance (DCHA), in conjunction with the U.S. Department of Agriculture and U.S. private voluntary organizations (PVOs). Resources are provided through the Food for Peace Program (PL 480) Title II. In many African countries, these PVOs have often been in the forefront of those providing both emergency relief to refugees and various forms of development assistance that are oriented toward food security .

When disasters strike overseas, USAID's Office of U.S. Foreign Disaster Assistance (OFDA), another branch of DCHA, leads the response. OFDA can draw upon a variety of assets in responding to disaster, including stockpiles of relief commodities such as plastic sheeting, tents, and water

purification units. OFDA is also charged with working with host governments to develop early warning systems and training programs to strengthen local self-reliance in the face of disasters.

In the past, concern for the environment was seen as a luxury that need not be addressed by those involved with emergency and refugee relief programs. USAID's environmental regulations specifically exempt emergencies and disaster relief operations from environmental review and scrutiny.¹ Experience, however, is leading to an awareness that human suffering in emergency situations is often linked to adverse environmental impacts, and that both can be lessened with early attention and pre-planning. This new awareness grows out of the recognition that the environmental damage caused by the disaster itself—or by the disaster victims or the disaster response—can worsen the condition of disaster victims, including refugees and internally displaced persons (IDPs). This is particularly true when the direct effects of environmental contamination threaten the health of an already endangered refugee population.



Without planning, refugee and IDP camps can cause significant environmental harm to surrounding areas and local communities.

Potential environmental effects associated with humanitarian programs include:

- Deforestation
- Contamination and depletion of water supplies
- Land use changes
- Air pollution
- Poaching
- Health effects on disaster victims
- Women's and children's safety

The adverse impacts of large concentrations of displaced people and/or their camps can also affect the local population of host communities and countries. Often, in the case of both natural and man-made disasters, refugees and IDPs flow into nearby areas where the local population may also be facing difficulties, though perhaps not yet at the level of an emergency. It is therefore imperative that those who aid disaster victims ensure that potential environmental problems are anticipated and that a mitigation action plan is followed.

Potential Environmental Impacts of Programs in the Sector and Their Causes

The influx of disaster victims into an area can disturb ecosystems and threaten the livelihoods of local communities. Environmental impacts of emergency, refugee, resettlement and food aid programs may include:

- **Deforestation.** Wood collection for firewood and construction materials can deforest large areas surrounding camps. The loss of forest and ground cover destabilizes watersheds, triggering or worsening soil

¹ See Regulation 216 (b)(1)(i)(ii).

erosion and flooding. Deforestation destroys animal habitats as well, causing loss of wildlife. Deforestation also reduces the local community's supply of fuel, timber, and non-timber forest products and undermines their efforts to manage their natural resources and parks.

- **Water contamination and depletion.** Water resources that are not protected from refugee wastes and wastewater may become contaminated. Groundwater sources may also be depleted through excessive pumping.
- **Environmental health deterioration.** Refugees in poorly designed and constructed camps can suffer from disease and accidents caused by insufficient or unsafe water supply; poor sanitation and waste disposal; poor drainage; hazardous terrain (including gullies and ravines); and uncontrolled disease vectors (such as insects and rodents).
- **Changes in land use.** Agricultural production to meet the basic needs of refugees for food and income can lead to conflicts with local land users, changes in land-use patterns, cultivation of marginal areas, and encroachment on areas that are ecologically sensitive or high in biodiversity value, whether they are formally protected or not.
- **Air pollution.** The burning of fuelwood (particularly green wood for cooking), as well as kerosene or other fuel oils, can release harmful smoke and cause acute respiratory infections.
- **Poaching.** Poaching, particularly in protected areas, can decimate endangered species populations and disrupt local communities' revenue streams from commercial hunting ventures.
- **Personal safety.** Deforestation of nearby areas often necessitates long journeys for wood collection. This exposes fuelwood collectors—who are most apt to be women and children—to assault and even kidnapping, especially when there are lawless or disputed territories near the camp.
- **Health impacts from measures to protect food aid resources from contamination.** Treatment of stored food supplies may impair human health. For example, people working in food aid stores as well as those who consume the food may be endangered by chemical residues of treatment, such as the dust from phostoxin tablets used to fumigate storage areas and stored food.

The influx of disaster victims into an area can disturb ecosystems and threaten the livelihoods of local communities.

Sector Program Design—Some Specific Guidance

Preparedness is the key to a quick response to emergency relief and disaster situations. Because of the urgency, a quick response capability should be anchored in a series of clear operational directives. The following precautionary operational steps will help to ensure an environmentally sound response:

Rapid Environmental Impact Assessments

A Rapid EIA is a shorter impact assessment tool specifically designed for disaster response. While not a substitute for a full environmental assessment, it requires less time and expertise, taking from a few hours to two days. A Rapid EIA:

- summarizes the situation
- identifies factors with immediate effect on the environment
- identifies immediate environmental hazards
- identifies unmet basic needs
- identifies the environmental effects of relief activities
- lists actions to address issues, and
- sets out guidelines based on a survey of the affected community.

Rapid Environmental Impact Assessment. A Rapid Environmental Impact Assessment (Rapid EIA)² is a shorter impact assessment tool specifically designed for disaster response. While not a substitute for the EIA process normally applied to development programs and projects, it requires less time and expertise, and can therefore better respond to emergency conditions. A Rapid EIA can also be frequently and easily updated to reflect the changing conditions at refugee and IDP camps. Such assessments can be completed in a few hours by one person or within 1–2 days by a small group of people, none of whom need to be experts in environmental assessment. The Rapid EIA includes a community assessment tool designed to capture the needs, views and desires of the disaster victims themselves. Rapid EIAs should be used in the first 90 to 120 days after a disaster strikes. Beyond that threshold, it is better to perform a complete environmental assessment as part of the recovery/rehabilitation process.

