Chapter 2

Emergencies in cold regions

2.1 Climatic data

Winter freeze-ups affect water supply and sanitation options, logistics, construction techniques and the health of the population. Even people's attitudes to work are adversely affected by the cold. To increase the effectiveness of aid provision, therefore, it is essential to obtain reliable climatic data. Basic climate information should include answers to the following questions:

About the winter

- When does the winter period start and finish?
- Are temperatures below freezing at night only or also during the day?
- What are the average daytime and night-time temperatures in winter?
- What is the minimum temperature likely to be?
- How much snow can be expected and at what time of year?

About the summer

- When does the summer period start and finish?
- Is there a period when there will not be a frost, even at night?
- What are the average day-time and night-time summer temperatures?

Also

- How much precipitation falls as rain? When?
- How many hours of daylight and darkness are there in the summer and how many in the winter?

Apart from talking to local people, climatic information is available from local meteorological stations (at airports or military establishments), media companies (TV, radio or newspaper), or on the Internet.

Monthly temperature and precipitation data for many cities around the world are given in *The World Weather Guide*.[1]

[1] Pearce and Smith (1998)

2.2 Emergency environments

It is worth considering how the winterised emergency differs from those that happen in warmer areas. Not only are the required technologies and approaches different, but also people living in one environment find it difficult to move to another. This was true of the Kurds who fled into the mountains of Northern Iraq in 1991, and who then suffered greatly, partly because they were used to living lower down on the plains.

Cold regions

If the definition of a cold region is taken to be an area where the average (mean) temperature is below 1°C for more than one month of each year, then over 1 billion people live in such an area.[2] For the purposes of this book 'cold regions' include anywhere where the temperature is likely to fall below 0°C for long enough to have an adverse effect on water supply or sanitation.

Urban and rural locations

Appropriate emergency watsan interventions vary, of course, depending on whether the affected population is in a rural or urban location, for example, or whether they are living in a temporary camp or mainly in houses as most Kosovar refugees did in Albania in 1999. The main differences between the urban and rural cases will be differences in the levels of technology used, although other factors include the more variable standard of education and the effects of seasonal work on community participation in rural areas.

In an urban setting repairing existing water supply and sewerage networks is the main priority in order to minimise further deterioration. These systems require the knowledge of experienced engineers. By repairing such systems large numbers of people quickly receive the benefits of clean water and sanitary conditions, reducing the associated health risks. As a guide only, some measures appropriate for the renovation of an urban sewerage system are included in Chapter 4. Methods of plumbing in collective centres and hospitals are discussed in Chapter 3.

In urban areas, aid agencies often find themselves repairing local facilities: fixing doors, windows, floors, and so on. Local people are often unable to obtain construction materials for financial, logistical or political reasons.[3]

In rural locations, or camps, the emphasis of watsan provision is on the development of new sources of water, and setting up new sanitation systems. However, in many countries even small villages are likely to have systems that could, and should, be renovated if at all possible.

Levels of development in different regions of the same country, or in different countries are often highly variable. This is even more confusing in countries in colder regions, many of which were highly developed prior to any disaster. For example, cities in the former Soviet Union countries or eastern Europe have almost certainly had working water supply, sewer-

[2] Smith (1996)
[3] Buttle (1998)

age, gas and electricity systems in the past, but in some of these areas regional disaster has greatly reduced the local level of development. Many rural and urban areas within the former Soviet Union countries, central Asia or eastern Europe could now be considered as under-developed, regardless of their previous level of development.

Mountain locations and climate

In addition to areas where the predominant climate is cool temperate or cold, cold regions must also include mountainous areas. Altitude causes a reduction in the ambient temperature. A fall in temperature of between 1.5°C (in moist air) and 3°C (in very dry air) should be expected for every 300m of altitude gained.[4] In addition, mountainous areas are often very exposed, so people forced to move through or live in those areas also suffer because of the rapid loss of body heat due to the cooling effect of winds. The wind-chill effect causes the apparent temperature to be less than the true temperature.

The ability of a displaced population to survive in the mountains is greatly hindered if they are not used to living in such conditions. This happened in Northern Iraq after the Gulf War in 1991, when some Kurdish refugees originated from mountainous areas, but many others had fled to the mountains from much warmer areas, and suffered greatly as a result.

