Goulet, D. 1898. “Participation in Development: A New Avenue,” *World Development* 17(2):6 178.

Kibreab, Gaim. 1993. “The Myth of Dependency Among Camp Refugees in Somalia, 1979–1989,” Journal of Refugee Studies 6(4):321–349.

Kibreab, Gaim. 1989. “Local Settlement in Africa: A Misconceived Option?” *Journal of Refugee Studies.* 2(4):468–490.

Kibreab, Gaim. 1985. *African Refugees: Reflections on the African Refugee Problem.* Trenton, New Jersey: African World Press.

Kok, Walter. 1989. “Self–Settled Refugees and the Socio–Economic Impact of their Presence on Kassala, Eastern Sudan,” *Journal of Refugee Studies.* 2(2):419–440.

Stollis, Peter. 1994. “The Relief–Development Continuum,” *Journal of International Affairs* 47 (2):451–471.

Stein, Barry N. 1986. “Durable Solutions for Developing Country Refugees,” *International Migration Review* 20(2):264–281.

United Nations High Commissioner for Refugees. 1993. *The State of the World’s Refugees 1993: The Challenge of Protection.* New York: Penguin Books.

United Nations Research Institute for Social Development. 1993. *Rebuilding Wartorn Societies: Report of the Workshop on The Challenge of Rebuilding Wartorn Societies.* Geneva.

World Food Programme. 1991. *Food Aid in Emergencies: Book A: Policies and Principles.* Rome: World Food Programme.

Theme THREE: Basic Assistance Needs

Topic 13 – Site Selection, Planning and Shelter

This paper was prepared by James Good of InterWorks. In addition to the resources listed in the paper, the following people provided significant contributions:

> *Rainer Nordberg – of the United Nations Centre for Human Settlements in Nairobi, Kenya.*
>
> *Cyrus Mechkat and Hossein Sasrem–Kalali – with the Institute Universitaire d’Etudes du Developpement.*

This paper is a synthesis of the efforts of all of those cited above and as such does not express the viewpoint of any single resource, contributor or organization.

Introduction

The issues of site selection, planning and shelter for emergency settlement communities are so central to a comprehensive plan or emergency response that all other aspects of community life are affected by them. Early decisions regarding selection of sites and shelter options will have marked long–term effects on the provision of assistance as well as the development of the community.

Traditionally, in the international community, there has been considerable focus on the best practices for the selection and design of rural sites for emergency settlement. Much of this work has been done in the area of refugee camp planning which are the basis for many of the guidelines for humanitarian response in programatically similar areas including camp planning for the displaced, those fleeing natural disasters, and, to some extent, for temporary emergency response to storms and earthquakes, even in highly developed countries.

In the last few years, more emphasis has been placed on non–camp emergency situations, such as urban and rural disbursed settlements, and situations of urban mass shelter in times of conflict and urban flight. These situations may quickly become the norm rather than the exception for physical planners involved with emergency settlement. Therefore, guidelines and best practices for improving responses in these areas are needed.

Principles

1. Access to basic, contextually appropriate shelter is an essential human right. This applies to uprooted urban communities as well as to rural settlements although the contextually and culturally appropriate shelter standards may differ considerably.

- Internationally recognized, quantitative standards can be established as useful minimums for site selection, planning and emergency shelter. Many of the existing standards are used for the design of refugee emergency camps and housing, and may be applied to all similar populations in need of emergency shelter and settlement regardless of the cause of their displacement or the legal status of the uprooted community.

- In urban contexts, emergency settlement is often facilitated through the use of abandoned buildings or those otherwise available for mass housing. In this case the contextually appropriate minimum basic requirements should include other dimensions beyond those required for rural camps or new settlements, such as privacy, internal temperature, safety, exiting, and ventilation requirements.

In addressing these minimum standards, attention must also be given to the cultural acceptability of the designs and the various programs to be implemented.

2. Help decrease the vulnerability of communities needing shelter through provision or use of safe sites and sound structures.

Structural assessment of buildings must be carried out to avoid use of unsound buildings (where better options exist) for mass shelter or individual family housing. Especially in urban areas suffering the effects of earthquake, flooding, or warfare, careful consideration must be given to the safety and utility of existing structures.

Site selection for rural settlements must be similarly assessed. Some sites are naturally vulnerable such as steep slopes in landslide areas and low lying areas within known flood plains. Typically, this very vulnerability or unsuitability for human habitation is what makes these sites available as potential locations for emergency settlement. These inherently vulnerable sites must be avoided, even when the predicted duration of the emergency settlement is short–term. Typical site–related vulnerabilities include: prevalence of hazards such as landslides, flooding, or erosion; high prevalence of vector–borne diseases and other human–made risks such as pollution of various types.

3. Provide privacy and security for the smallest cohesive unit in the community, the family where possible, and in some cases for the individual.

Individual family shelter is preferable to combined family shelter, which is preferable to mass shelter, which is preferable to no shelter at all. In cases of mass shelter, means for the provision of privacy must be found to protect family social structures and to protect the psychological well–being of the occupants. Provision must also be made for adequate public and community areas to be used for the benefit of the community as a whole.

4. Use long–term planning practices even when the settlement is expected to be temporary.

Emergency settlements often remain occupied for long periods even though they may be designed for temporary use only. Services will be better provided and community systems will be better maintained if the settlement is planned as a town, rather than as a temporary refuge.

“Camps should be seen as small new towns, with the potential for self–government and with a supporting economic base. The goal of self–reliance implies an independent free–standing community, dependent on its own resources in future endeavors. Land allocation becomes important, since all land not assigned to refugees becomes a future maintenance burden for the community. The more land deeded to refugees, the

more taxable land in the future" (UNHCR, 1993).

5. Design emergency settlements *with* the community rather than *for* the community.

Planning input should come from the community itself, especially in those cases where the emergency settlement design and planning is to be managed by those unfamiliar with the community norms and social functioning of the group. Including community inputs will help to build self–reliance through community participation and will foster greater acceptance of the planning by the emergency settlement residents. Three likely areas for resident participation are:

- planning
- implementation (construction)
- repair and maintenance

6. Design site layout around a sanitation and services plan.

Site planning for rural settlements must be based on adequate sanitation and services planning. These elements are completely integral and cannot be designed well if viewed as being independent from the overall site planning process.

7. There should be designated environmental preservation areas – respected and protected from the effects of emergency settlement

Preserve ground cover and perimeter vegetation to the extent possible. Protect forest preserves from intensive fuelwood gathering and other foraging pressures. Especially in situations where public or preserve land has been made available for emergency settlement use, precautions must be taken to protect the original use restrictions on the land. In areas where there are environmental agencies or ministries, those bodies must be partners in planning for the development and use of the site.

8. The design of emergency settlements must be developed taking into account *who* comprises the uprooted community and *how* they live.

Site and shelter planning must respond to the particular culture of the people involved and the shelter types to which they are accustomed. Shelter is often thought of as a technical sector for which technical solutions must be found, but the basis for acceptability will depend as much on sociological factors as on technical functioning. Shelter for nomadic herders, for example, will not be appropriate for urban factory workers.

There are numerous examples of housing schemes which have been implemented at great cost, and ultimately abandoned or never accepted due to inappropriate siting, poor design, or complete ignorance or inattention to lifestyle and culture of the intended beneficiaries.

Best Practices

The following are the priority recommendations for implementing the principles of site selection, planning and shelter.

■ Preventive measures

• Implementing preventive and preparedness measures, including contingency planning, in disaster prone areas (both human–induced, and natural) can reduce the vulnerability of the communities to emergency conditions and will facilitate emergency operations after disaster. Preparations for shelter needs in view of possible emergencies include:

- preparation of risk maps of the natural or human–made disaster prone areas
- campaign to raise awareness of the possible emergency situation and appropriate community and personal strategies for mitigating against damage
- organization of training programs for specialists (architects, urban planners, engineers) on emergency operational issues

• establishment of rapid appraisal techniques or protocols for assessing building safety for different building types in the region which might be useful for lodging displaced people

Camps

Physical planners responding to situations of emergency settlement need to understand the difference in the usage of the terms *camp* and *settlement*. While a camp can be considered a short–term settlement, many practitioners use the term “camp” distinctly to mean “not a settlement.” While this usage is common and denotes a distinct difference of intent, there are numerous examples of camps which have existed for years and even decades. The underlying premises and attitudes toward settlements and camps vary in the following fundamental ways:

SETTLEMENTS	CAMPS
Settlements are planned to be durable, self–sufficient and an integral part of the local community, spatially and economically.	Camps are planned to address basic survival needs, local integration is a low priority
They generally take more time to plan, for they must consider a broader range of issues, with a longer time horizon.	They may require less political support, because of their intended temporary nature
They require long–term planning which is dependent on host country political support	They may require less political support, because of their temporary nature.
They require the involvement of development agencies	They involve relief and protection agencies
They assume the affected population is there to stay	They assume the affected population are short–term and temporary

(adapted from Goethert and Hamdi, 1988a, pp. 17–18)

For the practitioner, it is important to keep in mind the differences between political and operational or analytical reasons for determining whether to establish an emergency settlement or a camp. Even when the parameters in the table above are not met and operational or analytical analysis indicates that the population will be a true long–term settlement, there may be strong political reasons for the local community and/or the host government to insist on the status of a temporary camp. While this political reality exists, camp planners, designers, and shelter specialists must address the operational realities of the situation as well as the political.