Rapid EIAs consist of seven sections, each of which helps planners anticipate potential impacts and estimate the risk associated with them:

1. **Context statement.** This short statement summarizes the facts of the disaster, perceived environmental issues, information sources, any needs for further assessment/data, and special environmental assistance needs (e.g., an oil spill, work in an area inhabited by an endangered species).
2. **Identification of disaster-related factors with immediate impact on the environment.** This element lists and prioritizes factors requiring mitigation and identifies ways to mitigate or avoid environmental damage. Sample factors include the number of affected people, population density, the duration and the extent of the disaster, whether the victims are displaced or not, what resources are available, density of settlements, how people make a living, and social structures.
3. **Identification of possible immediate environmental hazards.** This analysis details and prioritizes any significant immediate threats to lives and well-being—for example, a flood passing through a fertilizer factory and contaminating nearby ponds used for drinking water. The focus of this Rapid EIA element is on hazards which may have an immediate impact on the environment and need to be addressed without delay.
4. **Identification of unmet basic needs.** This very important step identifies and prioritizes the unmet needs of the disaster victims, including refugees or IDPs, with their likely environmental impacts. An example would be the need for fuelwood to cook or to generate income and the deforestation that may result. The form rates the

² The Rapid EIA was jointly developed by the Benfield Hazard Research Centre /University College of London and CARE International, funded by the UN Environmental Program (UNEP)/Office for the Coordination of Humanitarian Affairs (OCHA) Joint Environmental Program, the Royal Norwegian Ministry of Foreign Affairs, and USAID/OFDA.

level of satisfaction of critical needs like water, shelter, fuel, food, health services and waste disposal.

5. **Identification of potential environmental damage caused by possible relief activities.** This element captures the negative impacts of ongoing or planned activities, including agriculture, irrigation, livestock expansion, introduction of agrochemicals, water supply and sanitation, and healthcare services. The form also lists possible changes to these activities and mitigation steps that could be taken during either relief activities or recovery operations.
6. **Synthesis action list.** This synthesizes the previous steps to prioritize critical environmental issues, determine actions to address these issues, and note issues which may require action after the relief phase is complete. The list specifies a deadline for completing each follow-up action and names the party responsible for completing the task.
7. **The community Rapid EIA guideline.** This is a useful tool to collect information in a participatory way from a diverse group representative of the affected community. Ideally, it should be completed separately with different segments of the disaster victim community, assuring inputs from women and other disadvantaged groups (youths, elderly people, members of minority populations, people with handicaps, etc.). It collects data on environmental issues as they are perceived by the disaster victims and allows respondents to prioritize their environmental concerns—not only those stemming from the disaster, but those that contributed to it in the first place.³

The most critical environmental damage begins to accrue right from the outset of emergency situations.

Include competent environmental specialists in disaster and relief teams: Experience has shown that the most critical environmental damage begins to accrue right from the outset of emergency situations. The most acute of these problems relate to basic human needs for water, sanitation and environmental health precautions. It is of fundamental importance to ensure that competent staff is on hand to deal with these problems, as well as provide advice to other team members attending to the food, shelter, health care and organizational needs of disaster victims.

³ The Rapid EIA documents, including the forms, can be all consulted and downloaded from the BGHRC/UCL at <http://www.bghrc.com/DMU/REA/DREA3v2.pdf>.

Environment-Related Directives from the *Field Operations Guide (FOG)*:

Water Matters:

Reduction in the quantity of water available to individuals has many health consequences. Proper supplementary and therapeutic feeding programs will be impossible unless sufficient water is available...

Minimum water needs vary ... the following amounts (liters per person per day) are desirable: drinking, 3–4; cooking and cleanup, 2–3; personal hygiene, 6–7; laundry, 4–6 = total individual daily need of 20–30 liters per day.

Efforts to control and manage the use of contaminated water should be arranged with community leaders ... immediate steps must be taken to prevent pollution from excreta.

Health Matters:

The risks of communicable (infectious) diseases are increased by overcrowding, poor environmental conditions and the often poor initial state of health of the population.

Measures to improve environmental health conditions are very important, and include: providing enough safe water and soap, properly disposing of excrement and garbage, controlling rodents and vectors, and educating the population.

Camp Site Selection:

WHO recommends a minimum of 30 m² per person; of this 3.5 m² is the absolute minimum floor space per person in an emergency shelter.

The single most important site selection criterion is the availability of adequate amounts of water on a year-round basis.

Sanitation and Environmental Services:

An acceptable and practical system for the disposal of human excreta is the key to reducing health hazards.

One latrine should be provided for every 20 people. Latrines should be located at least 6 m. from dwellings, 10 m. from feeding and health centers, and 15 m. (and preferably farther) from wells or other drinking water sources.

Once people have been settled in camps, their care and maintenance will also require giving attention to the natural environment and to how it can more sustainably provide food, energy and building resources. In longer-term refugee situations, fostering a degree of self-reliance and independence from external food resources will also require guidance about appropriate and durable land-use patterns that are compatible with the local environment. Finally, specialists will be needed to help plan and implement an effective program for the environmental rehabilitation of host areas once the refugees begin to return to their places of origin.

Distribute and follow environmental guidelines for operational planning. The Sphere project—a multi-year project sponsored by NGOs, the International Red Cross and Red Crescent, donor governments, and UN agencies—has published *The Humanitarian Charter and Minimum Standards in Disaster Response*, an extensive treatise on the standards for water and sanitation, nutrition, food aid, shelter and site planning, and medical services needed to respond to humanitarian crises.⁴ The *Environmental Guidelines* of the United Nations High Commissioner for Refugees (UNHCR), the USAID/OFDA *Field Operations Guide (FOG)* for



Planning, information and education are critical to preventing environmental damage during relief efforts.

Disaster Assessment and Response, and the UNEP/OCHA *Guidelines for Environmental Assessment Following Chemical Emergencies* also provide specific guidance for addressing the environmental dimensions of these situations. Chapter III of the FOG provides specific guidelines for assessments and responses related to water supplies, disease control, site selection and planning, shelter, and sanitation and environmental services. (See summary in sidebar, previous page.) Copies of these documents should be issued to all emergency and disaster relief teams.

Additional technical guidance and best practices can be found in the chapters on water and sanitation, forestry, agriculture and irrigation, rural roads, solid waste, and medical waste in the present volume.