In the mountains the positioning of water supply distribution points, latrines and any other facilities must take into account not only their location, but the location of areas where people will have to queue. This is partly to minimise the time people take to walk to the facilities in the cold, but also to take care that people are not forced to cross steep or loose areas of mountainside to get there. Areas for distribution should also be organised carefully to minimise the risks from exposure and physical harm.

2.3 Winterisation studies

At the start of any emergency, a rapid assessment of the situation is made, leading to a plan of action. Planning for the next season is an important activity throughout the year. In cold regions this planning aspect needs to be repeated annually in preparation for each oncoming winter.

Winterisation studies should be done in the summer, to allow sufficient time to implement measures necessary to prepare for winter. The aims of such studies are, firstly, to predict the factors that will (or could) affect the provision of aid during the winter period and, secondly, to determine what can be done by way of preparation to overcome the difficulties.

Likely issues include:

Shelter

- Are the current shelter options going to beadequate in winter, or not?
- What general shelter improvements can be made – provision, upgrading and repairs?
- How well is the area drained? What will happen to the groundwater level?
- How will heating be provided?

[4] Walker (1988)

Water supply and sanitation (watsan)

- Which systems are at risk of freezing, what damage will result if they do freeze, and what can be done to protect those systems? To what depth will the ground freeze?
- Are there social reasons for changing water supply or sanitation practices in the winter (e.g. toilets are too cold or too far away from accomodation and people will not use them; washing water needs heating)?
- Is it possible to construct new facilities in winter? By what date should projects be completed?
- How will the cold affect the maintenance of watsan facilities (e.g. more work may be necessary to drain distribution pipes; cold weather may make workers less inclined to work)?
- Is it possible to collect solid waste from all areas in winter?

Logistics

- What areas are likely to be completely cut off by the weather, and what areas are likely to be difficult to reach?
- Which items should be stockpiled, (e.g. food, fuel, blankets, warm clothing, shelter materials, or bags to contain wastes)? Is extra warehousing necessary, and is it possible to provide it?
- How will winter weather (e.g. snow or icy roads) affect access to disaster-affected areas, and what effect will any lack of access have on current systems, such as hauled water?

Physical threats

- What risks of flooding exist, including from snowmelt in the spring?
- Is there a risk from landslides or avalanches?

Human issues

- How will adverse weather affect local people's attitudes? For example people may show less motivation to work in cold weather, or may become so preoccupied with money, food, shelter and warmth that water supply and sanitation become a very low priority.
- What winter-related health problems are likely (e.g. respiratory diseases)?
- What can be done to minimise these health problems?
- What can be done to help the most vulnerable members of the community, such as older people and young children?

2.4 Appropriate technology for cold regions

Water supply technology

Equipment from donor agencies, although well tried and tested in Africa, is not always suitable for use in colder countries. Oxfam storage tanks , for example, have had problems with both water freezing over (tank liners could easily be damaged by ice forming on the water's surface) and roofs collapsing under a snow load. Problems have been overcome, in some instances, by erecting the tanks indoors. The other main difficulties arise when distribution networks freeze: ice forming in pipes and valves is liable to damage them.

The technology used for an emergency water supply in the tropics is not always suitable for the winter in central Asia, in which case it is necessary to use technology and techniques that are specifically designed for use in cold regions. Examples of the use of effective technology include insulating water tanks, burying pipes, and designing water treatment processes that take into account slower rates of reactions and the higher viscosity of water at lower temperatures. Water supply matters are discussed in more detail in Chapter 3.

Environmental sanitation technology

As in warmer climates, sanitation options always need to be considered in the context of cultural and religious acceptability, however cooler temperatures do affect the range of technologies that it is possible to use. The actions of pit latrines and septic tanks are impeded by cold temperatures. However technology that is used in everyday life in, for example, Alaska can be successfully adapted for use in humanitarian aid programmes following disasters in cold regions.

The rates of biological reactions, which are critical to the decomposition processes that are used to treat excreta and wastewater, are greatly reduced at low temperatures. In some areas excreta has to be stored throughout the winter, until ambient temperatures are sufficient for treatment processes. In other cases, emptying on-site excreta disposal facilities more frequently and more reliably than in warm climates can solve the problem. Excreta disposal technology and other sanitation issues are discussed more thoroughly in Chapter 4.