Site selection

Site selection for emergency settlement will depend largely on the nature of the emergency causing the original displacement or loss of shelter by the affected population. For non–repetitive, or low frequency disasters such as earthquakes, volcanic eruptions and various types of industrial accidents, resettlement will be on or near the disaster site, with an immediate outlook for re–establishing the previous settlement.

For emergency situations resulting from habitual emergencies or for which the frequency of occurrence is actually increasing, new sites in less vulnerable areas or other means of mitigating against the recurrent hazards must be found. In some limited cases, such as the seasonal flooding which typically occurs in Bangladesh, sites may be improved by elevation of housing sites or other mechanical or engineering approaches carried out *in situ.*

For situations of conflict or other gross human rights violations resulting in the flight of persons from their habitual area of residence, whether internally displaced or refugees, negotiations for sites must be made with the controlling authorities in the areas or countries into which the displaced community flees. These situations are the most difficult since the humanitarian actions to “settle” those in flight are often not seen as positive developments, but rather as an unwanted burden by the local host community or government. In these cases, the political aspects discussed above may become the most serious issues.

Given the above constraints, the following general guidelines are useful for selecting sites when options exist, and for arguing for additional choices when no satisfactory option has been offered.

Area – 30 sq.m./person gross site area.

Slope – about 2% for good drainage.

Ground cover and native vegetation should be present in adequate amounts to control erosion from wind and water and to keep the formation of dust and mud to a minimum.

Free access to the site should be available for monitoring and for the delivery of assistance and administrative services to the community.

Sites should be elevated above low−lying areas subject to seasonal flooding or cut off from assistance by flooding.

Sites made environmentally unhealthy due to radiation contamination, chemical or biological pollution, or other toxic sources should not be accepted.

Sites should have **reasonable access to water** and, where possible, should have independent self−supplied water in suitable quality and quantity for daily use (approximately 20 liters/person/day).

A workable sanitation scheme must be implementable on the site selected.

Special care must be taken to protect the environment from the negative effects of emergency settlement. The concept of environment in this sense must be expanded beyond the usual considerations of air, land, and water to include the built environment as well. In urban situations the impact on infrastructure (especially fuel, electricity, water, and sanitation systems) may be great and programs of response must address these issues as well as those of individual and mass shelter.

Appropriate specialist profiles

Urban planners, environmental engineers, sociologists, architects, and engineers with appropriate backgrounds and with a clear understanding of environmental impacts of emergency settlements may all be needed for their technical and management expertise. The exact profile needed will depend on the nature of the emergency and the particular area and context that the emergency settlement population finds itself.

For example, a survey of damaged buildings to determine their safety for use as mass shelters may require a structural engineer or architect. Provision of shelter materials to dispersed populations may require sociologists and logisticians. Planning for self−built shelter in rural areas might require input from an environmental engineer. In all cases, however, expatriate specialists should only be used if required. If they are necessary, expatriate resources are best used when working with local specialists with a knowledge of local building norms and procedures.

Design approach

The planning and design process for the emergency settlement should be progressive in its approach. Designing for an ability to upgrade or improve shelter responses over time will mitigate against unforeseen political and social pressures on the evolution of the settlement. Such an approach is designed to:

- permit better control over development of the settlement over time.
- reduce unnecessary costs in the emergency phase.
- respond better to long−term needs should the settlement remain in place for an extended period.

The emergency settlement should be able to adapt to radical change, either through incorporation of more people on an emergency basis or the ability to disappear with minimum detrimental effect on the local environment. Therefore the design process should plan for change – especially growth of the settlement population.

Community input

Especially in rural situations where settlement is likely to be long−term, one of the primary inputs from the emergency settlement community can be the construction of their own shelter. It is the view of Habitat, for example, that emergency shelter is most productively self−built, with external involvement best limited to enabling the community to meet this challenge (Habitat, 1995).

For the designer of emergency settlements the most important questions should be:

- How can the self–build process be best facilitated?
- What materials have proven to be suitable for self–built shelter programs?
- How can environmental degradation best be avoided in self–build programs?
- What technical assistance is needed?
- How should training best be organized?

Realistic determination of the amount of input required and or desired from the emergency community will depend on the situation and the extent of needs of the community – both physically and mentally. Emergency conditions will exist in some extreme circumstances where the primary necessity is to provide shelter and other basic services in the most efficient and fastest way possible – with or without community input. This situation, however, is much less common than generally perceived; and in almost all disasters resulting in emergency settlement, there are many useful ways to incorporate input from the community. Not to do so in all but the most extreme situations is to devalue the ability of the community to cope, to provide disincentives for positive development, and to promote dependency on outside aid.

In the past, community input has largely been seen by physical planners as a source of unskilled labor. It has not been unusual in refugee situations, for example, to hire the refugees to build roads and other infrastructure, and certainly to construct their own shelter as discussed above. What is needed is a larger involvement in the actual planning and allocation of shelter assistance, and representation from the community leadership (where such structures exist) in the decision–making process. In such instances the physical planner may have to be a group facilitator as well as designer in order to keep an inclusive process such as this on track and on time.

Materials and prototype shelters

The use of wood for building shelter, along with collection of firewood, is a major cause of environmental destruction related to emergency settlement. The energy issue is discussed in more detail in the topic 16 Emergency Settlement paper “Household Needs”. Even in situations where prefabricated shelters or plastic sheeting is provided for emergency shelter, local deforestation is often a result of collecting wood for building purposes.

In post–emergency situations, prefabricated housing is often proposed as a quick and superior emergency response. However, one must use extreme care in injecting completely alien technology and or forms of shelter into emergency settlement situations. Such interventions often are too expensive to be sustainable, and are often ill–suited to the use or environment in which they are placed.

> “Obviously, the pursuit of improvements in housing technology is an important and worthwhile activity. The various research programs should be encouraged and the results disseminated as widely as possible. The point to be made here is simply that the solution to the housing problem for lowest–income people will not be found on the drawing board. The gap between standard housing and what lowest income people can afford is simply too great. The real benefits in improved technology will flow to people further up the income curve” (Van Huyk, 1971, pp. 9–10).

Tents or other structures should be produced from locally available materials where possible. Tents are problematic for medium and longer–term use as they are not very suitable for upgrading or expansion and also often constitute a severe fire risk. Tents do not offer much protection from the elements in harsh climates (although military style “winterized” tents which offer an improved insulation rating are available for cold climates.) In very cold climates, shelters should be constructed from materials with a high thermal insulating value.

Rural dispersed settlements

Assessment of shelter options for populations that have been dispersed into a large region or area is a very different exercise from the selection of a single site or sites for a refugee or displaced persons’ camp. In many such cases, the displaced persons move in with relatives or other willing hosts who can take them in (at least for the short–term). In situations where the cause of the emergency situation is short lived, no outside assistance may be required. In situations where the initial cause of displacement proves to be long–term, assistance programs may be necessary for the emergency displaced population, for the hosts or for both.

One solution may be the distribution of **shelter packages.** Pre–apportioned or formula–rationed packages of building materials of various types may be distributed on a per family basis to those requiring new or replacement shelter. This system has been used widely in rural situations especially in Africa for refugee populations as well as for repatriation and resettlement programs.

In many places around the world, such systems have been implemented to assist local populations in replacing housing destroyed by natural disasters such as storms and earthquakes. In these situations, assessment of the local housing stock, material, and construction technology is made, and a simplified "package" or collection of building materials is distributed to the families qualifying for assistance. Distribution may be based on a per family basis, adjusted for the size of the family, magnitude of need as illustrated by total holdings of the family, and in some cases based on the size of the structures that have been lost. In any case, an important aspect of such distributions is that they are seen to be "fair" and non–biased, and that they actually serve the target group of those most needy. All such programs, due to the relatively high value of the commodities distributed and their durability (non–food items), are subject to corruption and misapplication by certain sectors for profit rather than humanitarian assistance.

Repair packages

Especially in situations of large–scale conflict where shared homes may also be war–damaged, repair programs may be required to meet the shelter needs of both the "host" and "guest" populations. These types of programs are also common after storms, earthquakes, and for returnees to war–torn areas and villages.

In post–storm situations the simplest and most expedient repair packages consist primarily of plastic sheeting with which to cover damaged roofs. Subsequent, and more sophisticated repair packages often consist of corrugated metal roof sheeting, lumber suitable for rafters, and roofing nails.