⁴ As of summer 2003, the Sphere standards are being reviewed and upgraded to include stronger environmental considerations. For further information, see

www.sphereproject.org

Plan for long-term demands. Camps may be used for years beyond their expected lifetime. In anticipation of this possibility, players must coordinate their activities with government and NGO staff to ensure compliance with local laws and minimize environmental damage, especially to sensitive and protected areas. Investments in infrastructure, such as road improvement, riverbank protection, and construction of health posts, should also benefit local communities. Develop an environmentally sound long-term land use strategy involving activities such as conversion of areas for agriculture or agroforestry. Begin planning for rehabilitation activities as early as possible.

Use food aid proactively to avoid dependency: A full discussion of the complexities of the issues surrounding food aid dependency is beyond the scope of these *Guidelines*. In the recent past, the issue has received considerable attention within the humanitarian response community, and a much more integrated approach—including food aid, food-for-work, cash and technical assistance, and development-oriented food aid programs—has become standard practice with both USAID- and UN-funded programs. A number of fundamental principles can help ensure that food aid is used proactively to move refugees, displaced persons and food-insecure people along the continuum from relief to development. The principles include:

- **Apply participatory approaches.** Helping people make environmental choices is a matter of information and motivation. In an emergency or relief situation, local community structures have often been weakened. Instituting a genuinely participatory approach to working with disaster victims and local communities—or, for that matter, with the people involved in development programs that are funded with food aid—can reinforce their resolve, both personal and collective, about their own capabilities, their prospects and their hopes.

USAID, in its *Food Security Policy Paper*, emphasizes this need: “...interventions must be designed and implemented on the basis of the same principles that guide sustainable development—capacity building, participation and sustainability” (USAID 1995). Building capacity and leadership is key to helping affected individuals and groups better understand the issues, build consensus, and negotiate the tradeoffs that are often required for them to adopt new behaviors in the face of new circumstances.

In fast-paced humanitarian response settings, where environmental problems tell quickly on the people being assisted, participatory monitoring can be especially effective. A good network of leaders and spokespersons within the community, and regular meetings with them, can help track environmental health conditions on a timely basis. This can be critical to ensuring the health and well-being of vulnerable people.

“Interventions must be designed and implemented on the basis of the same principles that guide sustainable development—capacity building, participation and sustainability.”

Source: USAID 1995

Zambia Initiative Benefits Refugees and Local Hosts

Zambia hosts 292,000 refugees, mainly from Angola and the Democratic Republic of the Congo. This is a heavy burden for a poor country with fewer than 10 million citizens of its own.

UNHCR, in partnership with the Government of Zambia, has created a new strategy for supporting development projects to benefit both refugee and local communities in the Western Province of Zambia. The "Zambia Initiative" is a plan to link relief and development assistance, contributing to peace and stability in refugee-hosting areas of Zambia.

The program will establish small-scale projects in:

- agriculture (irrigation, crop production, poultry and fish farming);
- health (HIV/AIDS programs, training, maternity wards, rural health centers);
- education (schools and vocational training centers, material and teachers), and
- infrastructure (water and sanitation, roads).

Source: UNHCR 2002b.

- **Conduct agriculture and natural resource management training that is oriented toward food security.** Much of the discussion of agriculture and small-scale forestry in these *Guidelines* reflects the principle that environmentally sound activities can help to enhance food security by raising the productivity of smallholder farming and other land uses. Readers who are involved in longer-term aid to refugees and displaced persons should familiarize themselves with the principles of environmentally sound design for these activities. Sustainable production models should be used in developing food or fuelwood production activities among camp communities. This can also benefit the participants by giving them knowledge and skills they can apply once they return to their own lands.
- **Provide for environmental rehabilitation.** In the spirit of environmental justice, humanitarian response programs must include the resources and the time needed to rehabilitate damaged areas so that the local populations do not suffer from having hosted the disaster victims. Rehabilitation efforts can include camp cleanup; disposal of waste materials; closure of latrines; removal or conversion of housing and other infrastructure; and the development and implementation of plans for rehabilitating affected resources nearby (e.g., via soil and water conservation and revegetation). The UNHCR estimates that rehabilitation costs for existing refugee camps in Africa could be as high as US \$150 million annually. These efforts may extend for years after the refugees depart. In some instances, it may be necessary to work with development organizations to integrate technical expertise and approaches to rehabilitation into other community development initiatives.

Design and Operational Guidance

Site selection. Large population increases in areas with limited natural resources may lead to conflict between disaster victims—particularly refugees (or IDPs)—and host communities. Where feasible, camps should be located away from local populations and should be spaced at least 20km apart to minimize the environmental degradation caused by camp activities. Camps should be at least 15km away from ecologically sensitive or protected areas. Before the camp is set up, planners need to understand the regular and seasonal land uses of the potential area, including grazing, hunting and gathering, wildlife migration, and encampment by nomadic communities. In some cases, camp-related environmental impacts may be reduced by integrating refugees or IDPs into local communities.

Areas with strong winds should not be chosen as camps. Winds damage infrastructure and vegetation, and worsen erosion from deforestation. The soil slope of the site should be between 2 and 6 percent. A 2 percent slope is the minimum recommended to achieve natural drainage. A 6 percent slope is the suggested maximum to prevent erosion from cleared areas.

Camp planners must select a site with an adequate freshwater supply. They should consider seasonal fluctuations, downstream water quality and potential impacts on downstream users, as well as quantity requirements, access, and the needs of local communities. Camps using groundwater supplies must be aware of water table levels and drawdown effects. Planners must also anticipate the long-term effects of deforestation or overgrazing on the local watersheds.

Campsites need to have enough timber resources to meet fuel and shelter requirements. Estimating these requirements and the available supply may require input from forestry or biomass energy experts, as well as the local population and representatives of the displaced people. Planners should consult with host governments and NGOs to develop and manage resource-use plans for designated camp areas. Planners should also budget for wood-harvesting fees, since forestry activities in private or government-managed forests may require royalties.

Planners should design refugee schools, hospitals and, if possible, cemeteries so that the local population can use them after the camp closes.

“Attention to environmental concerns during site selection and planning can be the single most significant strategy in avoiding environmental degradation during mass population displacements.”

Source: CARE 1999.

Site selection, design and operations issues	
Site selection	Spacing (away from population centers, environmentally sensitive areas and other camps)
	Area's regular and seasonal land uses
	Local wind speed patterns
	Slope of land
	Water supply; effects of camp on watershed
	Timber resources and effect of camp on them
	Possible local use of camp school, hospital, cemetery after refugees leave
Site design	Proper design of roads (cambering, drainage) and footpaths
	Layout of garden plots (clustering plots, adding ground cover)
	Storage, household supply and fire prevention system
	Proper design and siting of latrines
	Using prefabricated or locally available construction materials
	Refugees' social customs
Site operation	Safe disposal of waste
	Safe control of pests

To supply or not to supply firewood?

Firewood is one of the most critical needs for refugees, and camp managers find the issue of supplying firewood equally critical. Supplies of firewood are expensive to truck in and difficult to distribute equitably. However, uncontrolled harvesting of local tree stands by refugees leads to deforestation, destroys habitats, and compromises the physical security of women and children sent to collect the wood.

Refugees can become very passionate about firewood supply programs, seeing them as a source of security and employment. Nevertheless, they may also abuse such programs by continuing to harvest trees to sell for income.

Site design. If new access roads are required, they should be cambered, have proper drainage and follow contour lines. Drainage ditches should be constructed to control rainwater; their outlets should have control measures (such as check dams) for preventing high-volume or high-velocity flows likely to cause gully erosion. Road gradients greater than 10 percent should be avoided whenever possible. For more on roads, see the rural roads chapter of these *Guidelines*.

Footpaths within the camp, like access roads, should be planned to minimize erosion and potential accidents. Firebreaks should be included; roads, for example, can act as firebreaks. The effects of soil compaction over time should be anticipated in designing pathways and roads.

Family residential and home gardening plots should be arrayed in clusters to encourage communal cooking and energy conservation. Households with family plots of 400m² or larger should be encouraged to cultivate trees and bushes for ground cover.

Sites should include storage facilities for fuel, fuelwood and food supplies. Facilities will also require fire prevention measures and a system for distributing supplies to households.

Latrines should be sited at least 30m from water sources to prevent contamination of surface waters. Latrine bottoms should be at least 1.5m above the water table to prevent groundwater contamination. Timber slabs may be used in pit latrines for short-term, emergency facilities, but concrete slabs should be used if latrines will be needed for more than a few months. Concrete is easier to clean, lasts longer, and does not use wood that is needed for shelters or home energy.

Site construction. If available, prefabricated structures or tents should be used for shelters. Locally supplied materials should be used whenever possible, particularly for communal spaces, offices, and storage facilities. Always consider the refugees' social customs during construction. Rwandan refugees in Tanzania, for example, refused to use improved cookers because they had been built "in the wrong place" in their huts. Somali refugees in Kenya shunned improved stoves because they were constructed in the shape of graves (UNHCR 2002a).

Areas should be left vegetated or replanted after construction to stabilize the soil. Trees should be planted around family plots and in areas susceptible to soil erosion.

Camp operations. Open water sources should be protected from bathing, laundry and dishwashing. Incentive programs should be designed to reward energy-efficient behavior. Camp enterprises (restaurants, breweries, etc.) should be encouraged to use improved stoves and other energy conservation measures. Plans to manage the use of natural resources should be implemented as soon as refugees or IDPs arrive.

Systems should be in place for reusing or disposing of non-biodegradable waste. If chemicals are used to control disease vectors (e.g., rats, mosquitoes), all guidance on safe storage and use of pesticides must be followed, as outlined in the chapters on safer pesticides and integrated pest management in these *Guidelines*.

Mitigation and Monitoring Issues

Water and sanitation

- Protect water sources from siltation, erosion, human and livestock waste, contaminated surface waters, and rainwater runoff.
- Do not divert surface water flows (e.g., rivers, streams) to the point where the remaining flows become stagnant.
- Mitigate disease threats from stagnant water bodies and ponds by incorporating fisheries into the humanitarian project. Fish can generate income while controlling mosquito populations.
- Use bed nets to protect against lice, mosquitoes, bedbugs and sandflies. Insecticide-treated nets are especially effective, but must be handled with care.⁵
- Mitigate erosion gullies by constructing a system of channels, bridges, culverts, and gabions (baskets of steel mesh filled with stones, used for erosion control along watercourses). These allow safe crossing, alleviate flooding and reduce erosion.
- Promote contour trenching and watershed management efforts as income-generating activities for refugees and local communities.
- Use wastewater for **multi-story gardens**, which recycle the water while growing food in a small space. These miniature gardens are constructed from deep tubular burlap bags filled with soil. A perforated funnel made from scrap tin cans is inserted into the center of the bag and packed with stones. Wastewater is then poured into the funnel, cleansed by the stones, and used to water vegetables, which emerge from small holes in the bag to grow at several levels (“stories”) in the soil.

Forest conservation

- Establish harvesting rules and harvest zones with clearly marked boundaries.

Mitigation and Monitoring Issues

The following areas should be the focus of planning for environmental impacts of relief activities:

Water and sanitation.

Protect water supplies from contamination. Prevent erosion and runoff and control disease-bearing insects and rodents.

Forest conservation. Establish rules to protect forests and preserve trees and watersheds. Encourage camp residents to replant trees and revegetate areas.

Energy conservation. Use renewable energy sources where possible. Use pre-cooked or easy-to-cook foods. Limit firewood use as much as possible.

Water conservation. Use special taps to minimize the leaking of water at drains and wells. Build tanks to catch rainwater for reuse.

Waste minimization. Compost and reuse organic wastes for gardening and agriculture. Recycle containers and packaging. Reuse wastewater, where possible, in gardens and farm plots.