Post–earthquake repair packages often contain the same lightweight roofing materials as those provided after storms. The failure of heavy roofs is often a central issue in repair as well as in mitigation against future earthquake damage. In addition, some schemes include cement and steel reinforcing bars for the repair and retrofitting of walls with a reinforced "ring beam" at the top perimeter of the walls.

War damaged areas can often be helped through the provision of repair packages as well. The first priority in areas where large numbers of people are living in damaged urban structures (and in smaller villages as well) is to stop penetration of wind and rain into the structure. In these situations, plastic sheeting for roof and window repairs along with the required materials for attaching them to the damaged structures are often provided. These additional materials may be nails, tacks, or staples and thin battens or other wood strips to be used as cleats for the attachment of the plastic sheeting. In colder climates, additional provision must also be made for heating and insulating damaged structures.

> "During sieges, most people from within the enclave who lose their homes will take shelter with friends and relatives. Only when housing losses reach more than about 25% will there be a need to find other forms of shelter. If building materials can be imported by relief agencies, it may be important to set up a program to distribute materials to repair houses that have received minor damages. The most useful materials may be thick plastic sheeting, corrugated roof sheets, wooden beams, and wood planks. It may be possible to purchase cement locally (it is normally a restricted item and is difficult to import during the siege) and distribute it to help repair concrete buildings. Salvaging materials from damaged buildings can be one of the best sources of materials for repairing homes; the government authorities should set up a formal salvage program to strip damaged buildings and ensure that the people who need the materials most get them before scavengers take them away" (Cuny 1994, p. 156).

Distribution of shelter materials in urban situations

Distribution of repair materials is often more difficult than the distribution of food since the materials are bulkier, more expensive, and importantly, may not be allowed passage as humanitarian assistance in areas of conflict. The following short account from Sarajevo illustrates this difficulty.

> "MSF has begun a building rehabilitation program as implementing partner for UNHCR. The program includes rehabilitation of the old school building (500 persons) and the gymnasium (300 persons) to move the 800 refugees out of the new school building (so school can start). The plan includes the construction of mezzanine floors in the gym and other rooms which allow the increased efficiency of the space. The plan also outlines collective kitchens in

several areas in the buildings utilizing wood burning stoves also constructed by MSF. In addition the rehab program plans to adapt two rooms in the old cinema to accommodate 250 persons. Additional buildings are also being looked at throughout the town. The difficulty and setback to the program is the reluctance of Bosnian Serb authorities to allow passage of material which is not considered humanitarian assistance, such as cement" (Lorance, 1993, p. 4).

Urban mass shelter – determination of capacity

"When refugees from outside seek protection within the enclave, it may be difficult to lodge them with families, so public shelters will have to be found. In most cases, the most appropriate forms of shelter are public buildings such as schools, unused government buildings and public sports stadia. This is because those buildings will offer some protection from shelling and will have facilities for water and sanitation, even though they may be minimal. In the winter they will be easier to heat and can retain heat longer than many other types of structures" (Cuny 1994, p. 157).

The types of buildings most often available for (and suitable) for this type of use are:

- **abandoned factories**
- **warehouses**
- **gymnasia and sports stadia**
- **schools**
- **government–owned hostels or flats**
- **hospitals and sanitoria**
- **churches and other religious structures**

The decision to use such structures depends primarily on the tenure or ownership of the structures and their capacity to shelter large numbers of people. The determination of capacity of a large structure for use as emergency shelter should be based on assessing the adequacy of several factors:

- **area – 3.5 sq. m. minimum floor area per person** (the density may be increased by use of multiple level bunks or mezzanines in some cases)

- **sanitation** facilities

- **exit ways**, stairs, corridors and other physical constraints to emergency exiting in case of fire or other emergency

- administrative and logistical **ability to provide other services** such as food, water, and basic health care in the structure selected

In cases of extreme emergency, the most critical of the above factors is simply gross area of the structure as this will have a direct effect on the comfort and health of the occupants. In the use of mass shelter, a separate issue to be considered, aside from the effect of the structure on the inhabitants, is the effect of the inhabitants on the structure. Preparation for use of a building or facility in a way other than intended by design (that is, for mass shelter) may require modification to the structure itself or removal or relocation of moveable assets and furnishings.

"When we worked in China, we met school board officials who had allowed schools to be used in 1992 – in the worst floods for 200 years. The families wrecked the chairs, desks, etc. so the policy now is to have a specific room into which all furniture is placed before the headmaster hands it over to the Civil Defense Office" (Davis, 1995).

Determination of safety

Inspection of large structures for use as emergency shelter must be made by qualified engineers or architects who can pass professional judgment on the soundness and safety of damaged structures. This can be a very complicated task and the decision to prohibit the use of (or demolish) unsound buildings in the midst of great need for shelter is a difficult one.

Generally speaking, buildings that are a public safety hazard, even though they may be attractive to homeless shelter seekers, should be demolished. This must be carried out in a safe and efficient way, so that the materials from the damaged structures can be salvaged for use in repairing other damaged but still structurally sound buildings.

Provision of privacy and security in mass shelter situations

Mass shelters should be provided with some form of temporary prefabricated partitioning which has good acoustical insulation properties. Such dividers can then help to transform the large areas into a number of smaller “plots” or accommodations which will be beneficial in allowing the occupants to have some control over their own space. This type of subdivision also will provide some privacy and overall reduction of stress induced by continuous noise from the larger group such as crying babies and other noises generated by children.

Individual security

One of the primary needs of people in mass shelter is that of security both for their person as well as for their possessions. To meet this need some demarcation of the space will be required. Sexual assault of women is a particularly great concern for which protective measures must be taken.

Sanitation services

Reuse or adapt existing municipal water service and sewer systems to the extent possible. In these situations it will usually not be possible to provide family/private toilet facilities, so extra care must be taken in the maintenance and cleaning of communal toilet and bathing facilities.

Urban shelter exchange

The term “urban shelter exchange,” as used in this paper, describes an approach to providing housing. During armed conflict, forced realignment of state borders, or forced policies of ethnic cleansing and consolidation, populations (especially urban) are forced to move within or between urban areas; the families, in essence, exchange housing with other groups who have similarly been forced to vacate their homes.

One example of this was the Turkish invasion of Cyprus in 1974 which internally displaced nearly 40% of the entire population of the island (some 200,000 Greek Cypriots and 50,000 Turkish Cypriots). “A large number of the more than 7,000 housing units, vacated by Turkish Cypriots in the process of reverse forced migration, were gradually occupied by the Greek–Cypriots displaced from the north (Zetter 1987:1992; Kliot and Mansfield 1994). The Government institutionalized this process by establishing a sophisticated registration system of all the properties. Temporary occupancy licences were granted to regularise the situation and to ensure the inalienable rights of the Turkish Cypriot owners should they return” (Zetter, 1995, p. 61).

“On the Turkish Cypriot side a similar process of occupation and rehabilitation took place. Given the vastly different numbers involved in the transfer of populations ... there was far less pressure to adopt emergency solutions. The rehousing process was conducted more systematically with well developed administrative procedures (Morvaridi, 1993; Kliot and Mansfield, 1994). Uprooted villagers were often resettled in their original groups. Housing (and land) was allocated on the basis of family size and a points system in order to compensate the loss of immovable property from the south” (Zetter, 1995, p. 61).

Constraints in Shelter: Differences in Refugee and Natural Disaster Contexts

The following table helps identify important differences in shelter issues between natural disasters and refugee influxes.

Constraints in Shelter	Shelter in Refugee Context	Shelter in Natural Disaster Context
Duration	Can be indeterminate	Final end in sight
Political Constraints	Heavily politicized	Political need to satisfy in a major disaster
Capacity to improvise own shelter	Applies, but scale of event may cause “environmental shadow.”	Applies, particularly for low–income groups in rural areas
Options for shelter		

a) tents		
b) ex–buildings	a), b), c), d)	All options normally in place
c) improvised shelters		
d) voluntary evacuations		
e) donor provided shelter		
Links to existing housing & construction	No link	Total link
Function of shelter		
a) Protection of property/Storage of property		
b) Territorial claims to land	a), c), d), f)	All options
c) Place receipt services		
d) Emotional value		
e) Transition to full–scale reconstruction		
f) Protection from elements		

Source: Oxford Centre for Disaster Studies

Standards

While the application of humanitarian standards are often called for in the provision of sites and shelters for emergency settlement populations, the agreement on such standards has proven more difficult in this area than for other sectors such as health and nutrition. This is largely due to the great variance among cultures and in the ways people live and build. Even so, it is clear that there are, in fact, minimum standards that can be quantified and used as tools to monitor the adequacy of shelter responses for emergency communities. These standards should correspond to:

- local conditions
- variance in economic situations and constraints
- local building materials (resources and practices)
- phase of the emergency (minimum acceptable for survival at the earliest stages and improved performance and standards in successive phases)

In emergency settlement situations, setting standards is also difficult because there is almost always an underlying sense that the emergency response may become the basis for a long–term or even permanent settlement.