⁵ To learn more, see USAID Africa Bureau’s Programmatic Environmental Assessment for insecticide-treated materials (at http://www.dec.org/pdf_docs/PNACP696.pdf) and “Insecticide-Treated Net Projects: A Handbook for Managers” (click on <http://www.liv.ac.uk/Istm/malaria/mcintroductions.htm#itnhandbook> for a summary and ordering information).

- Allow area closures for natural regeneration whenever possible.
- Mark specific trees with paint to prevent them from being harvested.
- Plant tree species with the greatest potential for growth and seed production.
- Designate specific tree stands for use in construction.
- Train and equip park rangers to protect vulnerable areas and prevent poaching.
- Transfer production responsibilities for tree seedlings to refugees and local community groups as early as possible.
- Encourage tree planting on household plots first, to generate enthusiasm and develop tree-planting skills.
- As camps are closing, emphasize to refugees the importance of leaving trees as a gift to their host community.
- See the chapter on forestry and agroforestry in these *Guidelines* for additional guidance and mitigation measures.

To conserve forests by saving on energy needs:

- Use milled grains and pre-cooked, soy-fortified, or local fresh foods instead of dried grains and pulses.
- Pre-soak grains, or pre-cook them using infrared radiation; pre-steam cereals and pulses.
- Provide pots with lids, large pots for communal cooking, and insulated pots.
- Encourage use of improved, fireless, and solar stoves and cookers.
- Use kerosene or other wood alternatives for cooking.
- Supply blankets and warm clothing in cold weather.
- Use a water purification system instead of having families boil water.

Energy-conserving activities

Food supply

- Using pre-cooked, blended foods instead of beans for children under three reduces cooking time from 45min to 5min. Milled grains require only 25 percent of the energy needed to cook whole grains. If they cannot be milled in a central facility before distribution, milling facilities should be provided at the camp. Be aware, however, that milled grains require vitamin supplements for complete nutrition.
- Use locally purchased, fresh foods instead of dried grains or pulses. Soy-fortified foods can be used to replace pulses.

Equipment supply

- Energy-saving cooking techniques include (1) pre-soaking whole grains, (2) steaming cereals and pulses before cooking, and (3) using infrared radiation to partially pre-cook grains.
- Provide cooking pots with lids to reduce cooking times. Larger pots encourage communal cooking, which is energy-efficient.
- Provide blankets and warm clothing in cool climates to reduce energy requirements for heating.

- Create incentive programs to encourage the use of improved stoves, fireless cookers, insulated cooking pots, and solar cookers where cost-effective and socially acceptable.

Energy supply

- Use a water purification system instead of having families boil water.
- Kerosene or other fuels can be used for cooking in lieu of firewood.
- Firewood should be supplied to camp residents only when:
 - insufficient fuelwood supplies exist within walking distance.
 - no other sources of fuel are available.
 - fuelwood collection is dangerous due to land mines, military attacks or potential sexual assaults.
 - other populations are dependent on the existing fuelwood supplies.
 - the source of the fuelwood to be supplied can be harvested sustainably over several years.
 - the distribution of fuelwood will be controlled and balanced by strong energy conservation measures.

Water conservation

- Use self-closing water taps and covered water tanks to minimize evaporation and water leakage, as well as reducing the risk of contamination.
- Use **ferrocement tanks** made of cement, chicken wire, and reinforcement bars (rerods) to collect rainwater runoff from shelters and buildings. Collecting rainwater also reduces the risk of flooding and soil erosion.

Waste-minimizing activities

- Distribute food in bulk so refugees can reuse packaging.
- Encourage refugees to reuse tins, containers and plastic bags. Tins can be used to raise tree seedlings and make stoves. Plastic bags can be woven into mats and baskets.
- Organic solid waste should be composted for use in agriculture or kitchen gardening.

Recycle “Waste” to Grow Food

- Reuse food tins to raise tree seedlings.
- Compost organic solid waste using pits or termite mounds.
- Treat wastewater to water gardens and seedlings.

- Treated wastewater can be used to irrigate home gardens, tree seedlings and areas vegetated for soil stability. (See discussion of multi-story gardens on p. 10–11.)
- Waste can also be packed into termite mounds, where it is broken down into fertilizer for crops.
- Consult the chapters on solid waste and on medical waste handling and disposal in these *Guidelines* for more information on this topic.

Environmental Education. Education helps refugees understand the impact of their actions on the environment and also helps establish ties to local communities. Information can be shared in classrooms; in meetings of refugees or of joint refugee and local groups; and through songs and theatrical productions. An added benefit is that refugees can use their environmental management knowledge and skills after returning home.

Chapter 10. 2

Natural Disasters

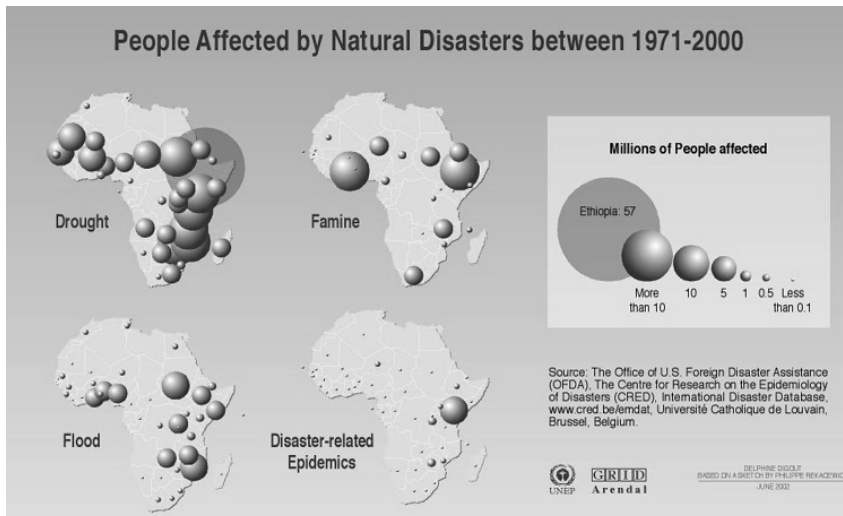
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Brief Description of Sector

The statistics that capture the frequency and magnitude of global natural disasters are staggering. Since 1990, natural disasters have killed an average of almost 1,300 people per week (Red Cross 2002). The poorest countries of the world—many of which are African nations—suffered 24.4 percent of the economic toll from natural disasters between 1985 and 1999. Disasters cost these countries 13.4 percent of their GDP, an unreasonably high proportion for nations already plagued by myriad economic and financial ills (Abramovitz 2001).