Adherence to minimum physical standards on the basis of promoting health, psychological and social well–being has long been a widely held notion by physical planners. The fact that these standards must vary from situation to situation makes them less usable. There are still many practitioners who argue that standards cannot be drawn up for all situations, especially in light of emergency situations where standards are often unmet due to the short–term demand being greater than short–term supply of shelter materials and options. The following short statement sums up the dilemma as it exists for the physical planner:

> “Revision to the codes and standards poses a dilemma for policy makers – the classic dilemma experienced in all planning systems. To accommodate the pressure of rapidly increased demand by refugees [or other affected populations], one response is to reduce standards... On the other hand, there is a long term price to pay in terms of degraded built and natural environments and their impact on the physical and social well–being of refugees and their hosts. This is an argument for holding standards or at least to evaluate carefully the long term consequences of not doing so” (Zetter, 1995, p. 65).

The issue of standards was also raised at a major workshop on emergency shelter issues. The following is the summary of a group deliberations report relating to standards from “Group B – Shelter Coordination” (UNHCR, 1994)

• **Encourage Standardization**

• UNHCR and ICRC should act as principal agencies and their roles will include enforcement of minimum standards taking into consideration geographical location (final destination), life span/time scale of shelter and ease of transportation of shelter/shelter materials (compact or bulky).

• UNHCR should develop pre−negotiated contracts for key emergency shelter items to save time.

• NGOs and other organisations should assume supporting positions and their roles would be to provide input and information about local conditions. Manufacturers/suppliers would also be involved by providing their expertise.

• Key suppliers should be involved in the development of new relief items, prior to the conflict (if possible).

The following table of “rule of thumb” standards has been compiled for UNHCR − Programme and Technical Support Services (PTSS).

Rule of Thumb Parameters

Site	minimum 3 m above water table 30 sq. m total site area per person minimum
Water Supply	100 m maximum walking distance to water point from any shelter 15−20 liters per person per day (see Environmental Health topic 14) minimum of 1 standpipe tap per 200−250 people
Latrines	between 6 and 50 m from user’s shelter minimum 1 seat per 20 people for public latrines 15 m distance from water source (30 m preferable)
Shelter	3.5 sq.m. floor area/person minimum

Source: adapted from UNHCR, 1982, *Handbook for Emergencies* and Goethert and Hamdi, 1988b, “Refugee Camps.”

Standard Damage Categories for War − Damaged Urban Buildings

Categories 1−2	Minor damage resulting from small arms fire such as broken windows
Categories 3−4	Partial destruction resulting from shell damage
Categories 5−6	Totally burned out or destroyed

There are other standards which might usefully be compiled for non−camp situations. Some of these might be:

• minimum maintained temperature inside buildings (particularly where buildings are served by central heating systems in cold climates)

• safe (non−hazardous) heating/cooking stoves and fuel where central systems do not exist or are not working

• safe emergency exits (adequate dimensions and safety of hallways, stairs, doors, etc.) in case of fire, shelling, or other cause for emergency evacuation

References

Davis, Ian, 1995, personal correspondence.

Goethert, Richard and Nabeel Hamdi. 1988a. “Refugee Settlements: A Primer for Development” paper prepared for the United Nations High Commissioner for Refugees Technical Services Section.

Goethert, Reinhard and Nabeel Hamdi. 1988b. “Refugee Camps: A Primer for Rapid Site Planning” paper prepared for the United Nations High Commissioner for Refugees Technical Services Section.

InterWorks. 1993. “Physical Planning” paper prepared for the Emergency Management Training Programme of UNHCR.

Kliot, N. and Y. Mansfield. 1994. “Resettling Displaced People in North and South Cyprus.” *Journal of Refugee Studies* 7(4), cited in Zetter, 1995.

Lorance, Bill. 1993. “Srebrenica Situation Existing and Plan of Action to Stabilize and Sustain Population Throughout Winter” situation report prepared for UNHCR.

Morvaridi, B. 1993. “Demographic Change, Resettlement and Resource Use” in *The Political and Economic Development of Northern Cyprus* edited by C.H. Dodd. Huntingdon UK: Eothern Press. Cited in Zetter, 1995.

UNDRO. 1982. “Shelter After Disaster – Guidelines for Assistance.” New York.

UNHCR. 1982. *Handbook for Emergencies.* Geneva.

UNHCR. Summary of Proceedings – First International Workshop on Improved Shelter Response and Environment for Refugees.

Van Huyk. 1971. “Planning for Sites and Services Programs.” Washington DC: USAID.

Zetter, Roger. 1995. “Shelter Provision and Settlement Policies for Refugees – A State of the Art Review” Studies on Emergencies and Disaster Relief Report No. 2, Nordiska Afrikainstitutet.

Zetter, Roger. 1992. “Refugees and Forced Migrants as Development Resources.” *Cyprus Review* 4(1):7–9. Cited in Zetter, 1995.

Zetter, Roger. 1987. “Rehousing the Greek–Cypriot Refugees from 1974: a Study in Access and Labelling” unpublished D.Phil. Thesis. Cited in Zetter, 1995.

Topic 14 – Environmental Health: Water, Sanitation, Hygiene, and Vector Management

This paper was prepared by James Good of InterWorks. In addition to the resources listed in the paper, the following people provided significant contributions:

> *Eduardo Perez – is Technical Director for Engineering and Technology of the Environmental Health Project of the US Agency for International Development in Washington, DC.*
>
> *Claude Rakotomalala – is a senior sanitary engineer for the Professional and Technical Support Services of the United Nations High Commissioner for Refugees.*
>
> *Gary Shook, MPH, Sc.D. – has been a health specialist for the Asian Disaster Preparedness Center at the Asian Institute of Technology in Bangkok, Thailand, and is currently at Boise State University in Idaho.*
>
> *Richard Swenson – is a co–founder of Public Health International in Roseburg, Oregon, US.*

This paper is a synthesis of the efforts of all of those cited above and as such does not express the viewpoint of any single resource, contributor or organization.

Principles

1. Environmental health planning must be held as the highest priority in the design of and programming for emergency settlements. No amount of curative health measures can offset the detrimental effects of poor environmental health planning for communities in emergency settlements. Well–integrated environmental health programs, which include the provision of sanitation, water, and drainage systems, play a major role in protecting the health of those in emergency settlements.

2. Environmental health begins with site selection. Site selection must be an integral part of the overall planning process. When multiple sites are available – even when none of these are deemed desirable – the criteria for selecting the best one must include the potential for good environmental health systems. Site planning must be integral with the environmental health plan, including the collection, disposal and treatment of excreta and other liquid and solid wastes. The physical characteristics of the site (vegetation, topography, nature of the soil and subsoil, and other attributes) together with the socio–cultural profile of the beneficiary community are determinant factors which must be taken into account. To expect that sanitation issues can be addressed at a later stage (once emergency settlement has become "permanent" and other basic systems are in place) is a false hope, which has often led to complex problems and the expansion, rather than the control, of emergency situations.

Access to adequate sources of potable water is a key component of site selection for emergency settlements. The most desirable water source is ground water, which is often more desirable than surface water, which in turn is more desirable than rain water. Trucking water from remote locations should be considered only as a temporary measure only unless it is demonstrated that it is the most practical and least expensive method to provide adequate quality and quantity of water to the settlement.

3. Access to a minimally–acceptable amount of safe drinking water is a basic human right. Accepted, quantifiable standards should be applied in the provision of water to emergency settlements. However, a universal pre–determination of such quantities is not appropriate for all situations. Factors such as climate, prevalent diseases, and types of facilities needing water will all affect the basic planning criteria. Proposed values for different climatic situations are listed in the *Standards* section of this paper.

4. In cases of extreme emergency where minimum standards cannot be adequately met, a large quantity of reasonably safe water is preferable to a smaller amount of relatively pure water. Especially in emergency conditions, water quantity will be more important than water quality. In the most extreme case polluted water is preferable to no water at all. In less severe situations it is advisable to focus quickly on provision of an adequate quantity of water well in advance of upgrading water quality, especially in cases where it is possible to manage good sanitation programs as adequate excreta sanitation is the best way to control water borne diseases.

5. Water sources must be protected from pollution. The impact on the local or regional water source (watershed areas of rivers, lakes and aquifers) must be considered in the planning for an emergency settlement. Runoff from the emergency settlement site including waste water and sewage must not pollute water supplies. Once a water source has been selected, direct access to it should be strictly prohibited except for authorized persons only. A means of protection against access (and therefore contamination) must immediately be installed. Some options are; fencing, cut–off trenches or other drainage works to protect water sources from site run–off, vegetation planting, guards, and public information along with enforcement.

When using ground water, the question of how to raise the water is the main issue. There are numerous alternatives for this operation depending upon resources. It is better to expend resources to obtain water in the most reliable and sanitary manner than to pay to clean it up after it is contaminated in the raising process.

6. Environmental health planning should be designed with input from the emergency settlement community. In emergencies the general rule regarding environmental health systems is "act now – improve later". This is a strategy put into place under emergency conditions in order to avoid, for example, the rapid pollution of an entire site with human excreta. Nevertheless, issues related to cultural norms, traditions and religion(s) of the resident community are still essential. Environmental health strategies, to be effective, should be tied to cultural norms and traditions. As such, the environmental health program should be designed with input from and understanding by the emergency settlement community. Failure to do so may lead to a disruption, or failure, of the environmental health program and an increase in the very health hazards that were targeted by the initial response.

It is recognized that emergency settlements are *atypical* communities which may require services different from the experience of the residents. The emergency nature of such settlements may also limit wider input. For example, nomads without knowledge of pit latrines may, nonetheless, be served best by their use of them

in high–density camps. Urbanites from developed countries will have to use non–flush facilities until damaged municipal systems are restored to service. It is imperative that public information and education campaigns accompany the introduction of systems which are unfamiliar to the community. In such cases there must be a distinction made between those aspects of the water supply and excreta disposal systems which are simply **different** from those previously used by the community and those which are **inappropriate** as emergency responses.

7. Environmental health programs must insure an adequate number and location of sanitation facilities, solid waste disposal points, and water distribution points. Sanitation, waste disposal, and water distribution systems within the emergency settlement community must be equitable for all residents. This is achieved through installation of an appropriate number of suitably located; excreta disposal facilities, such as toilets, latrines or defecation fields; waste pick–up points, and water distribution points. Coordinated scheduling of water distribution, where required, and dissemination of public information to the community regarding the environmental health service facilities of the settlement may also be necessary.

8. Both local and technical expert advice must be sought for planning and implementing water and sanitation systems. Many of the issues surrounding the suitability of water supply and sanitation are technical in nature and require expert technical advice. Expert local knowledge of the area, the people and their traditional customs is also essential. While expatriate technical advice may be required for development of new, rural sites, it may be generally presumed in urban situations that those involved in the day–to–day operation of the local urban water and sanitation systems can provide the best expertise, as they have intimate knowledge of the workings of these systems. It is essential that consultants, advisors, or others leading the environmental health programs have people, management and administrative skills as well as technical skills.

9. Good water, sanitation, and hygiene education practices in emergencies should be no different from those in "regular" development programs. The basics of community education and information campaigns are the same regardless of the "emergency" element of the community's situation. Those practices of personal hygiene which are promulgated in developmental campaigns aimed at reducing morbidity are exactly the same as those recommended for emergency settlements. The only difference is that the results of failure to change behaviors in the community will be far worse for a an emergency settlement community than for a "normal" developing community. Hygiene education and information programs, where required, are at the center of environmental health management. The aim of all such programs must focus on changing behavior of the community members in their homes as well as in the community.

Best Practices

Overall Approach to Environmental Health Management

Environmental health provides the best approach to the technical issues of water provision and excreta disposal. Control of the environmental pathways in which pathogens and other agents may harm the inhabitants of emergency settlements must be maintained through an integrated and effective environmental health management system. All services that protect the settlement inhabitants from environmentally–borne disease are interrelated and must be managed in an integrated way, giving priority to those services most needed but without exclusion of the others. Provision of potable water; adequate shelter; suitable sewage and waste disposal; protection from vectors, pests, and damaging air pollutants; delivery of clean food stocks and protection from noise and physical hazards must all be coordinated in an integrated manner which optimizes health.

For more than two decades, it was thought that the best approach to "environmental health" (usually not using this terminology, however) was to combine environmental sanitation and water programs. In fact, especially where resources were lacking, priority was given in most cases to water at the expense of environmental sanitation. Also, the users' willingness to participate in sanitation programs was traditionally very low. Making this even more difficult was the fact that there was very little political will for the funding of such activities, since sanitation activities were never very highly regarded.

It is therefore recommended that environmental health planning be an integrated system of activities. **The management of sanitation, and especially excreta management systems, must be treated as a priority topic in its own right** and not simply as an add–on component of a water supply program. Sanitation – although integrated with the whole program – must have its own dedicated resources and time–frame if the best results in the overall environmental health system are to be achieved.

The following points are the key recommendations for achieving implementation of the principles of environmental health.

1. Getting it done

The first activity is to take a skills and knowledge inventory of the affected population. Teachers, public health officials, and business leaders often provide excellent resources to be used in the promotion of an environmental health program. Identify local leaders who will be able to introduce the program to the community or to gain acceptance of the program by the community. Explain to people that the point of such programs is primarily for the protection of the community, especially for those most vulnerable to environmentally–borne disease and infection, i.e. the elderly and the young. When it is understood that programs are for the benefit of the children, then community support should be forthcoming. Organize the community into blocks or groups to be responsible for their own areas.

2. Education programs

Before designing any emergency environmental health education program, one must first determine what is important to that particular community. Only after this step can one engage the community in a meaningful environmental health education program. It doesn't work to teach people things they don't care about. Leadership will develop and the local community will teach themselves only if they are motivated by interest or because the subject satisfies a felt need.

The outside expert can act as a trainer of trainers and a catalyst for environmental health education programs. Education is central to many aspects of managing the day–to–day functioning of an emergency settlement, and this education must be carried out simultaneously in many ways. For example, if people want to learn English, teach them English, but use environmental health topics for reading material as well.

"General hygiene, as a component of environmental sanitation ... involves specific considerations. As a mater of fact, habitat hygiene, food hygiene and personal hygiene, while being integral parts of environmental sanitation, are more a matter of health education and community sensitization than of sanitary engineering as such.

It is nevertheless worth underlining that education in general and health education in particular are to be sustained by visible and concrete activities in the field – what sanitary engineering precisely aims at. As for community participation, it will remain only an interesting concept as long as the community is not provided with the necessary resources – human, institutional and material – for members to be able to assume their responsibilities in this domain" (Rakotomalala, 1994, p. 41).

3. Vector Control

The control of disease vectors such as mosquitoes, flies, and rats and fleas is an important part of an environmental health approach to protecting community members from disease. There has been a tendency to use poisons for the control of all of these vectors. Especially in emergency situations, the rationale exists for using those programs or approaches with the fastest short–term results. The problems with these approaches are twofold. First, they are dangerous to the human population as well as to the vectors they target, and mistakes and accidents often occur in the application of the poisons. Secondly, even when short–term successes in the control of vectors are achieved, it is common that longer–term environmental control approaches are not put into place. The result over time, therefore, is to endlessly resort to short–term measures.

Plainly, in an environmental health approach to vector control, the environment must be manipulated for vector proliferation to be controlled on a lasting basis. Managing the environment in this way, however, takes more work and is not as quickly rewarding as insecticide spraying operations. Community involvement is also a prerequisite for the success of such activities and community members must be sensitized to the value of such programs.

4. Site drainage

Drainage from newly developed sites for emergency settlement is a critical aspect of environmental health which must be considered at the time the initial site development decisions are being taken. If left unattended, the lack of forethought about natural drainage patterns will result in impassable roads during rainy periods; stagnating ponds and pools which present many problems including mosquito breeding habitat, unsanitary

latrines and other facilitates; and the general advancement of disease throughout the community. Drainage must be assured around all water using or water producing facilities such as washing/laundering areas, water supply points, latrines, schools, clinics, markets, and individual family shelters. Families can and will generally provide their own small scale drainage network around their own houses for the control of limited amounts of water, however the provision of network drainage systems into which these small drains can lead must be planned out ahead of time as it can be very difficult, if not impossible, to move individual, family, and community structures once they are set in place. Especially in situations where there is a marked wet season/dry season cycle, emergency settlement populations may not be able to predict the seasonal increase in drainage problems when they begin to settle in a previously unoccupied site (these sites are often unoccupied precisely because they are difficult to use, are prone to seasonal flooding, or are inconvenient for development for some other reason).

The water drained away from heavily used facilities may be removed to surface water sources such as rivers, lakes, or the sea. In cases where, due to topography, it is not possible to drain wastewater to safe areas away from the community, it may be necessary to use soak pits or *soakaways*. These are simply drainage areas with gravel beds or other porous material which are designed to facilitate the soaking of water into the ground. The planting of water–thirsty trees such as bananas or papayas at the edges of these soakaways (in those regions in which they thrive) has also been found to be extremely beneficial.

In areas of high rainfall and relatively flat sites, the improper construction of roads often aggravates poor drainage systems. Due to the muddy conditions during rainy periods the roads are typically elevated on a compacted base to raise them out of the mud and to allow year–round vehicular access. When this is done without adequate consideration for site drainage, the roads act as dams holding water within the network of elevated roads. This causes water to stay longer and increases problems for the developed areas of the site. Overall site drainage must be considered before the improvement of access roads so that culverts or other drainage devices can be installed as the road improvements are developed. To correct problems afterwards is much more expensive and disruptive to the overall functioning of the community.