Natural disasters cost the world's least developed countries 13.4% of their GDP between 1985 and 1999. While some disasters have natural causes, other "natural" disasters are rooted in human actions that call for long-term, sustainable solutions.



The United Nations Department of Humanitarian Affairs (UNDHA) defines a disaster as “a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the

ability of affected society to cope using only its own resources” (UNDHA 2001). However, to group all disasters as “natural” masks the fact that many stem from *unnatural* causes (IFRC and RCS 2002). Improved disaster management requires people to identify the human-made root causes of

Deforestation, overgrazing and climate change may all lead to drought.



disasters and find the resolve to tackle them in a sustainable manner.

Drought, flooding, cyclones and earthquakes are among the most common disasters affecting African populations. Southern Africa, for example, experienced five major periods of drought between 1980 and 1998—each lasting for a year or more (Abramovitz 2001). In February and March of 2000, floods in Mozambique killed 650 people and left half a million people homeless; during that same period, cyclones Eline and Gloria left 184,000 people in need of immediate relief support out of the total of 737,000 affected in Madagascar (UNEP 2002). The specter of a higher frequency and severity of these events, due in part to human activities, presents a grave threat to the people of the African continent.

The initial effects of disasters may be less devastating than the long-term economic disruption they cause.

Disasters cause loss of lives and livelihoods, damage to infrastructure and communications, interruption of economic activities, deterioration of social networks, and increased disease outbreaks (GEO 2002). Costs may be direct, through the loss of capital stock (including infrastructure and inventories of materials); or indirect, through decreases in the flow of goods and services, lost income, unemployment and lower output from damaged assets. Secondary effects include declines in economic growth and development as a result of debt, inflation, or distribution of income for relief instead of investment (Anderson 2000). The indirect costs of disasters, natural or unnatural, are the most devastating to many Africans’ livelihoods.

This section is divided into the following sub-sections: (1) an overview of the environmental forces that fuel natural disasters or make them worse; (2) specific policy guidance for program design in this sector; and (3) a list of

mitigation measures that could potentially reduce the environmental, social and economic impacts of natural disasters.

Environmental Forces That Fuel Natural Disasters

The aim of this section is to underscore the major environmental forces adding to the frequency and intensity of natural disasters. These forces are often caused or worsened by human mismanagement or the unsustainable use of natural resources.

Climate change The general features of climate change—higher temperatures, altered precipitation patterns, and changes in the frequency and intensity of some extreme climatic phenomena—act on both human and natural systems. In Africa, climate change poses a major threat to the environmental systems on which communities depend for survival.

The Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) projects that surface air temperatures will increase 1.4–5.8°C by 2100 (relative to 1990) and that “the balance of evidence suggests a discernible human influence on global climate,” though the relative importance of human activities vs. natural variability is unclear (IPCC 2001a). Research indicates that African countries could be among the most susceptible to changes in temperature and rainfall associated with changing climate. Some of these changes are expected to manifest themselves as

Changes in Extreme Climate Phenomena Related Disaster
<p>Temperature Extremes:</p> <p>Higher maximum temperatures, more hot days and heat waves</p>	Heat waves and droughts
<p>Rainfall/Precipitation Extremes:</p> <p>More intense precipitation events</p> <p>Increased evaporation, rainfall variability</p> <p>Intensified droughts and floods associated with El Niño events</p>	<p>Flash flood; flood; inundation; mudslide; extreme erosion</p> <p>Crop failure; drought; land subsidence (slumping); wildfire</p> <p>Droughts and floods</p>
<p>Wind Extremes:</p> <p>Increased intensity of mid-latitude storms</p> <p>Increase in tropical cyclone peak wind intensities, mean and peak precipitation intensities</p>	<p>Windstorms and tornadoes</p> <p>Tropical storms, including cyclones, hurricanes, and typhoons</p>
Adapted from International Panel on Climate Change (IPCC) 2001a.	

disasters: increases in damaging floods, dust storms, and droughts; sea-level rise and flooding from storm surges; and more violent windstorms. The table above summarizes extreme climate-related phenomena in Africa and the disasters that could ensue.

Environmental degradation

Steady increases in deforestation, destruction of wetlands, removal of large expanses of mangroves, overgrazing, poor crop cover, and construction of river embankments, dams and channels are all culprits undermining the natural hydrological cycle. In times of heavy rainfall, forests, mangroves,



Ironically, deforestation can cause both floods and droughts. Heavier runoff during rainy season leads to floods and mudslides; depleted groundwater and reduced evapo-transpiration lead to drought.

floodplains, and wetlands absorb and collect water and stabilize soils; their absence leads to excessive surface runoff. The runoff clogs rivers and floodplains with soil and mud, leading to disasters such as inundation, flash floods, severe erosion, land subsidence and mudslides. The secondary effects are equally serious—loss of farmland, contamination of water supplies, destruction of homes and death of livestock. Ironically, the same activities that may bring on floods and mudslides can also exacerbate a recurring disaster in Africa—drought. Deforestation and overgrazing results in declining soil moisture, depleted groundwater sources, and reduced rates of evapo-transpiration, which disrupts natural rainfall patterns.

Fire is a major factor causing environmental degradation in Africa, especially in its impact on forests. Fire is used to clear land for farming or access to timber, to drive game animals into the open, and to clear dry grass stands so that new green shoots can feed farmers' herds. Smaller fires are used to produce charcoal or to force honeybees from the hive, as well as to cook meals for hunters, loggers and other forest users. Especially during dry season, fires may easily escape their intended boundaries and burn animals, timber, even whole villages. They may change forest ecosystems as light-loving plant species take advantage of the sunny new clearings made by the

flames. Finally, they may threaten human (and planetary) health by unleashing clouds of choking smoke and greenhouse gases.

The spread of non-native vegetation—introduced or invasive species—may raise the incidence of intense fires. Some of these species are known to have high water requirements, which may increase local vulnerability to both drought and fire. Timber residues (“lops and tops”) left by careless loggers may also feed or intensify forest fires.

Sector Program Design—Some Specific Guidance

Policy change and technical measures must converge to address the gaps and missing links in disaster preparedness. The following section summarizes various policy tools that may be useful in minimizing the impacts of disasters on local communities.

- **Integrate disaster preparedness into related national development programs.** To date, most countries have focused on responding to disasters rather than mitigating them—that is, lessening or protecting against the effects of disasters ahead of time. Although relief efforts are crucial to saving lives, mitigation deserves at least comparable emphasis since, on average, \$1 invested in mitigation can save \$7 in disaster recovery costs (Abramovitz 2001). Unfortunately, funds for disaster recovery are often obtained by reducing funding to other budgeted programs, which undermines overall development performance. This situation also tends to leave insufficient resources for pre-planning and implementation of disaster mitigation measures.

It is absolutely essential for the national government to recognize the development challenges that disasters impose. Once it realizes how disasters can turn back the clock on progress, the government can integrate disaster response policies into national development plans and strategies. These must include programs to prepare for, mitigate and prevent disasters. At the same time, the central government should devolve some disaster management authority to local municipalities, townships, wards or local communities. The mandate of local authorities should be expanded from that of solely responding to crises to monitoring potential disasters, managing public education initiatives, and galvanizing public and private action to minimize impacts in advance. Besides encouraging local input and buy-in, this devolution implies that both national governments and local authorities will follow a consistent set of rules and regulations for risk reduction (ISDR 2000).

- **Promote regional disaster cooperation.** Countries with similar socio-economic levels in a sub-region are likely to be grappling with the same threats and vulnerability issues. The principal advantages of regional collaboration in disaster management activities are (1) the efficiencies made possible by cooperation in mitigation planning and (2) the potential savings of resources through economies of scale in responding to disasters. The South African Development Community has identified disaster management as a regional priority and has convened a working

Disaster Preparedness vs. Disaster Relief

Disaster *mitigation*—protecting against the effects of disaster ahead of time—usually receives less attention than disaster *relief*. Yet mitigation deserves equal emphasis: \$1 invested in mitigation can save \$7 in disaster recovery costs.

group to review disaster-related impacts and recommend mitigation strategies (ISDR 2002).

- **Establish public awareness and designated training centers.** Effective educational and outreach activities create a “culture of mitigation” that ultimately helps to build disaster-resistant communities (Electronic Debate for the World Summit on Sustainable Development 2002). One effective way to promote local participation is to enroll community members in disaster management training. Training institutions instruct enrollees on risk reduction measures that their communities can take. Examples of national training centers in Africa include the Disaster Mitigation for Sustainable Livelihoods Programme of the University of the Western Cape in South Africa; the Disaster Management and Mitigation Unit of the National College for Management and Development Studies in Zambia; and the Emergency Management Training program at Africa University in Mutare, Zimbabwe (ISDR 2002).

Economic Incentives to Help Avoid or Reduce Future Disasters:

- Tax incentives, subsidies and loans to encourage sustainable land use practices
- User fees to manage domestic water use, agriculture, hydropower, fisheries, and recreation sustainably
- Transfer of development rights to avoid undesirable development, e.g., in flood- or erosion-prone areas
- Easements and legal agreements to restrict the type and amount of property development
- Restricted purchase and property rights for particularly exposed lands, e.g., coastlines
- Fines/liability systems for damages caused to human settlements or the environment
- Structuring prices for natural resources in a way that discourages unsound use

However, such institutions do not replace clear and consistent public awareness campaigns. Campaigns should be tailored to local conditions and aimed at all sectors of society. A comprehensive campaign requires different types of messages and preparatory measures for target audiences such as the illiterate, the homeless, minority communities, youths and the elderly.

- **Explore the possibility of economic incentives for disaster reduction.** Economic incentives and disincentives are potentially powerful tools to raise community awareness about the consequences of certain land uses or environmental practices. (See the box to the right.)
- **Invest in strategic partnerships.** Disaster mitigation policies should build on synergistic alliances between effective community-based civil society organizations (CSOs) and inter-governmental entities, such as the United Nations Development Programme (UNDP) or the International Federation of the Red Cross. The CSOs can provide a vital link between the interagency bodies, which coordinate the emergency phase, and multilateral financial institutions, which support long-term reconstruction (UNDP 2001). Fruitful partnerships may also be formed around a specific topic, such as chronic vulnerability; potential partners include government agencies, international NGOs, and local communities. In Mozambique, for example, the Vulnerability Analysis Group is chaired by the government’s Department of Early Warning and Food Security and collaborates with the World Food Programme and local communities to study the causes and effects of a community's vulnerability.
- **Create and enforce hazard mitigation codes.** Regulatory approaches may involve enforcing hazard mitigation codes for infrastructure or restrictions on land use. These have had limited success in developing countries. However, if a community is willing to establish and enforce

such regulations, model codes and standards can be helpful, especially when technical assistance is limited (ISDR 2002).

- **Scrutinize harmful or misguided government policies.** A well-managed natural resource base—forests, swamps, upper catchment areas—helps to absorb the shocks of disasters and can even prevent the onset of some disasters. Conversely, certain government programs or initiatives undertaken without adequate impact assessment studies (e.g., the conversion of forest or swamps into agricultural settlements or the construction of homes on unstable hill slopes) may have devastating impacts on the ability of natural systems to lessen the immediate effects of disasters or to rebound over the longer term.

Mitigation Measures—Guidance to Reduce Environmental, Social and Economic Impacts

The following section outlines certain technological options and applied activities for mitigating the damage caused by disasters. Guidance for mitigating social and economic impacts is included, since they are often inextricably linked to the environmental impacts of disasters. The list of measures underscores the value of investing in “soft measures” that emphasize planning for various types of adaptation and that address the underlying causes of vulnerability, rather than relying on “autonomous adjustments”—i.e., private adaptations that occur without government intervention and are usually paid for privately.