■ Water Provision

5. Setting and Meeting Water Supply Standards

The priority goal of water provision systems is to get a large supply of reasonably clean water to the emergency settlement community for drinking (potable water), cooking, washing, laundering and other uses. The determination of “reasonably clean” and “large amounts” are to be found in the *Standards* section of this paper and in the following general discussion. The supply of potable water must be considered as a component of total water supply to emergency settlements. However, where a distinction is made, the listing under the *Standards* section of this paper is proposed as a useful guideline for quality and quantity standards for various situations.

6. Treatment

Surface water should always be assumed to be contaminated. Except when settlements are located upstream from sources of contamination, treatment strategies are a major consideration. In some cases infiltration galleries, using natural sand and soil as filters, provide adequate protection from mass pathogenic concentrations. Chemical contamination may require activated charcoal, coagulation, precipitation/filtration or other chemical treatment systems. In any case, sedimentation should be the minimum treatment for surface water, followed by chlorination or other disinfection. Depending on the raw water characteristics, it might also be advisable to install coagulation/flocculation basins above the settling tanks. In this instance plans must also be made for the disposal of the sludge resulting from these basins.

“The objective of any treatment system is to bring the water to an acceptable level of clarity so that the chemical used to disinfect it can be as effective as possible. The overall aim of the process is to kill pathogens in the water and thus minimize the risk of transmitting disease through the water supply. Particulate matter can encourage the growth of bacteria and protect pathogens against the effects of disinfection. The simple chlorination of cloudy (turbid) water, for example, will require more chlorine than clear water and even then the water may still not be safe to drink. Water treatment, therefore, aims first to remove pathogens and particulate matter by mechanical and biological means (settlement, filtration, etc.) before relatively clear water can be finally treated by disinfection” (Chalinder, 1994, p. 40).

Even when the water source is good quality, chlorination is recommended, especially in cases where water is collected at communal tapstands and carried and or stored in containers. The point of such chlorination is to

achieve a level of active chlorine available in the water at the collection point so that it can disinfect the (often) contaminated containers. The provision of clean water is useless if in the final instance it is contaminated by poor hygiene practices such as dirty water containers. This illustration also points out the need to maintain public awareness and education programs relating to environmental health issues.

7. Protection of Water sources

Prevent human and animal access to surface water sources. Sources should be fenced and protected by means of drainage ditches against contamination by site run−off water. The specific nature of the protection required for the water source will depend on the configuration of the water shed as well as other factors. In addition to fencing and ditching, vegetative plantings, catch dams and terraces may also be employed. Any communal activities such as swimming, laundering, bathing, etc. should take place downstream if using river sources, or at designated areas if using other large surface water sources such as lakes.

Hand dug wells should be properly covered, provided with drainage facilities, and fenced. Where water is collected by means of a bucket and rope, users should not be authorized to dip their own buckets into the well, but rather, should use a communal bucket instead.

8. Delivery and Distribution Systems – "Hardware"

Hand pumps may be preferred in smaller settlements (<5,000 people) with modest densities. Pumping water to overhead storage tanks with at least a 6−12 hour reserve capacity is usually best done in concert with piped distribution to designated tapstands or distribution points.

When long−distance hauling of water is required due to lack of other more economical and sustainable options, lorries with bladders or water tankers can be used to transport water. In order to use maximum truck capacity, metallic tanks with baffles are typically a better option. When transporting water, additional issues such as the following must be considered:

- number, capacity and durability of tankers
- length and safety of travel routes
- adequacy or roads (and bridges) for sustained heavy usage
- road maintenance and repair
- installation and maintenance of off/on−loading facilities
- organization of water disinfection within the carrying containers while they are being filled to ensure proper retention time and mixing
- contingency plans for logistical failure or breakdowns

For emergency settlements requiring development of new water systems, centralized water supply systems should be installed comprised of a pumping station, storage facilities, chlorination system, and a gravity distribution system through a series of standposts (one for approximately each 250 users.)

A basic part of the water delivery system is the container in which water is collected from the public access point (a tapstand or other water point). As such this element of the system must also be adequately planned for and not left to chance. Appropriate containers (preferably jerry cans or other durable, easily cleaned containers with tight fitting lids) are to be provided to each household for the collection and storage of water. A combination of 10 and 20 liter jerry cans may be considered adequate for these purposes.

Storage requirements for individuals in emergency settlements may be considered to be on average 20 liters/household/day. The target for individuals should be 10 liters/person/day as the ultimate goal. Low storage in houses is important to minimize long−term storage where water can become contaminated or result in mosquito breeding.

9. Delivery and Distribution Systems – "Software"

Once total requirement standards are met, equitable distribution is almost always problematic: corruption, control of resources by those with social status, or military power, and simple mismanagement due to lack of training and public education all contribute to poor distribution. The “software” component of the system should include (among other things), a water committee whose members are designated by the larger emergency settlement community. Such committees should have the full power to recruit, post or dismiss water attendants, to set up tariff and collection systems as appropriate, to decide upon the use of available resources, etc. Through this committee, responsibility for managing the system can be gradually transferred to the community. Sufficient outside technical assistance to insure proper maintenance and support may be required if it is beyond the means of the emergency settlement community.

10. Monitoring Water Distribution and Quality

The minimum quality monitoring parameter for a water supply system for an emergency settlement should address pathogenic or indicator bacteria. In urbanized areas, a strong investigation for heavy metal and organic chemical should be conducted. The particular technical methods for analysis of water quality are not addressed in this paper, as they should be determined with appropriate field expertise given the context and resources at hand. However, ground water quality should be monitored regularly at least weekly, and primarily for bacteriological tests for E. Coli.

> “Biological and physical indicators can easily be monitored using simple analysis methods and kits. Portable kits specifically designed for this purpose are available. Reliable and relatively inexpensive water test kits such as the Delaqua, which was developed jointly by the Roebens Institute at the University of Surrey, UK, and OXFAM specifically for use in emergencies will cost from $1,500, and are widely used.
>
> “A more contentious aspect is that of *who has responsibility* for water quality monitoring. Regular monitoring is very important. Frequently it is the agency providing the water which, for its own reasons, takes on the responsibility for reporting on its quality; this can be acceptable to other agencies when there are no problems, but if outbreaks of water–related diseases occur it will cause considerable friction. It is preferable that a third party should have responsibility for monitoring, recording and reporting on biological quality concerns. Local water departments may have this capacity; failing that, another agency with no direct interest in health service provision for the emergency should be used” (Chalinder, 1994, pp. 34–35, emphasis added).

Aside from monitoring for quality, it is often necessary to monitor the quantity of water actually being used in the household. It may be difficult to accurately measure this for the amount taken from the water source as waste through spillage and leakage may be considerable. One way to assess the *amount* of water actually used by an emergency settlement community regardless of the system type (centralized distribution through standposts, motorized– or hand–pumps, or other systems) is to check the storage capacity at the household level and then to establish how many times each day these containers are filled.

11. System Management

Policies affecting the overall maintenance and use of the water distribution system which have been set by the system users have proven effective. Community–run systems have helped to eliminate abusive control of water systems by gangs in some camps for Vietnamese Boat People.

Operation and Maintenance (O&M) of these systems should be organized through the community structure as soon as possible, through O&M teams or committees.

Contingency arrangements should always be made for unavoidable breakdowns and repair periods. Stand–by pumping equipment should always be provided as an integral part of any system. In cases where wells are equipped with hand pumps, spare parts should be stockpiled together with the necessary tools for their replacement. Additionally, identification, recruitment and training of the water attendants, mechanics, and others on the O&M committee are an integral part of any emergency settlement water provision strategy.

12. Urban Systems

Especially during and after conflict situations with active shelling and as well as with earthquakes, urban infrastructure systems for the delivery of water and the disposal away of sewage may be damaged beyond use. In such situations entire populations of such towns or cities may be considered as emergency

settlements. In these cases the urban dependents on piped systems are likely to be even more vulnerable than their rural counterparts to water borne diseases and other effects of the lack of clean water. The most vulnerable people are the elderly and infants, and children who may already be weakened due to other effects of the conflict or emergency situation.

Water systems have long been military targets due to the very debilitating and demoralizing effect that the destruction of such systems have on communities. “During the Gulf War (1990–1991), air strikes rendered Iraqi hydroelectric plants and water pumping stations totally inoperative. In Afghanistan, the traditional irrigation infrastructure was demolished at the outset of the conflict. Fourteen locations in Bosnia–Herzegovina had had their water supply cut off in July 1994. Three of the cases were caused by deliberate destruction of water facilities. ‘Today’s armed conflicts are essentially wars on public health,’ comments Dr. Remi Russbach, the ICRC’s Chief Medical Officer” (Poklewski–Koziell and Dorais–Slakmon, 1994, p. 10).

In these situations, the two aspects of water provision programs figure prominently. Water quantity is diminished or lost entirely due to breakdown of piping and pumps, or the loss or damage of water towers or other elevated sources. Secondly, even piped water sources may become contaminated due to damage to the system lines. In many urban areas water supply and sewer lines may lie side by side underground. When the lines are damaged, it is very possible that water supply sources can become contaminated from sewer pipes. This is especially so when water pressure in the mains fluctuates due to power failures. In addition to the direct threats of lack of water or water of poor quality, secondary urban systems may also be affected by lack of water pressure, including district heating in some urban centers, and even systems for factory and plant operations.

Urban water systems are complex. In all such cases the specialists best suited to correct the problems, and to repair and rehabilitate theses systems are those national or municipal engineers who have built and maintained the systems and who have access to and a working knowledge of the system diagrams, drawings, specifications, as well as its performance history. It is generally the case that in such instances what is needed most is money, equipment, and materials, rather than expertise.

In some cases, especially for hospitals and other critical urban facilities, hauling water from outlying areas has been required to maintain the functioning of key facilities. The Red Cross/Red Crescent, among others, have at times shipped, bagged and/or bottled water for such situations when need is extremely critical. In such cases the military, civil defense, or other large and well–funded organizations may be required to mobilize this type of cost and labor–intensive response.

Immediate response may typically include the installation of unitized local treatment units to clean polluted water supplies, or equipment to augment or replace damaged pumps. Additionally, the distribution of quickly dissolving water purification tablets (chlorine) for home use with container storage can be used. In situations of active conflict where repairs to centralized facilities may in fact attract further attacks and damage, it may be necessary to construct decentralized service points, such as wells with smaller pumps, and/or rerouting of water service to local distribution points.

■ Excreta Management

13. Locating Appropriate Expertise

UNHCR is often the lead agency in determining which sewage management systems are best or most applicable to the situations involving refugee camps or other emergency settlements of refugees. This determination is made with or without the advice of local NGOs. UNICEF also has developed expertise in this field, although their aim is more developmental and less emergency–oriented. The minimum qualifications for consultants in this area, whether agency specialists or private consultants, should be that the individuals are experienced environmental health specialists, sanitary or environmental engineers.

The specialist hired for this task should be pressed into service from the outset of the emergency if possible to allow him or her to participate in the preliminary work/survey, such as identifying suitable sites for emergency settlement. From this basis the expert can better contribute to the development of these sites and help in the organization and management of programmes for the monitoring and surveillance of the quality of the settlement’s environment.

14. Sustainable Steps in Implementing an Environmental Health Plan for emergency settlements.

The settling of people in an emergency situation will often take place while the site is being developed. Therefore, a sector–by–sector or block–by–block approach is recommended for such situations. This applies both at the household level as well as the community level for schools, markets, clinics, etc. The installation of different facilities for managing excreta disposal, domestic garbage collection, and wastewater drainage should start where physical conditions such as soil, and topography present fewest difficulties for the installation of the system “hardware”. Also useful in determining where to start are the attitudes of the people in various sectors, their willingness to participate, and their awareness of the issues surrounding environmental health.

Designing a management scheme for the disposal of human excrement in large scale emergencies is critical. Improvements to the scheme should be approached incrementally, working towards small, lasting improvements that are sustainable at each step, rather than the wholesale introduction of new systems.

For a rapidly growing emergency settlement population there must be both a long– and short–term plan. The short–term plan must address the inevitable lack of time and resources but still adequately manage wastes without spreading contamination. The timeframe for the environmental sanitation response is usually climate dependent. It takes only about 1 week for flies to emerge from wastes in warmer climates. Therefore a good system must be put into place quickly. For a rapidly–settled emergency–displaced community, one such incremental sanitation plan might include (in chronological order) the following:

a) A site survey of its sanitary disposal needs must be conducted immediately.

All of the following steps (2–4) must be carried out in concert with a public awareness/education campaign on the proper use of the current system or strategy including the formation of environmental health committees to assist in the design, implementation, operation and maintenance of the systems.

b) Demarcate fields for controlled defecation areas and install temporary trench latrines (as deep as the soil, subsoil and water table will allow).

c) Next, (or simultaneously with # 2 if resources allow) construct a sufficient number of pit latrines for families (private family–held units) and for public facilities such as schools, markets, and clinics. Both types of latrines should be installed in such a way that they can be provided with ventilation (i.e. VIP latrines) at a later stage without having (for example) to construct new squatting slabs. In this respect and given the various nature of site specific constraints, the siting of these different facilities must be well thought through before the implementation of the latrine program.

d) Improve latrine facilities by transforming them into VIP, VIDPs (ventilated improved double pit), or pour–flush toilets if water is available, and the excess water is not deemed to be a problem for the proper functioning of the latrines. Small bore piped sewer networks are also appropriate where topography is favorable.

15. Planning for Emergency Settlement in Urban Situations

In urban situations served by piped sewer systems it can be assumed that approximately 1 liter of waste per person per day will be produced and will need to be removed or treated in the emergency settlement every day. This figure is exclusive of the water used to carry it. In the immediate response to an emergency situation, on–site sewage storage may suffice. However, off–site facilities will be required, either through trucking such wastes from holding tanks or carried away by water in piped systems. The repair and restoration of pre–emergency services is the preferable solution, even if inadequate in the very short term.

In many cases in urban settings people will be housed in public buildings and community facilities such as schools, churches, universities, gymnasia, stadia, community centers and so on. In such cases, previously functioning sewage systems may become quickly overtaxed and fail. Such facilities may already be using latrines or small localized systems not connected to the municipal sewerage system. In this case the waste holding facilities (especially the latrine pits) quickly become full, and overflow. This must be avoided at all costs. There are three options available:

a) abandon the over–stressed latrine facilities for newly installed units

b) initiate a system of routine pumping or desludging to keep (primarily) water volume down to a manageable level

c) convert pit systems to sewered systems by extending municipal systems to these facilities where topography and other concerns allow.

The “best practice” to recommend from these options can only be determined by site investigation into the costs, reliability, and viability of the various options proposed. As a generalized best practice, however, it can be said that planning immediately for the implementation of one or more of these solutions must be taken at the time the use of such facilities is identified as a response to emergency settlement.

16. Community Toilets Don’t Work

In any type of system, rural or urban, wet or dry flushing, latrines or toilets should be assigned on a family basis wherever possible. These units must be easily cleaned, located, and identified as belonging to a particular family group. Only in cases of very short term, or transit situations can public toilet facilities be made to function well. This strategy should only be employed where there is no option for individual family assignment, or as part of community facilities such as schools and clinics. In any case, full–time maintenance is required.

17. Involvement of the Community in System design and Management

All segments of the community – religious and political leaders, women, and other active or influential groups – should be involved in the design and operation of the emergency settlement’s environmental health systems.

The community should be solely responsible for the operation and maintenance of its own environmental health systems. This will take training and time – up to a year. However, it should not take longer in order to avoid development of dependence on outside assistance providers.

As with environmental health services, health education must be integrated with other aspects: maternal and child care, immunization, family planning, nutrition and common sense use of curative care. It must start immediately, is often required to effect use of new types of water or sewerage disposal systems, and is critical in getting good solid waste disposal and vector control. Women should train women. Religious or community leaders must also be convinced of the need. Political will get almost anything done in cases of emergency settlement. NGOs such as IRC, ARC, CARE, SCF, and MSF have extensive backgrounds and experience in emergency health education.

18. Technology and Latrine Types

Although there are improved types of latrines now widely used (VIP and improved VIP for example), the final decision on which type to use and where they should be located should rest with an experienced professional who is knowledgeable in the community norms, local conditions, and environmental health, regardless of the expressed preferences of the community.

Standards

The following set or proposed standards incorporates the two **headings Absolute Minimum Acceptable** and **Preferred Minimum.** There are two reasons for this determination of multiple minimums. The first is the time element of applying the standards – the lower or Absolute Minimum Acceptable applies to those situations of short duration (a few days or two–three weeks), the Preferred Minimum applies to all other situations. The second reason is that while it is important to recognize the Absolute Minimum Acceptable standards listed, lessons learned from past situations have taught us that the Preferred Minimums proposed are in fact good practice, and should be held by implementers as the minimum acceptable standard of performance.