- **Focus on housing as part of the recovery process.** Post-disaster efforts are more effective in the long term if they are community-driven and adapted to local conditions. One entry point for community-driven mitigation is the construction of disaster-resistant housing. For families made destitute by typhoons and flooding, a new, more durable house may be the most time-efficient and cost-effective form of relief (IFRC and RCS 2002). Often the use of traditional materials to construct homes is not sustainable; for example, the use of hardwoods contributes to increased rates of deforestation and erosion, which can worsen disasters. Thus communities, with the aid of NGOs (local or international) and donors, should experiment with more appropriate materials (concrete foundations, steel frames) and designs that can be maintained locally.
- **Implement effective early warning systems.** Advances in the science and technology of early warning systems have far outstripped the ability of responsible parties to deliver vital alerts to the public in disaster-prone locations. An added complexity in Africa is that the onset of drought—perhaps the continent’s most pressing disaster challenge—is often extremely difficult to detect until major impacts, such as scarcity of water or failed crops, become evident. The publication *Living With Risk: A Global Review of Disaster Reduction Initiatives*, issued by the International Strategy for Disaster Reduction (ISDR) secretariat, identifies four prerequisites for effective early warning systems: (i) national leaders feel a responsibility to promote integrated early warning

The FEWS NET Early Warning System

One prime example of an effective early warning system is the Famine Early Warning Systems Network (FEWS NET), which is a collaborative effort between USAID, government agencies, NGOs and professional groups in Africa. FEWS NET monitors data for early indications of natural and man-made threats to food security. The group also disseminates monthly reports from 17 countries and three regions in sub-Saharan Africa. The FEWS NET Web site is at <http://www.fews.net/>

strategies; (ii) communities and NGOs are involved in disseminating messages, as well as operating and maintaining warning equipment; (iii) international cooperation is leveraged to finance national early warning capacities; and (iv) the technical skills to identify and monitor hazards are available.

Restoring ecosystems is one of the most effective ways to buffer against natural disasters and reduce their effects. For example, dunes, forests, wetlands, and floodplains absorb floodwaters and slow down violent winds; barrier islands and mangrove forests protect against coastal storms.

- **Emphasize vulnerability and capacity assessment.** Vulnerability and capacity assessments, like hazard assessments, employ methods that include the collection of primary data, monitoring, data processing, mapping, and application of social survey techniques. However, unlike hazard assessment activities, which are largely reserved for the scientific community, vulnerability and capacity assessments use methods that encourage community participation, such as community-based mapping (UNEP 2001).
- **Encourage natural resource rehabilitation.** Many recent studies highlight the need for a stronger emphasis on restoring and rehabilitating ecosystems. This is one of the most effective ways to provide buffers for natural disasters and reduce their effects. As one researcher puts it, “the time has come to tap nature’s engineering techniques—using the services provided by healthy and resilient ecosystems” (Abramovitz 2001). For example, dunes, forests, wetlands, and floodplains absorb floodwaters and help diminish violent winds; barrier islands and mangrove forests protect against coastal storms.
- **Strengthen “sustainable livelihoods” approaches.** Sustainable livelihoods (SL) provide employment rooted in the productivity of the community, requiring minimal capital investment and placing minimal pressure on the environment. Environmental management is intrinsic to the SL approach. SL increases the resilience, or coping capacity, of a community toward environmentally related shocks, including disasters. SL involves the community in activities that not only safeguard the natural resource base upon which the population relies for survival, but may, in some cases, mitigate the onset and impacts of drought (PCDF 1995). Examples include use of renewable energy sources; soil management through intercropping, fallow cycling, and forest buffering; water harvesting; windbreak construction; and intercropping.

Resources and References

Internet Sites Pertinent to the Environmental Dimension of Humanitarian Response:

- In July 1997, the Sphere Project was launched by a group of humanitarian agencies. The project aims to improve the quality of assistance provided to people affected by disasters, and to enhance the accountability of the humanitarian system in disaster response. Sphere has developed a Humanitarian Charter and a set of universal minimum standards in core areas of humanitarian assistance: water supply and sanitation, nutrition, food aid, shelter and site planning, and health services. The Sphere Project Web site is <http://www.sphereproject.org/>.
- The Famine Early Warning Systems Network (FEWS NET) is a USAID-funded activity that can be accessed at <http://www.fews.net/>
- USAID's Bureau for Humanitarian Response offers a series of postings on the Internet about its mission and organization which can be found at http://www.usaid.gov/hum_response/
- Seventeen U.S. PVOs involved in food aid programs have joined together to form Food Aid Management, an advisory body to USAID's Food for Peace Programs. They offer a variety of services, including an Environmental Working Group and sponsorship of Regulation 216 Training of Trainers Workshop opportunities for member organization staff and others. Reach them at <http://www.foodaid.org>

FAM sponsors a free electronic mailing list (listserv) for those interested in food aid and environment issues. The FAM Resource Center also has a 1998 publication, available in PDF format, titled *Selected Bibliography of FSRC Resources on Environmental Issues*. Written by Jessica Graef, it is available on the Internet at <http://www.foodaid.org/pdfdocs/environmentwg/environmentbiblio.pdf>

- ReliefWeb is a project of the United Nations Office for Coordination of Humanitarian Affairs (OCHA), and its Web site is intended to serve the information needs of the international humanitarian relief community. Its home page can be accessed at <http://www.reliefweb.int/rw/dbc.nsf/doc100?OpenForm>
- The Benfield Hazard Research Centre in the Department of Geological Sciences at University College, London, carries out work in disaster studies that focuses on disaster mitigation and preparedness. It comprises research, project management, training, consultancy, information dissemination and education. The Center's Web site is <http://www.benfieldhrc.org/>
- The International Organization for Migration Web site can be found at <http://www.iom.int/>
- The Centre for Research on the Epidemiology of Disasters (CRED) Web site can be found at <http://www.cred.be/>

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