Water Supply	**Absolute Minimum Acceptable**	**Preferred Minimum**
Water Quantity, minimum liters per person per day (l/p/d) – general population		

	Cold dry climate	8.4	18.7
	Cold wet climate	7.9	18.4
	Hot dry climate	11.8	25.3
	Hot wet climate	9.7	23.4
Water Quantity, minimum liters per person per day (l/p/d) – hospitals			
	Cold dry climate	14.2	27.2
	Cold wet climate	13.6	26.6
	Hot dry climate	18.1	37.8
	Hot wet climate	15.8	30.9
Water Quantity, minimum liters per person per day (l/p/d) – feeding centers			
	Cold dry climate	7.3	15.9
	Cold wet climate	7.0	15.7
	Hot dry climate	11.3	22.0
	Hot wet climate	9.6	18.4
Water bacteriological quality		**Absolute Minimum Acceptable**	**Preferred Minimum**
Fecal coliforms, maximum per 100 ml water		31.0	0.0
Total coliforms, maximum per 100 ml water		53.0	1.8
Fecal streptococcus, maximum per 100 ml water		5.5	0.0
Heterotrophic plate count, maximum		1.0	0.0
Enterococcus, maximum per 100 ml water		20.0	0.0
Water chemical and physical quality		**Absolute Minimum Acceptable**	**Preferred Minimum**
Total dissolved solids, maximum mg per liter		2300.0	540.0
Salinity, as chloride, maximum mg per liter		475.0	41.02
Nitrates, as Nitrogen, maximum mg per liter		40.0	50.0
Fluoride, maximum mg per liter		2.4	2.4
Organics, including pesticides, max mg per liter		1000.0	1000.0
Odor, maximum		palatable	none
Taste, maximum		palatable	none
Turbidity, maximum NTU units		1.00	5.0
Color, maximum		–	none
Excreta Disposal		**Absolute Minimum Acceptable**	**Preferred**

		Minimum
Depth of effective soil, minimum meters	1.0	2.3
Soil infiltration rate, minimum liters per square meter per day	21.0	67.0
Soil Type	clay or sand	loam
Depth to groundwater, minimum meters	4.1	13.1
Distance to wells, minimum meters	41.0	93.0
Distance to surface water, minimum meters	47.0	152.0
Distance to dwellings, minimum meters	25.0	50.3
Solid Waste Disposal – Landfills	**Absolute Minimum Acceptable**	**Preferred Minimum**
Soil infiltration rate, minimum liters per square meter per day	30.0	61.0
Soil Type	sand	clay or loam
Depth to groundwater, minimum meters	8.6	9.8
Frequency of covering, minimum days	4.4	1.0
Depth of soil cover, minimum days	0.4	0.9
Distance to wells, minimum meters	28.3	74.0
Distance to surface water, minimum meters	36.0	144.0
Distance to dwellings, minimum meters	217.0	366.0
Drainage	**Absolute Minimum Acceptable**	**Preferred Minimum**
Slope of entire camp, minimum percent	1.6	3.7
Maximum soil infiltration rate, liters/sq. m./day	77.0	100.2
Minimum soil infiltration rate, liters/sq. m./day	12.5	29.5
Elevation above 10 year flood plain, min. meters	2.5	5.7
Elevation above 100 year flood plain, min. meters	3.5	6.6
Vectors and Pests	**Absolute Minimum Acceptable**	**Preferred Minimum**
Distance to mosquito–breeding areas, min. meters	179.0	632.0
Distance to fly–breeding areas, min. meters	187.0	719.0
Distance to endemic pests, minimum meters	310.0	770.0

	Absolute Minimum Acceptable	Preferred Minimum
Distance to noise sources, minimum meters	190.0	350.0
Distance to natural polluters, min. kilometers	9.6	18.0
Distance to transportation routes, min. kilometers	2.4	3.8
Distance to industrial zones, min. kilometers	1.8	3.9

* Information in this table is adapted from “Developing Environmental Health Criteria for Locating and Assessing Disaster Relief and Refugee Camps, Using a Multi Attribute Utility Rating Technique” – G. Shook, Dissertation Dec. 1990. Published Elsewhere

Environmental sanitation guideline standards

A latrine should be provided for every 20 people or ideally 1 per family sited not farther than 50 m from the users’ accommodations and not nearer than 6 m.

Provide at least 1 100 liter refuse bin for each 50 people.

Provide at least 1 wheelbarrow per 500 people.

Provide one tip–truck (1–2 ton capacity) per 5,000 people.

Provide 1 communal refuse pit (2 m × 5 m × 2 m) per 500 people.

Provide water taps at a rate of 1 per 200 people sited not farther than 100 m from user accommodations.

Especially where sedimentation tanks are needed, site storage capacity should equal at least one day’s supply of water

Resources

(CEFIGRE) International Training
Centre for Water Resources
Management
P.O. Box 13
06561 Valbonne Cedex
(water supply and sanitation)

(CEHA) Centre for Environmental Health Activities
World Health Organization
P.O. Box 926967
Amman Jordan
(All aspects of environmental health, with emphasis on water supply and sanitation – CEHANET information system)

(CEPIS) Pan American Centre for Sanitary Engineering and Environmental Sciences
Casilla 4337
Lima 100, Peru
(all aspects of environmental health – REPIDISCA information system)

(ECO) Pan American Centre for Human Ecology and Health
Apartado Postal 105.34
Mexico 5, Mexico

(Human ecology, health aspects of environmental pollution)

(EHP) Environmental Health Project
1611 N. Kent Street, Suite 300
Arlington, Virginia, 22209–2111
USA
(water supply, sanitation, environmental hygiene)

(ENSIC) Environmental Sanitation Information Centre
Asian Institute of Technology
P.O. Box 2654
Bangkok, Thailand
(Emphasis on water supply and sanitation, environmental engineering – SENSIC database)

(ITDG) Intermediate Technology Development Group
9 King Street
London WC 2E 8HN
England
(low cost appropriate technology, emphasis on water supply and sanitation)

(IRC) International Reference Centre for Community Water Supply and Sanitation
P.O. Box 93190
2509 AD, The Hague
The Netherlands
(tel. 31–70–814–911)
(water supply and sanitation)

(REDR) Register of Engineers for Disaster Relief
The Director – Institute of Civil
Engineers
1 Great George Street
London, SW1
tel. 44–171–233–3116
(specialists in engineering support for water and sanitation systems for emergency response)

Ross Institute of Tropical Medicine
London School of Hygiene and Tropical Medicine
Keppel Street
London WC 1E 7HT
England
(environmental health, water supply, sanitation, vector control)

(UNEP) United Nations Environment Programme,
P.O. Box 30552
Nairobi, Kenya
(environmental pollution, overall aspects of environmental protection)

(UNESCO) United Nations Educational, Scientific and Cultural Organization
7, Place de Fontenoy
75007 Paris, France
(Environmental Education)

(UNHCR) United Nations high Commission for Refugees
Centre for Documentation of Refugees
Case Postale 2500, CH–1211 Geneva 2
Depot
Switzerland
(PTSS provides expertise in water and sanitation and other aspects of environmental health for refugee camps and other situations requiring external assistance)

(WEDC) Water, Engineering and Development Centre
Loughborough University of Technology

Leicestershire LE11 3TU UK
tel. 44−1509−222−390
(training in water supply and sanitation issues)

(WHO) World Health Organization Division of Environmental Health
1211 Geneva 27, Switzerland
(all aspects of environmental health)

The World Bank
Infrastructure Department
1818 H Street
Washington, D.C. 20443
USA
(water supply and sanitation, waste disposal)

References

Auerbach, P.S. and E.C. Geehr. 1989. *Management of Wilderness and Environmental Emergencies.* Mosby.

Benenson, A.S., editor. 1990. *Control of Communicable Diseases in Man.* APHA.

Canadian Department of National Health and Welfare. 1979. *Emergency Health in Disasters.*

Chalinder, A. 1994. *Good Practice Review #1 − Water and Sanitation in Emergencies.* Relief and Rehabilitation Network.

Feacham, et al. 1980. *Health Aspects of Excreta And Sullage Management: A State of the Art Review.* World Bank.

Franceys, R., F. Pickford and R. Reed. 1992. A *Guide to the Development of On−Site Sanitation.* World Health Organization.

Ockwell, R. 1986. *Assisting in Emergencies: A Resource Handbook.* UNICEF.

Poklewski−Koziell and Dorais−Slakmon. 1994. “No Life Without Water”, *Red Cross, Red Crescent* 3:8−10.

PTSS. 1992. *Water Manual for Refugee Situations.* United Nations High Commissioner for Refugees.

Rakotomalala, C. 1994. “Environmental Health Management in Refugee Camps” in *Proceedings of the Regional Workshop on Environmental Health Management in Refugee Areas, Pakistan.* WHO Technical Publication, pp. 38−47.

Shook, G.A. and A.J. Englande. 1992. “Environmental Health Criteria for Disaster Relief and Refugee Camps.” *International Journal of Environmental Health Research* 2(2):212−220.

Turner, J. Ellis. 1991. *Environmental Health: Water, Sanitation, Wastewater Management, and Drainage.* Water and Sanitation for Health Project − USAID.

USAID/OFDA. 1994. *Field Operations Guide for Disaster Assessment and Response.*

Topic 15 − Food, Nutrition and Medical Care

This paper was prepared by James Good of InterWorks. In addition to the resources listed in the paper, the following people provided significant contributions:

> *Dr. Brent Burkholder − is with the Refugee and Disaster Section of the Centers for Disease Control in Atlanta, Georgia.*
>
> *Dr. Peggy Henderson − is a Doctor of Public Health working as a health project officer for UNICEF in Harare Zimbabwe.*